Puget Sound Energy
Proposed Tacoma Liquefied Natural Gas Project
Final Environmental Impact Statement

Prepared for:

Tacoma

September 30, 2015

Prepared by:

ecology and environment, inc.
Global Environmental Specialists

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Prepared for:

City of Tacoma
Planning and Development Services Department
747 Market St., Room 345
Tacoma, WA 98402

Prepared by:

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Portland, OR 14086

SEPA Fact Sheet

Name of Proposal	Tacoma LNG
Proponent	Puget Sound Energy 10885 NE 4TH Street PSE-095 Bellevue, WA 98009-9734
Location	The proposed Tacoma Liquefied Natural Gas (LNG) Facility would be located in the Port of Tacoma with access to Puget Sound. The project site is generally located north of East 11th Street, east of Alexander Avenue, south of Commencement Bay, and on the west shoreline of the Hylebos Waterway. The Tacoma LNG facility site is in an area zoned as Port Maritime Industrial. It is primarily developed for industrial maritime use and has been in industrial use for at least 75 years. The site is composed of four separate parcels owned by the Port of Tacoma: Pierce County tax parcels 2275200502, 2275200532, 5000350021, and 5000350040. The boundaries for these parcels include both in-water and upland areas, reflecting a total area of approximately 33 acres. The upland portion of the site is approximately 30 acres, and the aquatic area is approximately 3 acres.
Proposed Action	The Proposed Action is to construct and operate an LNG liquefaction, storage, and marine bunkering facility, referred to herein as the Project. The Proposed Action would include construction and operation of a small-scale LNG facility to fuel marine vessels and provide LNG fuel to various customers in the Puget Sound area via LNG bunkering barges and tanker trucks. The liquefaction facility would cool natural gas into a liquid state at -280° Fahrenheit (cryogenic) for on-site storage. The facility would also have the capability to vaporize LNG back to its gaseous state from a storage tank for injection into the Puget Sound Energy (PSE) Natural Gas Distribution System during periods of high demand (referred to as peak shaving). The Project would consist of the following main components: • *Tacoma LNG Facility*: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the adjacent TOTE Marine Vessel LNG Fueling System, bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to re-gasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System. • *TOTE Marine Vessel LNG Fueling System*: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities, and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. • *PSE Natural Gas Distribution System*: Conveys natural gas to and from the Tacoma LNG Facility. However, this system will require upgrades, including two new distribution pipeline segments with a total length of 5.0 miles, a new limit station (Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. The Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the City of Tacoma. Two new distribution pipeline

segments would be constructed in the City of Tacoma, and the City of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). The new pipeline segments would be constructed within the dedicated road rights-of-way currently used for vehicular traffic. In addition, the Golden Given Limit Station would be constructed on a developed parcel owned by PSE in unincorporated Pierce County, and modifications to the Frederickson Gate Station would be also located in unincorporated Pierce County.

EIS Alternatives

The *No Action Alternative* and the *Proposed Action Alternative* are evaluated in this Final Environmental Impact Statement (FEIS). Key elements of each alternative include the following:

No Action Alternative: Construction of the Project, including upgrading of the PSE natural gas distribution system, would not occur.

Proposed Action Alternative: The Tacoma LNG Facility would be constructed and produce between approximately 250,000 and 500,000 gallons of LNG per day, for use by marine customers, including TOTE, as well as regasification into the PSE natural gas distribution system for peak-shaving purposes. Additional uses would include providing LNG to other industries or merchants, such as fuel for high-horsepower trucks used in long-haul trucking or other marine transportation uses. The Tacoma LNG Facility would operate and be staffed with approximately 16 to 18 full-time employees 24 hours per day, 365 days a year.

The *Proposed Action* also includes the construction of segments of the PSE natural gas system in the City of Tacoma, the City of Fife, and unincorporated Pierce County. This includes the installation of new pipe, a new limit station, and modifications to the Fredrickson Gate Station.

SEPA Lead Agency

City of Tacoma, Planning and Development Services Department.

SEPA Responsible Official[1]

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[1] The Responsible Official is the designated person within the City of Tacoma's Planning and Development Services Department that is responsible for compliance with the SEPA lead agency procedural responsibilities.

ER/ITS Study

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City of Tacoma Final Actions

- Approval of the FEIS for the Tacoma LNG Project as a document that is adequate for SEPA compliance and permit and approval decision making, including proposed mitigation;
- Determination of whether the Action Alternative or the No Action Alternative is the preferred alternative;
- Adoption of the Emergency Response/Intelligent Transportation System Study (ER/ITS)

Phased Environmental Review

No additional SEPA review will be required for site specific development that is proposed within the scope of the Proposed Action described in this FEIS.

Required Approvals and/or Permits

This FEIS evaluates the construction and operation of an LNG liquefaction and marine bunkering facility within the City of Tacoma on land leased from the Port of Tacoma, and construction of segments of a natural gas pipeline in the City of Fife and unincorporated areas of Pierce County. While Final Actions by the City are noted above, the following approvals, licenses, and permits may also be required.

AGENCIES	APPROVAL, LICENSE, or PERMIT
FEDERAL	
U.S. Department of Transportation/Pipeline and Hazardous Materials Safety Administration	Delegated to Washington Utilities and Transportation Commission for approval of design elements consistent with Federal standards
U.S. Department of the Army Corps of Engineers, Seattle District (USACE)	Section 10 Permit (Rivers and Harbors Act)
	Section 404 Permit (Clean Water Act - CWA)
	Section 106 Consultation (National Historic Preservation Act) with applicable tribes (Puyallup Tribe of Indians and the Muckleshoot Tribe).
U.S. Coast Guard (USCG)	Waterway Suitability Analysis Addresses requirements of 33 CFR Part 127: Coast Guard assessment of LNG Marine Operations
	Permission to establish Aids to Navigation required under 33 CFR Part 66
	Letter of Intent (33 CFR Part 127) recommendation to operator and develops operation plans (OPLAN) at sea ports.

AGENCIES	APPROVAL, LICENSE, or PERMIT
National Marine Fisheries Service (NMFS)	Section 7 of Endangered Species Act
	Essential Fish Habitat (EFH), Magnuson-Stevens Fishery Management and Conservation Act
	Marine Mammal Protection Act Level B harassment authorization
STATE	
Department of Ecology (WDOE)	National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit (separate permits for LNG facility and pipeline system).
	NPDES Industrial Stormwater General Permit
	Coastal Zone Consistency Determination
	401 Water Quality Certification (CWA)
	Spill Prevention and Spill Response Plan (CWA)
	Hazardous Chemical Inventory Reporting Requirements
Department of Fish and Wildlife (WDFW)	Hydraulic Project Approval
Department of Transportation (WSDOT)	State Highway Crossing Permit
Department of Archaeology and Historic Preservation (DAHP)	Section 106 Consultation (NHPA) in coordination with lead federal agency (USACE)
LOCAL JURISDICTIONS	
City of Tacoma	SEPA Lead Agency
	Shoreline Substantial Development Permit
	Wetland/Stream/Fish and Wildlife Habitat Area Permit
	Floodplain Development Permit
	Clear and Grade Permit/Demolition Permit
	Building Permit
	Street Use or Right-of-Way Use Permit
	Demolition Permit
Pierce County	Street use or Right-of-Way Use Permit Conditional Use Permit
	Construction (Clear & Grade) Permit
	Building Permit
	Critical Areas Review
City of Fife	Right of Way permit Utility permit
	Flood permit
	Critical Areas Review
Port of Tacoma	Tenant Improvement Procedure

AGENCIES	APPROVAL, LICENSE, or PERMIT
TRIBAL	
Puyallup Tribe of Indians	Section 106 Consultation in coordination with USACE
Muckleshoot Tribe	Section 106 Consultation in coordination with USACE
REGIONAL AGENCIES	
Puget Sound Clean Air Agency	Notice of Construction Application
	Air Operating Permit

Authors and Principal Contributors

This Tacoma LNG Project Environmental Impact Statement (EIS) has been prepared under the direction of the Tacoma. Planning and Development Services Department. Research and analysis associated with this EIS were provided by the following consulting firms:

- **Ecology and Environment, Inc.** – EIS research, analysis, and document preparation
- **Braemar Engineering, Inc.** – Review of the LNG facility design, engineering and risk analysis

For a complete list of individual contributors, see Appendix A.

Location of Background Data

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Draft EIS Comment Period

July 7, 2015 to August 17, 2015 (extended by request of the Puyallup Tribe).

Draft EIS Comment Meetings

- Agency meeting held July 9, 2015
- Public meeting held July 16, 2015

The purpose of the meetings is to provide an opportunity for agencies, organizations and individuals to learn more about the proposed Tacoma LNG project and to present comments regarding the Draft Environmental Impact Statement (DEIS) – in addition to submittal of written comments.

Date of Issuance of this FEIS

- September 30, 2015

Availability of this FEIS

Copies of the FEIS and Emergency Response/Intelligent Transportation System (ER/ITS) study will be made available on CD to agencies, organizations, and individuals noted on the Distribution List (Appendix B to this document). Hard copies of the FEIS, the ER/ITS study, and environmental impact statements incorporated by reference can be reviewed at the following locations:

- City of Tacoma Planning and Development Services Dept.; 747 Market St., Room 345;
- Tacoma Public Library; 1102 Tacoma Avenue S.
- City of Fife -5411 23rd Street East, Fife, WA 98424

- City of Fife Public Library - 6622 20th St. E., Fife, WA 98424
- Pierce County - County-City Building, 930 Tacoma Ave. S., Room 737 Tacoma, WA 98402
- Port of Tacoma - One Sitcum Plaza, Tacoma, WA 98421

The FEIS can also be reviewed online at: www.cityoftacoma.org/planning. In addition, a limited number of complimentary hardcopies or CDs of the FEIS and ER/ITS report will be made available (while the supply lasts) from the City of Tacoma Planning and Development Services Department.

Additional copies may be purchased at the Planning and Development Services Dept. for the cost of reproduction. The Planning and Development Services Dept. is open 8 AM to 4:30 PM Monday through Friday.

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Acronyms and Abbreviations

Term	Definition
°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
ACQR	Air Quality Control Region
ADT	average daily traffic
AHJ	Authority Having Jurisdiction
APE	area of potential effect
ASCE	American Society of Civil Engineers
bgs	below ground surface
BLEVE	boiling liquid expanding vapor explosion
BMP	best management practice
BOG	boil off gas
BPA	Bonneville Power Administration
CB&I	Chicago Bridge & Iron
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFD	Computational Fluid Dynamic
CFR	Code of Federal Regulations
CH_4	methane
CMMP	contaminated media management plan
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Coast Guard	United States Coast Guard
CSA	combined statistical area
CWA	Clean Water Act
DAHP	Washington Department of Archaeology and Historic Preservation
dB	decibels
dBA	A-weighted decibels
DDT	Dichlorodiphenyltrichloroethane
DEA	David Evans and Associates
DEIS	Draft Environmental Impact Statement
DOH	Washington State Department of Health
DOR	Washington Department of Revenue
Dth	dekatherms
ECA	North American Emissions Control Area

Ecology	Washington State Department of Ecology
EDNA	environmental designation for noise abatement
EFH	Essential Fish Habitat
EIS	environmental impact statement
EMS	emergency medical services
EMT	emergency medical technician
EPA	United States Environmental Protection Agency
ER	Emergency Response
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FMC	City of Fife Municipal Code
ft^2	square feet
GDP	gross domestic product
GHG	greenhouse gas
gpm	gallons per minute
GWP	global warming potential
HAP	hazardous air pollutant
HDD	horizontal directional drill
HOV	high-occupancy vehicle
HPA	Hydraulic Project Approval
I-5	Interstate 5
IBC	International Building Code
ICS	Incident Command System
IRP	integrated resource plan
ITS	Intelligent Transportation System
KMMEF	Kalama Methanol Manufacturing and Export Facility
KOP	key observation point
kV	kilovolt
L&I	Washington State Department of Labor and Industries
L_{10}	noise level that is exceeded during 10 percent of the measurement period
L_{90}	noise level that is exceeded during 90 percent of the measurement period
L_{eq}	equivalent sound pressure level
LNG	liquefied natural gas
LOS	level of service
MAOP	maximum allowable operating pressure
MDNS	Mitigated Determination of Nonsignificance
MIC	manufacturing industrial center
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MS4	NPDES Phase I Municipal Stormwater Permit
MSA	Magnuson-Stevens Fishery Conservation and Management Act of 1996

MTCA	Model Toxics Control Act
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NESHAP	National emissions standard for hazardous air pollutants
NFPA	National Fire Protection Association
NIMS	National Incident Management System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOC	Notice of Construction
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NRHP	National Register of Historic Places
NSR	new source review
NTU	nephelometric turbidity units
NWIW	Northwest Innovation Work
O&M	operation and maintenance
OBE	Operational Basis Earthquake
OD	outside diameter
OFM	Washington Office of Financial Management
OPS	Office of Pipeline Safety
OSHA	Occupation Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyls
PCC	Pierce County Code
PDC	Power Distribution Center
PEWS	Port Emergency Warning System
PFMC	Pacific Fishery Management Council
PHMSA	Pipeline Hazardous Materials Safety Administration
PHS	Priority Habitats and Species
PL&WCo	Parkland Light & Water Cooperative
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in diameter
PMI	Port Maritime Industrial
Port	Port of Tacoma
Project	Tacoma Liquefied Natural Gas Project
Proposed Action	Construction, operation, and decommissioning of the Tacoma LNG Project
PSCAA	Puget Sound Clean Air Authority
PSD	Prevention of Significant Deterioration
PSE	Puget Sound Energy
psi	pounds per square inch
psig	pounds per square inch gauge
PSRC	Puget Sound Regional Council

PTT	Puyallup Tribal Terminal
RCW	Revised Code of Washington
RMP	Risk Management Program
ROW	right-of-way
RPT	rapid-phase transition
SDWA	Safe Water Drinking Act
SEPA	Washington State Environmental Policy Act
SIP	State Implementation Plan
SPCC	Spill Prevention, Containment, and Countermeasure
SR	State Route
SSE	Safe Shutdown Earthquake
SWPPP	Stormwater Pollution Prevention Plan
TAP	toxic air pollutant
TIP	Transportation Improvement Program
TMC	Tacoma Municipal Code
TOTE	Totem Ocean Trailer Express
TPCHD	Tacoma-Pierce County Health Department
TWIC	Transportation Worker Identification Credentials
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
UST	underground storage tank
VOC	volatile organic compounds
WA-99	Washington State Highway 99; Pacific Highway East
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WHPA	Wellhead Protection Areas
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WISHA	Washington Industrial Safety and Health Act
WPG	water/propylene glycol
WRIA	Water Resources Inventory Areas
WSA	waterway suitability assessment
WSDOT	Washington State Department of Transportation
WUTC	Washington Utilities and Transportation Commission

Executive Summary

ES.1 Introduction and Background

In September 2014, the City of Tacoma initiated an environmental review of the Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) proposed by Puget Sound Energy (PSE). The Project would be one of the nation's first marine vessel bunkering facilities, with on-site LNG liquefaction and storage (bunkering) at the Port of Tacoma. To meet natural gas demand for the LNG facility, the Project would also include the construction of two new segments of pipeline connecting the LNG facility to PSE's existing natural gas distribution system. The construction, operation, and decommissioning of the proposed Project is referred to herein as the Proposed Action.

This environmental review process, performed under the authority of Revised Code of Washington chapter 43.21C (State Environmental Policy Act [SEPA]), was triggered when PSE formally applied for a Shoreline Substantial Development Permit with the City of Tacoma (SHR2015-40000246123). Public notice of that permit application was issued on May 12, 2015, with a comment period extending through June 11, 2015.

On September 12, 2014, the City of Tacoma issued a SEPA Determination of Significance, indicating the City's intention to require an Environmental Impact Statement (EIS) to assess the environmental impacts of the Project at the Port of Tacoma and the surrounding area.

On September 12, 2014, the City of Tacoma also began a scoping process to solicit input from the public on the issues that should be addressed in the environmental review. The City accepted comments through October 13, 2014. Eight letters were received and considered, in addition to the comments of attendees of a public scoping meeting on September 24, 2014. The City of Tacoma is issuing this Final EIS (FEIS) after consideration of comments on the DEIS and making appropriate changes.

An EIS is an informational and evaluative tool. It does not mandate approval or disapproval of a project, but informs the public and decision-makers of a project's potential substantial and minor adverse impacts, along with its beneficial effects to both the built and natural environment and suggests to decision-makers the means by which those impacts could be avoided or reduced through mitigation.

This FEIS is organized as follows.

Chapter 1 describes the purpose and need of the Project in the context of the analyses conducted by the City of Tacoma to comply with SEPA.

Chapter 2 describes the Project and construction procedures.

Chapter 3 evaluates the Project's potential impacts on the surrounding region and on specific elements of the environment. It also offers mitigation measures to reduce or eliminate identified environmental impacts.

Chapter 4 provides the comments received on the DEIS and responses to comments.

Chapter 5 provides a list of sources used to develop the analyses presented in this FEIS.

ES.2 Project Objectives, Purpose, and Need

The purpose of the Proposed Action is to receive natural gas from PSE's distribution system, chill natural gas to produce approximately 250,000 to 500,000 gallons LNG daily, and store up to 8 million gallons of LNG on site. Eighty-five thousand decatherms of peak-day gas supply would also be re-injected and diverted into PSE's distribution system when needed to supply consumers. Finally, LNG would be distributed for use as maritime transportation fuel by Totem Ocean Trailer Express (TOTE) at its Port of Tacoma facility, along with other potential future regional LNG marine vessel customers. LNG would also be loaded onto trucks or barges for use by other regional markets seeking a cleaner fuel source.

The Proposed Action would address a long-term need for new peak-day resources as identified through PSE's 2013 biennial integrated resource plan. The Project was evaluated against long-haul interstate pipeline capacity, regional underground natural gas storage service combined with interstate pipeline storage redelivery service, and a stand-alone LNG peaking facility in other locations. PSE determined that the most cost effective way of meeting its resource needs would be the combination of additional regional underground storage, the Tacoma LNG facility, and refurbishment of an existing, on-system, peak-day resource. The Tacoma LNG facility would fill approximately 50 percent of the anticipated deficit.

In addition to meeting long-term resource needs, the Proposed Action would enable TOTE to meet new fuel standards for maritime vessels in response to the North American Emission Control Area (ECA), which established more stringent emission standards within 200 miles of the United States and Canadian coasts. A significant portion of the LNG to be produced at the Tacoma LNG Facility will be consumed by TOTE. However, additional fuel switching by other companies from petroleum products to LNG in response to ECA will provide further demand for LNG in the region.

ES.3 Project Alternatives and Review

This document evaluates two alternatives: the Preferred Alternative (the Project) and the No Action Alternative. Several potential alternatives were considered during the development of the DEIS, but were not analyzed in detail because they were not deemed reasonable or they did not meet the Project objectives.

This FEIS addresses direct and indirect Project impacts, as well as the cumulative impacts of other reasonably foreseeable projects in the Project vicinity. It also evaluates potential impacts of the Project that would result from its construction, operation and maintenance, and decommissioning at the end of its design life.

One result of the environmental review is the development of potential mitigation measures whose implementation may avoid or reduce impacts to the built and natural environment, as well as help identify significant unavoidable impacts that cannot be mitigated.

Mitigation measures recommended in this FEIS are actions PSE would undertake to reduce the impacts of the Project or they are measures that would be incorporated as conditions in permits issued by the City and other state and local jurisdictions.

ES.4 Significant Areas of Interest and Issues Considered in the Analysis

This FEIS considered the following significant issues to be resolved through environmental and permit review:

- Changes to emergency service needs at the Port of Tacoma manufacturing/industrial center;
- Potential spill of LNG and impacts on human health and safety;
- Disruption of traffic during new pipeline construction, particularly on Taylor Way;
- Effects of the Project related to seismic and other geologic hazards;
- Management of on-site subsurface contamination during construction;
- Effects of the Project on regional air quality, including greenhouse gas emissions; and
- Visual and aesthetic impact of the facility, particularly the LNG storage tank.

ES.5 Major Conclusions

Based on the analyses presented in this FEIS, the following major conclusions have been drawn:

- The Project would allow PSE to provide new peak-day resources to its retail natural gas customers, the demand for which is expected to grow to a deficit over the next two decades. The Project would also enable TOTE vessels to meet new emissions standards detailed in the ECA. Natural gas has been identified as a key resource to implement greenhouse gas emission reductions for commercial truck, bus, rail, and marine transportation. The Proposed Action would address this need as the transportation industry and other industrial markets seek to comply with updated emissions policies and reduce operational costs.
- The Proposed Action as mitigated would have nominal adverse effects on water resources, soils and geology, vegetation, climate and air quality, health and safety, socioeconomics, and cultural resources. Impacts to these resources would be minimized because the Project footprint would be contained in previously developed areas and paved road rights-of-way and would be mitigated as described herein.
- The Proposed Action would have an unavoidable adverse impact to visual resources due to the size of the LNG storage tank. However, proposed mitigation measures would reduce the visual impacts such that they are less than significant.

The preliminary LNG design, construction, and integrity testing are compliant to 49CFR Part 193, NFPA 59A, and USCG regulations. However, the design should be reviewed when complete to confirm all conditions for the installation have been met.

Preliminary siting studies were performed for Tacoma LNG using basic modeling tools, Degadis for vapor dispersion, and LNG FireIII for thermal radiation. More advanced modeling is required later in detailed engineering when the design is further defined using Computational Fluid Dynamic (CFD) software. The updated CFD models should be reviewed when they are complete to confirm that all vapor dispersion and thermal radiation conditions for the installation have been met and accepted by PHMSA.

The Project does introduce a major new risk factor into an area with one of the City's lowest emergency response times. The City and other stakeholders have prepared a draft Emergency Response/Intelligent Transportation Systems Study (ER/ITS Study) that seeks to address area-wide ER/ITS improvements needed to support projects such as PSE's. The FEIS proposes mitigation measures that would provide additional resources for the Tacoma Fire Department in the vicinity of the Project and improve response times along Taylor Way.

ES.6 Mitigation and Minimization Measures

Table ES-1 summarizes all recommended mitigation measures to address the Project's potential impacts. This table will be revised and updated to reflect any additional mitigation measures needed to address concerns raised in public comments. Major mitigation measures discussed here are reasonably calculated to reduce, at times eliminate, and, in several instances, enhance the beneficial impacts of the Project to the built and natural environment. The mitigation measures listed in Table ES-1 are both those inherent in the Project design and those developed separately from the Project design to reduce potential impacts.

Avoidance will continue to be utilized to prevent many types of impacts from occurring in the first instance, and best management practices (BMPs) will be applied to minimize impacts where appropriate. Application of all of these measures, especially during construction, would limit and, in most instances, eliminate adverse impacts that could result from the Project.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
Section 3.1: Earth			
	• Impacts associated with seismic effects and volcanic activity • Potential for Project to contribute to slope instability, topographic alterations, and erosion • Potential for subsurface contamination to migrate from nearby sites (see also Section 3.3: Water)	• Project facilities would be sited to avoid potential geologic hazard areas, to the maximum extent practicable. • Due to the area's seismic activity and high liquefaction potential, ground improvements would be required throughout the Project, particularly beneath the LNG storage tank. • All elements of the Project would be designed to withstand an Operational Basis Earthquake and continue functioning in its aftermath. • The facility would be designed to prevent catastrophic failure in the case of a Safe Shutdown Earthquake, but would not be required to remain operational in its aftermath. • Engineering controls would be employed to stabilize the slopes along the Hylebos and Blair shorelines, which would be unstable during a seismic event. • During construction and operation, the Project would maintain strict emergency response protocol to prepare for tsunami or volcanic hazards/lahar. • Consistent sampling of soil and groundwater throughout construction, especially near known contamination sites, would determine measures for removal of contaminated material. • Properly designed and constructed shoring systems would be used to prevent caving of excavation faces from temporary construction excavations. • Appropriate methods to remove, contain, and discharge groundwater accumulated would be used in excavations to mitigate dewatering impacts. Extracted groundwater would be handled and discharged using BMPs to prevent erosion and degradation of surface water. Groundwater extracted from known areas of contamination would be analyzed to determine treatment and disposal options. • Excavated soils would be used on site, to the extent practical, to reduce the volume of material exported from the site and requirements for importing material. • Criteria would be developed for controlling the quality of fill materials imported to the site. • A work plan would be prepared for actions to be taken if soil contamination is found during construction. • During construction, contractors would employ temporary erosion and sedimentation control measures and BMPs.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
Section 3.2: Air Quality			
	• Construction and operational impacts on air quality (i.e., particulates/fugitive dust and vehicle emissions) • Hazardous and toxic air pollutants • Greenhouse gas emissions	• Standard dust control measures would be applied throughout the course of construction. • To reduce air emissions, PSE would require contractors to implement measures to reduce emissions from vehicles and construction equipment during construction. • Construction equipment would be regularly maintained in accordance with manufacturer's specification or standard practices. • Carpooling by construction workers would be encouraged. • Ultra-low sulfur diesel would be used for the emergency generator during Project operations. • PSE would implement a leak detection and repair program for fugitive volatile organic compound emissions.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.
Section 3.3: Water			
	• Stormwater runoff effects on water quality • Spread of existing contamination through groundwater during construction • Water quality impacts from spills during construction and operation • Water consumption for Project construction and operation • Sedimentation and erosional effects on water quality	• Wet or uncured concrete would not be allowed to enter waters of the state. • Excess or waste materials generated during construction would not be disposed of or allowed to enter waters of the state. • Land-based staging areas for activities such as storage of machinery, equipment, materials, and stockpiled soils in shoreline areas or waterward of shoreline areas would be prohibited. A silt fence would be installed around the perimeter of the upland locations where machinery, materials, and stockpiled soils are situated. • Any temporary soil stockpiles would be covered when not in use. • Work barges would not be allowed to ground on the shoreline during construction. • All equipment that would operate over water or below the mean high higher water mark would be cleaned of accumulated grease, oil, or mud. All leaks would be repaired prior to arriving on site. Equipment would be inspected daily for leaks, accumulations of grease, etc., and any identified problems would be fixed before operating over water or below the mean high higher water mark. • Vessels, construction equipment, fuel hoses, oil drums, oil or fuel transfer valves and fittings, and other equipment components would be checked regularly for drips or leaks and would be maintained and stored properly to prevent spills; • The contractor would have a spill kit with oil-absorbent materials on site to be used in the event of a spill or in the event that any petroleum product is	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		observed in the water. • Fueling of upland and land-based construction equipment would not occur within 100 feet of surface water. • The following mitigation measures would be implemented to minimize potential impacts to the Hylebos and Blair waterways: - Visible turbidity anywhere at or beyond the 150-foot point of compliance from activity would be considered an exceedance of the standard. - During demolition, including removal of existing piles in both the Hylebos and Blair waterways, containment booms would be used to surround the work areas. All accumulated debris would be collected daily and disposed of at an approved upland site. - A silt curtain may be installed around the pile removal area to prevent sediment from migrating beyond the existing project footprint. - Existing piles would either be fully extracted in a single slow and continuous motion using a vibratory hammer or cut 2 feet below the mud line should the piling break during extraction. If cut 2 feet below the mud line, the resulting holes would be filled with clean sand or other habitat mix approved by the Washington Department of Fish and Wildlife. - All creosote-treated wood would be contained during and after removal to preclude the entrance of sediments and any contaminated materials to the aquatic environment. - The work surface on the uplands or barge would include a containment basin for piles and any liquid or sediment removed during pulling of the piling. - Creosote-treated wood and piles from demolition of existing structures would be disposed of at an appropriate upland facility. - Sediments spilled on work surfaces would be contained and disposed of with the pile debris at an approved upland disposal site. - Hydraulic water jets would not be used to remove or place piles. - Spill impoundments for collection of spilled LNG, mixed-refrigerant, heavy hydrocarbons, WPG, amine, and equipment lubrication system and transformer oil design features would minimize impacts to surface water during operations. - Promptly remove motor oil and hydraulic fluids as a good housekeeping practice.	

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		- Vehicle washing and maintenance would occur offsite. - Contaminated groundwater encountered during construction would be contained and disposed of at an appropriate facility. - Regular spill prevention measures would be implemented during construction, including regular equipment inspection and maintenance. Workers would refuel vehicles and machinery 100 feet upland of surface waterbodies. - Marine turbidity minimization measures would be implemented during construction. The water column would be continuously monitored for turbidity discharges during and immediately after construction. - BMPs would be implemented during construction to manage sedimentation and erosional effects on water quality. - During replacement of a creosote-treated bulkhead structure with a new steel sheet pile bulkhead, the existing structure would remain in place to provide erosion and sediment control.	
Section 3.4: Plants and Animals			
	• Impacts to aquatic habitat • Impacts to marine mammals • Pile driving • Disturbance of bird species during construction • Loss of habitat • Wildlife mortality • Coastal and stream bank disturbances • Loss of riparian vegetation	• To limit the amount of noise and vibratory impacts of pile driving, pilings would be installed initially with a vibratory hammer to 90 percent-plus of their design depth (within 10 feet of design tip elevation). Impact hammering would then be employed until load-bearing or pile-tip elevation specifications have been met. • One or more other noise attenuation methods (e.g., wood blocks, nylon blocks) would be used during impact installation or proofing of all steel pilings. • Intertidal pilings would be installed during dry or shallow water tide stages to the extent practicable. • Trenchless technology would be used to install pipeline along existing culverts, thereby avoiding impacts to stream habitat along pipelines. • 532 creosote-treated timber piles would be removed from the Blair-Hylebos waterways to be replaced with 142 steel piles, improving water quality as a result. • Intertidal pilings would be installed during dry or shallow water tide stages, to the extent practicable. • Pile removal and installation would be restricted to the in-water work window for Commencement Bay (July 16 to February 14) • Project-associated tugs and bunkering barges would maintain slow speeds (less than 5 miles per hour) to avoid striking marine mammals.	• No significant, permanent, unavoidable impacts to animals are anticipated because the majority of the Project footprint would be contained in existing developed areas, largely port-industrial sites and paved road rights-of-way. Potential impacts to aquatic/marine habitat would be mitigated with proposed avoidance and minimization measures.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		• During pile-driving, a qualified observer would monitor humpback and killer whale activity. Observers would have authority to halt pile driving if humpback or killer whales are observed within distances in which behavior disturbance may occur.	
Section 3.5: Health and Safety			
	• Fire/explosion risk due to construction and/or operation of the Project • Risks to workers from existing on-site contamination • Spill potential during Project construction • Increased traffic accidents as a result of construction	• The LNG facility design would incorporate mitigation measures to ensure that thermal radiation and vapor dispersion does not extend beyond the land portions of the PSE and TOTE property lines. • During LNG fueling in the Blair Waterway or barge loading activities on the Hybelos Waterway PSE should consider establishing public exclusion zones around the operating area. • A Contaminated Media Management Plan would be developed, outlining the proper protocol that would be implemented should contaminated media be encountered during installation of the distribution system. • Hazardous materials would be stored, handled, and used in accordance with best practices for storage and management of hazardous materials. • A construction worker health and safety plan would be implemented to address health and safety during construction. • A Joint Emergency Response Plan would be prepared by local first responders and facility owners/operators that would detail emergency response command system and procedures. • Fueling and maintenance of construction-related equipment would occur within dedicated areas equipped with spill kits. • PSE would strictly adhere to local jurisdictional traffic control requirements to minimize traffic impacts, which may include night-time work or reduced-duration daytime schedules to avoid rush-hour traffic. • The facility and equipment would be laid in such a way as to separate the public from hazardous material dispersion. • Fire and gas monitoring and protection systems would be installed throughout the facility. • The facility would be provided with an emergency shutdown system designed to leave the facility in a safe state in case of an incident.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
Section 3.6: Noise			
	• Noise impacts from the construction and operation of the Project	• In-water and air noise during pile driving would be minimized using a vibratory hammer, followed by limited impact hammering. • Sound-reducing design measures would be implemented during construction and operation • Haul trucks and other engine-powered equipment would be equipped with adequate mufflers. • PSE would establish a phone number or other effective means for the public to report significant undesirable noise conditions associated with construction and operation of the Tacoma LNG Facility. • Throughout Project construction and operation, PSE would document, investigate, evaluate, and attempt to resolve noise complaints related to the Project.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.
Section 3.7: Land Use and Recreation			
	• Construction-related impacts to recreational resources • Project's consistency with existing zoning regulations	• Temporary limitations on active recreational waterway uses within the Project Area would not be significant enough to require mitigation • Facilities would be landscaped to be reasonably compatible with existing development. To this end, existing vegetation bordering the site of the proposed Golden Given Limit Station should be maintained, or new, densely planted row vegetation should be placed along edges of proposed fence.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.
Section 3.8: Aesthetics/Light, and Glare			
	• Permanently changed views from residential, recreational and roadway viewpoints • Light and glare impacts	• During construction, lighting for safety and security will be shielded and oriented downward, bare bulbs will be fully screened from view from sensitive viewing receptors such as residences, and on-demand lighting and/or timers will be used to minimize visual impacts of lighting. • It is recommended that the LNG storage tank be a non-reflective concrete finish and dark gray color. • To minimize visual impacts and add texture and structure around the LNG storage tank, PSE would include a combination of gravel, larger boulders, and intermittent stands of drought resistant trees and shrubs. PSE would also keep this area free of invasive and noxious plants. • To minimize impacts from street views along 11th Street and Alexander Way, to the degree possible, existing trees should be retained and additional landscaping provided.	• Due to the size of the LNG storage tank, overall visual impact of the Project would be unavoidable, but not significant. Minimization measures in the form of aesthetic alterations would greatly reduce its visual impact. • With implementation of design and other measures, the impacts of light and glare would not be significant or

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		• PSE would maintain the appearance of all construction and operation sites and would ensure that vehicles are located as inconspicuously as possible. • To minimize nighttime visibility of lights associated with the Tacoma LNG Facility site, PSE would use minimum lighting necessary for security at construction areas, and orient lighting in a way to minimize the effects of increased light pollution. • Exterior lighting fixtures would be attached to 30-foot-tall poles, which would be similar in height, or shorter than, most poles used for lighting in the area. • Exterior nonpole (attached to buildings and other facilities) lighting would point downward and be shielded. • Lighting would be located and oriented to minimize horizontal radiation or light spillover. • Lighting would be provided with switches or automatic controls that would turn off lights when not required for operations.	unavoidable.
Section 3.9: Cultural Resources			
	• Impacts of construction on existing historic and cultural resources or potential resources.	• PSE will prepare an Unanticipated Discovery Plan that will outline procedures in the event of an unanticipated discovery of cultural resources and human skeletal remains. This would help minimize the potential for, and degree of, impacts. • Pipeline construction in areas near the base of the Blair-Hylebos peninsula at or near the natural shoreline that are deemed likely to have cultural importance would be monitored by a trained and experienced cultural resource expert. • PSE will provide training in identifying cultural artifacts according to a training protocol developed by PSE and approved by the City after consultation with the Puyallup Tribe. • If suspected cultural artifacts are found, construction will be halted in the vicinity of the find until the status of the artifact can be determined. • In addition, PSE will notify a contact person provided by the Puyallup Tribe prior to commencement of ground breaking and the expected duration of any excavation.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.
Section 3.10: Transportation			
	• Impacts related to additional traffic trips generated by Project • Impacts on roadways related to construction and delivery of oversized loads	• A construction traffic management plan would be developed. • Applicable governmental permits or approvals would be obtained. • Public involvement and outreach efforts would be undertaken prior to construction to help minimize access disruptions	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
	• Impacts related to road maintenance and public access • Damage to roadways	• Carpooling among construction workers and personnel would be encouraged to reduce traffic volume to and from the Tacoma LNG Facility site. • Pipeline Segment A would be constructed without disturbing rail tracks by using a horizontal drill or bore construction technique. • All roads and other transportation infrastructure impacted by construction would be videotaped prior to construction to document pre-construction conditions. • Following installation of the pipeline, roads would be restored by repaving the travel lane impacted by the pipeline construction pursuant to the appropriate plans and specifications adopted by Tacoma Public Works, City of Fife Public Works, and Pierce County Public Works. • To improve driving conditions on Taylor Way, from SR 509 to the project site an approach that results in rebuilding of Taylor Way to "heavy haul" standards has been agreed upon by PSE, the Port of Tacoma, and The City of Tacoma. • Construction of Phase I of the planned ITS Infrastructure is needed for basic information sharing among stakeholders, as defined in the ER/ITS study.	unavoidable adverse impacts. • Construction and operation of the Project would not significantly impact maritime activity in either the Hylebos or Blair waterways.
Section 3.11: Public Services			
	• Increase in demand for public services (police, emergency services, medical services, education) • Increased response time for emergency services • Impacts to the distribution of regional fire protection services. • Impacts related to wastewater and solid waste generation	• A new unit of the Tacoma Fire Department with fire response and EMS response capabilities and hazardous materials awareness could be stationed in proximity to the site of the Tacoma LNG Facility for the duration of construction. • PSE would provide emergency response agencies with regularly updated maps of the facilities and current access points, relevant contact information, and site procedures for fire protection and rescue operations. • The emergency preparedness, emergency access, and construction health and safety measures proposed by PSE and described in Section 3.5 (Health and Safety) would reduce potential impacts to fire protection and EMS throughout the construction period for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. • Security would be provided throughout the construction period for each separate component of the Project. • Temporary security fencing would be erected around the construction sites to prevent trespassing and vandalism. • PSE or its selected contractor would notify the relevant fire department or district prior to initiating work within that department or district's service area. • PSE would obtain permits before hydrostatic testing of Pipeline Segment A and Segment B begins, in accordance with the provisions of local codes for the use	• The Proposed Action could have significant impact on local fire protection services. However, this would be mitigated by reintroducing a staffed fire station in advance of the Project's opening in late 2017. • With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		of fire hydrants. • During post-construction hydrostatic testing, the contractor would communicate with fire protection services prior to drawing water from any fire hydrant. • A new unit of the Tacoma Fire Department with fire response, EMS, and hazardous materials operations capabilities would be stationed in proximity to the site of the Tacoma LNG Facility. • PSE would provide regular orientation to the site to relevant responders at the Tacoma Fire Department, and operations personnel and the Fire Department would consult to develop and implement an ongoing training regime that integrates best practices for responding to fire and emergencies at the Tacoma LNG Facility. • The Tacoma LNG Facility would contain fire and hazardous gas detectors, fire-extinguishing systems, and an extensive firewater system, as well as new pier and access trestles that would provide firetruck access to the loading platform. • The intrusion detection system would monitor the perimeter for the facility and alarm when the perimeter is disturbed. • Security cameras would be installed along the perimeter and other select locations for maximum viewing coverage. • Closed-circuit television system components would be powered by an uninterruptible power system. • The perimeter of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be enclosed by a chain-link security fence to ensure public safety, welfare, and site security. • Phase I of the Intelligent Transportation System study would be implemented. • PSE would implement measures to plan for and minimize emergencies, such as LNG and facility-specific safety and emergency response training to raise the level of preparedness in case of an emergency. • Security measures would be implemented during construction and operation, including policies for security procedures, protective enclosures, security communications, security monitoring, and warning signs. • New firefighting, emergency medical services, and hazardous material capacity would be added in the vicinity of the Project.	

Notice of Availability
Final Environmental Impact Statement (FEIS)
Puget Sound Energy Tideflats LNG Facility

Lead Agency: **September 30, 2015**

City of Tacoma
Planning and Development Services
747 Market Street, Room 345

Description of Proposal: PSE Proposed Tideflats LNG Facility EIS

Puget Sound Energy, Inc., (PSE) proposes to construct a natural gas liquefaction and storage facility on a 33-acre site on the Blair-Hylebos Peninsula in the Port of Tacoma. The LNG would be available for use as a reduced-emissions fuel, as well as for utility peak shaving. A single 8-million gallon, non-pressurized full-containment LNG storage tank would be located on the site. The liquefaction facility would receive natural gas from PSE's existing natural gas pipeline distribution system to which two new segments would be added: an approximately 1-mile distribution pipeline in unincorporated Pierce County, and an approximately 4-mile pipeline from the City of Fife into Tacoma. The proposed system improvements would include one new limit station and modifications to a gate station, both of which would be in unincorporated Pierce County.

Location of the Proposal

LNG: 901 and 1001 Alexander Avenue East; 3533 E. 11th Street, Tacoma WA 98421. Pipeline: the Cities of Tacoma, Fife, and Pierce County. (See www.cityoftacoma.org/planning, "PSE Proposed Tideflats LNG Facility".)

Mitigation

The FEIS has identified mitigation measures including: re-opening of Fire Station 15, re-construction of Taylor Way to heavy haul standards, and implementation of Phase 1 of an Intelligent Transportation System (ITS).

Appeal and Noticing

This notice of availability is provided in accordance with the Washington State Environmental Policy Act (SEPA) of 1971, Chapter 43.21C of the Revised Code of Washington (RCW) as revised 1983, and SEPA Guidelines, Effective 16 January 1976 as revised 4 April 1984, Chapter 197-10, Washington Administrative Code (WAC). Appeals shall be commenced in accordance with *TMC13.12.820 - Appeals of SEPA threshold determination and adequacy of final environmental impact statement*; the timing of the appeal is based on the appeal provisions for the underlying government action, which must be appealed at the same time. The City will not take action on the proposal for 7 days following this notice.

Availability of the Final EIS and Background Materials

The complete Puget Sound Energy – Tideflats LNG Project Final Environmental Impact Statement (FEIS) and Appendices can be downloaded from the project website at www.cityoftacoma.org/planning by clicking on "PSE Proposed Tideflats LNG Facility". The document may also be acquired on CD from Planning and Development Department at no charge.

Contact

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2 Description of Proposed Action

2.1 Introduction

Puget Sound Energy (PSE) is the proponent of the Proposed Action, which consists of the construction, operation, and decommissioning of the Tacoma Liquefied Natural Gas (LNG) Project (Project). PSE is a corporation organized under the laws of the State of Washington. The company is a Washington-regulated utility serving 1.1 million electric customers and over 800,000 natural gas customers in 11 counties across the state. This chapter describes the Proposed Action, including the components, construction procedures, and operations of the Proposed Action.

2.2 Proposed Action Components

The proposed Project would consist of three main components: (1) Tacoma LNG Facility, (2) Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System, and (3) associated improvements to the existing PSE Natural Gas Distribution System. All components are subject to numerous applicable regulations. The main components of the Project are described below.

2.2.1 Tacoma LNG Facility

2.2.1.1 Overview

The Tacoma LNG Facility would produce between 250,000 to 500,000 gallons of LNG per day. This LNG volume is less than typical LNG import-export facilities that serve world markets. The LNG would be distributed to marine customers, including TOTE, who would use the LNG as a cleaner-burning vessel fuel, as well as re-gasifying the LNG for reinjection into the PSE natural gas distribution system for peak-shaving purposes. An additional use would be providing LNG to other industries or merchants, such as fuel for high-horsepower trucks used in long-haul trucking.

The LNG would be stored in the Tacoma LNG Facility LNG storage tank before being transferred to TOTE's ships via either cryogenic pipeline as part of the TOTE Marine Vessel LNG Fueling System or bunkering barge originating at the Hylebos Waterway pier.

Other industry merchants could transport LNG from the Tacoma LNG Facility by tanker trucks or, most likely, by barge that could be filled at either the TOTE Marine Vessel LNG Fueling System or the Hylebos pier.

The Tacoma LNG Facility would operate and be staffed with approximately 16 to 18 full-time employees 24 hours per day, 365 days a year. PSE staff would also be responsible for operating and maintaining the LNG pipeline and fuel loading equipment that would be located on TOTE's property. Maintenance and operating protocols would be developed taking into account federal and state regulations, PSE policies and practices, and best industry practices. Additionally, PSE would contract for security service as required to meet regulatory requirements and for stevedoring services to bunker TOTE's ships and load other marine vessels.

LNG Properties

LNG is natural gas in its liquid state. To reach the liquid state, natural gas is cooled to -260 degrees Fahrenheit (°F). Similar to natural gas in its vapor state, LNG is odorless, colorless, non-corrosive, and nontoxic. LNG has a density of approximately 26.5 pounds per cubic foot and is neither flammable nor explosive. Upon conversion to its liquid form, natural gas condenses to occupy a volume that is 1/600 the original volume in its gaseous form. In its liquid form, natural gas is stored at or near atmospheric pressure.

LNG vaporizes rapidly on contact with a temperature warmer than the LNG itself. At -259°F, LNG becomes a dense vapor. Between -259°F and -160°F, the LNG vapor is heavier than air and pools at the ground level in

collection pools or sumps. Vapor captured in the sumps continues to warm, and, at -160°F, the LNG vapor becomes buoyant, rises, and rapidly disperses into the atmosphere.

Location

The Tacoma LNG Facility would be located in the industrial Port of Tacoma with access to Puget Sound (see Figure 1-1 in Chapter 1 [Purpose, Need, and Alternatives Considered]). The general location of the site is north of East 11th Street, east of Alexander Avenue, south of Commencement Bay, and on the west shoreline of the Hylebos Waterway (see Figure 2-1). The Tacoma LNG Facility site is in an area zoned as Port Maritime Industrial. It is primarily developed for industrial maritime use and has been in industrial use for at least 75 years. The site is composed of four separate parcels (see Figure 2-1) owned by the Port of Tacoma. These are Pierce County tax Parcels 2275200502, 2275200532, 5000350021, and 5000350040.

The boundaries for these parcels include both in-water and upland areas, reflecting a total area of approximately 33 acres. The upland portion of the site is approximately 30 acres, and the aquatic area is approximately 3 acres.

There are several buildings currently located on the proposed Tacoma LNG Facility site, including a warehouse, two office buildings, and dispersed storage facilities. The Hylebos Waterway shoreline in this area is covered with slope protection materials, including a timber bulkhead and riprap. Two piers extend from the site into the Hylebos Waterway. One of the piers is approximately 40 by 15 feet, with a walkway approximately 90 feet long, located on the northeast corner of Parcel 2275200532. This creosote-treated timber pier is abandoned and in disrepair. The second pier is a creosote-treated timber structure measuring roughly 600 by 25 feet, located on Parcel 2275200502.

The general character of the Tacoma LNG Facility site reflects previous and ongoing industrial activity. The upland portion of the site is developed, paved, or graveled. Undeveloped areas total less than 1 percent of the entire site.

Environmental Health and Safety Considerations

Design, construction, and operation of the Tacoma LNG Facility would meet the safety requirements of the Pipeline and Hazardous Materials Safety Administration and the United States Coast Guard. The Washington Utilities and Transportation Commission is responsible for application and enforcement of 49 Code of Federal Regulations [CFR] 193 (Liquefied Natural Gas Facilities: Federal Safety Standards). The United States Coast Guard is responsible for application and enforcement of 33 CFR 127 (Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas). These requirements include, but are not limited to, the following:

- Establishment of thermal radiation and flammable vapor-gas dispersion protection exclusion zones and design of facilities to withstand wind forces;
- Emergency shutdown system requirements;
- Site preparation for retention of spilled LNG, flammable refrigerants, liquids, and surface water drainage within limits of the plant and spacing requirements for LNG facilities;
- Design criteria for process equipment and vaporization facilities;
- Design criteria for stationary LNG concrete tanks, relief devices, piping systems and components, and welded pipe tests and inspection;
- Seismic design criteria for stationary LNG storage containers;
- Corrosion control requirements for underground and submerged piping;
- Design criteria for storage tanks of refrigerant and process fluids, pressure and vacuum gauges of containers, and temperature monitoring for field-erected containers, inlets, and outlets of vaporizers;

- Design criteria for electrical equipment, grounding, and bonding;
- Design criteria for transfer of LNG and refrigerants;
- Fire protection provisions; and
- Personnel qualifications and training.

Key Components

The Project would include a variety of components further described in this section. All components of the Project are included in an Integrated Safety and Control System. The proposed site plan is shown in Figure 2-2. Additional details about the layout of the various components proposed at the Tacoma LNG Facility are shown in Figure 2-3.

2.2.1.2 Natural Gas Delivery and Pretreatment Systems

Natural gas would be delivered by a distribution pipeline and metered before it enters the Tacoma LNG Facility. Natural gas, upon delivery and prior to conversion to LNG, must be conditioned. This entails the removal of any constituents other than pure methane. These constituents could include ethane, propane, butane, and other heavy-end hydrocarbons, as well as minor quantities of nitrogen, carbon dioxide, sulfur compounds, and water. The pretreatment system would consist of amine gas treating and regeneration, a gas dehydration system, outlet gas filtration, and an intermediate heat transfer fluid system.

As part of the pretreatment process, carbon dioxide and sulfur compounds removed from the natural gas would be flared through a ground flare system described in Section 2.2.1.7 (Other Process Facilities). Heavy hydrocarbons are used as fuel gas to the maximum extent possible, also described in Section 2.2.1.7. When operating conditions are such that all of the heavy hydrocarbons are not used as fuel gas, the components are sent to a holding tank. Periodically, this holding tank would be emptied and its contents transferred to a truck and taken off site for disposal or sale to a third party for use as fuel.

2.2.1.3 Liquefaction

LNG would be produced using a mixed refrigerant design process. This closed loop system uses a specific, but adjustable, mixture of methane, ethylene, propane, isopentane, and nitrogen as refrigerant. These constituents would be stored on site. The refrigerant would pass through heat exchangers to cool the gas to a liquid (cryogenic) temperature. Refrigerant storage tanks would be above ground with the following capacities:

- Propane Storage Vessel - 4,500 gallons
- Isopentane Storage Vessel - 4,500 gallons
- Ethylene Storage Vessel - 4,500 gallons

These storage tanks would be situated in a concrete containment area filled with sand for fire protection purposes (see Figure 2-3).

2.2.1.4 LNG Storage

A single LNG storage tank (see Figure 2-4) would be constructed on site to store LNG at cryogenic temperatures with a working capacity of 8 million gallons. The temperature of the LNG must be consistent in order for it to remain in its liquid state. LNG is a boiling cryogen, meaning that it is a very cold liquid at the pressure it is being stored. The LNG vapor released by the boiling liquid helps to maintain the temperature of the LNG within the storage tank. Even with increased heat, the temperature of the fluid itself does not change because it is cooled by evaporation, or the creation of vapor. These vapors are collected, placed back into the liquefaction processor, and sent back to the tank. The LNG storage tank would be a full containment structure consisting of a steel inner tank and a prestressed concrete outer tank. An aluminum suspended deck would sit atop the LNG surface in the inner tank. The storage tank would rest upon a seismic

stabilization system. Insulation materials would be installed between the inner and outer tanks to minimize heat gain from the atmosphere to the inner tank contents. The tank would be approximately 130 feet in diameter and 140 feet in height.

Every element in the inner tank would be composed of material that can perform at a temperature of -270°F. This includes internal piping systems. All storage tank piping connections would be located at the top of the tank to avoid any structural penetrations through either the sidewall or bottom of both the inner and outer tanks, thereby mitigating the potential for leaks.

The tank would have redundant pumps of sufficient capacity to pump LNG at design loading rates. Instrumentation and safety systems would be included for proper long-term safe operation and control.

2.2.1.5 LNG Vaporization for Peak Shaving

The LNG vaporization system would consist of a pump and vaporizer. The vaporization pump would be external to the LNG storage tank and would boost the pressure to a sufficient level for vaporization and reinjection into the PSE Natural Gas Distribution System pipeline. The vaporizer would consist of a warm water bath that heats the LNG to a gaseous state suitable for use in the pipeline. The vaporization system would have the capacity to deliver 66 million standard cubic feet per day of natural gas at the standard distribution pipeline pressure. The gas sent out to the natural gas pipeline would be metered and odorized. Only one pipeline would convey natural gas to and from the Tacoma LNG Facility. Thus, when the vaporization and reinjection system is operating, the LNG liquefaction system would be shut down.

2.2.1.6 LNG Transfer Facilities

The Tacoma LNG Facility would have three ways to deliver LNG for use as fuel. The facility would include infrastructure for: (1) loading bunkering barges at the Hylebos Waterway pier for fueling marine vessels, (2) conveying LNG by underground pipeline to the TOTE Marine Vessel LNG Fueling System to directly fuel TOTE ships in the Blair Waterway, and (3) loading tanker trucks for further distribution.

Hylebos Pier

To accommodate LNG bunkering operations at the Project site, a new concrete pier would replace an existing timber pier in the Hylebos Waterway, as shown in Figures 2-5 and 2-6. The proposed location for the new pier is shown in Figure 2-2. Preliminary details of the pier are shown in Figures 2-7 through 2-10. Information about the piles that would be used to construct the new pier and associated dolphins is summarized in Table 2-1 and discussed below.

Table 2-1 Tacoma LNG Facility Pier and Dolphin Piles

Component	Number	Construction Material and Dimensions
Trestle and loading Platform	26	30-inch-diameter steel pipe piles
Fender system	16[a]	18-inch-diameter steel pipe piles
Breasting dolphins	40[b]	18-inch-diameter steel pipe piles
Catwalks	4	18-inch-diameter steel pipe piles
Bulkhead	1	600-foot-long steel sheet pile
Total	86[c]	Steel pipe piles; dimensions various

[a]Two groups of four on the platform, four on each of two breasting dolphins.

[b]Four dolphins, each consisting of 10 piles (not including fender piles).

[c]Does not include the steel sheet pile.

The new concrete pier would have less surface area than the wood pier to be removed. The concrete pier is proposed to be 60 feet long by 25 feet wide (1,500 square feet [ft^2]) and would include a 68-foot-long by 33-

foot-wide (2,244 ft^2) concrete access trestle extending from the upland portion of the site. In addition to a 20-foot-wide access lane for fire vehicles, the access trestle would have an 8-foot-wide combination spill channel and pipe support area. The pier and access trestle would be constructed of precast concrete panels or poured-in-place concrete that meets the requirements of 49 CFR Part 193 (Liquefied Natural Gas Facilities) and National Fire Protection Association Standard 59A (Standard for the Production, Storage, and Handling of Liquefied Natural Gas; NFPA 2013).

The new pier and trestle would be constructed with 26 steel pipe piles 30 inches in diameter. The fender system at the face of the pier would consist of two groups of four 18-inch-diameter steel pipe piles with an ultra-high molecular weight polyethylene rub strip on the breasting face of each fender pile. Rubber fender elements would help absorb berthing energy from docking vessels.

The berthing system would also include four 15- by 15-foot (225 ft^2 each) dolphins, positioned at either end of the pier. The dolphins would each be supported by up to 10 steel pipe piles 18 inches in diameter. The two inner dolphins would be used for both breasting and mooring and would each have four 18-inch-diameter steel pipe fender piles with an ultra-high molecular weight polyethylene rub strip on the breasting face of each fender pile. The outer dolphins would be for mooring only and would not have fenders. Access to the dolphins would be provided by aluminum or steel-grated catwalks with a total surface area of 1,450 ft^2.

Shoreline Improvement

The existing shoreline along the Hylebos Waterway at the Project site is constructed of gravel and soil fill material supported by a timber bulkhead, which is located at about 11.8 feet above mean lower low water (MLLW) (see Figure 2-11). A new steel sheet pile bulkhead approximately 600 feet in length would be installed approximately 9 feet shoreward of the existing bulkhead, as shown in Figure 2-11. The existing bulkhead and supported fill material would be removed and replaced with light, loose riprap varying in size from 3 inches to ½ cubic yard, constructed at a 2:1 slope similar to the existing shoreline slope below elevation 11.8 feet above MLLW.

Loading Bunkering Barges at Hylebos Pier

LNG from the storage tank would be loaded onto the bunkering barges within the Hylebos Waterway using in-tank LNG loading pumps by way of a loading pipeline. The aboveground pipeline would extend approximately 600 feet from the LNG storage tank to the Hylebos shoreline, where it would transition to a pipeline extending down the trestle to the loading platform at the end of the pier.

The LNG pipeline would end at a loading arm or hose on the loading platform, which would transfer LNG to the barge. The loading arm or hose would have full-bore emergency release couplings at the outboard of the arm or hose.

A concrete spillway installed down the trestle below the transfer pipeline would provide for conveyance of any released LNG to a purpose-built containment basin located onshore, in the event of a liquid release.

The bunkering barge would be specially designed to transport LNG and to make ship-to-ship LNG transfers. The bunkering barge would be moored at the new Hylebos pier, where it would be loaded with LNG upon demand. To make deliveries, the LNG bunkering barge would travel up the Hylebos Waterway and toward Commencement Bay and then to the vessel that would receive the LNG fuel.

The LNG bunkering barge would be moved by tug-boats between the new Hylebos pier and its fueling destination. The LNG bunkering barge and tug-boats would be owned and operated by independent third parties. These vessels would not be committed to or under the control of Tacoma LNG Facility. The specific features of the bunkering barges would depend on the owner and operator of the barges.

Loading Tanker Trucks

The tanker truck loading system would consist of two loading bays located on the west side of the facility and would be accessed by a dedicated gate accessible from the facility parking area. As elsewhere on the site, the loading area would be paved and graded to a spill trough designed to safely direct any spills in the area to a spill containment sump at a location remote from the truck loading area. An emergency shutdown valve would be installed at a location remote from the truck station and would be operable both remotely and manually.

2.2.1.7 Other Process Facilities

The process facilities would include other specific components, such as a meter station, boil off gas (BOG) recovery system, and flare system. These components are described in more detail below.

Meter Station

The meter station would measure gas flows from the incoming natural gas pipeline, as well as natural gas flows from the LNG vaporizer back into the pipeline.

Odorizer

The odorizer would add odorant to the natural gas flowing from the LNG vaporizer back into the pipeline.

Boil Off/Flash Gas Recovery System

The BOG recovery system would handle BOG, flash gas, or displacement vapor from the LNG storage tank and truck and marine loading systems. The BOG recovery system would warm this gas and boost its pressure sufficient for re-liquefaction or discharge to the PSE Natural Gas Distribution System pipeline. The BOG recovery system would maintain the LNG storage tank within its operating pressure by handling BOG and flash vapor, which may cause the pressure inside the tank to increase. This would avoid the need to vent or flare excess BOG from the tank.

Facility Cooling Water System

Cooling water consisting of 60/40 weight percent water/propylene glycol would be utilized in a closed loop to provide heat rejection for various users within the facility.

Flare System

The flare system would consist of an enclosed ground flare to be used for flaring of normal discharges. The ground flare system would be designed for high efficiency and smokeless operation. The ground flare would be approximately 40 feet in overall height and 10 feet in diameter. The flare system would also include an open flare, but it would be used only in non-normal situations; i.e., in the event that the refrigerant or process piping needed to be rapidly evacuated. Typically, this would only happen if a fire occurred in the process area. The open flare would produce a visible flame, but only during non-normal situations. It would be approximately 2 feet in diameter and 85 feet tall.

Heavy Hydrocarbon Collection and Storage System

Heavy hydrocarbons in the feed gas that may freeze within the liquefaction process would be removed, as discussed in the liquefaction section above. The storage tanks for heavy hydrocarbons would have secondary containment. Spill prevention and controls would be addressed in the facility Spill Prevention, Containment, and Countermeasure plan. The heavy hydrocarbons would be collected, stored, and subsequently trucked to appropriate and licensed disposal facilities.

Integrated Control and Safety System

The Tacoma LNG Facility would be equipped with an Integrated Control and Safety System. This system would allow for monitoring and control of all systems in the plant. In addition to being used for manual operation of the plant, it would also control automatic emergency shutdown functions in the event of a non-normal event. Furthermore, the plant could also be shut down manually in an emergency via emergency

shutdown buttons located throughout the facility. The system's redundancy would include duplicate control signals and backup power sources.

Buildings

The Tacoma LNG Facility would include the following buildings:

- Control Building: An existing two-story office/shop building approximately 11,000 square feet in size would be re-purposed to serve administrative, maintenance, and control room purposes. In addition, the building would house the fire water boost pump, firewater jockey pump, water demineralization system, and instrument/process air compressor system.
- Storage Building: An existing 24,000-ft^2 sheet metal building in the northeast portion of the site would be kept and used to store materials.
- Compressor Building: A new, single-story pre-engineered building would be built to accommodate the feed gas compressor, refrigerant compressor, BOG compressor, and ancillary equipment. This building is expected to be approximately 6,000 square feet.
- Power Distribution Center (PDC): The PDC would be an approximately 1,500-ft^2 prefabricated building shipped with electrical internals.

Access and Parking

The Tacoma LNG Facility site would include two main points of access off of Alexander Avenue East serving the truck rack and plant operations.

Two existing rail sidings are present at the site, one of which would be maintained. This proposal would not impact existing rail service elsewhere in the Port of Tacoma.

Electrical Systems

Electrical service is provided to the Tacoma LNG Facility site by Tacoma Power. Transmission lines are located throughout the Blair-Hylebos peninsula.

The Tacoma LNG Facility would require approximately 15 megawatts while operating at peak load. The facility would be served through existing Tacoma Power transmission lines. A new substation is proposed within the Tacoma LNG Facility. This substation would include two 115-kilovolt (kV)/13.8-kV power transformers.

The power distribution system within the Tacoma LNG Facility would be centrally located. Three main three-phase voltages would be utilized: 13.8 kV, 4160 volts alternating current, and 480 volts alternating current.

Standby power would be provided from a diesel engine, capable of running all essential loads within the facility. Critical facility control system, security, lighting, and hazard detection loads would be powered by an uninterruptible power supply.

Demineralized Water

Makeup water for the pretreatment system would be provided by a demineralized water system located in the control building. Prefiltered potable water would be routed to a reverse osmosis system that removes water contaminants and total dissolved solids to a required level.

Fuel Gas

Natural gas would fuel uses within the facility, including but not limited to, the pretreatment system, enclosed ground flare, and vaporization system.

LNG Spill Impoundment

In the event of LNG spills, LNG would be directed to various spill containments consisting of below grade open top concrete sumps. LNG spills emanating on the loading platform at the end of the pier would be

collected in a concrete curbed area under the loading arms or hoses and piping, which would gravity drain to a concrete trench that runs the length of the pier back ashore. Sumps would be sized for a maximum design spill pursuant to federal regulations.

Other Spill Impoundments

All other process liquids on site, such as lubricant oil or refrigerant components, would be captured within containment curbs.

Fire Protection System

Fire Suppression System

A fire suppression system would be installed at the facility. This system would include fire water, dry chemical extinguishers, and sprinklers within the control building. Water is not used to extinguish flame on an LNG pool. Fire on an LNG pool is typically extinguished by smothering the flame with a dry chemical extinguishing agent or left to burn itself out if it presents no risk to life or property. Initial and ongoing training and familiarization would be provided to City of Tacoma fire department personnel to ensure they have a strong understanding of behavioral properties of LNG and to inform them of appropriate response tactics at the facility.

Mixed refrigerant components would be stored in tanks encased in a sand-filled containment area to prevent fire impingement from a plant or tank fire. The control building would be fully sprinklered, and numerous portable dry chemical extinguishers would be located throughout the plant. Sprinkler connections would be compatible with local municipal fire department equipment. The PDC (switchgear/motor control center room) would be equipped with fire suppressant systems.

A fire water system would be installed at the plant for use in cooling exposed buildings and equipment in the event of a prolonged natural gas fire resulting from an ignited LNG spill or for any other general fire-fighting use. The firewater system would be an underground looped system that allows flow from more than one direction to most hydrants and monitors. Hydrant and monitor connections would be compatible with City of Tacoma Fire Department equipment. The underground firewater piping would be made of high-density polyethylene. The aboveground firewater piping to the Hylebos pier would be carbon steel and would be heat traced and insulated. The firewater source for the facility would be from two tie-ins to the municipal firewater main: one inner connection on the south side of the facility along Alexander Avenue and one connection on the east side of the facility along East 11th Street. Hydrants and monitors would be placed around the facility. Specific placement would be selected in compliance with building code and in consultation with the Tacoma Fire Department. Elevated monitors on the pier would deliver firewater to the marine vessel's manifold connections, and a ship-to-shore firewater connection would be provided for vessel connection.

The firewater supply pressure and flow rate from the municipal firewater main would be sufficient for firefighting and equipment/structural cooling within the process areas of the facility. A firewater boost pump would be provided to meet the requirements of 33 CFR 127 (Waterfront Facilities Handling LNG) to provide firewater at the marine transfer area. The pump would be sized to provide the entire facility firewater demand rate and would be capable of providing 2,000 gallons of water per minute of water to fight a fire or protect adjacent equipment from the heat of a fire. The firewater pump would be automatically activated in the event of pressure loss in the firewater header system. The firewater system would be kept pressurized by a small electric-motor-driven jockey firewater pump. The two pumps would be located in the control building. The firewater boost and jockey pumps would take suction from the East 11th Street firewater tie-in. Each of the municipal firewater tie-in connections would be equipped with a backflow preventer to isolate the municipal firewater system from the elevated LNG facility firewater main pressure. A bypass with check valve around the firewater boost pumps would permit the municipal supply to feed the facility in the event of pump failure or maintenance.

Fire and Hazardous Gas Detectors

Fire and hazardous gas detectors would be distributed throughout the facility. The system would include, but not be limited to, the following hazardous detection equipment:

- Combustible gas detection system,
- Ultraviolet/infrared (flame) detection system,
- Low temperature (spill) detection system,
- Smoke detection system, and
- High temperature detection system.

Fire and hazardous gas detectors would be routed to the fire and hazardous gas control panel in the main control room. Alarms and beacons would be sounded as appropriate.

Dry Chemical Extinguishing Systems

Dry chemical extinguishing units (of varying sizes and types) would be located throughout the facility to provide adequate dry chemical firefighting capability in areas deemed to have a risk of controllable fires. Uncontrollable fires have been accounted for through the use of passive firefighting (for instance, a tank impoundment fire is expected to just burn out over time with no failure of the concrete secondary containment wall).

The following area in the facility would be provided with a large skidded (1,500-pound) dry chemical extinguishing unit mounted on concrete slabs:

- Refrigeration Area

This skid would be equipped with two 150-foot-long hoses and long range nozzles extending their reach to 190 feet. This reach allows the two skids to cover the entire process area.

The following areas would be provided with 300-pound wheeled dry chemical units:

- Marine loading area,
- Truck loading area,
- LNG ex-tank pump and vaporizer area,
- Process area sump, and
- Hot oil heater and storage area.

These units are intended for movement to fight fires in the areas where needed. These units have a 100-foot-long hose and would be provided with potassium bicarbonate (Purple-K).

2.2.2 TOTE Marine Vessel LNG Fueling System

The TOTE Marine Vessel LNG Fueling System would consist of a cryogenic pipeline from the Tacoma LNG Facility to the TOTE Terminal and transfer facilities to an access trestle and LNG loading platform. The loading platform would be used to fuel ships. The LNG pipeline would end at a loading arm or hose on the loading platform, which would transfer LNG to the TOTE vessel, or other barges and bunker ships. The loading arm or hose would have full-bore emergency release couplings at the outboard of the arm or hose.

The TOTE Marine Vessel LNG Fueling System would be located on the TOTE site on the Blair Waterway. See Figure 2-1. The TOTE site is primarily a paved parking area for trailers, other vehicles, and equipment and includes some small buildings and structures.

The shoreline along the Blair Waterway is developed with wharves, piers, and armored slopes containing riprap, concrete and asphalt pieces, and various debris. The slope and armoring of this section of shoreline would remain unchanged. In-water structures in the Blair Waterway associated with existing TOTE operations include a timber T-pier, three concrete piers, and one concrete breasting dolphin.

The cryogenic pipeline corridor would exit the storage tank and extend 1,200 feet west, traveling below the Alexander Avenue right-of-way (ROW) to the transition point near the TOTE pier. A separate aboveground pipeline would extend along the trestle to the loading arm on a platform in Blair Waterway.

A concrete, steel pile-supported access trestle would extend from shore to the LNG loading platform. This 81-foot-long by 33-foot-wide (2,673-ft^2) trestle would be constructed adjacent to the existing aft loading platform for the TOTE vessels. It would provide a roadway section for fire truck access to the loading platform, pipeway, and utility corridor for all required piping and utilities, and a walkway for personnel. Twelve 30-inch-diameter steel pipe piles would support the trestle. The proposed in-water infrastructure is shown in Figures 2-12 through 2-17. Information about the piles that would be used to construct the new access trestle, LNG loading platform, and associated dolphins is summarized in Table 2-2 and discussed below.

Table 2-2 TOTE Marine Vessel LNG Fueling System Access Trestle and LNG Loading Platform Piles

Component	Number	Construction Material and Dimensions
Trestle	12	30-inch-diameter steel pipe piles
Loading platform	20	30-inch-diameter steel pipe piles (includes 5 extra just in case)
Catwalk	2	Two 18-inch-diameter piles at intermediate support
Fender system	10	14-inch-diameter steel pipe piles
TOTE vessel breasting dolphin	4	30-inch-diameter, load-bearing, steel pipe piles
Free-standing breasting dolphins	8*	20-inch-diameter, load-bearing, steel pipe piles
Total	56	Steel pipe; dimensions various

*Two breasting dolphins, each has four pilings; TOTE is permitting the breasting dolphins (required for the interim fuel supply).

A concrete spillway installed along the trestle below the transfer LNG pipeline would provide for conveyance of any accidental release of LNG into a purpose-built containment basin located onshore.

The steel pile-supported loading platform at the end of the trestle would be 69 feet long by 32 feet wide (2,208 square feet). Twenty 30-inch-diameter steel pipe piles would be installed to support the platform. The fender system may include up to ten 14-inch-diameter steel pipe piles with an ultra-high molecular weight polyethylene rub strip on the breasting face of each fender pile. Rubber fender elements may be placed between the loading platform and each fender pile to absorb berthing energy.

The pier and access trestle would be constructed of precast concrete panels or poured-in-place concrete that meets the requirements of 49 CFR 193 (Liquefied Natural Gas Facilities) and National Fire Protection Association Standard 59A (Standard for the Production, Storage, and Handling of Liquefied Natural Gas).

A steel pipe pile-supported catwalk would provide line-handlers access to the onshore mooring point and capstan from the aft loading ramp. This open steel-grated catwalk with pipe hand railing would connect the loading platform to the onshore mooring point and capstan. Two 18-inch-diameter pipe piles would be used at the intermediate support to support the catwalk.

One breasting dolphin would be installed. The breasting dolphin would be installed just to the north of the existing aft loading pier to protect that pier and the LNG platform from impact by the TOTE vessel. Four 30-inch-diameter steel pipe piles would be used for this dolphin.

PSE's extent of the LNG delivery system would terminate at the loading flange on TOTE's ship.

2.2.3 PSE Natural Gas Distribution System

The Proposed Action would include improvements to the existing PSE Natural Gas Distribution System. These improvements would include the construction of new pipeline segments and modifications to associated limit and gate stations. Figure 1-2 and Figures 2-18 through 2-20 show the distribution system improvements proposed in separate locations within the Port, City of Tacoma, City of Fife, and unincorporated Pierce County. The new pipeline segments are described below, followed by a description of construction of the new Golden Given Limit Station and proposed improvements to the existing Frederickson Gate Station.

2.2.3.1 New Pipeline Segments

The distribution system improvements would include construction and installation of two new pipeline segments with a combined total implemented length of 5.0 miles. The new pipeline segments would range from 12 to 16 inches in outside diameter (OD). The maximum allowable operating pressure (MAOP) in the new pipeline segments would range from 250 to 500 pounds per square inch gauge (psig). The new pipeline segments are proposed within the dedicated road ROWs that are currently used for vehicular traffic. Figure 1-2 in Chapter 1 (Purpose, Need, and Alternatives Considered) Figures 2-18, and 2-19 provide an overview of where the new pipeline segments are proposed.

The approximate lengths of the pipeline segments and the jurisdictions they would cross are as follows:

- Pipeline Segment A: Approximately 4.0 miles long; would cross the City of Tacoma and City of Fife
- Pipeline Segment B: Approximately 1.0 mile long; would cross unincorporated Pierce County

More detailed descriptions of the new pipeline segments are provided separately below.

Pipeline Segment A – Taylor Way

Pipeline Segment A – Taylor Way would extend generally northwest to southeast from the Tacoma LNG Facility to 20th Street East in the City of Fife, just south of Interstate-5 (I-5). Pipeline Segment A would be a total of approximately 4.0 miles in length and would consist of 16-inch-OD pipeline and be designed with an MAOP of 250 psig. The initial approximately 2.2 miles extending southeast from the Tacoma LNG Facility would be within the city of Tacoma, and the remaining approximately 1.8 miles would be within the City of Fife.

Pipeline Segment A would extend southeast from the Tacoma LNG Facility within Taylor Way for approximately 2.5 miles before turning south for approximately 0.6 mile within 54th Avenue. Pipeline Segment A would then extend east within 12th Street East for approximately 0.5 mile before turning south within 62nd Avenue East. The pipeline would extend south for approximately 0.5 mile to the south side of I-5 before ending at the intersection of 62nd Avenue East and 20th Street East.

Pipeline Segment B – Golden Given Road East

Pipeline Segment B—Golden Given Road East would connect an existing north-south pipeline extending from north of I-5 in the City of Tacoma to an existing pipeline extending generally east-west. Pipeline Segment B would extend north to south within Golden Given Road East between 96th Street East (north) and 112th Street East (south) in unincorporated Pierce County and connect to the Golden Given Limit Station via 99th Street East. Pipeline Segment B would be approximately 1.0 mile long and would consist of 12-inch-OD pipeline and be designed with an MAOP of up to 500 psig. The entire segment would be within unincorporated Pierce County.

2.2.3.2 Limit and Gate Stations

The PSE Natural Gas Distribution System improvements would include one new limit station and modifications to one existing gate station. The limit and gate stations would reduce pressure in the pipelines; the gate station would also transfer the natural gas from the transmission system to the local distribution system. The construction of a new limit station and improvements to an existing gate station are

necessary to support the new pipeline segments. The new Golden Given Limit Station and improvements to the Frederickson Gate Station are described below.

The approximate acreages of the parcels where these facilities would be located are as follows:

- Golden Given Limit Station: Parcel 0319032025: 0.32 acre
- Frederickson Gate Station: Parcel 0318011007: 21.9 acres

Golden Given Limit Station

The new Golden Given Limit Station would be built south of the intersection of East 99th Street and East 10th Avenue, and west of Golden Given Road East (see Figure 2-19). The limit station would be located on a parcel with an existing structure and paved parking lot owned by PSE. The new limit station would require a fenced area built in compliance with applicable Pierce County development standards. The Golden Given Limit Station would include pressure regulation equipment, associated piping, over-pressure protection, and gas heating facilities, also to be developed in compliance with applicable development standards.

Upgrade Existing Fredrickson Gate Station

PSE would upgrade the station regulation and heater at the Fredrickson Gate Station. These upgrades would ensure gas supply to the Tacoma LNG Facility while maintaining the operational reliability of the existing distribution system into Pierce County. The upgrades would include pressure regulation equipment, associated piping, over-pressure protection, and gas heating facilities at the meter station.

2.3 Construction Procedures

2.3.1 Tacoma LNG Facility

2.3.1.1 Upland Construction

Demolition of Upland Buildings and Structures

Construction of the Tacoma LNG Facility would begin with demolition and removal of the various existing structures on the Tacoma LNG site, as shown in Figure 2-21. Two of the existing structures would be left intact. Any hazardous materials would be removed and disposed of in accordance with applicable regulations.

Site Preparation

As described in Chapter 3, Section 3.1.1.4 (Earth: Environmental Conditions), soil and groundwater contamination associated with the historical industrial uses in the surrounding area may extend to locations within the construction footprint proposed for the Tacoma LNG Facility and portions of the proposed natural gas distribution pipelines on the Blair-Hylebos peninsula. PSE has solicited the United States Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) for information about contaminated sites in the vicinity of the LNG facility and a portion of the natural gas pipeline. Both of the agencies were provided with the site assessment sampling and analysis plan for the Tacoma LNG Facility site (GeoEngineers 2014), and it is anticipated that they would also review future PSE project plans associated with work in areas of known or suspected contamination. PSE is currently conducting sampling along the pipeline alignment to document any potential contamination that could be encountered during site preparation.

Specific procedures would be identified for the proper handling, transport, and disposal and/or on-site reuse of contaminated media, if present. The Tacoma LNG Facility would not preclude future remedial actions, if needed, within the facility footprint. Future remedial actions, if needed, would be conducted by other parties in collaboration with EPA and/or Ecology.

Site preparation for the land-based LNG storage, process, and support facilities would require clearing and grading activities. It is anticipated that some combination of ground improvements would then be installed to improve seismic performance and provide support for structures.

Following ground improvements, ground elevation would be reestablished for the various aboveground structures. The large existing warehouse building in the center of the Tacoma LNG Facility site sits on a raised foundation approximately 3 to 5 feet of fill soil. The preliminary plan for site preparation following demolition of the warehouse involves spreading this soil to the south.

Stormwater Management

Before construction, best management practices (BMPs) would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the Project's National Pollutant Discharge Elimination (NPDES) General Construction Stormwater Permit. The NPDES permit guides construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

Ground Improvements and Foundations

Ground improvements are required to meet the seismic design criteria in 49 CFR 193. These ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in a design earthquake.

The LNG tank would be the largest component of the facility, and ground improvement efforts would be concentrated at this location. A seismic base isolation system would be added under the LNG tank to address potential seismic events. Other portions of the facility such as the LNG process area and land adjacent to the Hylebos pier would also require ground improvement.

Based on geotechnical analyses, the ground improvement methods would involve injection of grout columns under the tank and other areas. These injected grout columns would range between 80 and 100 feet in depth and compress the soil around them, which would avoid creation of preferential pathways for groundwater migration. The number of columns would vary depending on the method selected, but could range from 4,000 to 6,000 columns.

LNG Storage Tank Construction

Construction of the storage tank and its associated foundation would include the following key activities:

- Prepare and level the location for the LNG storage tank and foundation.
- Install requisite ground improvements, and then construct the tank concrete foundation. The foundation would consist of a base concrete slab, a set of seismic isolators, and an elevated upper concrete slab.
- Construct the outer-tank carbon steel liner, install the outer-tank carbon-steel bottom liner on the foundation, erect the outer-tank carbon-steel roof liner on the outer-tank bottom, and erect the inner-tank suspended deck and connect this to the steel roof.
- Raise the outer-tank steel roof and suspended deck, and weld it to the top compression bar at the top of the tank shell.
- Install the outer concrete wall against the outer-tank steel shell. While this concrete work is progressing on the outside, the construction of the inner tank takes place.
- Install the tank bottom insulation and inner-tank foundation.
- Install the inner-tank bottom.

- Erect the inner-tank shell.
- Install the outer-tank concrete roof.
- Install and tension concrete wall pre-stress tendons.
- Install tank internal accessories such as pump columns, bottom and top fill pipework, instrument wells, and purge and cool-down pipework.
- Install tank external accessories, such as tank instrumentation, electrical equipment, pipework, roof platforms, and access stairways.
- Hydrotest the inner tank.
- Install the tank internal and annual space instrumentation.
- Install tank perlite insulation in the annulus space between the inner and outer tank.
- Conduct the final tank cleaning.
- Install in-tank LNG pumps.
- Purge the tank with nitrogen.
- When the facility is ready for commissioning, cool down the tank to prepare to fill it with LNG.

Testing of the LNG Storage Tank

The primary inner container of the LNG storage tank would be filled and hydrostatically tested in accordance with the requirements of American Petroleum Institute Standard 620. Approximately 5.0 million gallons of water would be required to perform the test. The hydrostatic test water would be supplied by the Tacoma potable water system, and the used test water would be discharged to the municipal stormwater system. At the proposed intake pumping rate of 1,000 gallons per minute, it would take approximately four days to fill the tank to the required level for testing.

Tank settlement monitoring would be performed during the water filling, testing, and emptying activities. Detailed procedures would be developed for final cleaning and drying out of the tank after hydrotesting.

Testing of Pipework

Piping within the LNG Fueling Facility would be tested using hydrostatic or pneumatic methods. In general, cryogenic piping for transfer of LNG and water sensitive products would be pneumatically tested with dry air or nitrogen at 1.1 times design pressure. Noncryogenic piping (that is, piping for transfer of warm products) would be hydrotested using clean water at 1.5 times design pressure.

Support Facilities

Construction of foundations for buildings and installation of major mechanical equipment would occur once the LNG storage tank construction is underway. Large equipment items would be set on their foundations upon delivery. After the pipe racks are completed, work would commence on the installation of the process and utility piping. The installation of mechanical equipment would be followed by electrical and instrumentation installation. Once the piping is completed and tested, piping insulation would be installed. As the construction of the process portion of the Tacoma LNG Facility progresses, work would commence on the precommissioning activities, so that these activities would be completed concurrent with the completion of the LNG storage tank and be ready for nitrogen purging.

Site Access and Traffic

Construction of the Project would require trips associated with construction workers, as well as equipment and materials delivery. The primary truck access route to the Tacoma LNG Facility site would be via the 54th Avenue East exit from I-5 in the City of Fife. Trucks would proceed north on 54th Avenue East and then onto

Taylor Avenue. Trucks may enter the Tacoma LNG Facility site from either East 11th Street or Alexander Avenue East.

Restoration

The existing ground surface within the construction footprint of the Tacoma LNG Facility site is either paved or covered with gravel. Existing concrete, asphalt, and gravel located outside the proposed footprint would remain in place. Equipment at the Tacoma LNG Facility would be mounted to new concrete pads. The associated LNG piping would be installed above ground. Areas outside concrete pads, but near equipment and piping would be covered in crushed rock or gravel.

2.3.1.2 Hylebos In-water Construction

Demolition and construction activities to occur below elevation 11.8 feet above MLLW (pile removal and installation) in the Hylebos Waterway would occur during the in-water work window for Commencement Bay. No dredging would be required during construction. In-water construction would consist of the following main phases: demolition and removal of existing in-water structures, construction of proposed in-water and above-water structures, and installation of shoreline improvements.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the Project's NPDES General Construction Stormwater Permit. The NPDES permit guides construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

Demolition of In-water Structures

The existing 13,300-ft^2 creosote-treated timber main pier in the Hylebos Waterway adjacent to the Tacoma LNG Facility site would be demolished by water-borne equipment and transported offsite. The existing 1,274-ft^2 dock off the northwest corner of the site would also be removed. Following mobilization and staging, the main steps in demolition and removal of the two existing in-water structures would include removal of fender system, utilities, and other appurtenances; removal of the decking, including creosote-treated timbers and pavement; and removal of the creosote-treated timber piles.

Creosote-treated wood and piles would be disposed of at an appropriate upland facility that meets the liner and leachate standards of the Minimum Functional Standards, Chapter 173-304 Washington Administrative Code (WAC). Five hundred and eight creosote-treated timber piles would be removed from the Hylebos Waterway associated with the two existing structures. These piles would be removed with a vibratory hammer. Based on the type of sediment and results from other pile removal projects along the Hylebos and Blair waterways, it is anticipated that the majority of holes would immediately fill themselves upon pile extraction. However, holes remaining from vibratory removal would be filled with clean sand or other habitat mix approved by the Washington Department of Fish and Wildlife (WDFW). It is conservatively estimated that 25 percent of the piles to be removed in the Hylebos Waterway would have a hole partially remaining following extraction (127 holes). It is estimated that the total quantity of clean sand or other habitat mix needed to fill pile holes for the Project in both the Hylebos and Blair waterways would be no more than 360 cubic yards, including up to 340 cubic yards in the Hylebos Waterway and the remaining balance in the Blair Waterway.

It is also assumed that up to 10 percent of the existing piles in the Hylebos Waterway (up to 51 piles total) would break during extraction with the vibratory hammer. Piles that break would be cut off 2 feet below the mud line and capped with clean sand or other habitat mix approved by the WDFW to an elevation flush with the existing mud line. PSE would consult with EPA and the Port of Tacoma to confirm appropriate steps addressing management of broken piles during demolition activities. Under the assumption that up to 51 piles would need to be cut off in the Hylebos Waterway, this would result in up to 4.3 cubic yards of clean

sand added to the waterway to fill the various 2-foot holes, which is included in the 340 total cubic yards in the Hylebos Waterway.

Construction of In-water Structures

All support and fender piles would be installed by a barge-mounted crane (derrick), using a vibratory and hydraulic or diesel impact hammer. Before installation, the piles would be transported to the site and staged on a support barge. Installation of the 86 piles would require approximately 16 to 24 working days. The pile-driving sequence would be as follows: first, vibratory drive the piles to 90 percent or more of their design depth (within 10 feet of design tip elevation); second, proof the installation with an impact hammer until load-bearing or pile-tip elevation specifications are reached. It is anticipated that up to 60 blows per foot may be required for proofing. No temporary piling would be used for construction purposes. Once pile installation is complete, all other pier construction would be above the mean higher-high water elevation. This subsequent construction includes cast-in-place concrete pile caps, installation of concrete decking , and construction of a cast-in-place concrete topping slab, including curbs, and bull rails. Cast-in-place concrete would be delivered to the site by ready-mix trucks and pumped from land into watertight forms. Over-water construction equipment would include a barge-mounted crane (derrick), a support barge, a diesel or hydraulic impact hammer, and various small work boats. A tug-boat may also be used to position the barges.

Once the concrete decking is in place, the requisite equipment would be installed on top of the decking to include LNG transfer pipeline and articulated loading arm or hose.

Shoreline Improvements

The existing creosote-treated timber bulkhead structure (fabricated with used timber piles) would be demolished by land-based equipment, which would remain above elevation 11.8 feet MLLW and the ordinary high water mark when conducting the work. Waste would be disposed of at an appropriate upland facility. Shoreline work quantities below the elevation of 11.8 feet MLLW would be as follows:

- Excavation: 1,900 cubic yards;
- Backfill: 690 cubic yards (light, loose riprap varying in size from 3 inches to ½ cubic yard); and
- Disturbance area: 5,440 ft^2.

The existing bulkhead would remain in place while the work behind it is completed (see sequencing notes provided in Figure 2-10). The existing bulkhead would provide a measure of erosion and sediment control during construction of the new cleaner bulkhead and regrading of the resulting shoreline. Care would be taken when removing materials above the existing bulkhead, and work would be conducted during low tides.

A new steel sheet pile bulkhead approximately 600 feet in length would be installed above elevation 11.8 feet MLLW to support the existing pavement. Installation of the steel sheet piles would occur 9 feet landward of the existing creosote bulkhead to minimize impacts to the shoreline area. Existing debris or industrial fill would be removed as necessary prior to placing new backfill behind this new bulkhead

No other specific disturbances to the existing shoreline are planned. In addition to the new bulkhead, improvements would also be made to the existing stormwater outfalls. For further information on the stormwater outfall improvements see City of Tacoma Shoreline Substantial Development Permit Application No. SHR2015-40000246123.

Any disturbed areas resulting from removal of the timber bulkhead or pier demolition and construction would be repaired with riprap similar to what currently exists along the shoreline. The slope of the shoreline would be improved to and maintained at 2:1.

2.3.2 TOTE Marine Vessel LNG Fueling System

2.3.2.1 Upland Construction

Before the start of construction on the upland improvements, the exterior limits of the approved construction ROW would be civil surveyed and clearly staked or marked. Vegetation clearing would not be required for construction of the cryogenic pipeline or pipe rack preceding the LNG loading platform as the TOTE site is fully developed and currently has paved ground surface. This work would occur entirely above elevation 11.8 feet MLLW and above the ordinary high water mark. The cryogenic pipeline would be horizontally drilled or bored underground without trenching or constructed below grade in a concrete trench with a steel grate over the top. Any excess or spoil material would not be stockpiled. These materials would be hauled from the workspace areas and disposed of at approved sites. Following construction, any disturbed surfaces would be restored to preexisting conditions. Groundwater encountered during construction would be placed into a tank and then discharged into a sanitary sewer system or decant facility consistent with applicable regulations.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the Project's NPDES General Construction Stormwater Permit. The NPDES permit guides construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

2.3.2.2 In-water Construction

This section describes the various procedures for construction of the in-water components of the TOTE Marine Vessel LNG Fueling System. Demolition and construction activities to occur below elevation 11.8 feet MLLW (pile removal and installation) in the Blair Waterway would occur during the in-water work window for Commencement Bay. The fueling operations and delivering-vessel berthing facilities would be configured to avoid dredging. In-water construction would consist of the following main phases: demolition and removal of existing in-water structures and construction of proposed in-water and above-water structures. The onshore end of the trestle to the new LNG loading platform would land on an abutment and wing-wall system constructed with land-based equipment and would not require any in-water work.

Demolition of In-water Structures

Demolition would include removal of the creosote-treated timber pile supported catwalk from the existing Aft Loading Ramp Platform to the onshore mooring point and capstan. See Figure 2-17.

The existing creosote-treated timber structure would be demolished by water-born equipment and transported off site. Creosote-treated timber and piling would be disposed of at an appropriate upland facility meeting the liner and leachate standards of the Minimum Functional Standards, Chapter 173-304 WAC. Twenty-four creosote-treated timber pilings would be removed from the Blair Waterway. These piles would be removed with a vibratory hammer. Based on the type of sediment and results from other pile removal projects along the Hylebos and Blair waterways, it is anticipated that the majority of holes would immediately fill themselves upon pile extraction. However, holes remaining from vibratory removal would be filled with clean sand or other habitat mix approved by the WDFW. It is conservatively estimated that 25 percent of the piles to be removed in the Blair Waterway would have some portion of a hole remaining following extraction (up to six holes). It is estimated that the total quantity of clean sand or other habitat mix needed to fill pile holes for the Project in both the Hylebos and Blair waterways would be no more than 360 cubic yards, including up to 20 cubic yards in the Blair Waterway and the balance in the Hylebos Waterway.

It is assumed that up to 10 percent of the existing piles in the Blair Waterway (up to two piles total) would break during extraction with the vibratory hammer. Piles that break would be cut off 2 feet below the mud line and capped with clean sand or other habitat mix approved by the WDFW to an elevation flush with the

existing mud line. Under the assumption that one pile would need to be cut off in the Blair Waterway, this would result in up to 0.2 cubic yard of clean sand added to the waterway to fill the 2-foot hole, which is included in the 20 total cubic yards in the Blair Waterway.

Construction of In-water Structures

Support and fender piles would be installed by a barge-mounted crane (derrick), using a vibratory and hydraulic or diesel impact hammer. Before installation, the piles would be transported to the site and staged on a support barge. Installation of the estimated 56 piles would require approximately 10 to 15 working days. The pile-driving sequence would be as follows: first, vibratory drive the piles to 90 percent plus of their design depth (within 10 feet of design tip elevation); second, proof the installation with an impact hammer until load-bearing or pile-tip elevation specifications are reached. It is anticipated that up to 60 blows per foot may be required for proofing. No temporary piling would be used for construction purposes. Once pile installation is complete, all other pier construction would be above the mean higher-high water elevation. This subsequent construction would include cast-in-place concrete pile caps, installation of concrete decking, and construction of a cast-in-place concrete topping slab, including curbs, and bull rails. Over-water construction equipment would include a barge-mounted crane (derrick), a support barge, a diesel or hydraulic impact hammer, and various small work boats. A tug-boat may also be used to position the barges.

Shoreline Improvements

No fill, excavation, or other alterations to the existing shoreline are proposed.

2.3.3 PSE Natural Gas Distribution System

The PSE Natural Gas Distribution System pipeline segments would be installed under road ROWs consistent with existing utility planning goals established for the various jurisdictions crossed (see Section 3.7.1.3 [Land Use and Zoning Designations]). No existing buildings or structures are present in these areas and the pipeline segments would not cross any un-culverted waterbodies or regulated shoreline areas.

A typical construction zone layout would use the traffic lane that the pipeline is being installed beneath and an adjacent lane or, if appropriate, the shoulder area. Minimizing traffic impacts is a high priority, and public and worker safety are of the utmost importance. Work zones would be minimized and tightly controlled since portions of this route include congested traffic with load transfers to and from the Port of Tacoma. Traffic Control Plans would be developed and approved by the applicable local jurisdictions. Emergency vehicle access would be addressed as a primary component of the Traffic Control Plan. Signs and other warning devices would be in accordance with the Federal Highway Administration's *Manual on Uniform Traffic Control Devices* (FHWA 2009) and the WAC as well as conform to the applicable city's and county's requirements or street use permits.

2.3.3.1 General Pipeline Construction Techniques

The pipeline alignment is based on a number of criteria, chief among which are constructability, existing utilities, and surface/subsurface conditions. Standard trench or horizontal directional drill (HDD) installation would be determined during the pipeline design process. Alignment location and construction methods would be finalized and discussed in detail with the City of Tacoma, City of Fife, Washington State Department of Transportation, and Pierce County Public Works. Details would be approved through the street use permitting process with these jurisdictions.

Clearing and Trenching

Standard trench pipeline construction is expected to occur in one travel lane or road shoulder and would include temporary construction closure of up to two lanes during construction (for a typical cross section for trench pipeline construction, see Figure 2-22). Standard trench depth would be 6 feet, and width nominally 3 feet.

Clearing of vegetation would not be required for construction of the pipeline segments within the developed road ROWs. Trenching, which involves excavating ditches for a pipeline, would occur once the existing road surface has been cut and removed. The trenching would then be accomplished with a trenching machine or backhoe-type equipment. Excavated spoils would be loaded directly onto haul trucks for appropriate disposal. The trench would be backfilled with appropriate pipeline bedding materials. Pipe laydown, stringing, welding, and x-raying of welds would occur within the construction zone adjacent to the trench. Side boom tractors would lift and move the pipeline into the trench. Additional pipeline bedding and lifts of road base material would be compacted until the road surface is reached. At the end of each workday, the open trench would be covered with steel plates to allow for roadway use by the public. If trench dewatering is required during construction, the dewatering would be conducted in a manner that does not cause sediment to leave the site and would not result in exceedances of water quality standards. Groundwater encountered during construction would be placed into a tank and then discharged into a sanitary sewer system or decant facility in coordination with the applicable local jurisdiction.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the Project's NPDES General Construction Stormwater Permit. The NPDES permit would guide construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

Restoration

Construction areas where earth has been moved, equipment has operated, or material was stored would be restored as close to their original profile and condition as practical. Surplus excavated material, debris, or construction material would be removed from the workspace. Any utilities or infrastructure temporarily removed during construction would be permanently repaired, returned to their preconstruction condition, or replaced, and then the surface of roads and streets would be restored.

Hydrostatic Testing and Commissioning

After construction of each pipeline segment and before the new pipeline segments are placed in service, the entire lengths would be hydrostatically tested to ensure structural integrity. Hydrostatic testing would be conducted in accordance with the requirements of pipeline safety regulations in 49 CFR 192 (Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards, Subpart J, "Test Requirements"). PSE would obtain the requisite approvals for use of hydrants and discharge to sanitary sewer systems, before initiation of construction.

2.3.3.2 Special Construction Techniques

Waterbody Crossings

Four streams/drainages are within culverts, where they would be crossed by the proposed pipeline segments within existing road ROWs. Typically, the pipeline would be installed under these existing culverts by using an HDD/bore or open trench with suspension of culvert without disturbing the streams. If the culvert is very deep, then the pipeline could be located over the culvert. Pipeline crossings under the existing culverts would maintain at least 12 inches from the bottom of the culverts to prevent damage during the installation.

Highway Crossings

The section of Pipeline Segment A that would cross under I-5 and Highway 99E may be installed via a single HDD to cross under both highways. The HDD could extend from a point within the 62nd Avenue East ROW for a distance of approximately 0.2 mile (1,000 feet) to the south side of I-5 before ending at the intersection of 62nd Avenue East and 20th Street East. A final HDD plan would be prepared during final design.

Railroad Crossings

Various railroad tracks are present on the Blair-Hylebos peninsula in the Taylor Way ROW. Some of these tracks will be removed and others reconstructed as part of the approach that results in rebuilding of Taylor Way to "heavy haul" standards that has been agreed upon by PSE, the Port of Tacoma, and the City of Tacoma.

Contaminated Soils

Contamination associated with the historical industrial uses in the surrounding area may extend to locations within the construction footprint proposed for distribution Pipeline Segment A on the Blair-Hylebos peninsula. One pipeline construction option is to horizontally drill or bore a portion of this segment to allow more comprehensive management of potential contaminated soils present in the Taylor Way ROW. The use of drilling or boring would preclude the need to expose soils in potentially contaminated areas.

2.3.3.3 New Limit Station and Upgraded Existing Gate Station

Construct New Golden Given Limit Station

The new Golden Given Limit Station would be constructed entirely within one previously developed parcel. No previously undisturbed area would be developed, and no additional construction workspace would be required outside of this parcel. The existing building and pavement would be removed as needed for construction of the proposed improvements. The specific improvements and components of the limit station would then be completed, including some trenching for underground piping. Two small buildings would be constructed to mitigate potential noise associated with the proposed equipment.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMP controls would be inspected and maintained until the end of construction.

Upgrade Existing Fredrickson Gate Station

The upgrades to the existing Fredrickson Gate Station would occur entirely within the existing developed footprint on Parcel 0318011007. The existing gate station components would be modified as needed and new components would then be completed including some trenching for underground piping.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMP controls would be inspected and maintained until the end of construction.

2.4 Operations

2.4.1 Tacoma LNG Facility

PSE will be responsible for staffing and operating the facility. PSE has extensive experience and capabilities in operating large energy infrastructure. In addition to its extensive natural gas and electric distribution systems, PSE also operates an LNG facility in Gig Harbor, Washington, a large underground storage facility in Chehalis, Washington, nine natural gas fired power plants, three wind farms, and two hydroelectric facilities. In total, PSE is responsible for over $10.5 billion of assets that are either directly or indirectly related to operating energy infrastructure.

PSE took delivery of its mobile LNG tanker and vaporizer in 2000 and has been operating the Gig Harbor LNG facility since 2004. LNG customers and the surrounding community will benefit from PSE's impeccable history of safe and efficient operations.

Further, the Tacoma LNG Project will be operated by trained and qualified staff 24 hours per day, seven days per week. Operation of the facilities will comply with prescriptive federal and state regulations for LNG facilities. Worker and public safety are paramount in the operation of the Tacoma LNG facilities. Training of staff and requalification will continue during the lifetime operation of these facilities.

2.4.2 Natural Gas Pipeline

PSE will also be responsible for operating the dedicated natural gas pipeline from the Fredrickson Gate Station to the LNG facility. Natural gas flow and pipeline pressure would be monitored by PSE through its standard operational procedures.

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

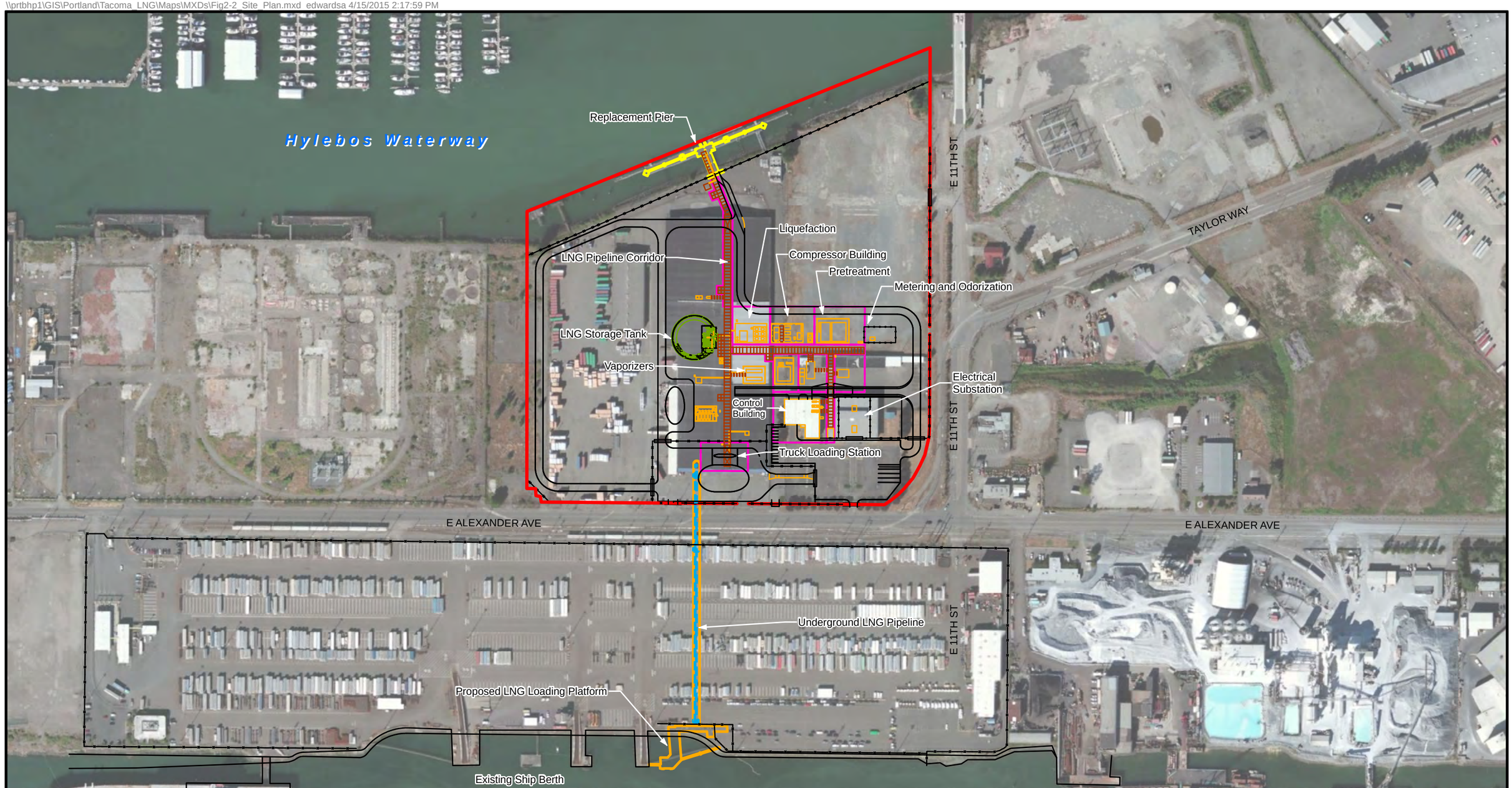
- Proposed New Pipeline
- Proposed Tacoma LNG Facility Site
- Proposed TOTE Marine Vessel LNG Fueling System Site
- Proposed Loading Platform
- Proposed Pier
- City Limit Boundary
- Parcel Boundary

0 350 700 Feet

City of Tacoma

Figure 2-1
Existing Conditions at Proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System Sites
Tacoma LNG Project

\\prtbhp1\GIS\Portland\Tacoma_LNG\Maps\MXDs\Fig2-2_Site_Plan.mxd edwardsa 4/15/2015 2:17:59 PM



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

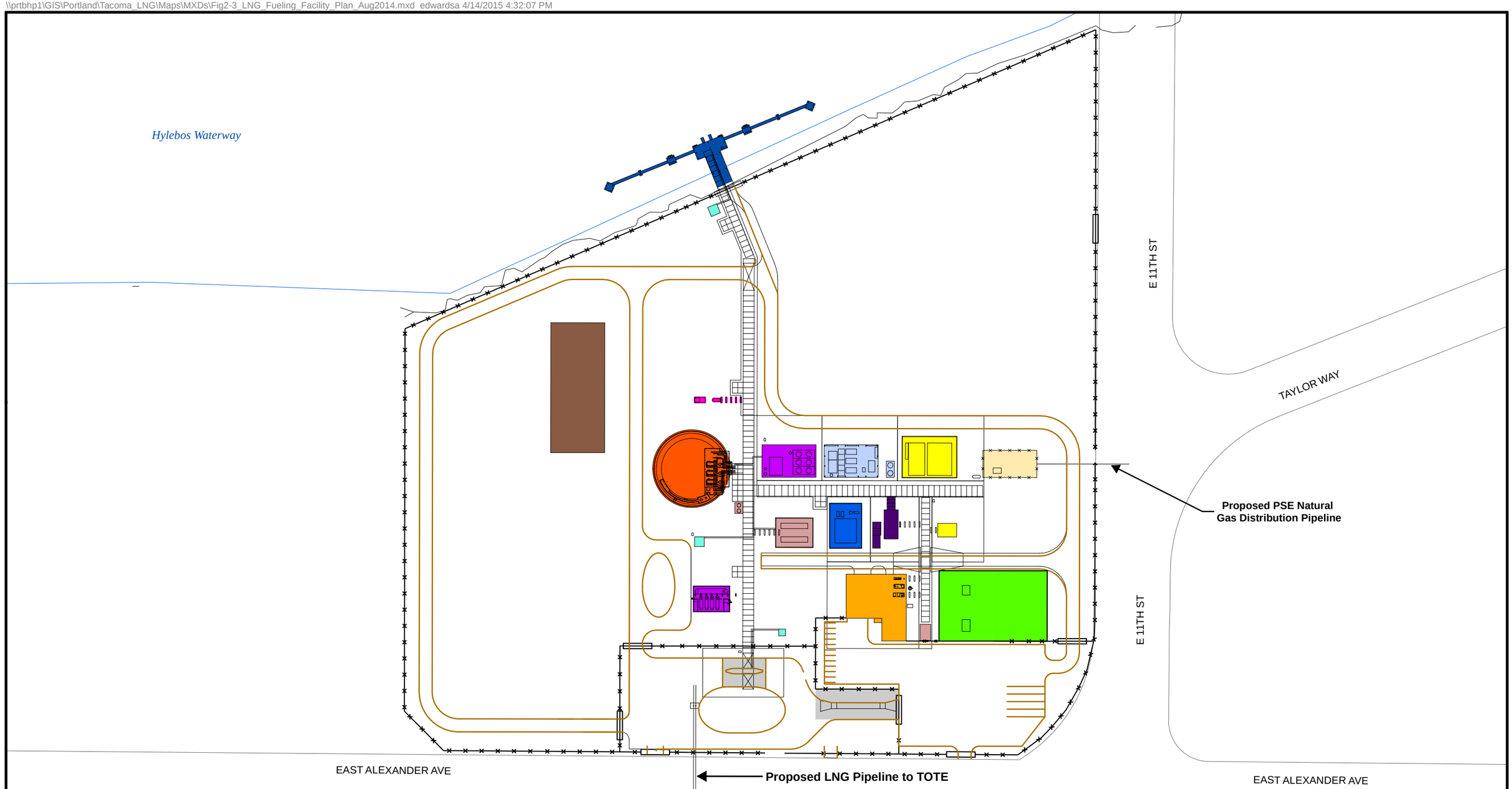
- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Pipeline - TOTE
- LNG Tank
- Racks
- Equipment
- Fence

0 300 Feet

City of Tacoma

Figure 2-2
Tacoma LNG
Facility Site Plan

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Metering and Odorization
- Pretreatment
- Compressor Building
- Liquefaction
- LNG Storage Tank
- In-Water Components
- Truck Loading Station
- Vaporization
- Sumps
- Enclosed Ground Flare System
- Facility Cooling Water System
- Power Distribution Center
- Electrical Substation
- Control Building
- Storage Building
- Equipment
- Roads
- Fence
- Hylebos Waterway
- Pipe Rack

N W E S

0 200 Feet

City of Tacoma

Figure 2-3
Tacoma LNG Facility Layout

Tacoma LNG Project

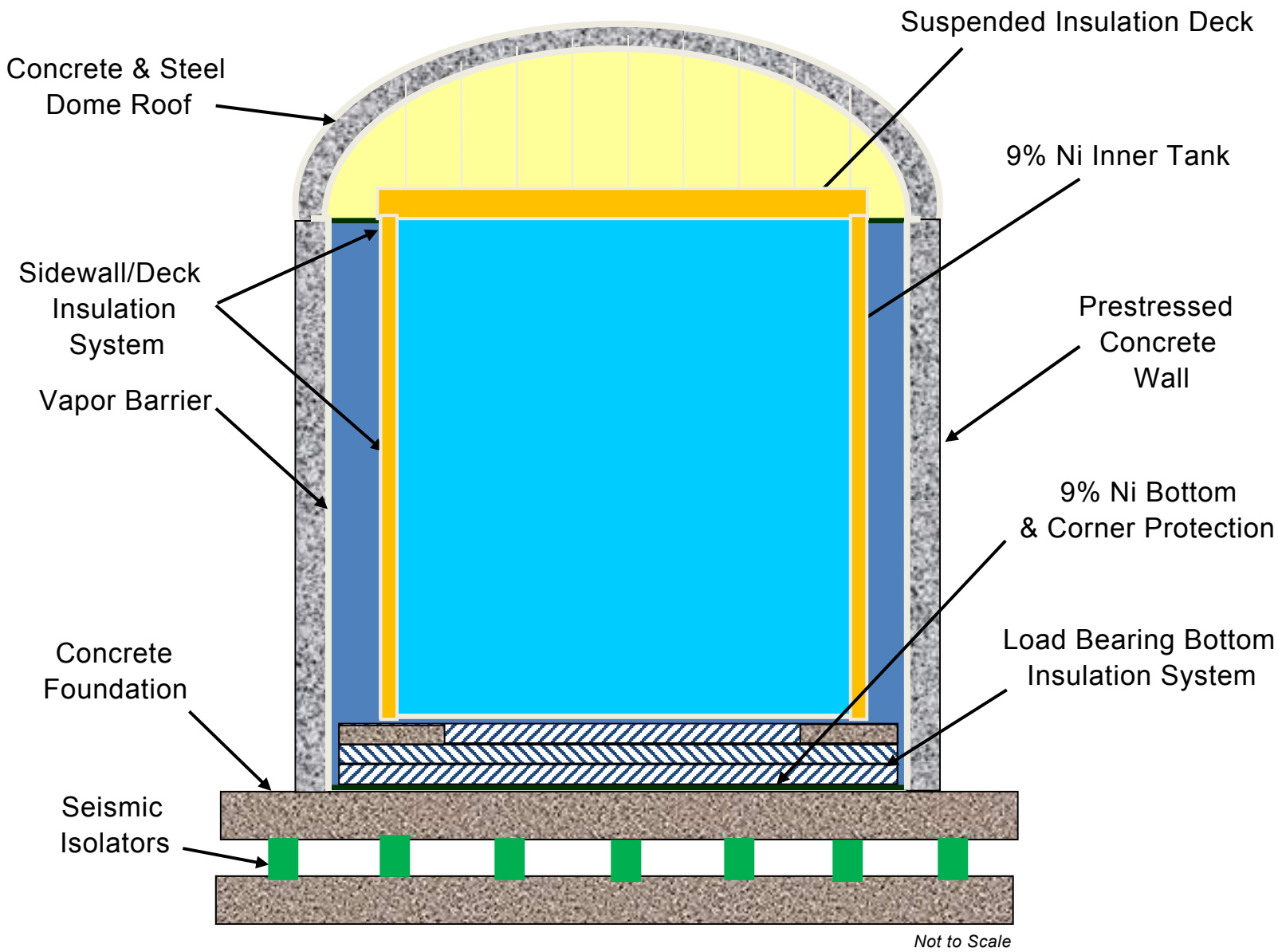
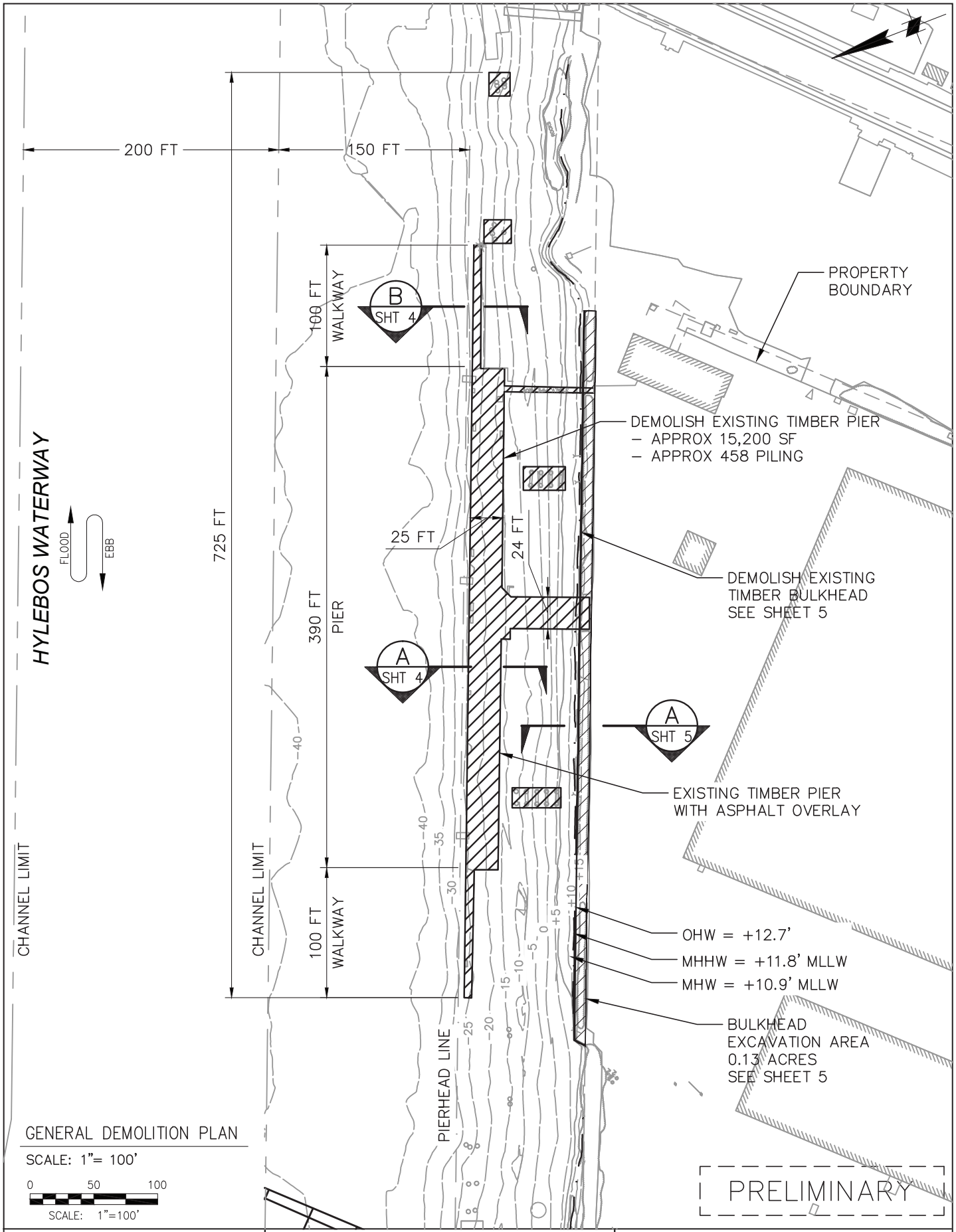


Figure 2-4
Full Containment (Concrete Roof) LNG Tank
Tacoma LNG Project

IS113012112816PDX 462738.E1.05.01 1-8-15 kk



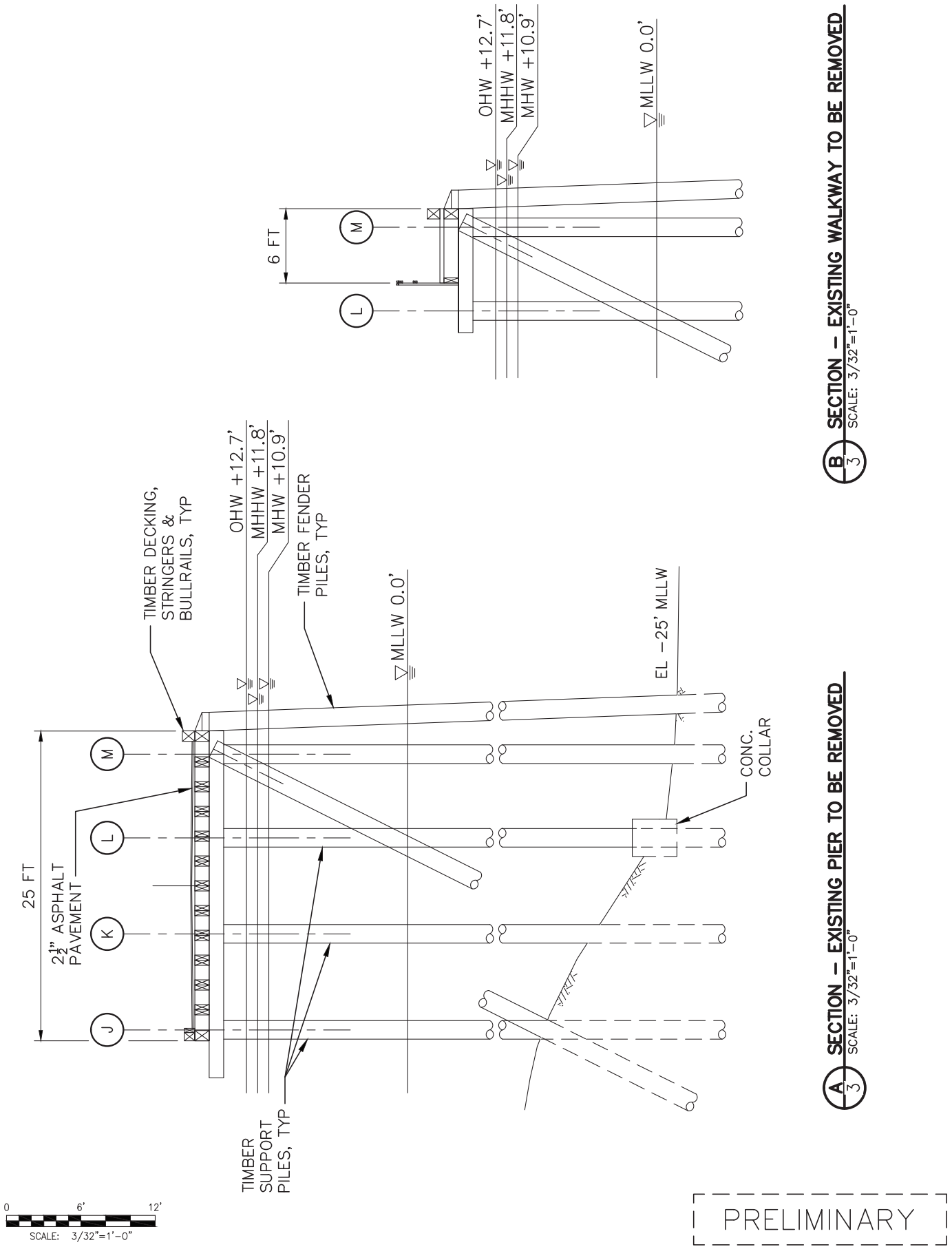
File: P:\7940 PSE LNG Barge\500 CADD_Active_Hylebos Permit Set\7940_PSE LNG – Hylebos Permit Figures; Plotted: 1/6/2015 7:03 AM

PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-5
Existing Pier Plan at Tacoma LNG Facility Site
Tacoma LNG Project



PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY

IN: PORT OF TACOMA DATUM: MLLW = 0.0'
SEC: 35 T: 21 N R: 3 E
COUNTY: PIERCE STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-6
Existing Pier Elevation at Tacoma LNG Facility Site
Tacoma LNG Project

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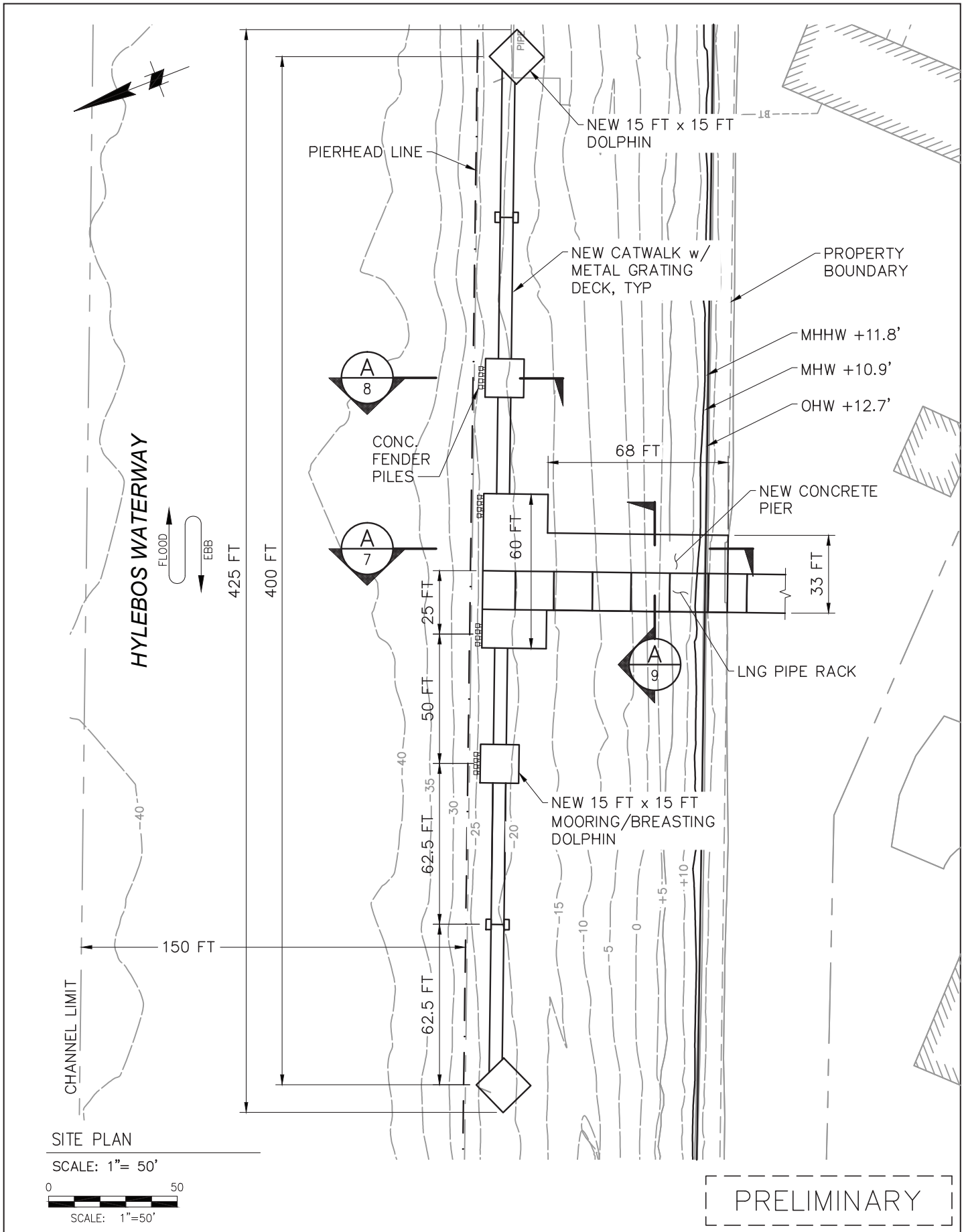

PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-7
Proposed Pier and Dolphins Plan at Tacoma LNG Facility Site
Tacoma LNG Project

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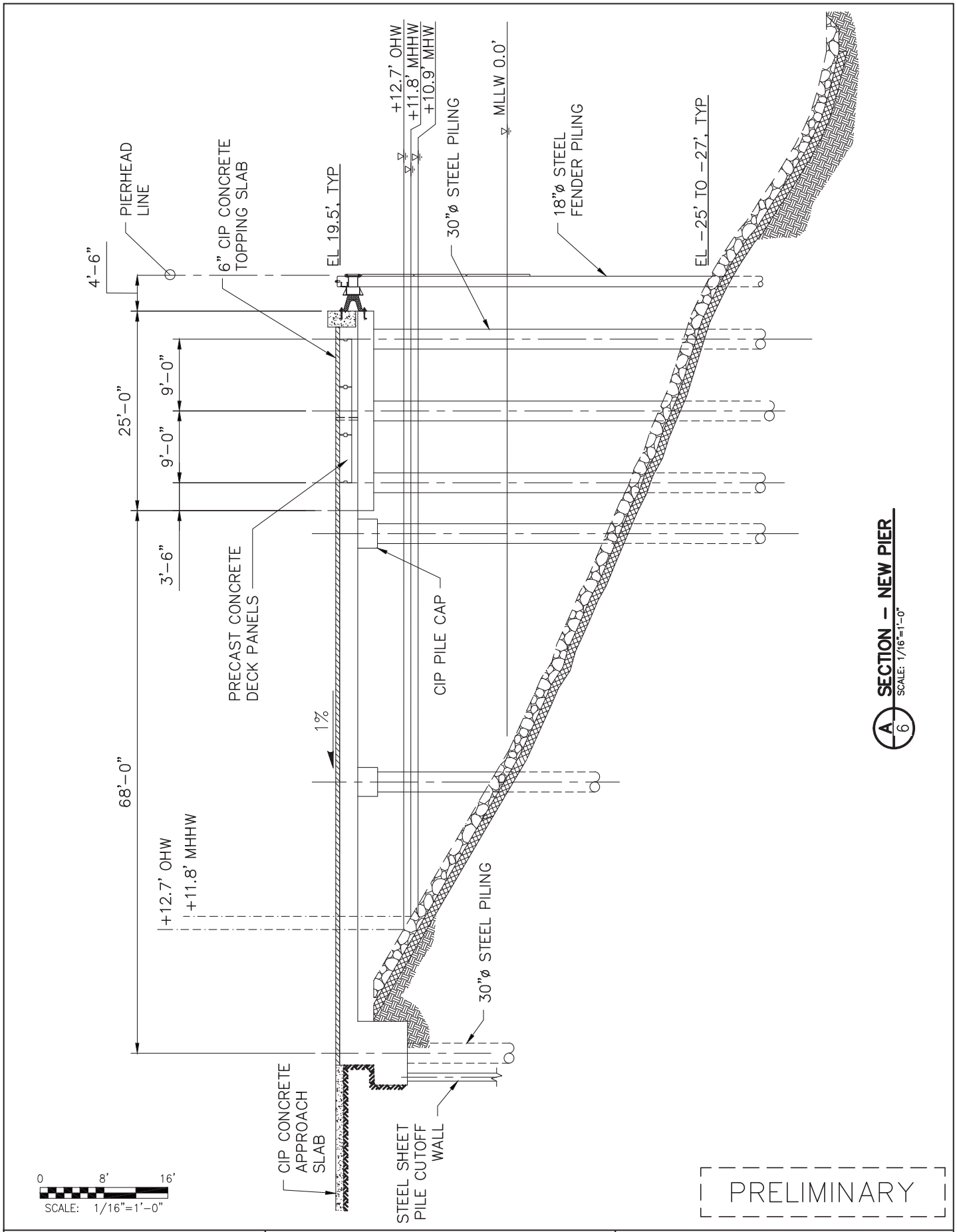

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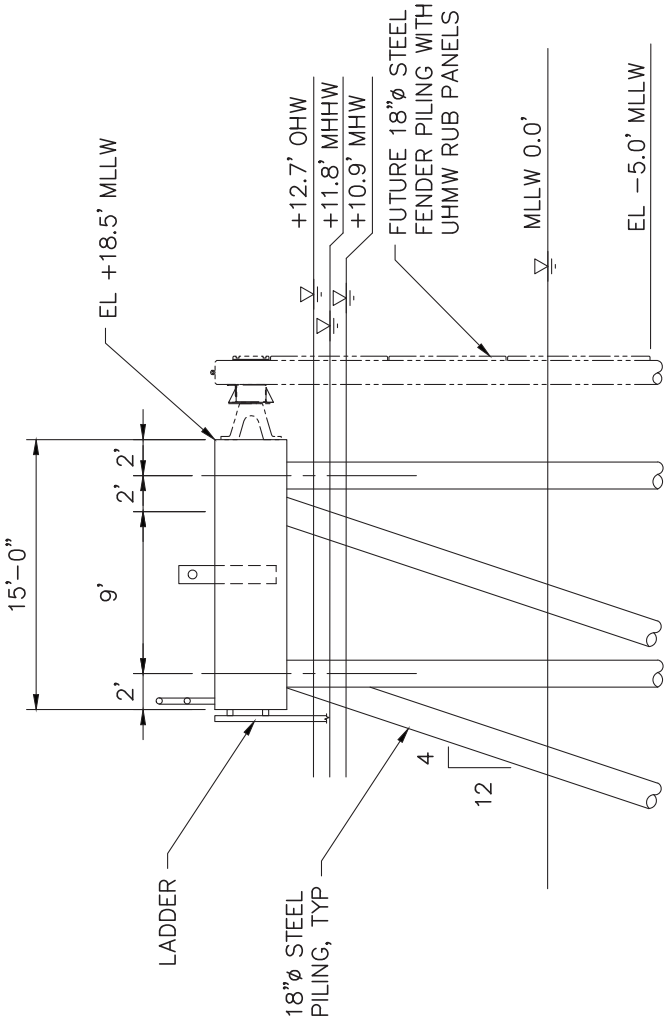
PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-8
Proposed Pier and Dolphins Elevation at Tacoma LNG Facility Site—1 of 3
Tacoma LNG Project



A/6 ELEVATION – MOORING/BREASTING DOLPHIN
SCALE: 3/32"=1'-0"

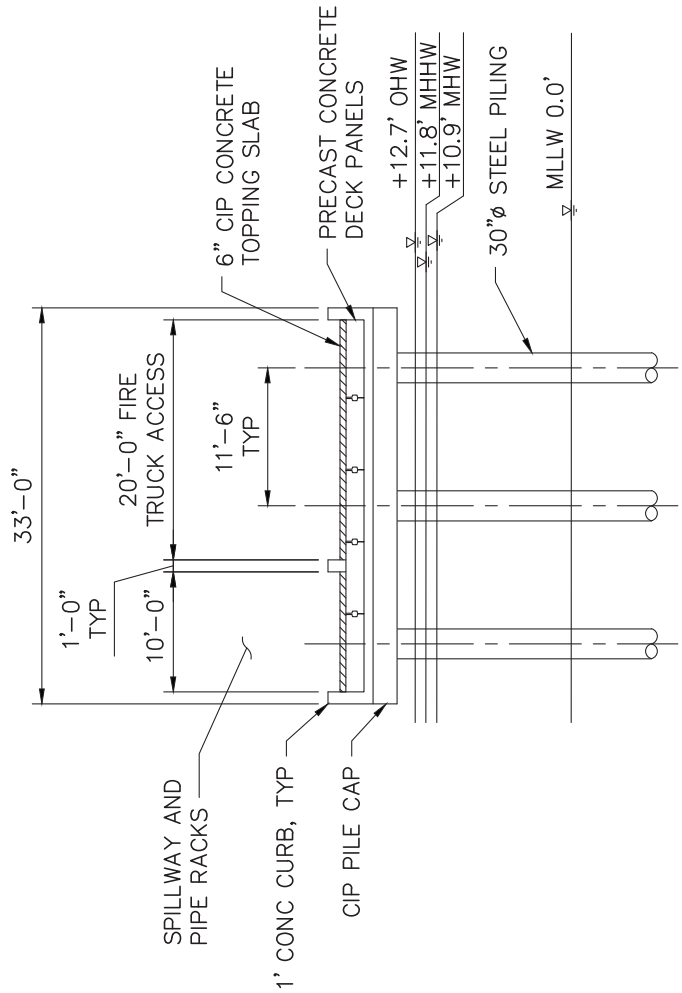
0 6' 12'
SCALE: 3/32"=1'-0"

PRELIMINARY

File: P:\7940 PSE LNG Barge\500 CADD_Active_Hylebos Permit Set\7940_PSE LNG - Hylebos Permit Figures; Plotted: 1/6/2015 7:04 AM

PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY
IN: PORT OF TACOMA DATUM: MLLW = 0.0'
SEC: 35 T: 21 N R: 3 E
COUNTY: PIERCE STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-9
Proposed Pier and Dolphins Elevation at Tacoma LNG Facility Site—2 of 3
Tacoma LNG Project



A/6 ELEVATION – ACCESS TRESTLE
SCALE: 1/16"=1'–0"

0 8' 16'
SCALE: 1/16"=1'–0"

PRELIMINARY

PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY
IN: PORT OF TACOMA DATUM: MLLW = 0.0'
SEC: 35 T: 21 N R: 3 E
COUNTY: PIERCE STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-10
Proposed Pier and Dolphins Elevation at Tacoma LNG Facility Site—3 of 3
Tacoma LNG Project

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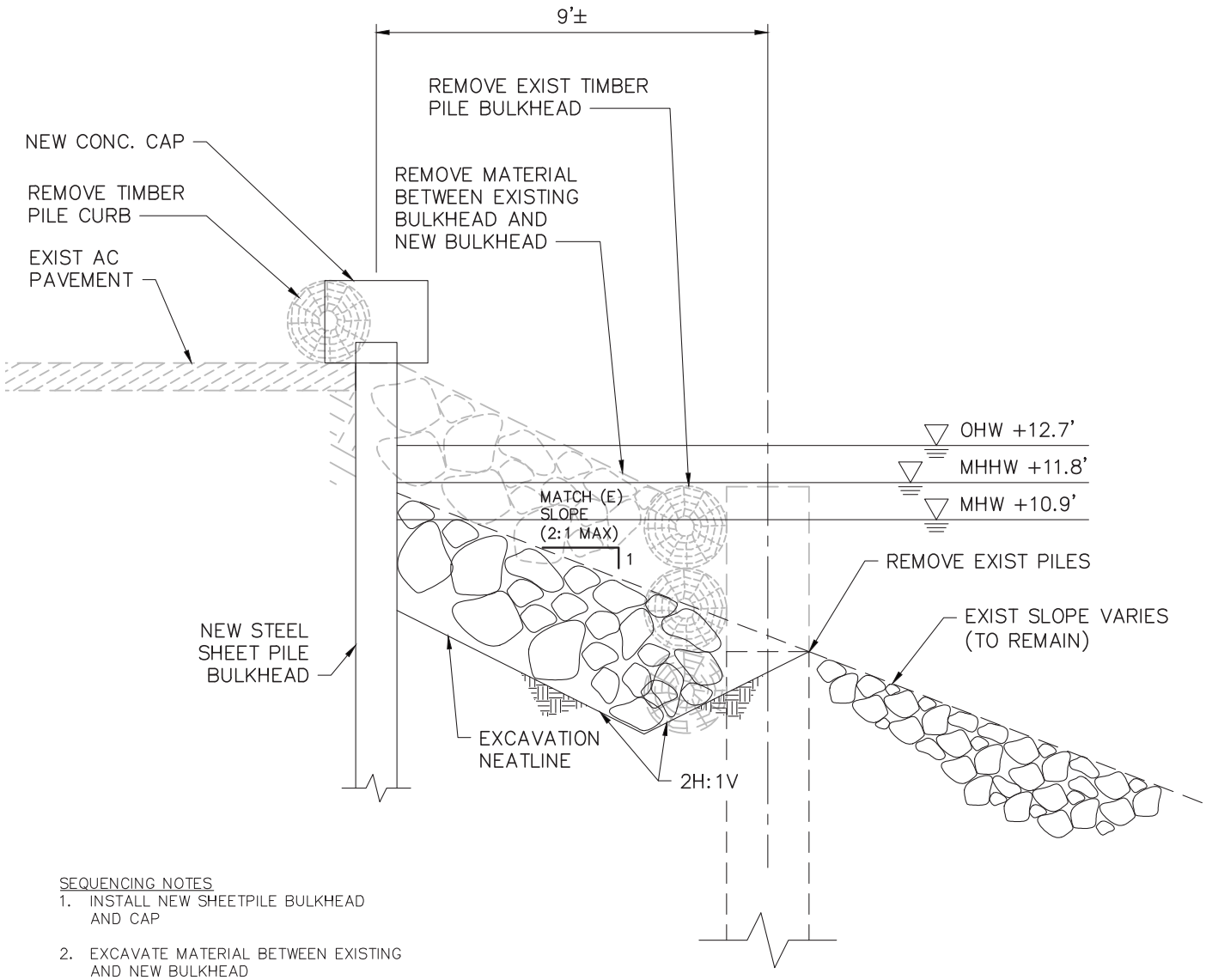

SEQUENCING NOTES

1. INSTALL NEW SHEETPILE BULKHEAD AND CAP
2. EXCAVATE MATERIAL BETWEEN EXISTING AND NEW BULKHEAD
3. PLACE BACKFILL BEHIND EXISTING BULKHEAD
4. REMOVE EXISTING TIMBER BULKHEAD

A/3 **SECTION – TIMBER BULKHEAD DEMOLITION & SLOPE RECONSTRUCTION**
SCALE: 1/4"=1'-0"

0 2' 4'
SCALE: 1/4"=1'-0"

PRELIMINARY

PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY
IN: PORT OF TACOMA DATUM: MLLW = 0.0'
SEC: 35 T: 21 N R: 3 E
COUNTY: PIERCE STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-11
Existing Shoreline Elevation at Tacoma LNG Facility Site
Tacoma LNG Project

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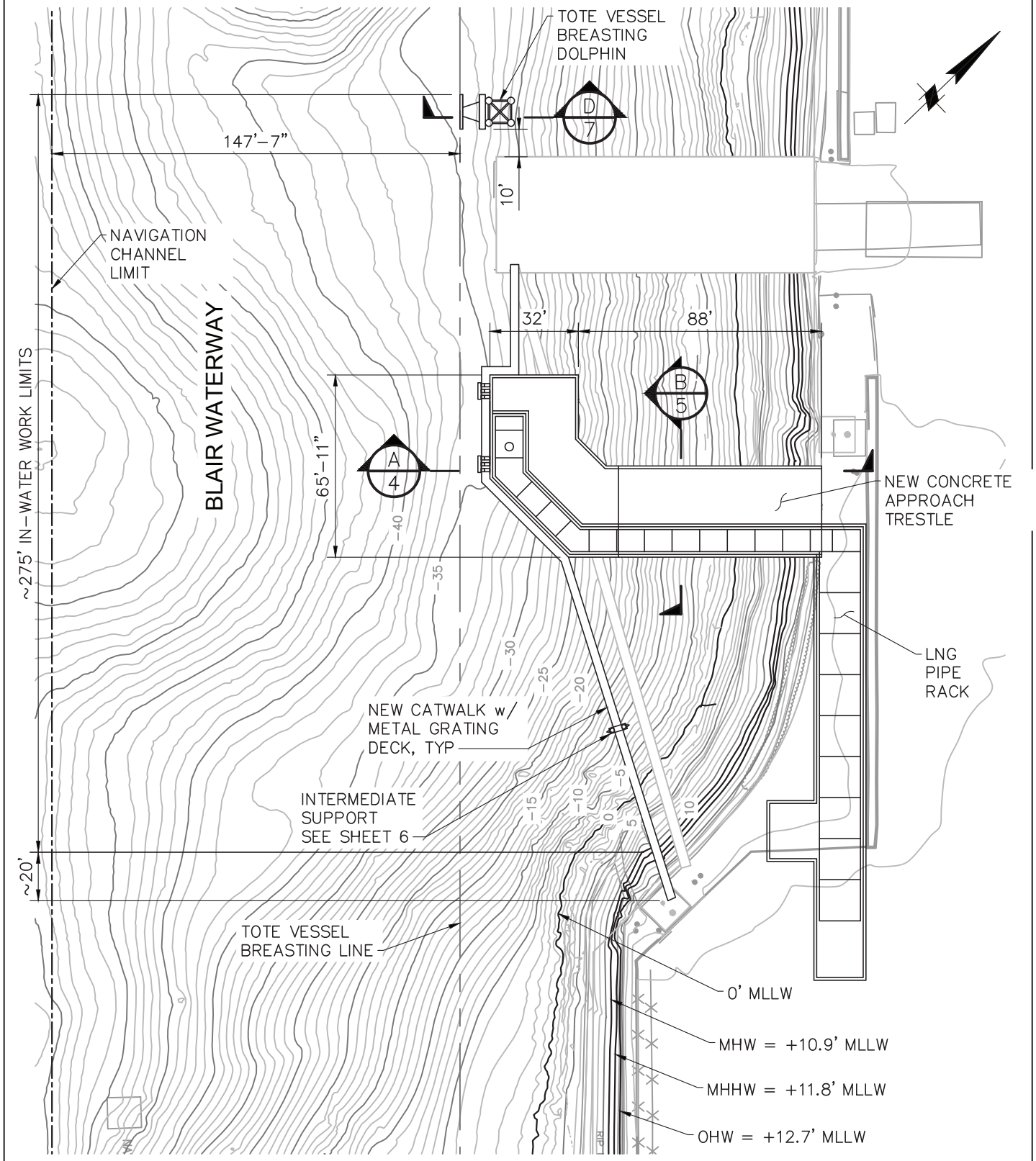


SITE PLAN – PROPOSED CONSTRUCTION

SCALE: 1"= 50'

25' 0 25' 50'

SCALE: 1" = 50'

PRELIMINARY

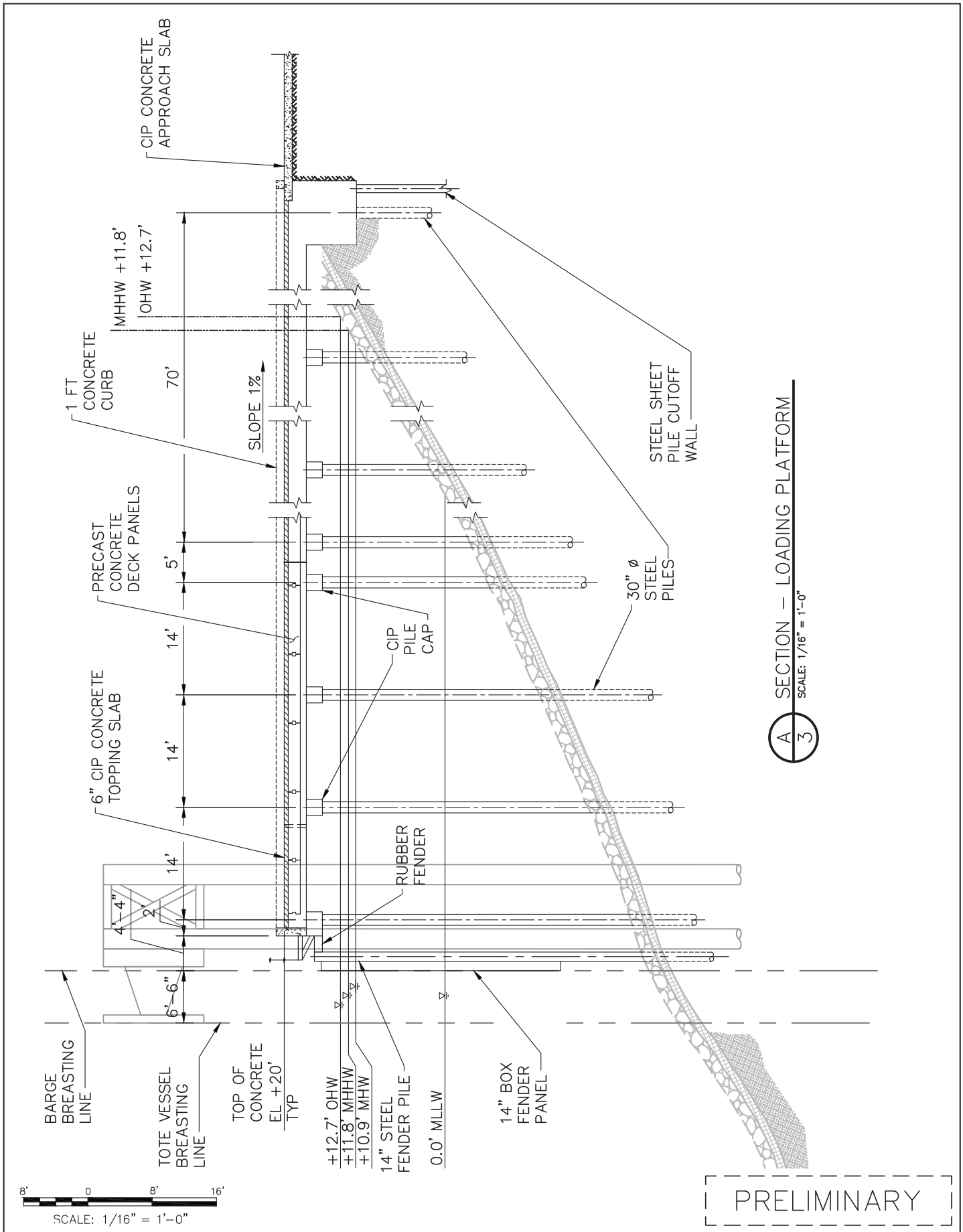
PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-12
Proposed Pier and Dolphins Plan at TOTE Marine Vessel LNG Fueling System Site
Tacoma LNG Project

File: P:\7940 PSE LNG Barge\500 CADD_Active_Blair Permit Set\7940_PSE LNG – Blair Permit Figures; Plotted: 1/6/2015 6:46 AM



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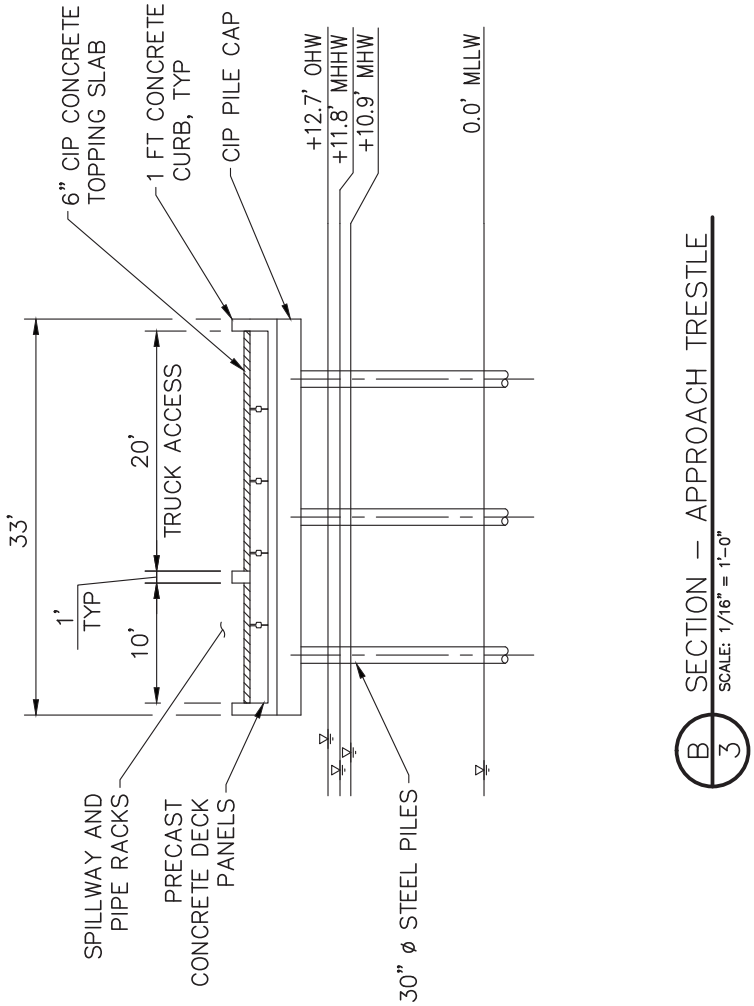
PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-13
Proposed Pier Elevation at TOTE Marine Vessel LNG Fueling System Site—1 of 2
Tacoma LNG Project



3' 0 8' 16'

SCALE: 1/16" = 1'–0"

PRELIMINARY

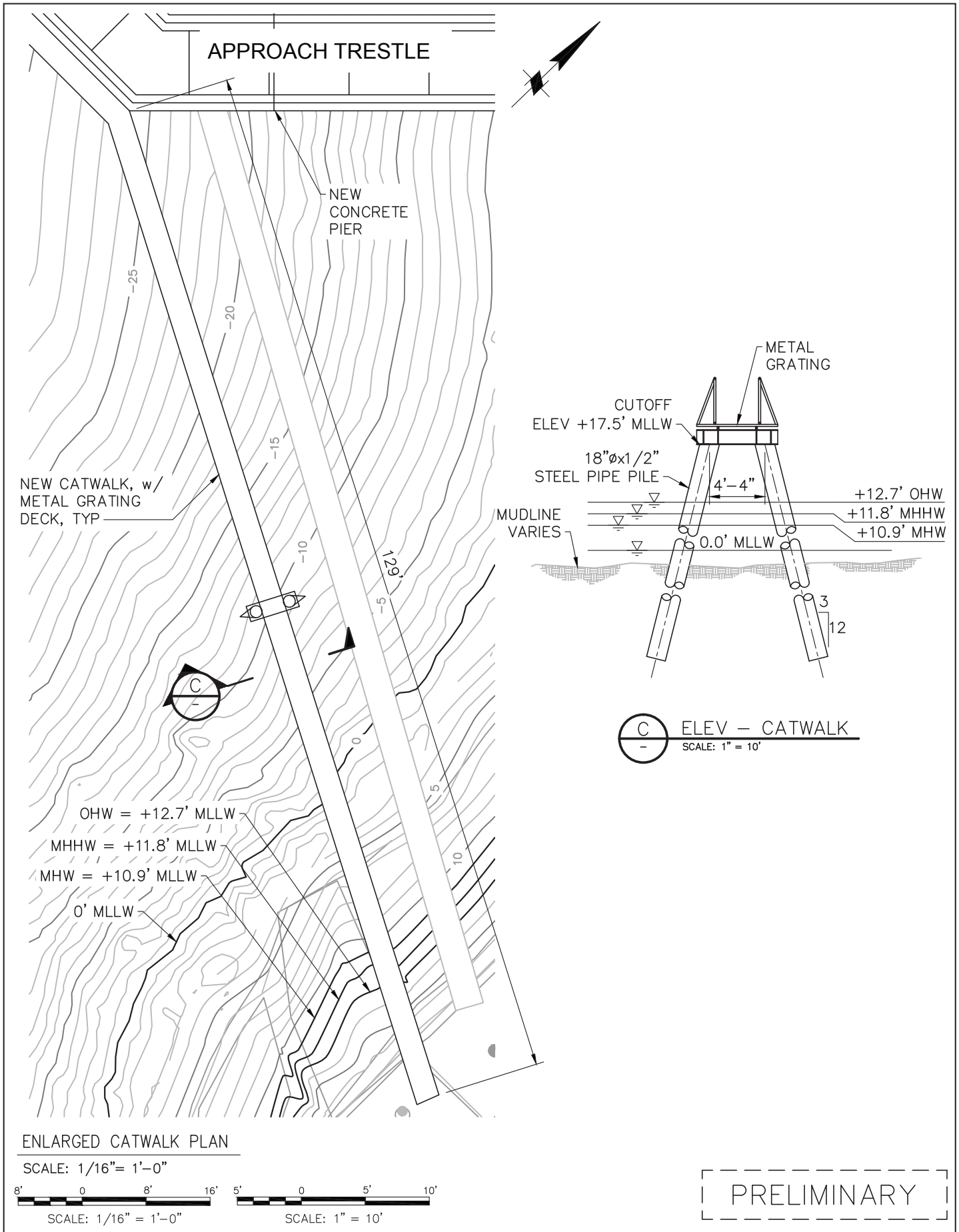
PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-14
Proposed Pier Elevation at TOTE Marine Vessel LNG Fueling System Site—2 of 2
Tacoma LNG Project

File: P:\7940 PSE LNG Barge\500 CADD_Active_Blair Permit Set\7940_PSE LNG – Blair Permit Figures; Plotted: 1/6/2015 6:46 AM



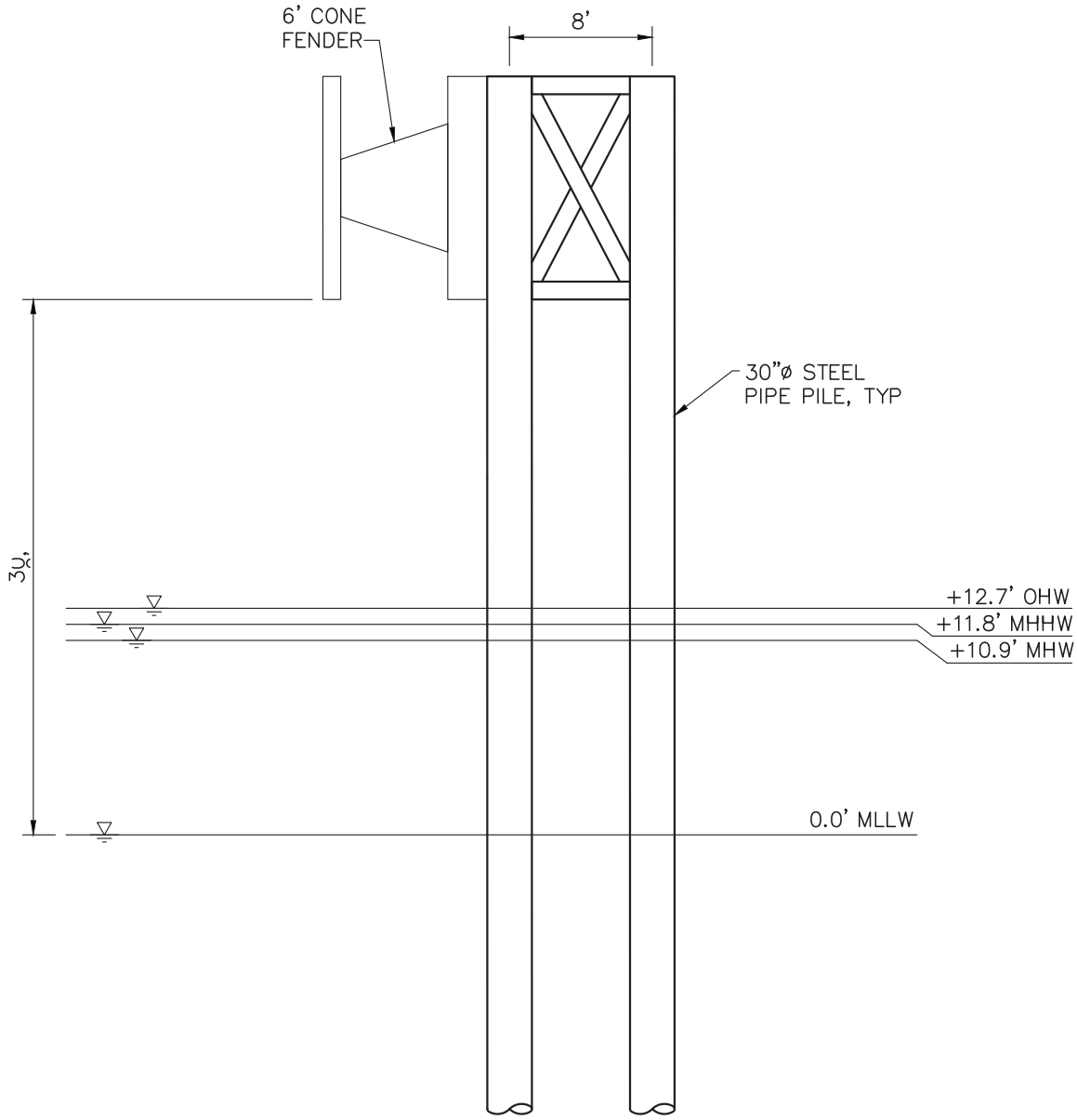
File: P:\7940 PSE LNG Barge\500 CADD_Active_Blair Permit Set\7940_PSE LNG - Blair Permit Figures; Plotted: 1/6/2015 6:47 AM

PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-15
Proposed Catwalk Plan and Elevation at TOTE Marine Vessel LNG Fueling System Site
Tacoma LNG Project



D/3 ELEV – TOTE VESSEL BREASTING DOLPHIN
SCALE: 1" = 10'

5' 0 5' 10'
SCALE: 1" = 10'

PRELIMINARY

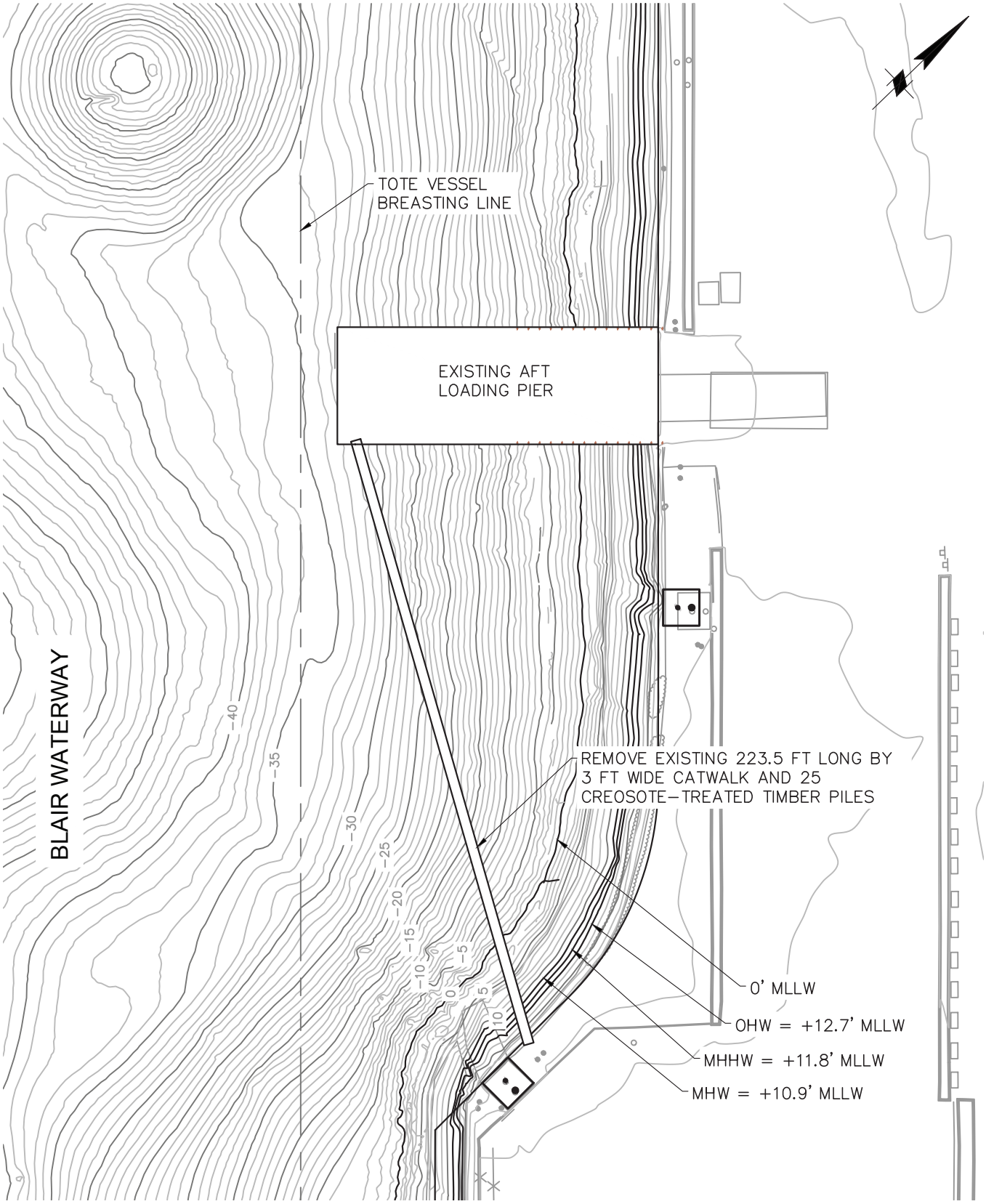
PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-16
Proposed Breasting Dolphin Elevation at TOTE Marine Vessel LNG Fueling System Site
Tacoma LNG Project

File: P:\7940 PSE LNG Barge\500 CADD_Active_Blair Permit Set\7940_PSE LNG – Blair Permit Figures; Plotted: 1/6/2015 6:47 AM



SITE PLAN – EXISTING CONDITIONS & REMOVAL PLAN

SCALE: 1"= 50'

25' 0 25' 50'

SCALE: 1" = 50'

PRELIMINARY

PROPOSED: BLAIR WATERWAY LOADING PLATFORM

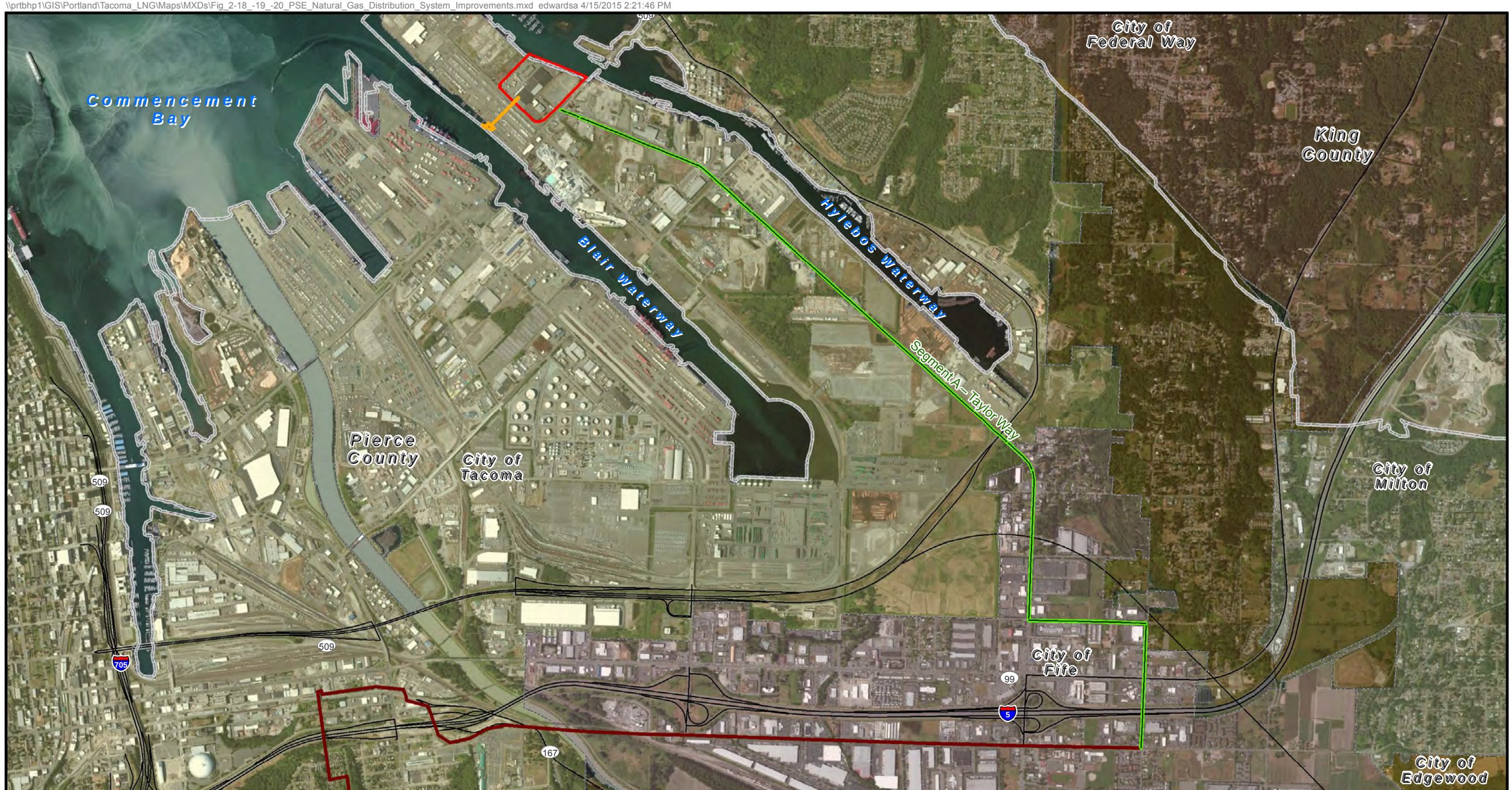
IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-17
Proposed Removal of Existing Catwalk at TOTE Marine Vessel LNG Fueling System Site
Tacoma LNG Project

File: P:\7940 PSE LNG Barge\500 CADD_Active_Blair Permit Set\7940_PSE LNG - Blair Permit Figures; Plotted: 1/6/2015 6:45 AM

\\prtbhp1\GIS\Portland\Tacoma_LNG\Maps\MXDs\Fig_2-18_-19_-20_PSE_Natural_Gas_Distribution_System_Improvements.mxd edwardsa 4/15/2015 2:21:46 PM



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- TOTE Marine Vessel LNG Fueling System
- Frederickson Gate Station
- Golden Given Limit Station
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

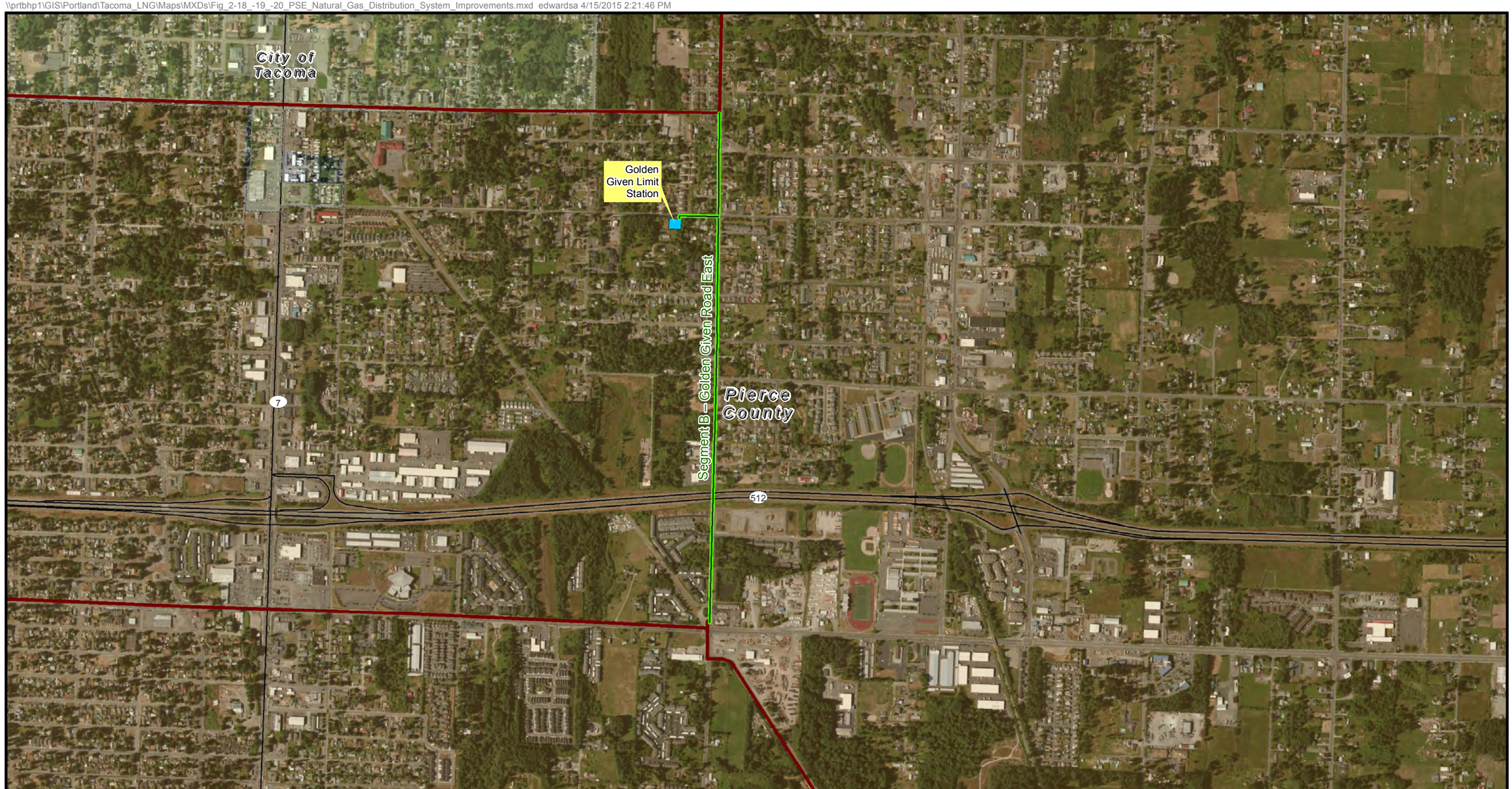
N W E S

0 1,500 Feet

City of Tacoma

Figure 2-18
PSE Natural Gas Distribution System Improvements: Pipeline Segment A

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- TOTE Marine Vessel LNG Fueling System
- Frederickson Gate Station
- Golden Given Limit Station
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

N W E S

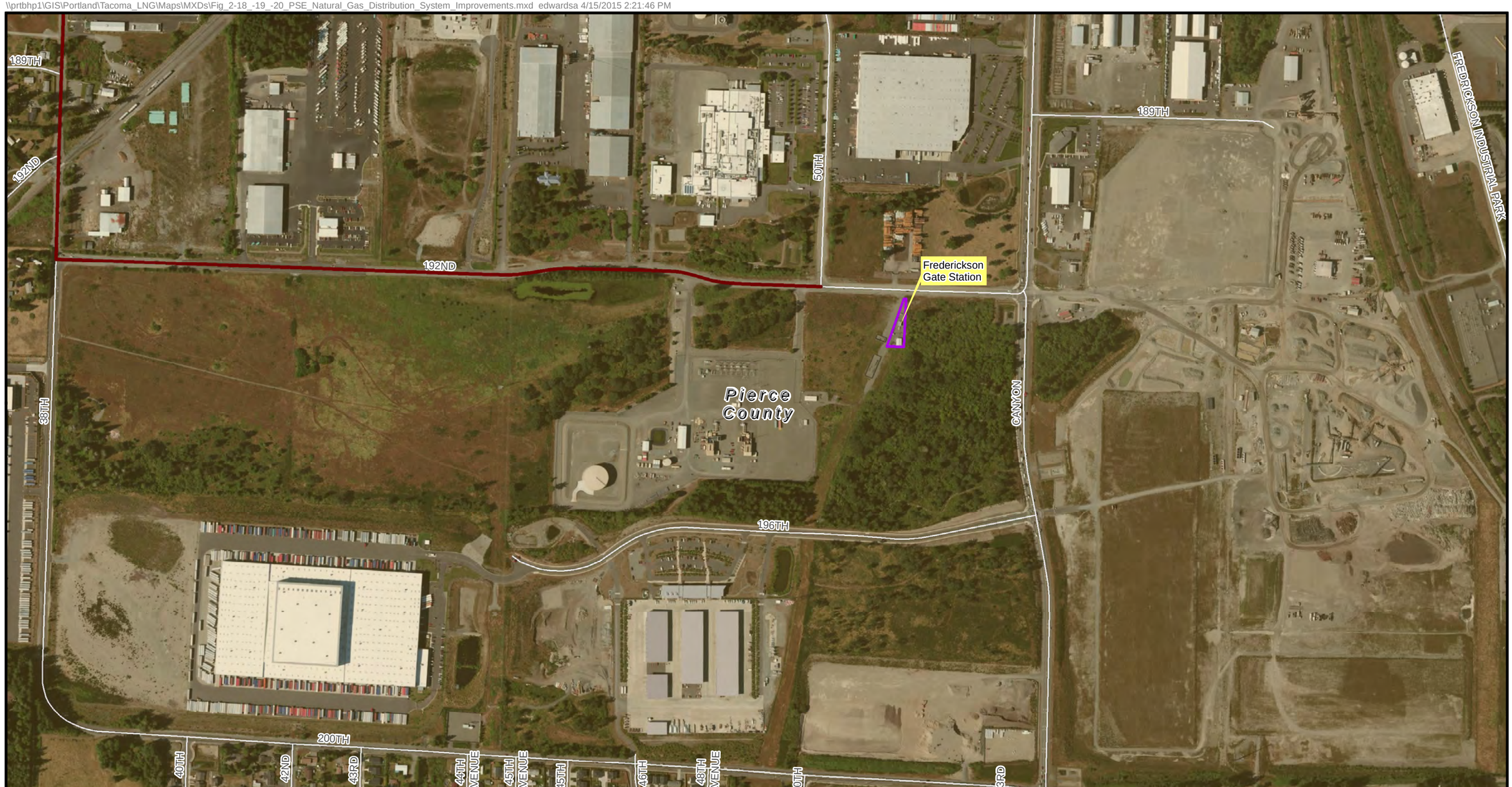
0 1,200 Feet

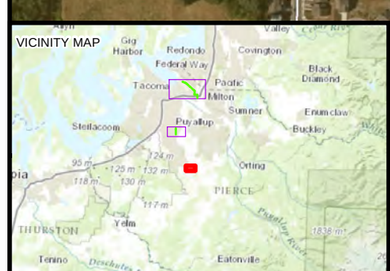
Tacoma

City of Tacoma

Figure 2-19
PSE Natural Gas Distribution System Improvements: Pipeline Segment B

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- TOTE Marine Vessel LNG Fueling System
- Frederickson Gate Station
- Golden Given Limit Station
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

N W E S

0 610 Feet

City of Tacoma

Figure 2-20
PSE Natural Gas Distribution System Improvements: Frederickson Gate Station

Tacoma LNG Project

Proposed
Control
Building

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed New Pipeline
- Proposed Tacoma LNG Facility Site Boundary
- City Limit Boundary
- Structures to be Demolished

0 100 200 Feet

City of Tacoma

Figure 2-21
Tacoma LNG Facility
Demolition Plan

Tacoma LNG Project

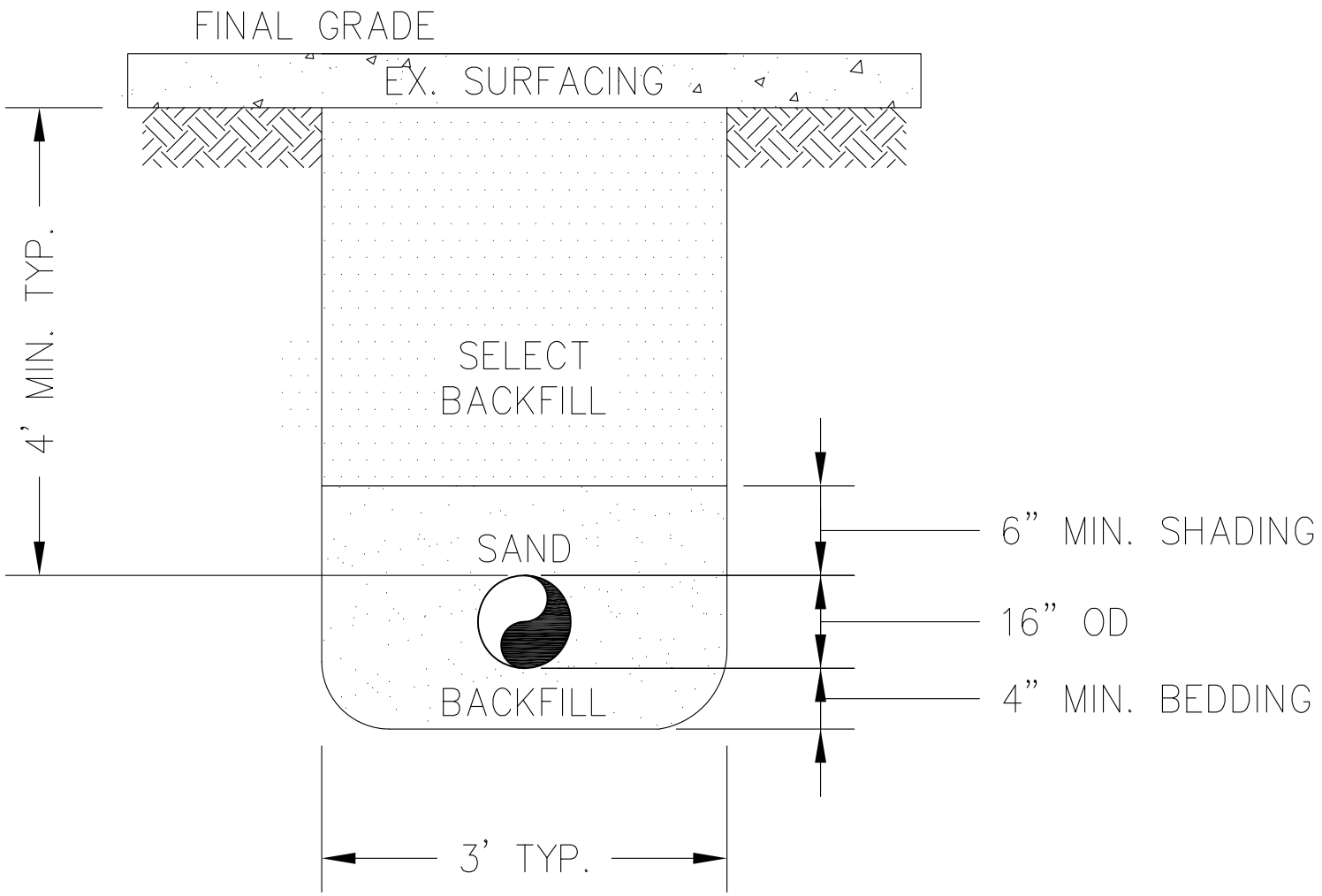


Figure 2-22
Typical Cross Section for Trench Pipeline Construction
Tacoma LNG Project

3 Affected Environment, Environmental Consequences, and Mitigation

3.1 Earth

This section describes the existing geologic, groundwater, and environmental contamination conditions in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on these conditions that could result from construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). Where appropriate, mitigation measures are identified to reduce or avoid these potential impacts.

3.1.1 Study Methodology

The methodology for the earth analysis consisted of a review of the Proposed Action site conditions as documented in geotechnical borehole logs and subsurface investigation reports, including the geotechnical report titled *Geotechnical Engineering Services, Tacoma LNG Project* (GeoEngineers 2015); published sensitive area and surficial geologic maps; United States Geological Survey maps; the *Coastal Zone Atlas of Washington* (Ecology 1979); Washington State Department of Natural Resources Division of Geology data; City of Tacoma and Pierce County critical areas ordinance maps; Pierce County Soil Survey information; and Project-specific planning and technical reports.

Existing information on site conditions and the status of existing contaminated site remedial actions in the vicinity of the Proposed Action, including the *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* (Port of Tacoma 2009) and the *Fourth Five-Year Review Report for Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington* (EPA 2014), were also reviewed as part of the evaluation presented in this section. Information on contamination and the status of remedial actions within the Proposed Action area was supplemented by initial discussions with the Port of Tacoma (Port), U.S. Environmental Protection Agency (EPA), and Washington Department of Ecology (Ecology), as well as an environmental site assessment conducted for the Project as documented in the data summary memorandum titled *Soil and Groundwater Data Summary – Limited Environmental Site Assessment, PSE Tacoma LNG Project* (GeoEngineers 2014), provided in Appendix C.

3.1.2 Regulatory Framework

This discussion of the regulatory framework is divided between: (1) geology and geologic hazards, and (2) environmental contamination and remediation.

3.1.2.1 Geology and Geologic Hazards

Federal regulations stated in 49 *Code of Federal Regulations* (CFR) 193, via their adoption of National Fire Protection Association*59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)* (as adopted by 49 CFR 193), establish requirements for seismic protection design of LNG facilities (NFPA 2013). Additionally, local jurisdictions' adoption of critical areas ordinances also establishes regulatory requirements regarding structures in and near geologic hazard areas. Within the Project area, these local entities are the City of Tacoma, the City of Fife, and Pierce County. The specific regulatory codes for these jurisdictions are listed below:

- City of Tacoma: Title 13, Land Use Regulatory Code, of the City of Tacoma Municipal Code (revised November 2014); Section 13.11.700, Geologically Hazardous Areas;
- City of Fife: Title 17, Environmental Protection of the Fife Municipal Code; Section 17.11, Geologically Hazardous Areas; and

- Pierce County: Title 18E, Development Regulations, Critical Areas of the County Code; Sections 18E.60 Volcanic Hazard Areas, 18E.80 Landslide Hazard Areas, 18E.90 Seismic (Earthquake) Hazard Areas, 18E.100 Mine Hazard Areas, and 18E.110 Erosion Hazard Areas

Geologic hazards within the proposed Project elements were evaluated with respect to the strictest criteria, found in federal regulation 49 CFR part 193 and in the critical areas provisions identified above.

3.1.2.2 Environmental Contamination and Remediation

The investigation, characterization, and cleanup of identified hazardous media (groundwater, subsurface soil, or sediment) are activities regulated by federal, state, and local regulatory programs. The principal regulatory programs applicable to the Project are summarized below.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly referred to as Superfund, is a federal law administered by EPA governing the cleanup of hazardous substance contaminated sites. CERCLA enabled modifications to the National Contingency Plan to include guidelines and procedures for responding to releases of hazardous substances, and to establish a National Priority List (NPL). The NPL is a management tool used by EPA to prioritize sites with known or threatened releases of hazardous substances, pollutants, or contaminants. Ongoing CERCLA remedial actions, and remedial action effectiveness monitoring, are being conducted under the direction of EPA within the Commencement Bay Nearshore/Tideflats, including the Hylebos Waterway (EPA 2011).

Model Toxics Control Act

The Model Toxics Control Act (MTCA) (*Revised Code of Washington* [RCW] Chapter 70.105D) is the Washington State cleanup law that funds and regulates the cleanup of sites contaminated with hazardous waste through a tax on the sale of hazardous substances (Ecology 2013). Ecology implements cleanup actions as dictated by the MTCA regulations (MTCA Cleanup Regulation, Chapter 173-340 Washington Administrative Code). The MTCA is intended to be a streamlined cleanup program with strict cleanup standards to protect human health and the environment, but provide greater flexibility for site-specific cleanup compared to federal programs (Ecology 2013). Sites requiring further action following an initial investigation by Ecology are added to either the Integrated Site Information System database or the Leaking Underground Storage Tank database and are tracked through cleanup completion. Sites not cleaned up voluntarily are added to the Hazardous Sites List, and Ecology strives to work cooperatively with potentially liable persons to achieve prompt and effective cleanup (Ecology 2013). Ecology may use formal agreements (consent decrees or agreed orders) or allow potentially liable persons to clean up their sites independently through a Voluntary Cleanup Program. While the Voluntary Cleanup Program is conducted without oversight from Ecology, Ecology can request review of cleanup completion reports to obtain a letter of "No Further Action." If cleanup actions are necessary, they ideally would be conducted before or during development of the Proposed Action and in accordance with MTCA regulations. In the event that cleanup actions extend to locations within the footprint of the Proposed Action, Puget Sound Energy (PSE) and the Port will work with the regulatory agencies to ensure continued coordination between development and cleanup actions.

Tacoma-Pierce County Health Department Underground Storage Tank Removal

The Tacoma-Pierce County Health Department (TPCHD) administers the underground storage tank (UST) removal program for properties within Pierce County under Chapter 4 of the Environmental Health Code, Underground Storage Tanks, Board of Health Resolution 2010-4225. Before removal of a UST, a UST Decommissioning Permit must be obtained from TPCHD (TPCHD 2014). If the UST is found to be leaking, the TPCHD requires the property or tank owner to undertake cleanup. The TPCHD works with Ecology on cleanup actions associated with contaminated groundwater and subsurface soil. Should a UST be discovered during implementation of the Proposed Action, PSE and the Port would work with the regulatory agencies to ensure continued coordination between development and UST decommissioning.

3.1.3 Affected Environment

The study area for the earth analysis encompasses the main components of the Project and areas directly adjacent to the components as needed to characterize potential environmental contamination and remedial actions. The main components are described in Chapter 2 (Description of Proposed Action).

Site-specific explorations and geotechnical and environmental studies have been completed for the site associated with the Project. An environmental site assessment data summary is provided in Appendix C. Figures 3.1-1a and 3.1-2a provide an overview of the Proposed Action area with respect to surface geology and liquefaction potential, respectively. Figures 3.1-1b and 3.1-1c provide more detail regarding surface geology and specific areas of the Project elements. Similarly, Figures 3.1-2b and 3.1-2c provide more detail regarding liquefaction potential and specific Proposed Action elements.

The ground surface at the proposed site of the LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System is generally level. Side slopes of the Hylebos and Blair waterways are mapped at less than 25 percent, 25 to 40 percent, and greater than 40 percent.

Topography along most of the pipeline segments and the surface of the Golden Given Limit Station and Fredrickson Gate Station is generally level or flat to less than 5 percent, without steep slopes.

3.1.3.1 Geology

As discussed in greater detail in Section 3.1.1.2 of the *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* (Port of Tacoma 2009), the geologic setting of the vicinity of the entire Project area is glacial till resulting from advancing and retreating ice sheets along with more recent mudflows originating from Mount Rainier. The Blair-Hylebos peninsula was created though dredging and deposition of those dredge spoils onto tidelands, nearshore areas, and upland areas to create the peninsula as it exists today (Port of Tacoma 2009).

The following geologic maps that cover the various components of the Proposed Action were reviewed:

- Geologic Map of the Tacoma North 7.5-minute Quadrangle, Washington (Troost and Booth, in review);
- Geologic Map of the Poverty Bay 7.5-minute Quadrangle, King and Pierce Counties, Washington (Booth, Waldron, and Troost 2004);
- Geologic Map of the Tacoma South 7.5-minute Quadrangle, Washington (Troost, in review);
- Geologic Map of the Puyallup 7.5-minute Quadrangle, Washington (Troost, in review);
- Geologic Map of the South Half of the Tacoma Quadrangle, Washington, (Walsh 1987);
- **Groundwater occurrence and stratigraphy of unconsolidated deposits, Central Pierce County, Washington,** *Water Supply Bulletin* 22 (Walters and Kimmel 1968);
- Map showing depth to bedrock of the Tacoma and Part of the Centralia 30’ X 60’ quadrangles, Washington, Miscellaneous Field Studies, Map MF-2265 (Buchanan-Banks and Collins 1994); and
- Volcanic Hazard Areas Map (Pierce County 2002).

These maps show that the proposed Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, pipeline segments, Golden Given Limit Station, Frederickson Gate Station, and surrounding areas are underlain by artificial fill, alluvial sediments, and glacial deposits.

Artificial fill at the Tacoma LNG Facility site, at the TOTE Marine Vessel LNG Fueling System site, and along portions of Pipeline Segment A consists of various grain sizes from silt to gravel and miscellaneous debris, which may include concrete rubble, garbage, and smelter slag, with relative density varying between loose and dense.

Alluvial sediments along the south portion of Pipeline Segment A are identified as alluvium (Qal), which is sand, silt, gravel, and cobbles, with some peat and organic silt, generally very loose to loose and dense in areas. Peat consists of predominantly organic matter, commonly interbedded with silt and clay, and very soft to soft.

Glacial deposits are mapped along Pipeline Segment B, and the Golden Given Limit Station would be located entirely within a mapped area of glacial till (Qgt), which is a silty sand matrix supporting gravel and lesser amounts of cobbles and boulders. The matrix varies locally in relative proportions of silt and sand, from dense to very dense.

The Fredrickson Gate Station site is underlain by Undifferentiated Glacial Drift (Qgd).

3.1.3.2 Geologic Hazards

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Because of their proximity, the geologic hazards in the vicinity of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are discussed together in this section.

Seismic Hazards

The Project would be located in an area considered seismically active due primarily to the interaction between the Pacific, Juan de Fuca, and North American plates. Subduction of the Juan de Fuca plate beneath the North American plate at the Cascadia Subduction Zone (CSZ) produces both intercrustal (between plates) and intracrustal (within a plate) earthquakes. Physical evidence suggests that several large-magnitude earthquakes (magnitude 8 to 9) have occurred along the CSZ in the last 1,500 years, the most recent of which occurred in January 1700 (Atwater 2005). The Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System sites are underlain by thick alluvial soils (primarily sand and silt deposits), which could amplify earthquake ground motions at various frequencies.

The facility would be designed to withstand two levels of earthquakes—an Operational Basis Earthquake (OBE) and a Safe Shutdown Earthquake (SSE). An OBE is an earthquake to which a facility could be subjected during its design lifetime. It is defined as a ground motion having a 10 percent probability of exceedance in 50 years (475-year recurrence interval). All elements of the Project would be designed to withstand this OBE, and the Project is expected to remain in operation following the event.

An SSE is the maximum considered earthquake ground motion per the definition in American Society of Civil Engineers (ASCE) 7 Code and the International Building Code (IBC). An SSE event is defined as a ground motion having a 2 percent probability of exceedance in 50 years (2,475-year recurrence interval). The design objective for an SSE event is to prevent catastrophic failure of critical facilities. A facility with an SSE design is not required to remain operational following the event.

Ground improvements are required to meet the seismic design criteria in 49 CFR Part 193. The ground improvements associated with the Project would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in an OBE OR SSE. The LNG tank is the largest component of the proposed Project, and ground improvement efforts would be concentrated at this location. A seismic base isolation system would be added under the LNG tank to address potential seismic events. Other portions of the Project such as the process area and land adjacent to the Hylebos pier and TOTE Marine Vessel Fueling System would also require ground improvement.

The consequences of a seismic event can include landslides, liquefaction and lateral spreading, and tsunami. The facility design standards and engineering design of LNG facilities take these events into account.

Landslide Hazards

The ground surface of the Proposed Action area does not meet the City of Tacoma's criteria for landslide hazard because the site is sloped at less than 5 percent. Slopes along the shoreline of the Hylebos and Blair

waterways do meet the City of Tacoma's technical criteria for landslide hazards. These shoreline slopes are stable under static conditions but would not be stable during an earthquake event at the OBE or SSE level. Slope stability engineering controls, including ground improvement and foundation design that would stabilize the slopes, are discussed further below in Section 3.1.6 (Avoidance, Minimization, and Mitigation).

Liquefaction and Lateral Spreading

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are located in an area identified as having a high potential for liquefaction on the City of Tacoma Seismic Hazard Area Map. Liquefaction refers to the condition by which vibration or shaking of the ground, usually from seismic forces, results in the development of excess pore pressures in saturated soils with subsequent reduction in soil sheer strength. This can result in potential liquefaction-induced settlement and lateral spreading. Ground stabilization and foundation design measures that account for these risks are included below in Section 3.1.6.1 (Construction) and further detailed in the geotechnical report (Geoengineers 2015).

Tsunami

Tsunami hazard areas are defined by the City of Tacoma as coastal areas and large lake shoreline areas susceptible to flooding and inundation as the result of excessive wave action derived from seismic or other landslide events, both described above. The Tsunami Hazard Map of Tacoma, Washington (Walsh et al. 2009) indicates that tsunami wave inundation is likely at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. A seismic tsunami coinciding with low tide would not affect the Tacoma LNG Facility. Only a seismic tsunami coinciding with normal high tides would encroach on this facility. The predicted maximum water depth is about 4.5 feet with a current of about 0.9 mile per hour (Walsh et al. 2009). Facility foundations and components close to grade would be designed to resist forces generated by the listed currents. Accordingly, Tacoma LNG Facility components would be located at their normal height above grade.

The City of Tacoma Fire Department's Emergency Management Division coordinates with the Port to operate the Port Emergency Warning System (PEWS) from the City of Tacoma Fire and Emergency Communication Center (City of Tacoma 2014). The PEWS is a system of five pole-mounted sirens linked to a central control point at the City of Tacoma Fire and Emergency Communication Center. The PEWS sirens warn of natural hazards such as tsunami in the immediate Port area and broadcast specific instructions and evacuation routes according to specific inundation zones (City of Tacoma 2014). Sirens are located throughout the Port area, including one location at the northwest end of the Blair-Hylebos peninsula where the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located (Port of Tacoma 2011). The *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013) ensures that emergency operation and evacuation efforts in response to a tsunami will follow the Federal Emergency Management Agency's (FEMA's) Incident Command System (ICS) of the National Incident Management System (NIMS), as required by RCW 38.52 and City of Tacoma Municipal Code (TMC) Chapter 1.10. The *Port of Tacoma Evacuation Map* outlines primary and secondary evacuation routes from the Port for use in the event that a tsunami requires the evacuation of the Port area (City of Tacoma 2009).

Volcanic Hazards and Lahars

The City of Tacoma and Pierce County define volcanic and lahar hazards as areas subject to pyroclastic flows, lava flows, debris avalanche, and inundation by debris flows, lahars, mud flows, or flooding resulting from volcanic activity. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are located within volcanic and lahar hazard areas. The volcanic hazards most likely to occur in the site area are mudflows, lahars, and flooding. Lahars can travel long distances. The likelihood of a large lahar, such as one travelling from area volcanoes, is at its greatest during periods of active volcanic activity. Signs of volcanic activity include earthquakes, ground deformation, gas emissions, and others, all of which provide objective indications of the need to monitor for precursory activity and provide alert-level notifications when merited.

As described above, the City of Tacoma Fire Department's Emergency Management Division coordinates with the Port to operate the PEWS from the City of Tacoma Fire and Emergency Communication Center (City of Tacoma 2014). As noted above, the PEWS includes sirens that warn of natural hazards in the immediate Port area, such as lahars resulting from the eruption of Mt. Rainier, and broadcast specific instructions and evacuation routes according to specific inundation zones (City of Tacoma 2014). (Port of Tacoma 2011). The system is also compatible with the Pierce County Department of Emergency Management's Lahar Warning System, which is a larger network of 24 sirens located throughout the Puyallup River valley and includes portions of unincorporated Pierce County and the City of Fife, Washington (Pierce County 2010). Furthermore, the *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013) ensures that emergency operation and evacuation efforts in response to the path of a lahar will follow FEMA's ICS/NIMS, as required by RCW 38.52 and TMC Chapter 1.10. The *Port of Tacoma Evacuation Map* outlines primary and secondary evacuation routes from the Port for use in the event that a lahar requires the evacuation of the Port area (City of Tacoma 2009).

Erosion Hazards

Susceptibility to erosion is generally a function of soil type, slope, groundwater seepage, or surface runoff. The City of Tacoma generally defines erosion hazard areas as a combination of specific geologic units (such as artificial fill and alluvial soils) on ground sloping greater than 15 percent or any slope 25 percent or higher with a vertical relief of 10 or more feet. The proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are not classified as erosion hazard areas, primarily because they are relatively flat.

Sea Level Rise

The potential impacts of climate change on mean sea level elevation in Commencement Bay and the Port area are difficult to accurately predict. A study issued by Ecology (2012) and the University of Washington suggests that there could be an average global sea level rise ranging from 3 to 55 inches by 2050 as a result of rising temperatures and melting glaciers. Sea level rise also can be diminished or magnified by areas of land uplift and subsidence (discussed below). The City of Tacoma identifies the Blair-Hylebos shoreline and additional uplands as being within floodplains or floodways.

Subsidence

Subsidence of the ground surface can occur from natural (karst terrain) and human-made (underground mines, tunnels) features. The City of Tacoma's maps show the nearest underground tunnel or mine as located 3 miles from the site, which poses no hazard to the Project. Geology that typically forms karst topography does not exist at or near the ground surface at the proposed Project site.

<u>Puget Sound Energy Natural Gas Distribution System</u>

General

The proposed pipeline segments within the city of Tacoma would be exempt from City of Tacoma geologic hazard provisions, based on City of Tacoma ordinance 13.09.090.F, Pipeline Facilities. Construction, maintenance, and repair of Pipeline Segment B and activities at the Fredrickson Gate Station, which would both take place in Pierce County, are exempt from provisions in the Pierce County Critical Areas ordinance, as stated in 18E.20.030.E. Similar exemptions are not defined in the City of Fife codes, where a portion of Pipeline Segment A would be located. The following sections address geologic hazards in each area.

Landslide Hazards

Pipeline Segment A, which would be located within the cities of Tacoma and Fife, would not be sited in an area that meets the criteria for landslide hazard areas. The pipeline would traverse relatively flat ground.

Pipeline Segment B and the proposed Golden Given Limit Station would be located within an upland area of Pierce County. Pipeline Segment B and the limit station would be located within a relatively flat area that does not meet the Pierce County criteria for landslide hazards.

The pipeline segments, Golden Given Limit Station, and Fredrickson Gate Station would not be located in or near steep slope areas shown on the 2003 Pierce County Steep Slope map.

Seismic Hazards

The pipeline segments, Golden Given Limit Station, and Fredrickson Gate Station would be located in western Washington, which is seismically active. Seismicity is discussed above in Section 3.1.3.2. Seismic hazards in this area are summarized as follows:

- **Ground Shaking and Ground Motion Amplification.** Some soil types can amplify the effects of earthquake ground motions at various frequencies. Pipeline Segment A is underlain by thick alluvial soils (primarily sand and silt deposits), which could amplify earthquake ground motions. Pipeline Segment B and the Golden Given Limit Station would be underlain by compact glacially consolidated soils, which are less likely to amplify ground shaking. The Fredrickson Gate Station is underlain by granular Steilacoom Gravel soils that are partially saturated. However, these deposits are typically dominated by gravel and cobbles, which are not likely to liquefy or amplify ground motions.
- **Liquefaction.** Pipeline Segment A would be located in a valley bottom that is identified as having a high potential for liquefaction during an IBC design level seismic event. Seismic activity at the Segment A locations could result in liquefaction, liquefaction-induced settlement, and lateral spreading. Pipeline Segment B, the Golden Given Limit Station, and the Frederickson Gate Station would be located in an upland area. Based on the liquefaction susceptibility map of Pierce County, Washington (Palmer et al. 2004), the liquefaction potential in this area is low.
- **Tsunami.** The Tsunami Hazard Map of Tacoma, Washington (Walsh et al. 2009) indicates that tsunami wave inundation is possible in the Port area, where portions of Pipeline Segment A would be located. There is little to no potential for a tsunami at the sites of Pipeline Segment B, the Golden Given Limit Station, or the Frederickson Gate Station. As described above in Section 3.1.3.2, the City of Tacoma Fire Department's Emergency Management Division coordinates with the Port to operate the PEWS sirens in the event a tsunami threatens the Port (City of Tacoma 2014). One of the PEWS sirens is located in the upland area of the Blair-Hylebos peninsula, where Pipeline Segment A would be located (Port of Tacoma 2011). The *Port of Tacoma Evacuation Map* outlines primary and secondary evacuation routes from the Port for use in the event that a tsunami requires the evacuation of the Port area (City of Tacoma 2009). The *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013) ensures that emergency operation and evacuation efforts in response to a tsunami will follow FEMA ICS/NIMS, as required by RCW 38.52 and TMC Chapter 1.10.

Erosion Hazards

Susceptibility to erosion is described above in Section 3.1.3.2. The proposed pipeline segments, Golden Given Limit Station, and Fredrickson Gate Station would all be located in areas of relatively flat topography and are not classified as erosion hazard areas.

Volcanic Hazards and Lahars

Volcanic hazards are described above in Section 3.1.3.2. Pipeline Segment A would be located within a Class II Inundation zone, which is an area where the recurrence interval for a lahar/mudflow is 100 to 500 years. Pipeline Segment B, the Golden Given Limit Station, and the Frederickson Gate Station would all be located in an upland area that is not within a volcanic hazard area.

The Pierce County Department of Emergency Management coordinates with the United States Geological Survey and Washington Emergency Management Division to operate and maintain the Puyallup Valley Lahar Warning System (Pierce County 2008) for areas in the potential path of a lahar. The Lahar Warning System is a network of 24 sirens located throughout the Puyallup River valley that includes portions of the city of Fife where the Project's new pipeline Segment A would be located (Pierce County 2010). The Lahar Warning

System is wired to Pierce County's Emergency Alert System, which issues emergency warnings through local broadcasters and is linked to the National Oceanic and Atmospheric Administration's all-hazards radio system designed to disseminate specific emergency warning information (Pierce County 2010). The Lahar Warning System is also compatible with the PEWS sirens described in Section 3.1.3.2. One of the PEWS sirens is located in the upland area of the Blair-Hylebos peninsula where new pipeline Segment A would be located (Port of Tacoma 2011). The *Mount Rainier Volcanic Hazards Mitigation Plan* (Pierce County 2008) ensures that emergency operation and evacuation efforts in response to the path of a lahar will follow FEMA's ICS/NIMS, as required by RCW 38.52.

Sea Level Rise

The potential impacts of climate change on mean sea level elevation are discussed in Section 3.1.3.2. Sea level rise would not inundate either the pipeline segment areas or the limit and gate station areas.

Subsidence

As described above, subsidence of the ground surface can occur from natural (karst terrain) and human-made (underground mines, tunnels) features. The City of Fife critical areas ordinance does not identify potential subsidence features such as karst topography or underground mines/tunnels, as these features are not known to exist within Fife. Karst topography does not occur within the pipeline routes or the Golden Given Limit Station site due to the substantial thickness of glacial and interglacially deposited soil material in these areas.

The Pierce County critical areas ordinance contains a Mine Hazard section to regulate development in and near known underground coal mines. The proposed pipeline routes, Golden Given Limit Station, and Frederickson Gate Station are located at least 15 miles northwest of areas where abandoned underground coal mines are known to exist within Pierce County. The pipeline routes and limit station would also located in areas that are underlain by at least 1,500 feet of glacially and interglacially deposited soil. Bedrock does not occur at or near the ground surface in these areas.

Aquifer Recharge

The pipeline segments, Golden Given Limit Station, and Frederickson Gate Station would all be located within areas that may be classified as aquifer recharge areas, based on the Pierce County January 2013 Aquifer Recharge area map.

The potential for groundwater recharge is likely low in the Pipeline Segment A site, based on the anticipated soil conditions and the fact that the pipeline would be located in roadway areas already covered with asphalt concrete pavement. Similarly, the potential for groundwater recharge is likely low at the Pipeline Segment B and Golden Given Limit Station sites since the underlying soil is relatively impermeable glacial till and the pipeline areas are already covered in impermeable asphalt concrete.

The potential for groundwater recharge is likely moderate to high at the existing Fredrickson Gate Station because the underlying soil is permeable to very permeable Steilacoom Gravel. However, the proposed activity comprises a very small area with respect to the overall extent of the Steilacoom Gravel deposit in this area.

3.1.3.3 Groundwater

This section provides general information regarding groundwater based on professional experience, explorations completed at the proposed LNG facility site, and a preliminary review of water well logs. The groundwater conditions were grouped into two general categories: lowlands (Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, and Pipeline Segment A) and uplands (Pipeline Segment B, Golden Given Limit Station, and Fredrickson Gate Station).

In the lowlands, groundwater is typically encountered at a shallow depth. In the vicinity of the Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, and Pipeline Segment A site, groundwater is typically present at depths between approximately 5 and 10 feet below ground surface. Additionally, the groundwater levels in the vicinity of the Tacoma LNG Facility site and the TOTE Marine Vessel LNG Fueling System site are moderately tidally influenced, mainly within 400 feet of the shoreline (CRA 2008).

A preliminary review was performed of well logs in the vicinity of proposed Pipeline Segment B and the Golden Given Limit Station. Based on this review and experience in the area, in the uplands areas other than the Fredrickson Gate Station, groundwater levels appear to be approximately 5 to 15 feet below ground surface. Shallow groundwater in the site area is likely perched on the impermeable glacial till soils.

A review of reports and geologic data performed in the area of the Fredrickson Gate Station shows that groundwater within the Steilacoom Gravel deposit at and near the site flows from southeast to northwest. Groundwater flooding occurred northwest of the site area in the late 1990s, based on a review of *Groundwater Flooding Evaluation, Fredrickson, Pierce County, Washington* (URS 2001). Groundwater is likely quite shallow at the site and can fluctuate by several feet in this area over a typical year.

3.1.3.4 Existing Contaminated Sites and Remedial Actions

Commencement Bay was added to the national interim list of highest priority hazardous waste sites in October 1981. In September 1983, about 10 to 12 square miles of what is named the Commencement Bay, Near Shore/Tideflats were added to the NPL as an EPA Superfund Site.

The deepwater portion of Commencement Bay was removed from the interim list in 1983 because studies showed minimal contamination in the area (EPA 2004). The entire Blair Waterway shipping channel was dredged as part of the Sitcum Waterway Remediation Project from 1993 and 1995. After completion of this dredging, the Blair Waterway was removed from the NPL.

The Hylebos Waterway is the northeastern-most waterbody associated with the Commencement Bay Nearshore/Tideflats Superfund site. EPA, in conjunction with the potentially responsible parties, formed the Hylebos Cleanup Committee, which investigated, designed, and performed remedial actions to clean up Hylebos Waterway sediment and upland source areas. Institutional controls have been placed within the waterway and upland source areas where contaminated media was left in place.

Prior to construction, PSE would obtain a Construction Stormwater General Permit and prepare a Stormwater Pollution Prevention Plan and a Materials Handling Plan to mitigate potential off-site discharges. The Tacoma LNG Facility's operations would be conducted under the Port of Tacoma's MS4 permit, or PSE would apply for an Industrial Stormwater General Permit, both of which contain best management practices (BMPs) that establish institutional controls for Hylebos Waterway sediments and upland source areas.

Tacoma LNG Facility

Hazardous substances may be present as a result of historical industrial activities on the property making up the Tacoma LNG Facility site and on nearby properties located farther northwest. Environmental cleanups or investigations have been completed on portions of these properties. The Tacoma LNG Facility site includes two areas where cleanup activities have been conducted: the Naval Reserve Center Tacoma (parcel number 2275200502; Ecology Facility Site Identification Number (FSID) 93581722) and Port Parcel 4 (parcel number 5000350040; FSID 3831). Investigation and cleanup activities are ongoing at one on-site property (Port Parcel 2, parcel number 5000350021; FSID 1377) and two properties located northwest of the site (Occidental Chemical, parcel number 2275200560; FSID 212, and Former PRI, parcel number 2275200510; FSID 1246). The formal parcel numbers (e.g., 5000350040) are shown on Figure 2-1 in Chapter 2 (Description of Proposed Action). This section describes generally these existing contaminated sites and remedial actions based on previous studies and specific information from an environmental site assessment conducted for the Project (GeoEngineers 2014).

Ongoing Investigation and Cleanup Actions

Subsurface contamination is known to be present immediately northwest of the proposed Project site as a result of hazardous material releases at the Occidental Chemical site and former bulk petroleum storage facilities on the former PRI site and in the northwest portion of Port Parcel 2. The latter two sites have been combined by Ecology and are now referred to as the Alexander Avenue Petroleum Tank Facilities (FSID 1377). Cleanup actions on properties adjacent to the Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System are summarized as follows:

- **Occidental Chemical** (approximately 1,000 feet to the northwest of the proposed Tacoma LNG Facility site): Contamination of this site resulted from historical industrial operations, including manufacturing operations for a variety of chemicals. Impacts to soil, groundwater, and nearshore sediments occur on this property and extend to the neighboring former PRI site, as well as Port Parcel 2. Some investigation activities extend to the Naval Reserve Center Tacoma property. Numerous site investigations and interim cleanup actions have been conducted. The three principal contamination issues at the site are nearshore sediments impacted by site-associated organic and inorganic contaminants; groundwater solvent plumes, which extend to the former PRI site and Port Parcel 2; and a high-pH groundwater plume that also extends off site (Port of Tacoma 2009). Remediation at the site is subject to the terms of an existing Administrative Settlement Agreement and Order on Consent (Port of Tacoma 2009).
- **Former PRI Site** (approximately 500 feet to the northwest of the Tacoma LNG Facility site): Historically, this site was primarily used for bulk fueling and related activities. However, additional historical operations also included plants for crude oil distillation or fuel blending (Port of Tacoma 2009). Impacts from Occidental Chemical include soil, groundwater, and sediment contamination associated with Occidental embankment areas (Port of Tacoma 2009). Additional petroleum impacts in soil and groundwater are associated with activities that took place at the former PRI site.
- **Port Parcel 2** (adjacent to the northwest of the Tacoma LNG Facility site): The northwest portion of this property is located adjacent to the former PRI site. The property historically was used for bulk petroleum storage. It is impacted by migration of groundwater-containing solvents and elevated pH from the Occidental Chemical site, and potentially by migration of petroleum contamination from the adjacent former PRI site (Port of Tacoma 2009). Petroleum contamination has been documented in soils and groundwater on the Port Parcel 2 property. Parcel 2 and the former PRI site are being investigated under an Agreed Order between Ecology, Marianna Properties (Occidental Chemical Corporation) and the Port.

Completed Cleanup Actions

Cleanup actions have been completed on two of the four properties proposed for the Tacoma LNG Facility site, as follows:

- **Former Naval Reserve**: This was a joint facility for the Naval and Marine Reserves that was transferred to the Port in 2011 (CRA 2012). Six USTs were removed from three locations on the property in 1993 (N.W. Construction General Contracting 1993). Four of the USTs were located near the eastern corner of the existing warehouse, and the remaining two were located southeast of the warehouse. Petroleum-contaminated soil was discovered beneath only two of the USTs (one near the eastern corner of the warehouse, and one southeast of the warehouse). This soil was removed and disposed of off site at a permitted facility. Analysis of verification soil samples obtained from the final limits of the UST excavations indicated that remaining petroleum hydrocarbon concentrations in soil were below analytical method reporting limits or MTCA Method A Cleanup Levels. Groundwater and sediment offshore of the site are subject to ongoing monitored natural recovery under the terms of the EPA Consent Decree as part of the overall Commencement Bay Nearshore/Tideflats Superfund site.

However, this property was not identified as an ongoing upland source of contamination within the Superfund site (Navy 2010).

Port Parcel 4: This property is a storage yard. The cleanup activities associated with the site were a result of areas of slag fill identified along the Hylebos Waterway. These areas were identified and addressed by a combination of removal and capping in accordance with an EPA Consent Decree (Port of Tacoma 2009).

Preliminary Environmental Assessment

As described above, known subsurface contamination is present immediately northwest of the Tacoma LNG Facility footprint as a result of hazardous substance releases at the Occidental Chemical site, the former bulk petroleum storage facilities on the former PRI site, and in the northwestern portion of Port Parcel 2. As part of an environmental assessment, PSE prepared an upland site assessment sampling and analysis plan (GeoEngineers 2014) and solicited input from EPA and Ecology. PSE would continue to work with EPA and Ecology on PSE's future project plans in areas of known or suspected contamination.

PSE conducted an environmental site assessment in May and June of 2014 (Appendix C) to evaluate whether contamination from these historical facilities has migrated to locations beneath the footprint of the Tacoma LNG Facility site. This investigation also evaluated other areas of historical industrial activity within the proposed footprint of the facility that had not previously been investigated. A preliminary review of the soil and groundwater analytical results from the site assessment suggests that groundwater contamination related to the former bulk petroleum storage facilities is present beneath the northern portion of the Tacoma LNG Facility site. Information from this investigation would be used to coordinate redevelopment plans in accordance with existing orders, restrictive covenants, or other requirements associated with such remedial actions.

TOTE Marine Vessel LNG Fueling System

Environmental investigations and cleanup actions have been performed on the proposed TOTE Marine Vessel LNG Fueling System site. Petroleum-impacted soil and four USTs were removed from the northwestern portion of the site. Two additional USTs were either abandoned in place or removed from the site; it is not known whether petroleum was released from these USTs. All of these former USTs were located approximately 500 to 1,000 feet from the proposed alignment of the cryogenic pipeline that would extend from the Tacoma LNG facility to the Blair Waterway.

In addition to the UST-related actions, a limited soil investigation was conducted adjacent to the Blair Waterway in 2007–2008. Petroleum-related contamination was identified in some soil samples at concentrations less than regulatory criteria levels. Most recently, investigations associated with the PRI and Port Parcel 2 sites (see "Tacoma LNG Facility," above) identified a delineated plume of dissolved benzene in groundwater that extends onto the TOTE Marine Vessel LNG Fueling System site, approximately 300 feet northwest of the proposed cryogenic pipeline.

Pipeline Segments

Contaminated media may be present along portions of the proposed pipeline segments. The potential for encountering contaminated media is greatest in the pipeline segment along Taylor Way (Pipeline Segment A) on the Blair-Hylebos peninsula. Past and present industrial activities adjacent to Taylor Way may have impacted soil and groundwater. There are no known cleanup sites associated with Pipeline Segment B.

Golden Given Limit Station

A Phase I Environmental Site Assessment (ESA) has been performed on the Golden Given Limit Station site and has shown that contaminated media are not likely present. A print and graphics shop was constructed on the property in the 1980s and remains on site. The building is a single-story, wood-frame structure with

an asphalt parking lot. Hazardous substances have been stored and used in association with the print and graphics business; however, no evidence of possible releases was identified.

Hazardous substances were released on a property located immediately north of the proposed limit station site. This adjacent property was used for equipment storage, maintenance and auto repair. Contaminated soil resulting from these activities was removed from the site and Ecology granted "no further action" status in 2002, indicating that the cleanup was successful. Based on the Phase I ESA research, it appears that there is a low potential that contaminants from this property migrated onto the proposed limit station site.

Fredrickson Gate Station

There is no known information on contamination at the Fredrickson Gate Station.

3.1.4 Impacts of the Proposed Action

3.1.4.1 Construction Impacts

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potential impacts associated with the presence of existing hazardous substances in the soil and groundwater could occur from the activities described in the following subsections.

Grading/Earthwork Activities

It is likely that some grading and earthwork activities would be required after demolition is complete in order to facilitate stormwater conveyance and to establish new utility corridors. Potential impacts from grading activities include soil erosion and sediment transport into adjacent waterbodies during storm events and temporary impacts to air quality from fugitive dust emissions. Whether raising or lowering grades is planned, construction staging and stockpiling of soils would likely occur. Stockpiles would be properly protected against erosion and to ensure no sediment would be transported off site. If grades were to be raised, truck haul routes would need to be established. If grades were to be lowered, soil transported off site would require proper disposal.

Following ground improvement described below, elevation would be reestablished for the various aboveground structures and would remain relatively unchanged from preexisting conditions. The large existing warehouse building situated on Parcel 5000350021 in the center of the proposed Tacoma LNG Facility site sits on a raised foundation consisting of approximately 3 to 5 feet of fill soil. The preliminary plan for site preparation following demolition of the warehouse involves spreading this soil to the south over the part of the Project footprint area that would be under the LNG storage tank and liquefaction system (which would all be covered with concrete and yard rock at completion) and the undisturbed open area in the southeast portion of the site. This preliminary plan assumes that the soil under the existing warehouse is not contaminated; a preliminary review of the results of limited sampling of this soil in May 2014 supports this assumption. If the soil were contaminated, then it would be transported off site and disposed of at an authorized facility.

The preliminary plan involves no earthwork north or east of the large warehouse. The various other areas north of the large warehouse are under asphalt, which would remain in place. Therefore, any contaminated soils present north of the large warehouse would not be disturbed.

Ground Improvements for Seismic and Geotechnical Considerations

Ground improvements are required to meet the seismic design criteria in 49 CFR 193. These ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in an OBE or SSE. Based on geotechnical analyses, the ground improvement method would likely involve installation of grout columns under the LNG storage tank and in other process-related areas. The number of columns would vary depending on the method selected but could range from about 4,000 to 6,000 columns. These grout columns would range between 80 and 100 feet in depth and compress the soil around them, which would avoid creating preferential pathways for groundwater migration. The ground

improvement method would likely involve displacement or densification of existing soils, which would reduce the amount of spoils generated and minimize the potential for generation of contaminated spoils. Any contaminated spoils encountered during ground improvements would be transported off site and disposed of at an authorized facility.

Slope Stability

Excavations could result in disturbance and adverse impacts to immediately adjacent areas or structures, utilities, and other improvements if excavation slopes are not properly retained. Standard construction measures, such as use of properly designed and installed temporary shoring systems or trench boxes, would reduce the potential for failure of excavation faces that may cause adverse impacts.

Construction of the Tacoma LNG Facility would involve modifications adjacent to the top of the sloped shoreline parallel to the Hylebos, and possibly Blair, waterway. Appropriate erosion and sedimentation control measures would be employed during construction to prevent discharge or surface water on the slopes. Other construction techniques such as limiting construction duration, re-establishing topography and drainage, and re-vegetating where appropriate could also be employed to reduce the risk of slope instability.

Settlement

Structural fill and backfill material placed during site construction would need to be compacted, which could cause vibrations and potential settlement of buildings, utilities, roads, and other structures. The potential lateral extent of influence from vibration and settlement resulting from fill placement could be up to 50 feet from the work. Placement of more than 4 feet of fill could cause some ground consolidation subsidence that would impact existing or future structures in the immediate area of the fill.

New buildings and structures could also be impacted by settlement resulting from loading of compressible soils. Buildings recently constructed at Port facilities that are constructed on shallow spread footings or mat foundations typically have been preloaded to induce settlement prior to construction. Portions of the Tacoma LNG Facility site, including the LNG tank and the process area, would be supported on a zone of improved ground to reduce the risk of settlement.

Groundwater

Excavation depths are anticipated to be shallower than groundwater during construction of the Tacoma LNG Facility; however, it is possible that groundwater could be encountered. Construction dewatering could be required in the event that groundwater is encountered during excavations. Extracted groundwater would be handled and discharged using BMPs to prevent erosion and impacts to surface water. In addition, appropriate analytical testing would be conducted to evaluate treatment and/or disposal options for any groundwater removed from known areas of contamination.

Pipeline Segments, Golden Given Limit Station, and Frederickson Gate Station

Grading/Earthwork Activities

Grading and earthwork activity associated with construction of the new distribution pipeline segments includes trenching for conventional installation of the pipeline. Grading and earthwork for construction of the Golden Given Limit Station and upgrades at the Frederickson Gate Station include trenching as needed for utility installation and removal of existing ground cover such as the asphalt at the limit station. Permanent grade changes are not anticipated during placement of the proposed new pipeline segments or the limit and gate stations. Additionally, construction staging and stockpiling of soils would likely occur. Potential Impacts from grading activities include erosion and sediment transport during storm events and temporary impacts to air quality from wind erosion (dust). Stockpiles would be properly protected against erosion and sediment transport off site.

Slope Stability

Proper shoring of shallow excavations for pipeline and station foundations would not result in slope instability. Standard construction measures, such as use of properly designed and installed temporary shoring systems or trench boxes, would reduce the potential for failure of excavation faces that may cause adverse impacts.

Settlement

Structural backfill is compacted to prevent settlement at the ground surface for the pipeline segments, Golden Given Limit Station, and Frederickson Gate Station. Structural fill and backfill material placed for the limit station (if any) would need to be compacted to limit the potential for settlement.

Groundwater

Shallow, tidally influenced groundwater could be encountered in excavations along Pipeline Segment A.

Shallow, perched groundwater could be encountered in excavations along Segment B and at the Golden Given Limit Station. Shallow groundwater also could be encountered in excavations at the Fredrickson Gate Station, particularly if subsurface pipeline work is completed during the normally wet winter season when groundwater levels are often higher. Because of the coarse grained nature of the Steilacoom Gravel deposits, dewatering in this area may be difficult, particularly during the wet winter months.

Groundwater removed from excavations would be handled and discharged using BMPs to prevent erosion, impacts to the site, and surface water.

3.1.4.2 Operations Impacts

Geologic hazard impacts are discussed below in terms of how the Proposed Action would affect the existing soil and geologic conditions at the site. For impacts associated with damage to Project facilities resulting from geologic hazards, see Section 3.5 (Health and Safety).

Seismic Hazards

The Tacoma LNG Facility site and Pipeline Segment A would be located in areas mapped as fill and alluvium deposits (see Figures 3.1-1b and 3.1-2b). These soils are often loose or soft and saturated, and consequently they are considered susceptible to liquefaction and lateral spreading, landslides, and ground rupture during seismic events. These soils also have the potential to amplify the ground motion at certain seismic frequencies during an earthquake. The ground improvements that would be implemented at the Tacoma LNG Facility site, including the installation of subsurface grout columns, would serve to decrease potential seismic hazards at the site. Installation and operation of the TOTE Marine Vessel LNG Fueling System and Pipeline Segment A would not exacerbate potential seismic hazards because they would be mostly buried within fill that is resistant to ground motion amplification and liquefacation. Placement of fill material and project structures in and on the earth surface would be unlikely to impact the seismic hazard risk posed to other local structures and works.

Pipeline Segment B and the Golden Given Limit Station would be located in areas mapped as having dense to very dense unsaturated soils (see Figures 3.1-1c and 3.1-2c). Accordingly, the potential for liquefaction and lateral spreading, landslides, and ground rupture during seismic events is expected to be low. Operation of these facilities would not intensify the geologic hazard level of soils at these locations, nor add to the risk of nearby structures and works.

Tsunami

Operation of the Project facilities would not exacerbate the hazards associated with a tsunami because none of the Project components would significantly alter the elevation of the ground surface in the tsunami wave inundation area of the LNG Facility and the TOTE Marine Vessel LNG Fueling System.

Volcanic Activity and Lahars

Operation of the Project facilities would not exacerbate the hazards associated with volcanic activity or lahars because none of the Project components are of sufficient size to affect the size or direction of movement of pyroclastic flows, debris flows, lahars, or related flooding.

Sea Level Rise

Operation of the Project facilities would not exacerbate effects associated with sea level rise because none of the Project components would significantly alter the elevation of the ground surface in the area of the LNG Facility and the TOTE Marine Vessel LNG Fueling System, and the pipeline system would be below grade in areas distant from potential sea level rise occurrence. The LNG process area is at an elevation of 15 to 20 feet above mean sea level, which is much higher than the projected 3 to 55 inches of sea level rise for Commencement Bay. Project improvements along the Hylebos Waterway shoreline would increase the site's resistance to slope failure from sea level rise.

Future sea level rise impacts could include changes to shoreline slope stability due to changes in tidal flux and wave action and higher frequency of flooding at the facility.

3.1.4.3 Decommissioning Impacts

Decommissioning of the Tacoma LNG Project components would generate impacts to earth resources similar to those discussed in Section 3.1.4.1 (Construction Impacts). Potential impacts would be temporary and would end upon completion of the decommissioning. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Project components.

3.1.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action-related impacts to earth elements would not occur.

3.1.6 Avoidance, Minimization, and Mitigation

This section describes mitigation measures that would be implemented during construction and operation of the Project to minimize and mitigate impacts to earth resources. Federal regulations found at 49 CFR 193, via their adoption of National Fire Protection Association 59A 2013 establish requirements for seismic protection design of LNG facilities. Additionally, local jurisdictions' adoption of the IBC and critical areas ordinances also establish regulatory requirements regarding structures in and near geologic hazard areas. As the Project moves closer to construction, mitigation may involve changes in the sequencing of the different elements of the Project, such as moving ahead with Blair Waterway components while allowing more time to gather/collect information on sediment quality in the Hylebos, and plan construction there accordingly.

3.1.6.1 Construction

The following mitigation measures could alleviate potential impacts during construction.

Grading/Earthwork Activities

Mitigation measures for potential impacts from grading activities include the following:

- Because of the uncertainty of embankment soil and sediments, additional soil and sediment characterization should be conducted prior to any shoreline or in-water construction.
- Final construction sequencing and design of structures along the Hybelos Waterway will depend on further sediment characterization.
- Using properly designed and constructed shoring systems to prevent caving of excavation faces from temporary construction excavations.

- Using appropriate methods to remove, contain, and discharge groundwater accumulated in excavations to mitigate dewatering impacts, as needed. Extracted groundwater would be handled and discharged using BMPs to prevent erosion, impacts to the site, and surface water. Groundwater extracted from known areas of contamination would be analyzed to determine treatment and disposal options.
- Controlling ground settlement by a variety of methods; methods typically used at the Port include preloading and mat foundations and driven piles or drilled shafts. Ground improvements are required to meet the seismic design criteria in 49 CFR Part 193. These ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in an OBE or SSE. Ground improvement methods would likely involve installation of grout columns under the tank and in other areas. The grout columns would range between 80 and 100 feet in depth and would displace and/or densify the soil around them, thereby avoiding creation of preferential pathways for groundwater migration. The number of columns would vary depending on the method selected, but could range from about 4,000 to 6,000 columns.
- Reusing excavated soils on site to the extent practical to reduce the volume of material exported from the site and associated impacts.
- Developing specifications criteria for controlling the quality of materials imported to the site.
- Disposing of excess excavated materials at approved locations if the materials cannot be spread on site and incorporated into the final grading plan.
- Developing a work plan for actions to be taken if contamination is found during construction. This plan would address necessary characterization of impacted media, protection of worker health and the environment, temporary storage of impacted media, and proper reuse or off-site disposal of contaminated soil in accordance with local, state, and federal regulations. Investigation results also would be used to evaluate management options for dewatering liquids (groundwater) if dewatering is anticipated to be necessary during construction in impacted areas.

Erosion and Sediment Control

During construction, contractors would employ temporary erosion and sedimentation control measures and BMPs to minimize erosion as described in Sections 3.3.6.1 (Construction). Additional measures include:

- Stabilizing exposed areas as soon as earthwork is completed;
- Routing surface water through temporary drainage channels around and away from disturbed soils or exposed slopes;
- Using straw mulch and erosion control matting to stabilize graded areas and reduce erosion and runoff impacts to any sloped areas, where appropriate;
- Intercepting and draining water from any surface seeps, if encountered;
- Using quarry spalls at construction ingress and egress to dislodge sediment;
- Using lined aprons or energy dissipaters at stormwater outlets to prevent scour; and
- Using sediment filter, elevated rim, or impounding area around storm drains.

3.1.6.2 Operations

The following mitigation measures could alleviate potential impacts during operations:

- Installation of ground improvements to reduce the damage associated with seismic soil liquefaction and lateral spreading. A more detailed discussion of ground improvement techniques is included in the Geotechnical Report and in the mitigation measures described for construction activities above.

- Emergency operations and plant shutdowns: The facility would be designed for two levels of earthquakes—an OBE and an SSE.
  - The OBE is an earthquake to which the facility could be subjected during its design lifetime. All elements of the facility would be designed to withstand the OBE to allow the facility to remain operational thereafter.
  - The facility would be designed to prevent catastrophic failure of critical facilities during an SSE, the maximum considered earthquake ground motion per the definition in ASCE 7 Code and the IBC. Applicable ASCE 7 Code and IBC standards do not require a facility to remain operational following the event.
- Ground improvements would be installed to meet the seismic design criteria in 49 CFR Part 193. The ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in an OBE or SSE. The LNG tank is the largest component of the facility. Ground improvement efforts would be concentrated at this location. A seismic base isolation system would be added under the LNG tank to address potential seismic events. Other portions of the facility, such as the process area and land adjacent to the Hylebos pier and TOTE Marine Vessel Fueling System, would also require ground improvement.
- Pipelines would be designed to withstand pressure greater than that which it normally carries. Design practices overseen by the Washington Utilities and Transportation Commission would limit the stress level to below 20 percent of the specified minimum yield strength for piping in the distribution system, resulting in a factor of safety of five, a level that is twice the most stringent federal requirement. In addition, although not required by state and federal regulations, PSE has adopted and would implement more frequent survey and inspection cycles for the high-pressure supply piping in its distribution system.
- Detailed pipeline records regarding construction and maintenance would be maintained by the applicant.
- To protect the pipelines against inadvertent excavation by third parties, which is the most frequent cause of pipeline damage, Washington law requires an excavator to call 811, a toll-free number, to have the pipe's location marked before any digging is attempted.
- During a tsunami event, operational staff at the Tacoma LNG Facility would be warned by the PEWS. The PEWS is a system of five pole-mounted sirens linked to a central control point at the City of Tacoma Fire and Emergency Communication Center. The PEWS sirens warn of natural hazards such as a tsunami in the immediate Port area and broadcast specific instructions and evacuation routes according to specific inundation zones (City of Tacoma 2014). Sirens are located throughout the Port area, including one location at the northwest end of the Blair-Hylebos peninsula where the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located (Port of Tacoma 2011). In addition, operations staff at the Tacoma LNG Facility would be educated by PSE on the *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013), which ensures that emergency operation and evacuation efforts in response to a tsunami follow FEMA's ICS/NIMS. Operations staff would also be educated by PSE on the *Port of Tacoma Evacuation Map*, which outlines primary and secondary evacuation routes from the Port for use in the event that a tsunami requires the evacuation of the Port area (City of Tacoma 2009).
- During a volcanic event, operational staff at the Tacoma LNG Facility would be warned by the PEWS. The PEWS is also compatible with the Pierce County Department of Emergency Management's Lahar Warning System, which is a larger network of 24 sirens located throughout the Puyallup River valley and includes portions of unincorporated Pierce County and the City of Fife, Washington (Pierce County

2010). Again, operations staff would also be educated by PSE on *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013) and *Port of Tacoma Evacuation Map* (City of Tacoma 2009).

3.1.7 Conclusion

The proposed Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling system would not result in substantial adverse impacts to area geology or groundwater. The planned development would also not exacerbate nearby preexisting environmental contamination.

Emergency shutdown protocols, precursory monitoring in the event of volcanic activity, and county-wide area alerts would be used in an emergency to minimize the effects of environmental or geologic hazards. Facility design and ground improvements would further mitigate the potential negative side effects of a seismic event during facility operation, including landslides, liquefaction, and flooding during tsunami. The Project would not exacerbate the local damage of these geologic hazards because of these site improvements.

The Project would not influence ongoing environmental remediation on nearby and adjacent parcels. Migration of subsurface contamination during construction and facility operation would be avoided with stringent compliance to a Construction Stormwater General Permit, a Stormwater Pollution Prevention Plan, a Materials Handling Plan, and an Industrial Stormwater General Permit.

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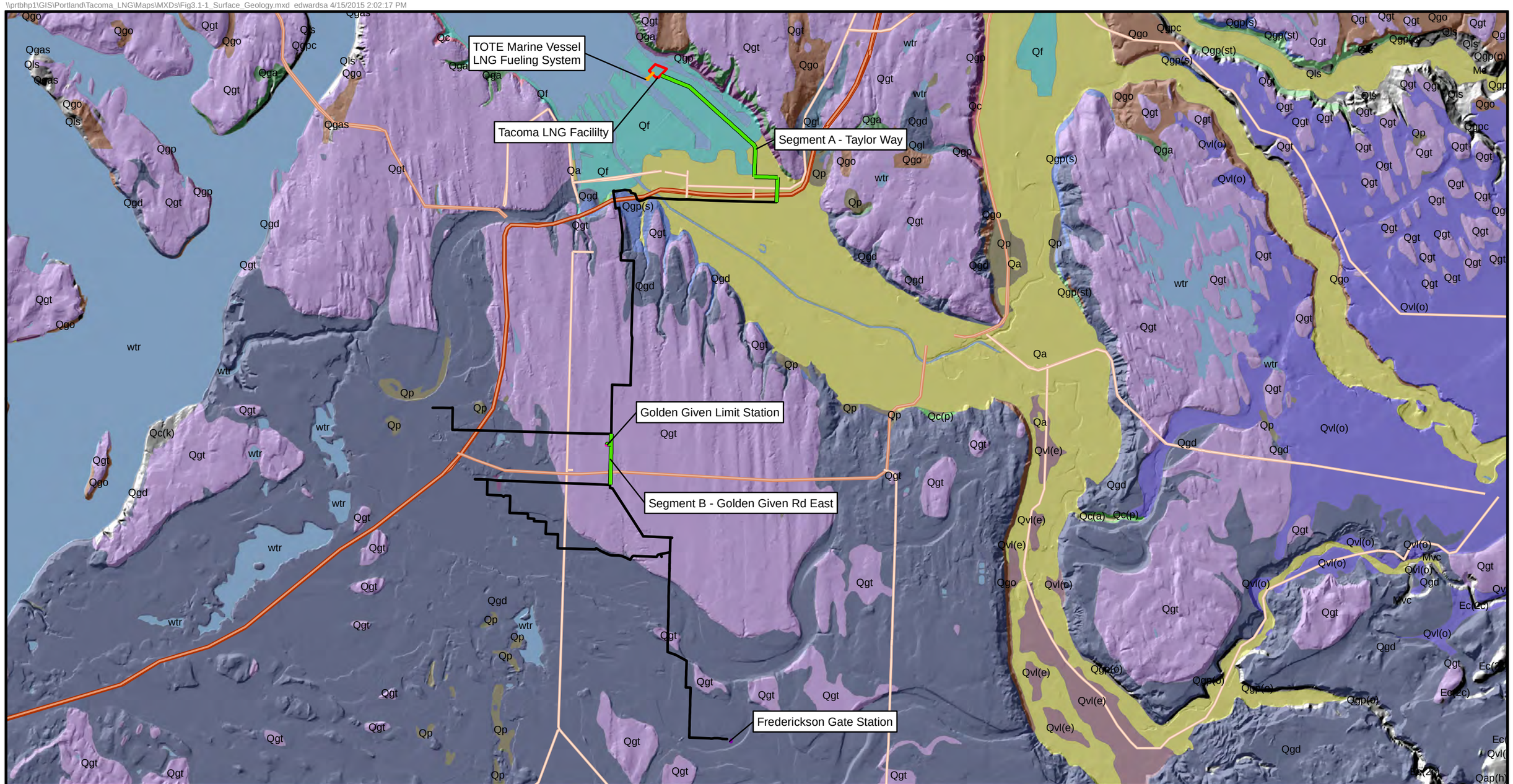
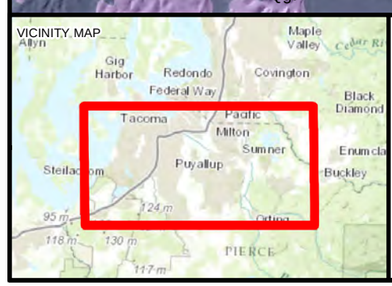




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Geologic Unit

Qa, Qc, Qc(a), Qc(p), Qf, Qga, Qgd, Qgl, Qgo, Qgp, Qgp(s), Qgp(st), Qgt, Qp, Qvl(e), Qvl(o), water, wtr

Notes:
1. The locations of all features shown are approximate.

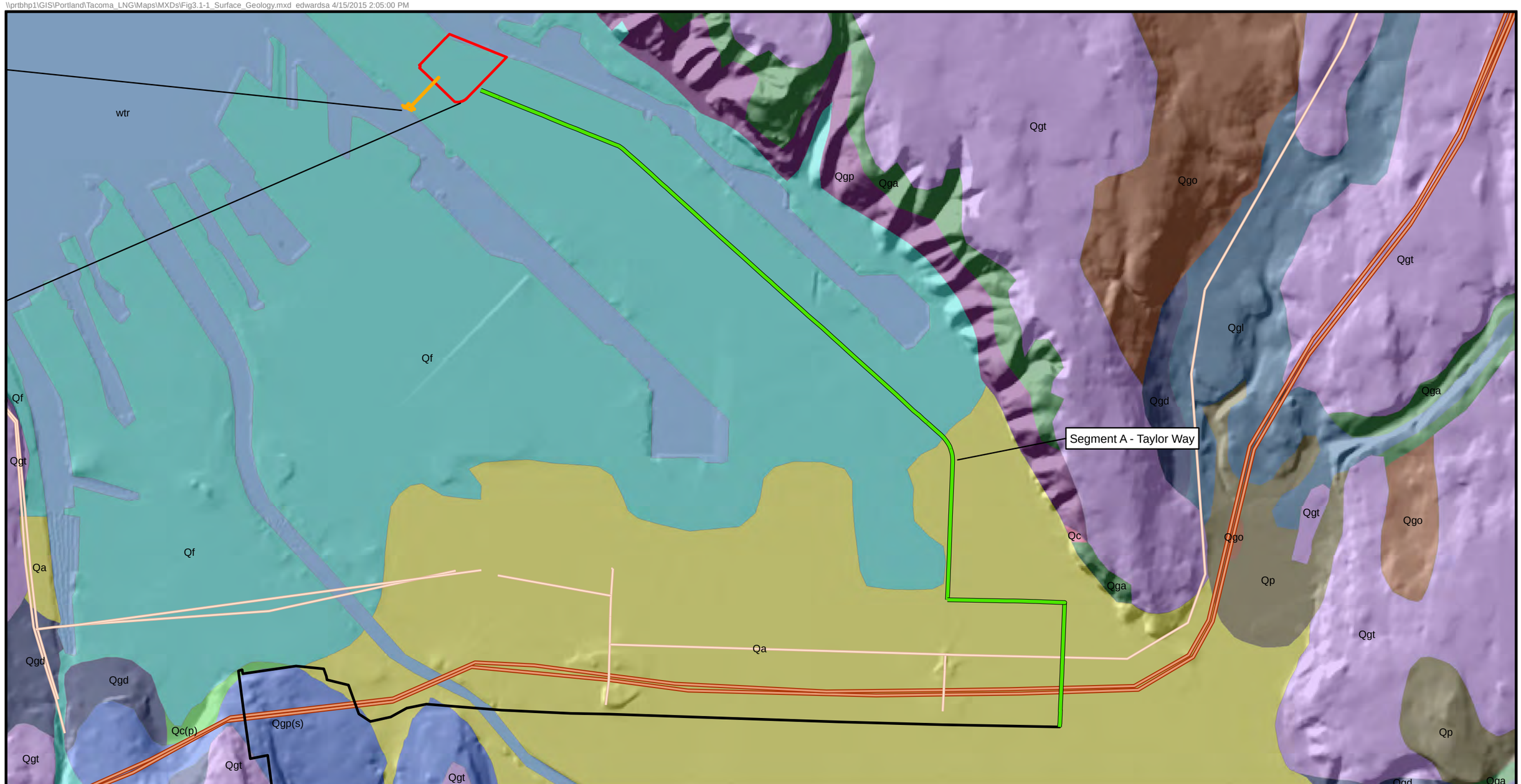
N W E S

0 10,000 20,000 Feet

City of Tacoma

Figure 3.1-1a
Surface Geology

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Geologic Unit

Qa	Qga	Qgp(st)
Qc	Qgd	Qgt
Qc(a)	Qgl	Qp
Qc(p)	Qgo	Qvl(e)
Qf	Qgp	Qvl(o)
	Qgp(s)	water, wtr

Notes:
1. The locations of all features shown are approximate.

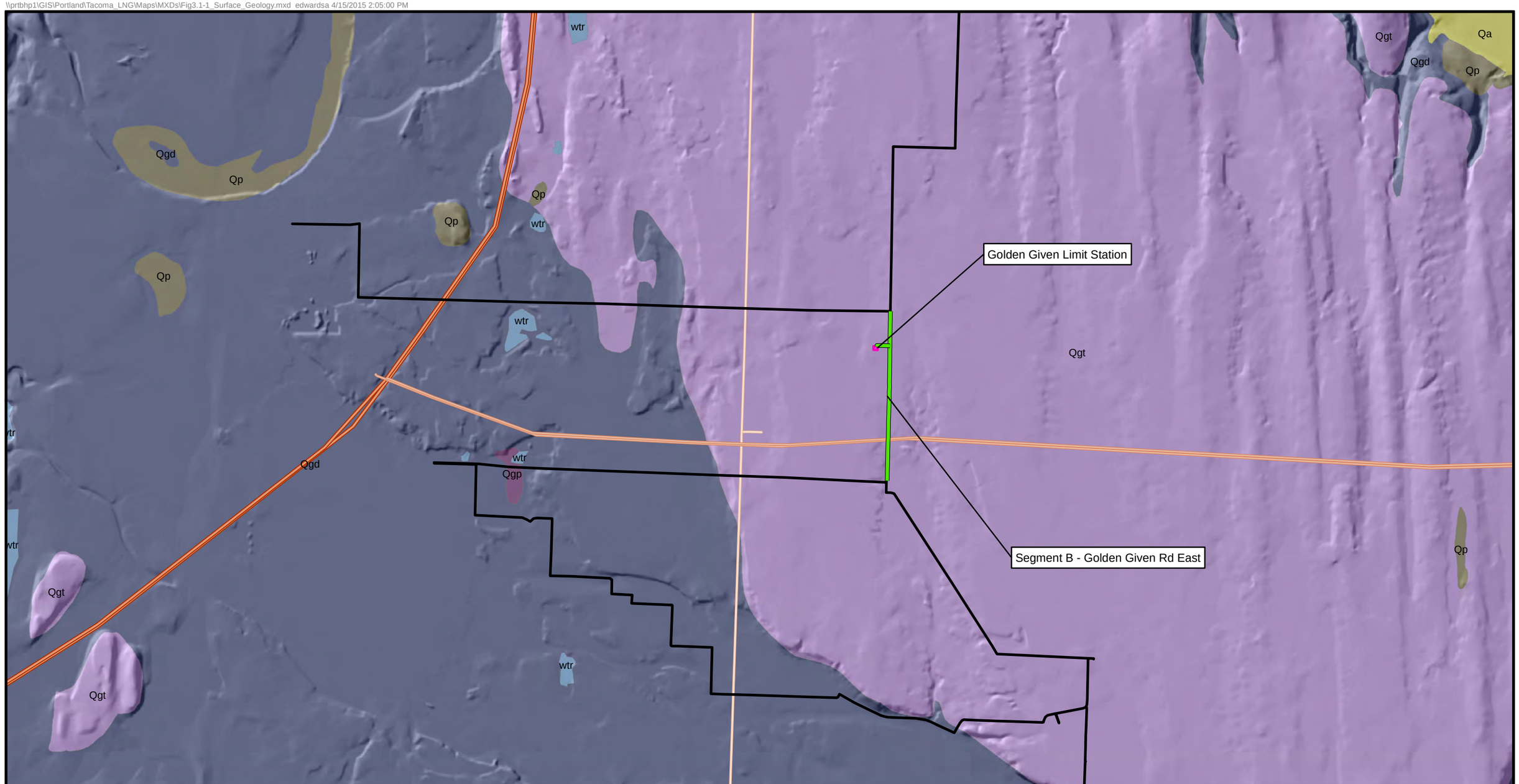
N W E S

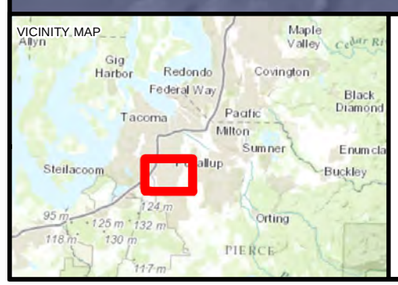
0 2,000 4,000 Feet

City of Tacoma

Figure 3.1-1b
Surface Geology

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Geologic Unit

- Qa
- Qc
- Qc(a)
- Qc(p)
- Qf
- Qga
- Qgd
- Qgl
- Qgo
- Qgp
- Qgp(s)
- Qgp(st)
- Qgt
- Qp
- Qvl(e)
- Qvl(o)
- water, wtr

Notes:
1. The locations of all features shown are approximate.

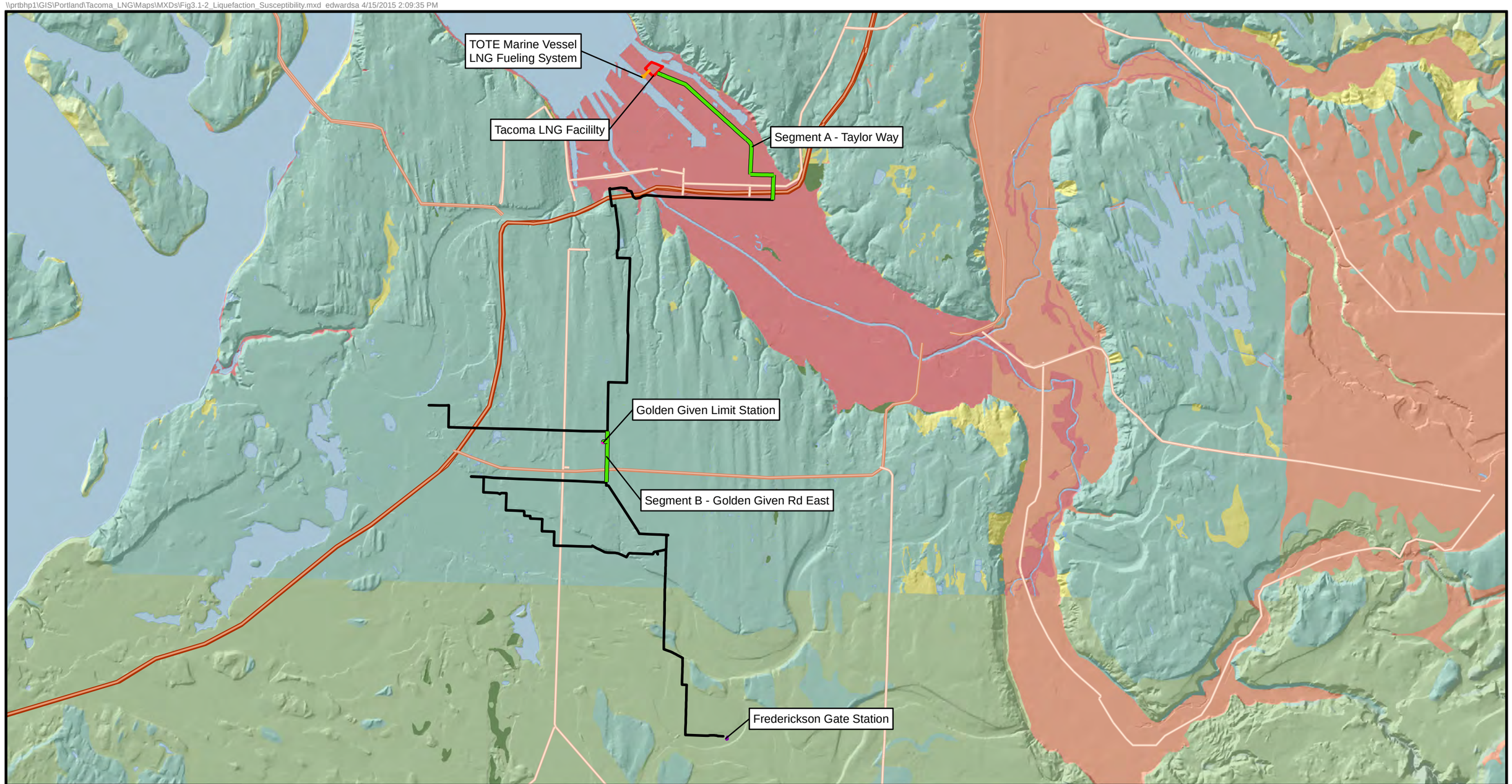
N W E S

0 3,000 6,000 Feet

City of Tacoma

Figure 3.1-1c
Surface Geology

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Liquefaction Susceptibility

- HIGH
- MODERATE to HIGH
- MODERATE
- LOW to MODERATE
- LOW
- VERY LOW to LOW
- VERY LOW
- N/A (bedrock)
- N/A (peat)
- N/A (water)
- N/A (ice)

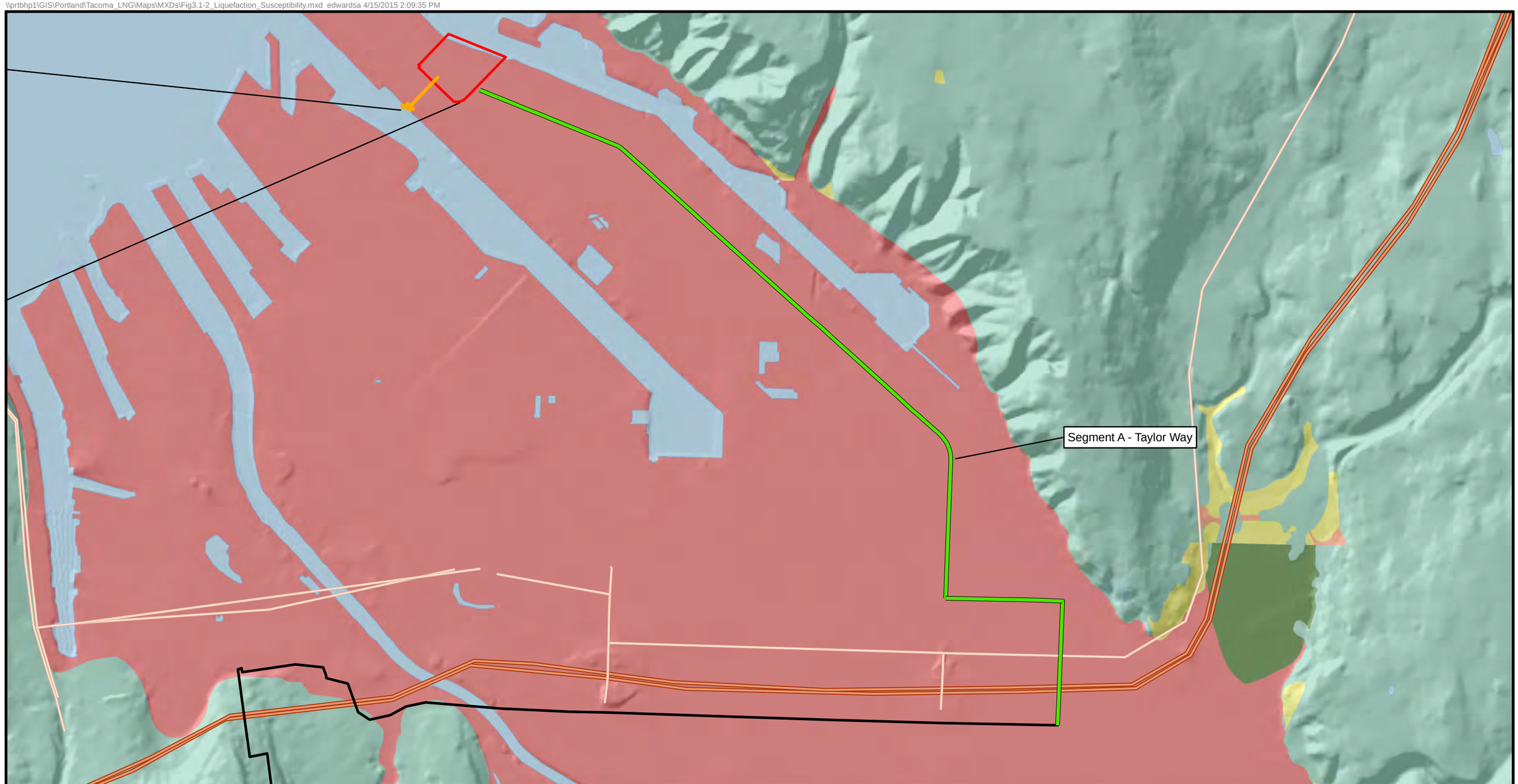
Notes:
1. The locations of all features shown are approximate.

N W E S

0 10,000 20,000 Feet

City of Tacoma

Figure 3.1-2a
Liquefaction Susceptibility
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Liquefaction Susceptibility

- HIGH
- MODERATE to HIGH
- MODERATE
- LOW to MODERATE
- LOW
- VERY LOW to LOW
- VERY LOW
- N/A (bedrock)
- N/A (peat)
- N/A (water)
- N/A (ice)

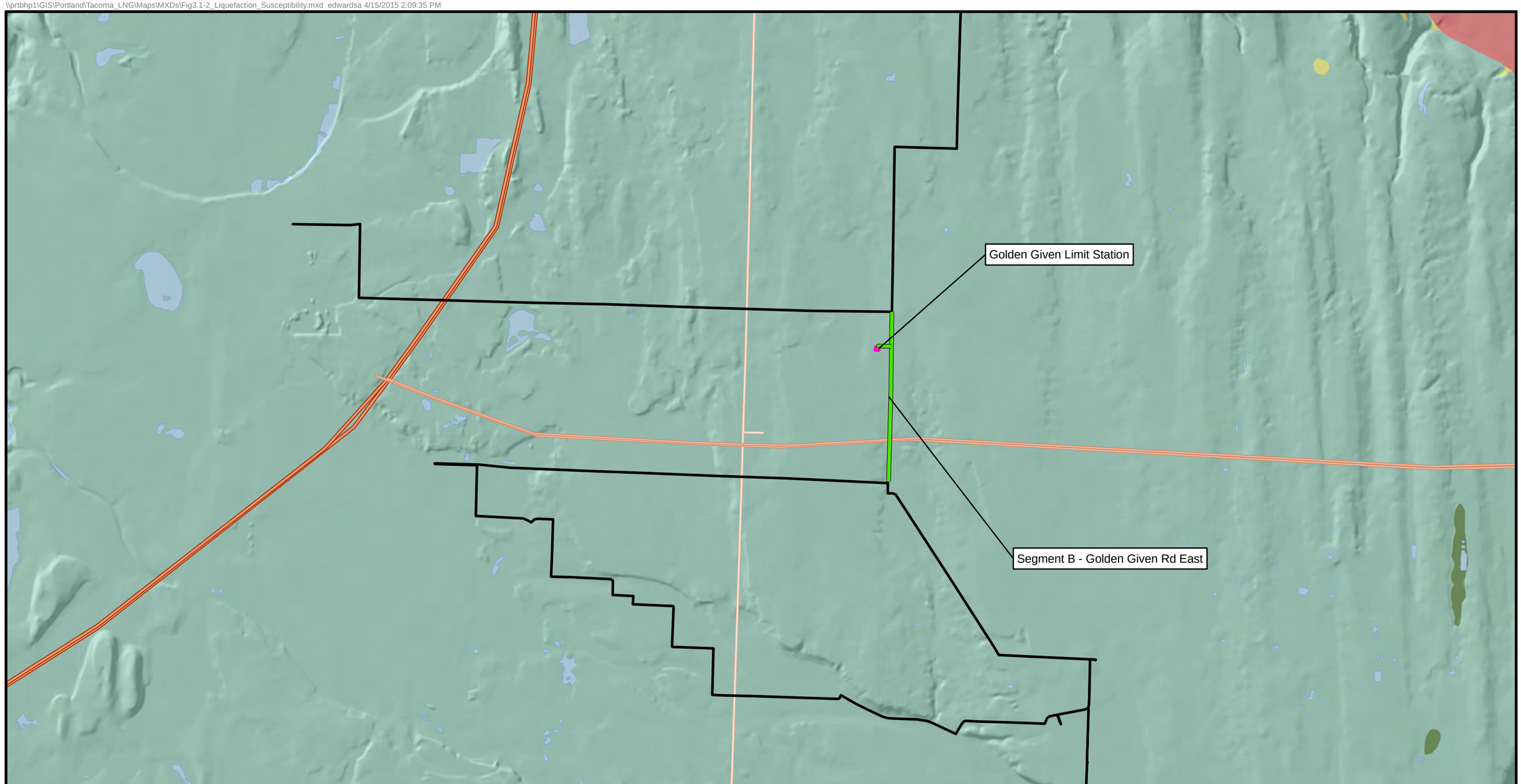
Notes:
1. The locations of all features shown are approximate.

N W E S

0 2,000 4,000 Feet

City of Tacoma

Figure 3.1-2b
Liquefaction Susceptibility
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Liquefaction Susceptibility

- HIGH
- MODERATE to HIGH
- MODERATE
- LOW to MODERATE
- LOW
- VERY LOW to LOW
- VERY LOW
- N/A (bedrock)
- N/A (peat)
- N/A (water)
- N/A (ice)

Notes:
1. The locations of all features shown are approximate.

N W E S

0 3,000 6,000 Feet

City of Tacoma

Figure 3.1-2c
Liquefaction Susceptibility
Tacoma LNG Project

3.2 Air Quality

This section describes the existing air quality in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on air quality that may result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action).

3.2.1 Study Methodology

Air quality resources are affected by both natural conditions and human activities that may alter the levels of atmospheric emissions in an airshed. The proposed Project would be located within areas of the Port of Tacoma, the cities of Tacoma and Fife, and unincorporated Pierce County, which all lie within the Puget Sound airshed.

Potential air quality impacts could result from both construction and operation of the proposed Project. Air quality in the vicinity of the Project was analyzed on both a local and regional basis. Locally, impacts may occur in the general vicinity of the three Project components, as described in Chapter 2 (Description of the Proposed Action): the Tacoma LNG Facility, the Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System, and the improvements to the existing Puget Sound Energy (PSE) Natural Gas Distribution System. Because of the types and amounts of air emissions associated with the Proposed Action, impacts are analyzed primarily in this local Proposed Action area.

The study area for air quality lies within the Puget Sound region. On a regional level, the Proposed Action may have an overall positive impact on air quality due to the replacement of existing regional diesel combustion sources with new LNG sources. These effects are qualitatively assessed. In addition to the "criteria" air pollutants (described further in this section), greenhouse gas (GHG) emissions may also have effects that extend beyond regional boundaries. This section addresses the potential impacts on air quality that may result from the Proposed Action, including the direct impacts of emissions from air pollution sources, and the indirect impacts represented by the expected conversion of combustion sources from diesel to LNG throughout the region as a consequence of implementing the Proposed Action.

3.2.2 Regulatory Framework

This section provides an overview of the federal, state, and local agencies with jurisdiction over the Proposed Action area, and a summary of specific regulations that apply to aspects of construction and operation of the proposed Project.

3.2.2.1 Agency Jurisdiction

Three agencies have jurisdiction over the ambient air quality for the areas of the Port of Tacoma, cities of Tacoma and Fife, and Pierce County: the United States Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and Puget Sound Clean Air Agency (PSCAA). The primary regulatory agency responsible for air quality permitting and overseeing compliance of the Proposed Action is the PSCAA.

3.2.2.2 Air Quality Standards

EPA established National Ambient Air Quality Standards (NAAQS) to protect the public from air pollutants that have been proven harmful to public health and the environment. There are two types of NAAQS. Primary standards protect public health, including sensitive categories such as elderly, children, and asthmatics. Secondary standards protect animals, crops, vegetation, and buildings and are effective against degradation of visibility. Air pollutants regulated by the NAAQS are called "criteria" pollutants. Table 3.2-1 summarizes the current NAAQS. Current Washington State Ambient Air Quality Standards are established in the Washington Administrative Code (WAC) Title 173. Ecology adopted the NAAQS per WAC 173-476. The PSCAA enforces these standards and has also established a more stringent daily average goal for particulate matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$).

Table 3.2-1 Ambient Air Quality Standards

Pollutant	Averaging Period	National and Washington State Standards		Details
		Primary	Secondary	
Ozone (O_3)	8-hour[a]	0.075 ppm	0.075 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$)	Annual (Arithmetic Mean)	12.0 µg/m^3	15.0 µg/m^3	Annual mean, averaged over 3 years
	24-hour[a]	35 µg/m^3	35 µg/m^3	98th percentile, averaged over 3 years
Particulate Matter less than or equal to 10 micrometers in diameter (PM_{10})	24-hour	150 µg/m^3	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Carbon Monoxide (CO)	8-hour	9 ppm (10 mg/m^3)		Not to be exceeded more than once per year
	1-hour	35 ppm (40 mg/m^3)		Not to be exceeded more than once per year
Nitrogen Dioxide (NO_2)	Annual (Arithmetic Mean)	53 ppbv (100 µg/m^3)	53 ppb (100 µg/m^3)	Not to be above this level in a calendar year
	1-hour	100 ppbv		The 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor is not to be above this level
Sulfur Dioxide (SO_2)[b]	3-hour		0.5 ppm (1300 µg/m^3)	Not to be exceeded more than once per year
	1-hour	75 ppb		99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Lead (Pb)	Rolling 3-Month Average	0.15 µg/m^3	0.15 µg/m^3	Not to be exceeded

Source: EPA 40 CFR Part 50 (http://www.epa.gov.air/criteria.html) and WAC Chapter 173-476 (http://www.ecy.wa.gov/laws-rules/ecywac.html#air).

Notes:

[a] PSCAA has also established a health goal of 25 µg/m^3 on a daily average. The health goal is the $PM_{2.5}$ level that PSCAA would eventually like to achieve; however, it is not a standard like the NAAQS.

[b] "Sunset" provisions apply to the Annual and 24-hour SO_2 standards under WAC 173-476-130(1)(a) and (b). The Proposed Action area has been in attainment for over 1 year and therefore it is not subject to these standards.

Key:

µg/m^3 = micrograms per cubic meter
CFR = *Code of Federal Regulations*
mg/m^3 = milligrams per cubic meter
ppb = parts per billion
ppbv = parts per billion by volume
ppm = parts per million
PSCAA = Puget Sound Clean Air Agency
WAC = Washington Administrative Code

3.2.2.3 Attainment, Nonattainment, and Maintenance Areas

In order to implement the Clean Air Act, and to comply with the NAAQS through state implementation plans, Section 107 of the Clean Air Act calls for the establishment of Air Quality Control Regions (AQCRs), which can be intra- or interstate regions. Improving the air quality in one portion of an AQCR requires emission reductions throughout the AQCR. EPA, Ecology, and PSCAA maintain a network of air quality monitoring stations throughout Washington State, particularly the Puget Sound Intrastate Air Quality Control Region, to measure existing air quality and determine whether areas are designated as "attainment" or "nonattainment" areas for each NAAQS (criteria air pollutant). "Attainment" for a given pollutant indicates that the air quality in an area complies with the NAAQS for that pollutant.

If the area does not meet the NAAQS for a particular pollutant, EPA designates the area as "nonattainment" for that pollutant. For these areas, the state (Ecology and PSCAA) must develop a State Implementation Plan (SIP), for approval by EPA, to achieve attainment of the NAAQS. SIPs can include a wide variety of pollution control measures. When the air in a nonattainment area has been restored such that an applicable NAAQS is met, the area is redesignated as "maintenance" and requires a maintenance plan to ensure that ambient concentrations do not deteriorate back to nonattainment levels. Maintenance areas that continue to meet the standards for several years (usually at least 10 years) may be reclassified again as "in attainment."

The Proposed Action would occur in an area that is in attainment for all NAAQS except for $PM_{2.5}$. A map of the Tacoma-Pierce County Nonattainment Area, along with the component locations of the Proposed Action, is provided in Figure 3.2-1. Further discussion about the status of $PM_{2.5}$ in this area is provided in Section 3.2.3.2 (Existing Air Quality).

3.2.2.4 Conformity

The Conformity Rule requires a federal agency to demonstrate that every action it undertakes, approves, permits, or supports in nonattainment and maintenance areas conforms to an applicable SIP.

The Proposed Action is not a federal project, nor does it use any federal money. However, emissions from construction activities in a nonattainment or maintenance area that require a federal permit must be assessed under the General Conformity Rule. Section 404 (Clean Water Act) and Section 10 (Rivers and Harbors Act) permits issued by the United States Army Corps of Engineers for in-water work are the only federal permits required for the Proposed Action. Therefore, the General Conformity Rule would apply to only those construction activities and would not apply to the remaining construction activities associated with the Proposed Action.

3.2.2.5 Greenhouse Gas Emissions

In March 2008, the Washington legislature enacted House Bill 2815, which directed Ecology to develop rules for the mandatory reporting of GHG emissions by sources that emit more than certain specified threshold amounts. These rules are codified in WAC Chapter 173-441.

On December 7, 2009, EPA determined that the presence of six GHGs in the atmosphere endangers public health and public welfare and included them as contributors to air pollution: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

GHGs are ranked by their global warming potential (GWP). The GWP is based on the ability of a GHG to absorb solar radiation, as well as its residence time in the atmosphere, compared to CO_2. Thus, CO_2 has a GWP of 1, CH_4 has a GWP of 25, and N_2O has a GWP of 298. Emissions of GHGs are typically estimated as carbon dioxide equivalents (CO_2e). Estimates of individual GHGs are converted to CO_2e by multiplying each pollutant by its GWP relative to CO_2.

On November 8, 2010, EPA finalized reporting requirements for the petroleum and natural gas industry under 40 Code of Federal Regulations Part 98 Subpart W. This subpart was then amended on December 23, 2011. Subpart W requires petroleum and natural gas facilities that emit 25,000 metric tons or more of CO_2e per year to report annual emissions of specified GHGs from various processes within the facility. In addition, per WAC 173-441, any source that emits 10,000 metric tons of CO_2e per calendar year is required to report its GHG emissions to Ecology. Once a source is subject to the GHG reporting requirements, it must submit an annual GHG report, even if the source does not meet the applicability requirements in WAC 173-441-030(1) or (2) in a future year.

The document titled *Guidance for Ecology Including Greenhouse Gas Emissions in SEPA Reviews* (Ecology 2011) indicates that for projects emitting at least 10,000 metric tons of CO_2e per year, but less than 25,000 metric tons per year, a qualitative disclosure of GHG emissions is required under the Washington State Environmental Policy Act (SEPA). For projects emitting more than 25,000 metric tons per year, a quantitative disclosure of GHGs is required. The quantitative analysis should include GHG emissions from all

aspects of the project, including Scope 1 emissions (project direct), Scope 2 emissions (associated with purchased electricity), and Scope 3 emissions (which include construction emissions as well as new, ongoing transportation emissions associated with the project).

GHG pollutants associated with the proposed Project include CO_2, N_2O, and CH_4. Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are expected to have the potential to emit more than 10,000 metric tons of CO_2e per year, but less than 25,000 metric tons per year; therefore, only a qualitative disclosure of GHG emissions would be required. Emission estimates, including GHGs, related to construction and operation of the proposed Project are described in Section 3.2.4 (Potential Impacts of the Proposed Action).

3.2.2.6 Hazardous and Toxic Air Pollutants (Technology-based Regulation)

The United States Congress amended the federal Clean Air Act in 1990 to address a large number of air pollutants that are known to cause or may reasonably be anticipated to cause adverse effects on human health or adverse environmental effects. A total of 188 specific pollutants and chemical groups were initially identified as hazardous air pollutants (HAPs), and the list has been modified over time.

Section 112 of the Clean Air Act governs the federal control program for HAPs. National emissions standards for hazardous air pollutants (NESHAPs) are issued to limit the release of specified HAPs from specific industrial sectors. These standards are “technology-based,” meaning that they represent the maximum available control technology currently used in that industrial sector. For many of the NESHAP standards, EPA is currently evaluating risk to public health and may revise those standards, as required by the federal Clean Air Act. It is expected that NESHAPs may apply to some tanks, flares, and emergency engines at the Tacoma LNG Facility. An evaluation of NESHAP applicability and standards will be made during the permitting process, when more specific equipment design details are known. The Clean Air Act does not require the establishment of air quality standards for HAPs that define legally acceptable concentrations of these pollutants in ambient air.

Toxic air pollutants (TAPs) are listed in WAC 173-460-150. The term TAP may include particulate matter and volatile organic compounds (VOCs) if an individual substance or a group of substances within either of these classes is listed in WAC 173-460-150. The purpose of WAC 173-460, Controls for New Sources of Toxic Air Pollutants, is to establish the systematic control of new or modified sources emitting TAPs in order to prevent air pollution, reduce emissions to the extent reasonably possible, and maintain such levels of air quality as would protect human health and safety. Project emission estimates for HAPs and TAPs are described below in Section 3.2.4 (Potential Impacts of the Proposed Action).

3.2.2.7 Air Quality Permitting Requirements

New Source Review

New source review (NSR) refers to the preconstruction permitting programs under Parts C and D of the Clean Air Act required for the construction and operation of any new stationary source to confirm compliance with applicable ambient air quality standards and emission standards, as well as to confirm that appropriate control technologies are employed. The program under which a new source or modification is reviewed depends on the type and quantity of the potential air emissions associated with the new source or modification. The Proposed Action would likely only be subject to NSR requirements for minor sources that are administered by PSCAA.

Notice of Construction and Order of Approval

Before actual construction of a new facility can begin, the applicant must obtain approval from the permitting agency (PSCAA) confirming that the NSR process is completed and a preconstruction permit or permit to construct obtained. A Notice of Construction (NOC) application must be filed and an Order of Approval obtained from the applicable clean air agency—in this case, PSCAA.

The State of Washington air permitting requirements are codified under WAC 173-400-110, 173-400-700, and 173-401. The responsible local clean air agency regulations are PSCAA Regulation 1, Articles 5 and 6. These regulations incorporate federal permitting program requirements and establish permit review procedures for all facilities that can emit regulated pollutants to the ambient air.

PSCAA Regulation 1, Section 6.03 states that it is unlawful for any person to cause or allow the establishment of a new source, or the replacement or substantial alteration of control equipment installed on an existing source, unless an NOC application has been filed and an Order of Approval has been issued by the agency.

NOC permits are required for a variety of stationary air contaminant generating equipment and air pollution control equipment. Agency Regulation I Section 6.03 also discusses which types of equipment require permits as part of the NOC process. All nonexempt emission units must go through a technology review to determine Best Available Control Technology for criteria, and TAP emissions. The facility must also estimate emissions from the affected units and determine if the ambient impacts resulting from those emissions are acceptable.

Other PSCAA Requirements

In addition to the NOC requirements, PSCAA Regulation 1 Sections 9.03, 9.07, 9.09, 9.11, 9.13, 9.15, and 9.20 address fugitive dust, visible emissions, odor, and concealment. PSCAA regulations require that persons use reasonable precautions to prevent particulate matter emissions from becoming airborne, including (but not limited to) the use of water or chemicals for dust suppression.

3.2.3 Affected Environment

3.2.3.1 Local Climate and Meteorological Conditions

The Cascade Mountain range divides the state of Washington into two major climatic regions: the Western Washington climatic region and the Eastern Washington climatic region. Each region comprises several districts (NOAA 1985).

The Project would be located in the Puget Sound-Lowlands climate district of the Western Washington climatic region. Variations in the temperature, length of the growing season, fog, rainfall, and snowfall in the district are due to such factors as distance from the sound, the rolling terrain, and air from over the ocean reaching this area through the Strait of Juan de Fuca and the Chehalis River valley. Occasionally, in the winter, cold air from the interior of Canada flows southward through the Fraser River canyon and over the northern Puget Sound lowlands.

Precipitation in the area of the Proposed Action is frequent during late fall and winter, with light rainfall in the summer. The average annual precipitation is approximately 43.5 inches. Approximately 75 percent of the annual precipitation occurs from October to March. According to the NOAA National Climatic Data Center (NOAA 2015), climate summaries collected for the Tacoma region are as follows: average maximum temperature = 59.1 degrees Fahrenheit (2000–2013); average minimum temperature = 42.5 degrees Fahrenheit (2000–2013); average annual precipitation = 43.5 inches (1901–2012).

A wind rose for the three-year period of January 1, 2011, through December 31, 2013, is presented in Figure 3.2-2. The wind rose is based on data collected by a sonic anemometer located at the Tacoma tideflats. The wind rose can be created using a tool located on the PSCAA web site: (http://airgraphing.pscleanair.org/) (PSCAA 2015). On an annual basis, this site shows bimodal winds, primarily from east southeast and west northwest. This is likely a localized effect corresponding to general onshore and offshore flow through Commencement Bay, and topographical features to the north of the site (west northwest to east southeast ridge).

3.2.3.2 Existing Air Quality

The Project components would be located within the Tacoma-Pierce County nonattainment area for $PM_{2.5}$ (see Figure 3.2-1). EPA and Ecology are in the process of redesignating this as a maintenance area after monitoring data demonstrated that the NAAQS for $PM_{2.5}$ had been consistently met. The proposed maintenance plan for $PM_{2.5}$ includes an enhanced burn ban enforcement/outreach, removal of uncertified wood stoves (supported by legislation passed in 2012), solid fuel burning regulatory updates (legislation in 2012 and 2013), and plans to limit/reduce on-road vehicle emissions.

Ecology submitted a redesignation request and maintenance plan to EPA as a revision to the SIP. In the December 11, 2014, *Federal Register*, EPA proposed to redesignate to "attainment" the entire Tacoma-Pierce County Nonattainment Area for the 2006 24-hour $PM_{2.5}$ NAAQS. EPA is also proposing to approve as a revision to the SIP the associated maintenance plan that provides for continued compliance of the 24-hour $PM_{2.5}$ NAAQS.

In general, agencies conduct air quality monitoring in areas where there is a potential for concern from a specific pollutant. There are currently two PSCAA monitoring stations for $PM_{2.5}$ in the Tacoma area. The maximum 98th percentile $PM_{2.5}$ value, averaged over the last three years (2012 through 2014), was 29 micrograms per cubic meter ($\mu g/m^3$) at the Alexander Avenue station and 23 $\mu g/m^3$ at the L Street station. These are both below the standard of 35 $\mu g/m^3$. No other ambient air pollutant monitoring is conducted in the Tacoma area; therefore, the concentrations of other criteria pollutants in this area are expected to be well within air quality standards.

3.2.3.3 Existing Sources of Air Emissions in the Proposed Action Area

The Port of Tacoma is a major center for container cargo, bulk, breakbulk, autos, and heavy-lift cargo. Existing sources of air pollutant emissions in the area associated with the transportation of cargo are on-road and nonroad sources. On-road emissions include emissions from vehicles such as cars and trucks, with nearby Interstate 5 being a significant contributor. Nonroad sources of emissions include emissions from sources such as marine vessels (including ocean freighters and harbor vessels such as tugs), cargo handling equipment, railroad locomotive operations, and heavy-duty, off-road vehicles. Air pollutant emissions from these on-road and nonroad sources include criteria pollutants, HAPs, TAPs, and GHGs (all described above) from the combustion of fossil fuels and from fugitive releases.

Vessel emissions from sources within the vicinity of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System include the existing TOTE Terminal and the Washington United Terminal. Also in the vicinity of the Proposed Action are a refinery, U.S. Oil & Refining Company; a Kraft pulp mill, formerly known as Simpson Tacoma Kraft Company, LLC, but recently purchased by Rock Tenn; and other industrial facilities that generate emissions of criteria pollutants, HAPs, TAPs, and GHGs from the combustion of fossil fuels, most commonly in boilers and heaters. Ecology maintains an air pollutant emission inventory that includes permitted point sources within the state, along with other source types such as motor vehicles, wood stoves, outdoor burning, agriculture, and natural sources (Ecology, not dated).

The Tacoma LNG Facility site itself covers approximately 34.7 acres consisting of four separate parcels. The parcels currently contain a gravel pad and an empty naval building that is sometimes used for container storage. Current emissions from the site result from mobile sources used to move the containers around; these emissions are relatively minor and sporadic in nature.

3.2.4 Potential Impacts of the Proposed Action

The proposed Project would consist of the following main components:

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System.

- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 1-2 in Chapter 1 (Purpose, Need, and Alternatives Considered).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments, the new Golden Given Limit Station, and an upgrade to the existing Frederickson Gate Station.

For a detailed description of the Proposed Action, refer to Chapter 2 (Description of Proposed Action). The Proposed Action area encompasses all three components of the proposed Project. Construction of the Proposed Action would result in short-term air quality impacts over the assumed buildout period (see Section 3.2.4.1 [Construction Impacts]). Operation of the Tacoma LNG Facility would result in an increase in emissions at the site. Operations impacts are discussed in Section 3.2.4.2 (Operations Impacts).

The Tacoma LNG Facility and the adjacent TOTE Marine Vessel LNG Fueling System would be located at the Port of Tacoma. The modifications to the PSE Natural Gas Distribution System would occur at the Port of Tacoma as well as surrounding areas, including the cities of Tacoma and Fife, and unincorporated Pierce County. The only air emissions associated with these ancillary modifications would be due to construction.

In general, replacing a diesel propulsion engine with a pure LNG propulsion engine creates an emission reduction for nitrogen oxides, particulate matter both 2.5 and 10 microns in diameter, sulfur oxides, and CO_2 (The Glosten Associates 2010). The use of LNG produced by the proposed Project, instead of diesel, in trucks and marine vessels, is expected to result in an overall decrease in emissions of these pollutants in the Puget Sound region, where this fuel would eventually be combusted.

3.2.4.1 Construction Impacts

Construction of the Project would generate air emissions temporarily from construction activities over a four-year period. Air quality may be degraded on a short-term basis while construction is taking place. During construction, PSE would implement emission control measures specified by Ecology and PSCAA guidelines and regulations to reduce impacts associated with construction, as described above in Section 3.2.2.7 (Air Quality Permitting Requirements).

This section describes the following impacts from general construction activities:

- Site preparation, including clearing, grading, trenching, excavation of footings and foundations, and backfilling operations;
- Combustion in fuel-burning equipment and vehicles;
- Fugitive dust associated with travel on paved and unpaved roads;
- Foundation work;
- Installation of pipeline/major equipment; and
- Right-of-way restoration.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Air emissions from the construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be ongoing during the approximately four-year construction period. Construction is expected to begin in the third quarter of 2015 and would include construction of the pier and docking facilities and construction and installation of buildings and equipment, including the new substation.

Construction emissions related to the site would result from combustion of fuel burning equipment and vehicles, and from fugitive dust associated with site preparation, grading, and travel on the access road. Appendix D contains estimated emission data from the construction of the Tacoma LNG Facility and TOTE

Marine Vessel LNG Fueling System, including footnotes with assumptions and references for emission factors. Pollutant emissions were calculated using conservative assumptions for equipment scheduling and usage, along with standard EPA and Washington State–approved emission factors. Table 3.2-2 provides a summary of the estimated emissions for each year in tons per year and a comparison to the federal de minimis levels for conformity.

Table 3.2-2 Estimated Construction Emissions from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Equipment	NO_x (tpy)	CO (tpy)	SO_2 (tpy)	VOC (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO_2e (tpy)
Year 1							
Construction Equipment	11.5	6.84	0.43	1.07	0.88	0.88	2,074
Road Vehicles/Commuting	0.02	0.004	2.13E-05	7.29E-04	1.10E-03	9.88E-04	2.55
Fugitive Dust					8.29	0.83	
Year 2							
Construction Equipment	15.8	8.92	0.11	2.02	1.31	1.31	3,791
Road Vehicles/Commuting	0.36	1.54	4.03E-03	2.86E-02	2.94E-02	1.94E-02	225
Fugitive Dust					0.73	0.18	
Year 3							
Construction Equipment	11.1	6.24	0.02	1.54	0.93	0.93	2,920
Road Vehicles/Commuting	0.30	1.96	5.66E-03	3.03E-02	3.06E-02	1.70E-02	305
Fugitive Dust					1.08	0.26	
Year 4							
Construction Equipment	5.74	3.27	0.01	0.84	0.48	0.48	1,703
Road Vehicles/Commuting	0.008	0.002	1.23E-05	3.34E-04	4.72E-04	4.08E-04	1.50
Fugitive Dust					8.83E-04	2.17E-05	
Total	**44.8**	**28.8**	**0.58**	**5.53**	**13.8**	**4.91**	**11,021**
Federal De Minimis Levels for Conformity	**100**	**100**	**100**	**100**	**100**	**100**	

Key:
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
NO_x = oxides of nitrogen
PM_{10} = particulate matter up to 10 microns in diameter
$PM_{2.5}$ = particulate matter up to 2.5 microns in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compound

Only a subset of the Proposed Action requires federal permits and thus is subject to the Conformity Determination (see Section 3.2.2.4 [Conformity]). Emission estimates include construction activities for in-water Project facilities proposed on both the Hylebos and Blair waterways that would have federal permits are clearly at or below de minimis levels (stated in 40 Code of Federal Regulations Part 93.193), so the construction activities with federal permits would conform with the SIP.

Pipeline and Associated Facilities

Potential air pollutant emissions related to the construction of the two new pipeline segments, new limit station, and modifications to the existing gate station include the following:

- Emissions from fuel-burning construction equipment and vehicles,
- Fugitive dust emissions from site preparation, trenching, and backfilling, and
- Fugitive dust emissions from travel of vehicles/equipment on paved and unpaved roads.

As discussed in Chapter 2, the proposed new pipeline segments would be located within existing road rights-of-way, and vegetation clearing would not be required. Excavated material from trenching would be removed (no stockpiling). The new limit station would be constructed entirely within a previously developed parcel; no previously undisturbed area would be developed, and no additional construction workspace would be required. As a result of these existing developed site characteristics, fugitive dust emissions are expected to be small. In addition, standard pollutant minimization and mitigation measures (as described below in Section 3.2.6.1 [Construction]) would be implemented to further reduce potential emissions from both combustion and fugitive sources.

Based on the short-term and transitory nature of these construction emissions, the segment and station locations and existing conditions, and the implementation of emission controls, the impacts on air quality of emissions from construction of the pipelines, limit station, and gate station are expected to be less than significant. Therefore, emission estimates have not been calculated for pipeline or station construction.

3.2.4.2 Operations Impacts

Some air pollutant emissions would result from long-term operation of the Project. Operations include the following LNG processes:

1. Pretreatment: Impurities are cleaned from the pipeline gas, and these compounds are sent to the enclosed ground flare. The ground flare combusts any of the volatile organics present to CO_2 and water, and converts the hydrogen sulfide, mercaptans, and other sulfur compounds into sulfur dioxide and other sulfur oxides
2. Liquefaction and LNG storage: Natural gas is liquefied using a single mixed refrigerant and a series of heat exchangers, and stored in a single LNG storage tank that maintains cryogenic temperatures.
3. LNG fuel transfer facilities: Cryogenic pipelines to transfer LNG fuel from the storage tank to both the pier on the Hylebos Waterway for direct marine fueling or barge fueling and the TOTE dock on the Blair Waterway for direct marine fueling of TOTE vessels, and a cryogenic line to a truck loading area to deliver LNG to tractor-trailer trucks for land-based delivery of fuel to other areas.
4. Vaporization: When needed, LNG can be converted back to natural gas through vaporization (heating the LNG) and reinjection into the PSE distribution system.[2]
5. Fuel Transfer Support Operations: Other specific components to support fuel transfer operations including a meter station, boil-off gas compressor, enclosed ground flare system, and emergency flare.
6. Support Facilities: Other specific components needed to support the process facilities, including control systems, safety systems, other buildings, electrical systems, and other utilities and firewater systems (included in these systems is an emergency flare and a backup diesel generator).

These processes are described in greater detail in Chapter 2.

Of these processes, emissions would primarily result from the pretreatment process, the enclosed ground flare system, fugitive emissions from any processes, and refrigerant losses from the liquefaction and

[2] Only one pipeline would convey natural gas to and from the Tacoma LNG Facility, so when the vaporization and reinjection system is operating the LNG liquefaction system would be shut down because the two systems cannot operate concurrently.

storage, transfer, vaporization, and support facilities. Emissions could also result on a more sporadic basis from the emergency flare, the LNG vaporizer, and the emergency diesel generator. The overall purpose of the Proposed Action is, in part, to construct and operate a facility with the capability to supply fuel for marine, land transportation, and other potential industries in the Pacific Northwest, that is cleaner (i.e., has fewer air emissions) than traditional fuels used by these industries.

The potential emissions for the Tacoma LNG facility and TOTE Marine Vessel LNG Fueling System are presented in Table 3.2-3. At the bottom of the table, the total emissions are compared to Prevention of Significant Deterioration (PSD) and Title V applicability thresholds. Pollutant emissions were calculated using conservative assumptions for equipment and operations, along with standard EPA and Washington State–approved emission factors. Detailed calculations are provided in Appendix D, including footnotes with assumptions and references for emission factors.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Air pollutant emissions would result from the long-term operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. Emission estimates for the sites assume that the facilities would operate 365 days per year. Actual operation of the sites would be closer to 350 days per year because of scheduled downtime for maintenance activities. Emissions were estimated for emission units at the pretreatment plant and terminal. Emission estimates for fugitive VOCs include emissions from storage tanks, flanges, valves, pumps, and other equipment sources.

On-road Emissions

The Tacoma LNG Facility would have the capability to deliver LNG to tractor-trailer trucks for land-based delivery of the fuel to other areas. The emissions from this part of the process are fugitive emissions from leaks, valves, pump seals, connectors, and other equipment sources, which are included in the emission estimates for the facility provided in Table 3.2-3.

A majority of the tanker truck deliveries of LNG would likely be to industrial facilities in the region, and a significant proportion of those deliveries would be to sources that have elected to use LNG instead of diesel.

Nonroad Emissions

The Proposed Action would not affect locomotive emissions, as these sources are not utilized by the facility, nor are they affected by the potential fuel change to LNG. The Proposed Action also has the potential to reduce emissions from vessels calling at existing facilities, by replacing the use of marine diesel in the vessel engines with LNG. The potential emission reductions are not included in these emission estimates.

Table 3.2-3 Potential Emissions for Tacoma LNG and TOTE Marine Vessel LNG Fueling System

	Potential to Emit (ton/year)									
Description	**PM_{10}**	**$PM_{2.5}$**	**NO_X**	**CO**	**SO_2**	**VOC**	**H_2SO_4**	**TAPs[a]**	**HAPs**	**CO_2e (metric)**
Tacoma LNG Emission Sources										
Pretreatment Heater	0.28	0.28	1.36	2.75	0.03	0.79	1.52E-03	4.14	6.90E-02	3,952
Enclosed Ground Flare (pilot and vent gas)	0.46	0.46	6.32	12.8	5.45	7.23	2.73E-01	24.6	2.75E-01	14,654
Emergency Flare (pilot)	0.02	0.02	0.19	0.39	0.002	0.11	9.21E-05	0.58	4.17E-03	181
LNG Vaporizer (Backup)	0.11	0.11	0.52	1.05	0.01	0.30	5.80E-04	1.59	2.64E-02	981
1,600-kW Emergency	0.18	0.18	5.36	3.09	0.01	0.28	-	8.65	5.90E-03	614

Table 3.2-3 Potential Emissions for Tacoma LNG and TOTE Marine Vessel LNG Fueling System

	Potential to Emit (ton/year)									
Description	**PM_{10}**	**$PM_{2.5}$**	**NO_X**	**CO**	**SO_2**	**VOC**	**H_2SO_4**	**TAPs[a]**	**HAPs**	**CO_2e (metric)**
Diesel Generator										
Total[b]	**1.03**	**1.03**	**13.8**	**20.1**	**5.50**	**8.72**	**0.27**	**39.6**	**0.38**	**20,381**
Fugitives										
Tacoma LNG Facility and TOTE Fueling System	-	-	-	-	-	2.89E-03	-	-	-	51.2
Refrigerant losses	-	-	-	-	-	77.0	-	-	-	318
Total						**77.0**				**369**
Total for Permit (Emission Units and Fugitives)	**1.03**	**1.03**	**13.8**	**20.1**	**5.50**	**85.7**	**0.27**	**39.6**	**0.38**	**20,751**
Significant Emission Rate	40	100	40	15	10	40	7	N/A	N/A	N/A
PSD Applicability	250	250	250	250	250	250	250	N/A	N/A	N/A
Exceeds PSD threshold?	NO	NO	NO	NO	NO	NO	NO	N/A	N/A	N/A
Title V Applicability	100	100	100	100	100	100	100	NA	10 individual or 25 combined	100,000
Exceeds Title V threshold?	NO	NO	NO	NO	NO	NO	NO	NA		N/A

Notes:
[a] TAP emissions include emissions of NO_2, CO, SO_2, and diesel particulate matter.
[b] Total is conservative, since the value includes the liquefaction process operating 8,760 hours per year and the vaporization process operating 1,000 hours per year. In actuality, the two processes cannot operate at the same time.
Note: Emissions are based on data provided by Chicago Bridge and Iron on September 9, 2013, and would be refined in the future. The emission estimates in this table are based on conservative assumptions.
Key:
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
H_2SO_4 = sulfuric acid
HAP = hazardous air pollutant
kW = kilowatt
LNG= liquefied natural gas
N/A = not applicable
NO = nitric oxide
NO_2 = nitrogen dioxide
NO_X = oxides of nitrogen
PM_{10} = particulate matter up to 10 microns in diameter
$PM_{2.5}$ = particulate matter up to 2.5 microns in diameter
PSD = Prevention of Significant Deterioration
SO_2 = sulfur dioxide
TAP = toxic air pollutant
VOC = volatile organic compound

As stated above, Table 3.2-3 indicates that, based on the potential emissions from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, the Proposed Action would not be subject to PSD nor to Title V permitting, but would be required to get an NOC permit from PSCAA.

Greenhouse Gas Emissions

As shown in Table 3.2-3, the Proposed Action would emit more than an estimated 20,000 metrics tons of CO_2e per year and thus would be subject to GHG reporting requirements, per WAC 173-441. An annual GHG report must be submitted to Ecology each year even if the source does not meet applicability requirements in WAC 173-441-030(1) or (2) in a future year.

3.2.4.3 Summary of Potential Impacts

Based on the estimated emissions, the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would need to prepare and submit an NOC application to PSCAA for a facility air permit. As part of the permit application process, ambient impact modeling would be conducted for each TAP that exceeds its respective small quantity emission limits, as defined in WAC 173-460 WAC, to determine if the impacts are below acceptable levels. No criteria pollutant modeling is expected to be required as part of permitting.

Operating emissions would be negligible from the two new pipeline segments and the limit and gate stations. Only extremely small emissions are expected from the valves and fittings; impact assessments from these sources are not expected to be required.

3.2.4.4 Decommissioning Impacts

Decommissioning of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System at the end of its useful life would generate impacts similar to those discussed in Section 3.2.4.1 (Construction Impacts). Potential impacts associated with decommissioning activities would result from combustion in fuel burning equipment and vehicles; fugitive dust associated with demolition, removal of material, grading, and travel on the access road. Regulated pollutant emissions associated with decommissioning include criteria pollutants, HAPs/TAPs, and GHGs. However, with the continual improvements in engine technology, it is not possible at the present time to specifically predict emissions from construction equipment and activities 50 years into the future when the decommissioning activities may occur. The emissions from decommissioning would be temporary and are not anticipated to have any long-term impacts.

3.2.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and Proposed Action–related impacts to air quality would not occur. However, a new and consistent supply of cleaner fuel with fewer air emissions than traditional fuels, as would be provided by the Proposed Action for marine and land transportation, would remain unavailable in the Proposed Action area. Further, the peak shaving capability of the Proposed Action would be unavailable to augment natural gas service to PSE customers.

3.2.6 Avoidance, Minimization, and Mitigation

3.2.6.1 Construction

Because of their temporary nature, construction emissions would not have a long-term impact on ambient air quality, and PSE's implementation of its proposed emission control measures, as well as other measures specified by the PSCAA, would reduce impacts associated with construction emissions to less than significant levels.

In its construction contracts, PSE would require its contractors to employ standard dust control measures during construction to reduce generation of fugitive dust from surface disturbance. Dust control measures may include the following:

1. Multiple applications of water during grading.
2. Paving, chip sealing, or chemical stabilization of internal roadways after completion of grading.
3. Reduction of speeds on unpaved roads to 15 miles per hour or less.
4. Use of sweepers or water trucks to remove "track-out" at any point of public street access.
5. Stabilization of dirt storage piles by chemical binders, tarps, fencing, or other erosion control.

PSE would also require its contractors to implement the following measures to reduce emissions from vehicles and construction equipment during construction:

- Properly maintain construction equipment in accordance with manufacturers' specification or standard practices;
- Encourage carpooling by construction workers; and
- Limit truck idling to the extent practicable.

3.2.6.2 Operations

As stated above, PSE would prepare and submit an NOC application to PSCAA for an air permit (Order of Approval) for the facility. During review of the NOC application, PSCAA would conduct a detailed review of applicable regulatory requirements, emissions, impacts, and potential mitigation measures. The Tacoma LNG facility would likely implement the following mitigation measures to reduce the potential for air quality impacts during operations:

- Ultra-low sulfur diesel would be used in the emergency generator,
- Best Available Control Technology would be implemented as required by local rules, and
- A leak detection and repair program for fugitive VOC emissions would be implemented.

3.2.7 Conclusion

No significant or unavoidable adverse air quality impacts would be anticipated as a result of the Proposed Action.

Construction and operation of the proposed Project would contribute new criteria pollutant, HAP/TAP, and GHG emissions sources at the facility site. However, the Proposed Action would result in a net reduction in some pollutant emissions regionally by displacing the use of liquid fuels in marine vessels and diesel trucks.

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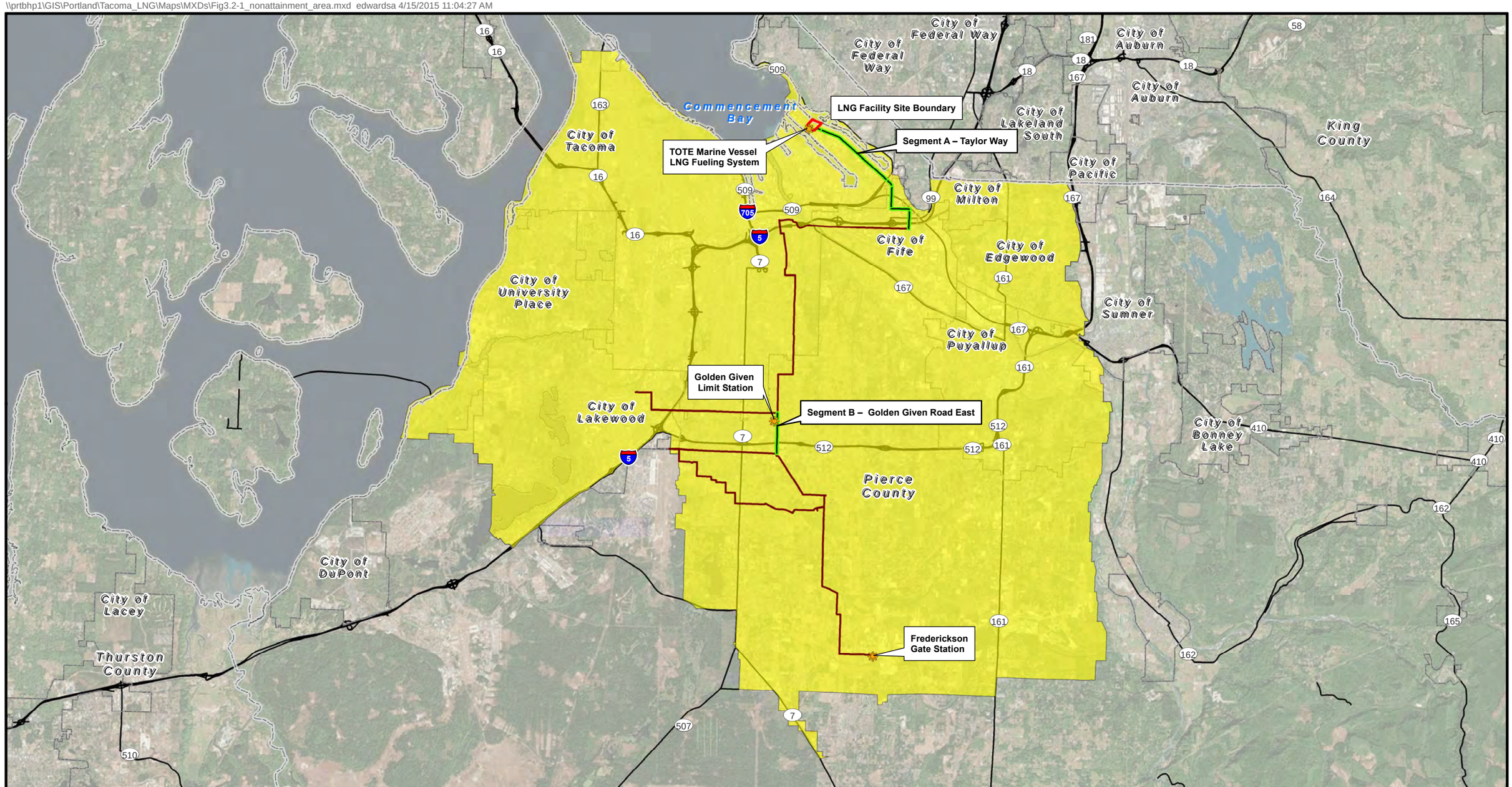


Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Pierce County Nonattainment Area for Particulate Matter
- Proposed Action Components
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

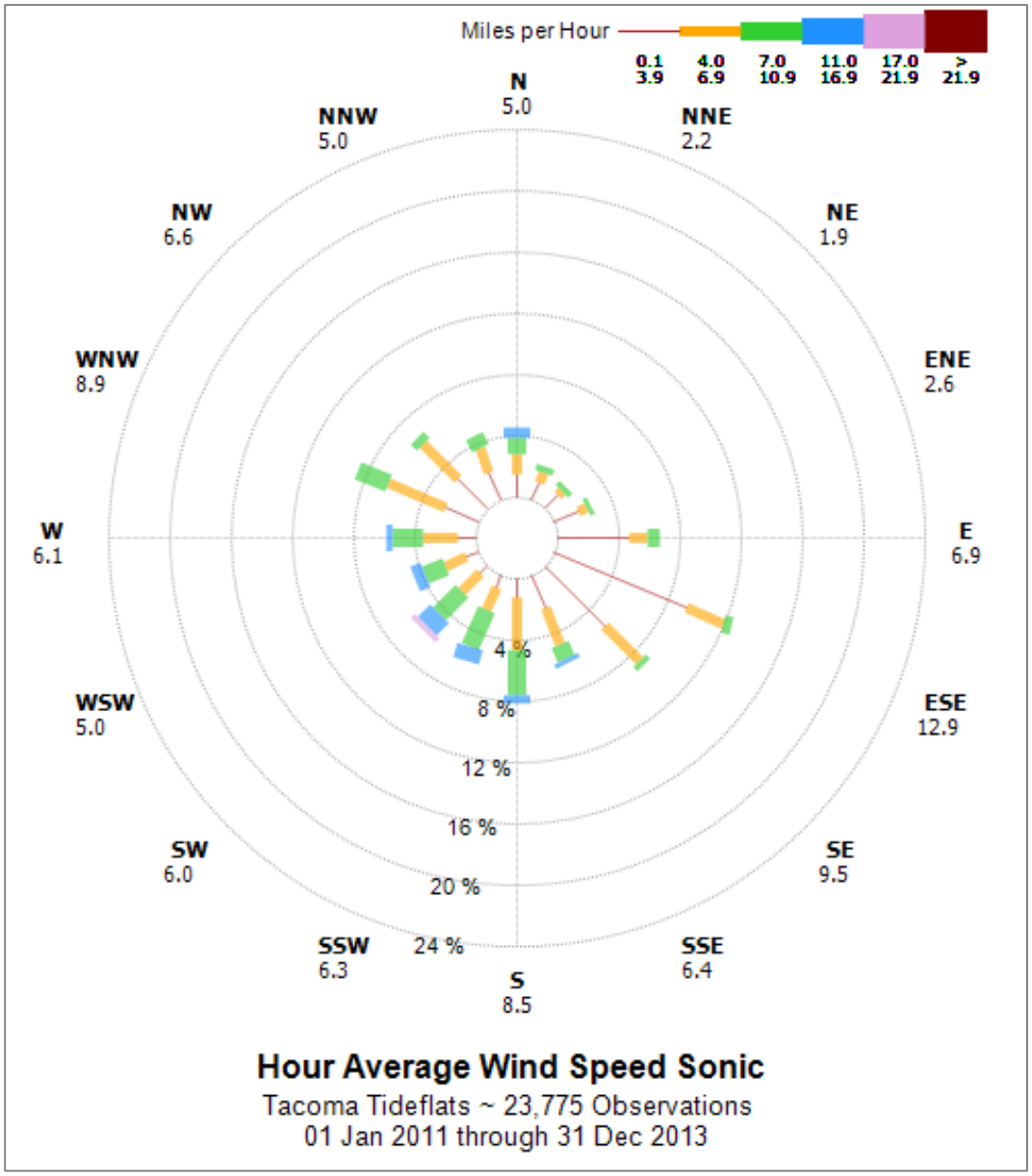
N W E S

0 1 2 Miles

City of Tacoma

Figure 3.2-1
Fine Particulate Nonattainment Area in Tacoma and Pierce County
Tacoma LNG Project

FIGURE 3.2-2
Tacoma Tideflats Wind Rose



3.3 Water

This section describes existing surface and groundwater resources in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on surface and groundwater quantity and quality that could result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action).

3.3.1 Study Methodology

The study methodology for water combined desktop reviews of existing information resources with field data collection and survey activities. Information about surface water (i.e., waterbodies and wetlands), floodplain, stormwater, and groundwater in and surrounding the Proposed Action area was collected from the following resources during the desktop review:

- Pacific Northwest Hydrography Framework (PNWHF 2011);
- National Wetland Inventory (USFWS 2014);
- Pierce County Wetland Inventory (Pierce County 2006);
- Washington Department of Ecology Environmental Information Management database and well logs (Ecology 2012);
- Washington Department of Health (DOH), Drinking Water Division Sentry Internet database; and
- City of Tacoma, City of Fife, and Pierce County codes.

A wetland survey of the proposed Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System was conducted on December 6, 2012. The survey identified potential wetlands and jurisdictional waterbodies. Survey results are documented in the *Wetland and Waters Delineation Report for Tacoma LNG Project – Pierce County, Washington* (CH2M HILL 2014) (see Appendix E).

3.3.2 Regulatory Framework

This section identifies and describes required federal, state, county, and city regulatory and permitting requirements applicable to the Proposed Action.

3.3.2.1 Surface Waters

As described in this section, surface water, wetlands, and stormwater are regulated at federal, state, and local levels.

Clean Water Act

The Clean Water Act (CWA) is the primary federal law governing water pollution intended to restore and maintain the integrity of the nation's surface water by preventing point and nonpoint pollution sources and maintaining the integrity of wetlands. Applicable to the Proposed Action, the CWA requires a permit for discharge of dredged or fill material into waters of the United States, including wetlands, and discharge of stormwater, and these permit requirements in turn necessitate a certification by the state that permitted activities would meet water quality standards for surface water.

Discharge of Dredge or Fill Material

Section 404 of the CWA governs the discharge of dredged or fill material into waters of the United States, including wetlands. A 404 permit is required prior to discharging dredge or fill material into waters of the United States unless the activity falls under an exemption. The United States Army Corps of Engineers, the Section 404 implementing agency, evaluates 404 permit applications under a public interest review as well as the environmental criteria (EPA 2012). The Proposed Action would likely not qualify for an exemption,

and thus would require a 404 permit for the proposed in-water work within the Hylebos and Blair waterways.

Stormwater

Pursuant to CWA Section 402, EPA regulates discharges from point sources through its National Pollutant Discharge Elimination System (NPDES). Ecology has delegated authority from the EPA to administer the NPDES program in Washington. Separate stormwater permit coverage would be required for construction and operation of the Project.

- **NPDES Construction Stormwater General Permit.** Construction site operators are required to obtain a NPDES Construction Stormwater General Permit if they are engaged in clearing, grading, and excavating activities that disturb one or more acres and discharge stormwater to surface water of the state. The Proposed Action would require coverage under Ecology's current Construction Stormwater General Permit.
- **Port of Tacoma NPDES Municipal Stormwater Permit.** Operations at the site require coverage under a municipal or industrial stormwater permit. The Port of Tacoma maintains a NPDES Phase I Municipal Stormwater Permit (MS4 permit), which covers discharges from regulated municipal storm sewer systems. The MS4 permit allows discharge of stormwater runoff from municipal drainage systems into the state's waterbodies. Discharges are allowed only as long as programs are implemented to protect water quality. The Port of Tacoma's Stormwater Management Plan was prepared as a condition of its MS4 permit and is consistent with the Stormwater Management Manual for Western Washington (Ecology 2012). The Stormwater Management Plan serves as a planning tool for the Port of Tacoma to use in its stormwater management activities.
- **City of Tacoma Municipal Code 12.08 Wastewater and Surface Water Management – City of Tacoma Surface Water Management Manual.** The City of Tacoma adopted an ordinance change (Tacoma Municipal Code [TMC] 12.08.080) authorizing implementation of the City of Tacoma Surface Water Management Manual effective January 1, 2008, to control the quality and quantity of stormwater in accordance with the CWA. The City updated the manual in 2012.

  The Tacoma 2012 stormwater manual includes, among other elements, minimum drainage requirements for new development and redevelopment; source control Best Management Practices (BMPs) for a variety of land uses, including commercial and industrial activities; construction BMPs; and proprietary stormwater treatment devices. Compliance with these stormwater manual requirements must be demonstrated to the City during the building permit review process.

Water Quality Certification and Standards

Section 401 of the CWA requires certification by the Washington Department of Ecology (Ecology) that a permitted activity meets state water quality standards to protect the overall health of water and wetland resources and the functions they provide. These functions include shoreline stabilization, nonpoint source runoff filtration, wildlife habitat, and erosion control, which directly benefit adjacent and downstream waters.

Water quality standards, including designated uses, quality criteria, and an antidegradation policy, provide a legal basis for protecting surface water and wetland resources through state water quality management programs. Ecology's *Water Quality Standards for Surface Waters of the State of Washington* (Washington Administrative Code [WAC] Chapter 173-201A) establish water quality standards consistent with public health and public enjoyment, and the propagation and protection of fish, shellfish, and wildlife. The water quality standards are established in conformance with present and potential uses (that is, designated uses) of the surface water and in consideration of natural water quality potential and limitations. Issuance of a 401 Certification means that Ecology has reasonable assurance that the applicant's project would comply

with state water quality standards and other aquatic resources protection requirements under Ecology's authority.

Ecology uses specific numeric criteria to protect the designated uses in order to set water quality standards. Individual numeric criteria are based on specific data and scientific assessment of adverse effects. The numeric criteria specify limits or ranges of chemical concentrations. Based on their designated uses, specific numeric criteria from WAC 173-201A-210 for the Hylebos and Blair waterways are shown in Table 3.3-1. Further discussion of the existing water quality conditions at the Hylebos and Blair waterways is provided in Section 3.3.3.2 (Wetlands and Waterbodies).

The Proposed Action’s application for a CWA 404 permit would trigger the need for a CWA 401 certification.

Table 3.3-1 Washington State Surface Water Quality Designated Use Numeric Criteria for the Hylebos and Blair Waterways (WAC 173-201A-210)

Designated Use	*Classification*	*Criteria*							
		Temperature	**Dissolved Oxygen**	**pH**	**Turbidity**	**Bacteria**	**Nutrients**	**Toxics**	**Radioactive Substances**
Aquatic Life Uses	Good	66.2°F	5.0 mg/L	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.	Turbidity must not exceed 10 NTUs over background when the background is 50 NTUs or less; or a 20 percent increase in turbidity when the background turbidity is more than 50 NTUs.	NA	NA	See Table 240 (3) from WAC 173-210A-240	Top of Form Deleterious concentrations of radioactive materials for all classes shall be as determined by the lowest practicable concentration attainable and in no case shall exceed: (a) 1/12.5 of the values listed in WAC 246-221-290 (Column 2, Table II, effluent concentrations, rules and regulations for radiation protection); or (b) EPA Drinking Water Regulations for radionuclides, as published in the *Federal Register* of July 9, 1976, or subsequent revisions Bottom of Form
Recreation	Secondary Contact	NA	NA	NA	NA	Enterococci organism levels must not exceed a geometric mean value of 70 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 208 colonies/100 mL.	NA		NA
Miscellaneous Uses	Wildlife Habitat	NA	NA	NA	NA	NA	NA	NA	NA
	Harvesting	NA	NA	NA	NA	NA	NA	NA	NA
	Commercial Navigation	NA	NA	NA	NA	NA	NA	NA	NA
	Boating	NA	NA	NA	NA	NA	NA	NA	NA
	Aesthetics	NA	NA	NA	NA	NA	NA	NA	NA

Key:
°F = degrees Fahrenheit
EPA = United States Environmental Protection Agency
mg/L = milligram(s) per liter
mL = milliliter
NA = not applicable
NTU = nephelometric turbidity unit(s)
WAC = Washington Administrative Code

Rivers and Harbors Appropriation Act of 1899

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the United States Army Corps of Engineers, for the construction of any structure in or over any navigable water of the United States. The law applies to any dredging or disposal of dredged materials, excavation, filling, rechannelization, or any other modification of a navigable water of the United States, and applies to all structures, from the smallest floating dock to the largest commercial undertaking.

The Proposed Action would trigger this law owing to the placement of structures within navigable waters, which are the Hylebos and Blair waterways.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) is the primary federal law that ensures the quality of Americans' drinking water, from both surface and groundwater sources. Under the SDWA, the EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. Washington drinking water regulations provide health quality standards that are maintained for public drinking water supplies. Drinking water standards established by the DOH comply with the SDWA (WAC 246-290-300). A mix of groundwater wells and the Green River are the primary drinking water sources in the area of the Proposed Action.

City of Tacoma and Pierce County Critical Areas Ordinances

The Growth Management Act (Revised Code of Washington [RCW] 36.70A) requires the designation and protection of "critical areas" to prevent harm to the community from natural hazards and to protect natural resources. Each jurisdiction (city and county) adopts a critical areas ordinance to define critical areas and to regulate their protection.

TMC Chapter 13.11 Critical Areas Preservation defines critical areas within the city of Tacoma. The City of Fife Municipal Code (FMC) defines critical areas under Chapter 17.05 Critical Areas – General Provisions. The Pierce County Code (PCC) defines critical areas in Chapter 18E Development Regulations – Critical Areas. Each jurisdiction (cities of Tacoma and Fife and Pierce County) impacted by the Project's proposed pipeline segments exempts "activities within an improved right-of-way" from critical areas review. This exemption does not authorize the degradation of a critical area or the ignoring of risk from natural hazards.

City of Tacoma

The City of Tacoma regulates two critical areas specific to the preservation of surface water. Wetlands are defined as a critical area and regulated under the provisions of TMC 13.11.300. Stream corridors are also defined as a critical area and are regulated under the provisions of TMC 13.11.400. Wetland and stream corridor classifications, buffers, and mitigation requirements are included in the applicable sections of TMC 13.11.300 and TMC 13.11.400, respectively.

City of Fife

Wetlands are identified as critical areas under FMC 17.17. Critical wetlands are defined according to the definitions provided in FMC 17.17.020 and regulated activities in wetlands as well as wetland buffers and mitigation requirements are described in the applicable sections of FMC 17.17.

Pierce County

Wetlands are defined and regulated as a critical area according to the provisions provided in PCC 18E.30. General wetland classifications are provided in PCC 18E.30.020. Regulated activities in wetlands as well as wetland classification, buffers, and mitigation requirements are described in the applicable sections of PCC 18E.30.

Flood Hazards

The Federal Insurance Administration prepared flood insurance studies and associated flood insurance rate maps to delineate flood hazard areas, including floodplains. Local jurisdictions regulate development of flood hazards through land use regulations such as critical areas ordinances. The Project would be sited with consideration to these flood hazards.

County and City Critical Areas Ordinances

City of Tacoma

The City of Tacoma classifies flood hazard areas as critical areas under TMC 13.11.600. Flood hazard areas are areas consistent with the most recent official Flood Insurance Rate Maps produced by the Federal Insurance Administration that delineate areas of special flood hazards (TMC 13.11.610). The City identifies appropriate flood hazard area development standards in TMC 13.11.620.

City of Fife

The City of Fife defines frequently flooded areas as critical areas under FMC 17.09. Specifically, floodplains and other areas subject to flooding that perform important hydrological functions meet the applicability criteria for frequently flooded areas provided in FMC 17.09.030. The City requires that development in frequently flooded areas be consistent with regulations provided in FMC 17.09.040.

Pierce County

Pierce County defines flood hazard areas as critical areas under PCC 18E.70. The intent of the provisions regulating flood hazard areas is to minimize public and private losses due to flood conditions in flood hazard areas and provide criteria necessary for regulated activities located within flood hazard areas in Pierce County (PCC 18E.70.010). Pierce County flood hazard areas are generally defined according to the criteria provided in PCC 18E.70.020. Flood hazard area development standards are provided in PCC 18E.70.040.

Groundwater

Groundwater is protected as drinking water at both the federal and state levels. See Section 3.3.2.1 (Surface Waters). Other aspects of groundwater are regulated at a state and local level.

Washington State Groundwater Standards

The State of Washington regulates groundwater under Revised Code of Washington (RCW) 90.44. Ecology has the authority under RCW 90.44 to establish standards, criteria, and a process for the designation of specific groundwater areas or subareas, or separate depth zones within such area or subarea. Ecology provides for local governments or groundwater users of a given area or subarea to initiate development of a groundwater management program that is consistent with state and local government objectives, policies, and authorities. Ecology works with local governments and users to identify groundwater management areas or subareas that have aquifer systems that are “a) declining due to restricted recharge or over-utilization; b) the primary source of supply for public water supply systems; c) designated as a sole-source aquifer by the EPA; or d) in geographical areas where land use may result in contamination or degradation of the groundwater quality” (RCW 90.44.400). The DOH administers the state Wellhead Protection Program. Other state agencies, such as Ecology and the Washington State Department of Agriculture, integrate wellhead protection into their programs. The proposed Project would not be located in a groundwater management area.

County and City Critical Areas Ordinances

City of Tacoma

Aquifer recharge areas are regulated as a critical area under TMC 13.11.800. Aquifer recharge areas are established where surface expressions of the Wellhead Protection Areas (WHPAs) of the water supply wells overlap coarse-grained (permeable) surface deposits. Generally, aquifer recharge areas are classified based on the susceptibility of the aquifer to degradation and contamination (TMC 13.11.810).

In accordance with TMC 13.11.820, standards for development in aquifer recharge areas must comply with the provisions of TMC Chapter 13.09, which regulate the South Tacoma Groundwater Protection District. No portion of the Project would be located in the South Tacoma Groundwater Protection District.

City of Fife

Aquifer recharge areas are regulated as a critical area under FMC 17.07. In accordance with applicability criteria described in FMC 17.07.030, the City of Fife would use the latest edition of the National Water Well Association and EPA's DRASTIC[3] map of Pierce County to identify areas where the potential for contamination of groundwater resources is high in association with land use activities. The Proposed Action would occur in a City of Fife aquifer recharge area as described in Section 3.3.3.5 (Groundwater).

Pierce County

Aquifer recharge areas and wellhead protection areas are classified and regulated as critical areas under PCC 18E.50. The purpose of these critical area regulations is to protect aquifer recharge areas and wellhead protection areas from degradation or depletion resulting from new land use activities in Pierce County (PCC 18E.50.010). Because groundwater underlying aquifer recharge areas would be exceptionally susceptible and vulnerable to contamination, and such groundwater is an important public water supply, Pierce County intends to safeguard groundwater resources by mitigating or precluding future discharges of contaminants from new land use activities (PCC 18E.50.010). Aquifer recharge areas and wellhead protection areas are identified on the Pierce County Critical Areas Atlas-Aquifer Recharge and Wellhead Protection Area Map and would be subject to the review procedures provided in PCC 18E.50.030. The Proposed Action would occur in a Pierce County aquifer recharge area as described in Section 3.3.3.5 (Groundwater).

3.3.3 Affected Environment

The study area used for the analysis of surface and groundwater consists of the location of the Project components. Project components associated with the Proposed Action are summarized as follows and further described in Chapter 1 (Purpose, Need, and Alternatives Considered) and Chapter 2 (Description of Proposed Action):

- **Tacoma LNG Facility:** Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the Puget Sound Energy (PSE) Natural Gas Distribution System. The study area for the Tacoma LNG Facility is defined by the facility site boundary (see Appendix F).
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities, and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 1-2. The study area for the TOTE system is defined by the site boundary (see Appendix F).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segments A and B), a new limit station (the Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. The study area for the pipeline segments is defined as the roadway corridor for project alignment. The limit station and gate station study areas are defined by their site boundaries. The figures in Appendix F show the study areas for the PSE Natural Gas Distribution System.

A detailed description of the Proposed Action components is provided in Chapter 2.

3 DRASTIC is an acronym for the parameters used to develop a rating for a particular area: D = Depth to recharge, R = Net Recharge, A = Aquifer media, S = Soil media, T = Topography, I = Impact of the Vadose Zone (Vadose is type of wetland soil), and C = Hydraulic Conductivity of aquifer.

3.3.3.1 Hydrologic Setting (Drainage Basins and Watersheds)

This section describes existing surface and groundwater resources in the Proposed Action area. Based on available information from the United States Geographical Survey, DOH, and Washington Water Resources Inventory Areas (WRIAs), elements of the Project would cross two drainage basins and two watersheds. Watershed council area boundaries are generally consistent with the subbasin boundaries and are listed in Table 3.3-2 and shown in Figure 3.3-1.

Table 3.3-2 Subbasins and Watershed Council Areas Crossed by the Proposed Project

Watershed Council	Proposed Action Element	WRIA	4th Field Hydrologic Unit Code	Watershed (5th Field Hydrologic Unit Code)
Puyallup River Watershed Council	Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, Pipeline Segment A	10 Puyallup-White	17110014	Hylebos Creek-Frontal Commencement Bay
Chambers-Clover Watershed Council	Pipeline Segment B, Golden Given Limit Station and Frederickson Gate Station	12 Chambers-Cover	17110019	Clover Creek

Key:
LNG = liquefied natural gas
TOTE = Totem Ocean Trailer Express
WRIA = Water Resources Inventory Area

Ecology-designated uses for the streams, rivers, and estuaries within the watersheds in the vicinity of the Proposed Action include public domestic water supply, salmonid fish spawning, private domestic water supply, resident fish and aquatic life, industrial water supply, wildlife and hunting, irrigation, fishing, livestock watering, boating, anadromous fish passage, water contact recreation, salmonid fish rearing, and aesthetic quality.

Available source water assessments for public water supplies were obtained from the DOH (DOH 2013). The source water assessments identify groundwater drinking water protection areas (Figure 3.3-2A,B,and C) and sensitive areas for surface water sources. The sensitive areas are those where the potential contamination sources, if present, have a greater potential to impact the water supply, including areas with high soil permeability, high soil erosion potential, high runoff potential, and areas within 1,000 feet of rivers and streams.

No surface water drinking water sources occur at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites, or would be crossed by the new distribution pipeline segments. Discussion of groundwater sources of drinking water is provided in Section 3.3.3.5 (Groundwater).

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The hydrologic setting of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites is primarily a function of the historical development of the Port of Tacoma area within Commencement Bay. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are situated on relatively flat areas of upland fill that make up the Blair-Hylebos peninsula. These sites were created decades ago from dredge and fill material and are situated on what was historically mudflat and salt marsh habitat. The resulting upland, marine tidal, and subtidal habitats have been actively developed, managed, and maintained for industrial and commercial shipping since that time.

Site conditions are the result of Port of Tacoma development activities beginning in the 1920s. The Hylebos and Blair waterways, both tidally influenced arms of Commencement Bay, were excavated from Commencement Bay tide lands. Adjacent tide lands were filled to create the upland portion of the sites.

Commencement Bay is a navigable natural deepwater embayment, trending northwest to southeast and located near the southern end of the main basin of Puget Sound. The bay is approximately 2 miles wide and has a water depth of 560 feet at the entrance. Urbanized areas of the city of Tacoma and its suburbs currently dominate the shorelines.

Commencement Bay became a Superfund cleanup site in 1983. The EPA oversaw the cleanup of polluted sediments, and Ecology worked to control the sources of pollution as well as cleanup. As cleanup is progressing, the state has increased its efforts to prevent sources of pollution, protect cleaned-up sites, and restore natural habitats (Ecology 2012). The current 303(d) listed parameters in Commencement Bay include bacteria, bis(2-ethylhexyl) phthalate, chlorinated pesticides, dichlorodiphenyltrichloroethane DDT, Dieldrin, dissolved oxygen, high molecular weight polycyclic aromatic hydrocarbons, and polychlorinated biphenyls (PCBs), which were identified through water and tissue samples (Ecology 2012). More information on the nearby contamination areas is provided in Section 3.1.1.4 (Earth: Environmental Conditions).

PSE Natural Gas Distribution System

Proposed Pipeline Segment A would be located within WRIA 10 Puyallup-White Basin, which drains to Puget Sound. Pipeline Segment B and the limit and gate stations would be located in WRIA 12 Chambers-Clover Basin, which also drains to Puget Sound.

3.3.3.2 Wetlands and Waterbodies

This section identifies the wetlands and waterbodies within the study area for the Proposed Action. The waterbodies are described below relative to the main Project components. The *Wetland and Waters Delineation Report for Tacoma LNG Project – Pierce County, Washington* (CH2M HILL 2014) (see Appendix E) documents the results of a wetland and waterbody survey conducted on the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. This wetland delineation documents that no wetlands were identified on either the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites.

The locations for the PSE natural gas distribution system improvements were specifically selected where wetlands and waterbodies are not present or could be avoided (see Appendix F).[4] The two new distribution pipeline segments would be constructed entirely within the paved portion of existing road rights-of-way (ROWs), as described in Section 2.3.3 (Description of Proposed Action: PSE Natural Gas Distribution System).

No wetlands or waterbodies occur on the sites of the existing Frederickson Gate Station or the proposed Golden Given Limit Station (see Appendix F). The limit station would be built entirely on an area previously developed as a building and paved parking area. Modifications to the existing gate station would occur entirely on previously developed area and within the existing fence line for the Frederickson Gate Station.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Proposed Action would include in-water development within the Hylebos Waterway for the Tacoma LNG Facility and Blair Waterway for the TOTE Marine Vessel LNG Fueling System. No other waterbodies were delineated on either of the two sites.

Ecology's designated uses for the Hylebos and Blair waterways are identified in Table 612 of WAC 173-201A-612 and include aquatic life, recreational, and miscellaneous uses. All of the port waterways are ranked "good" or Class B water for aquatic life use, which in turn requires maintaining Ecology-defined numeric

[4] There are two legend items for "Stream/River" on the figures in Appendix F. Both legend items represent waterbody data that originated from Pierce County and are dated 2012. The data include linear and area features. The linear feature, shown as a blue line, represents the centerline of waterbodies. The area feature, which is the shaded polygon, represents the approximated width of waterbodies.

criteria. Numeric water quality criteria for the designated uses in the Hylebos and Blair waterways are shown in Table 3.3-1.

Hylebos Waterway

The Hylebos Waterway is a navigable channel dredged for Port of Tacoma activities. It is the easternmost waterway in the port and flows east to west, draining into Commencement Bay. The mean higher high water elevation for the Hylebos Waterway is 11.8 feet above mean lower low water (MLLW), based on the National Oceanic and Atmospheric Administration tidal datum for the Tacoma tide gauge, located on Commencement Bay.

The Hylebos Waterway shoreline in the vicinity of the Tacoma LNG Facility site is covered with slope-protection materials, including a creosote-treated timber bulkhead and riprap. Two piers extend into the Hylebos Waterway. One of the piers is approximately 40 by 15 feet, with an approximately 90-foot walkway. This creosote-treated timber pier is abandoned and in disrepair. The second pier is a creosote-treated timber structure measuring roughly 600 by 25 feet.

Blair Waterway

The Blair Waterway is a navigable channel dredged for Port of Tacoma activities. It is situated between the Hylebos Waterway to the east and the Sitcum Waterway to the west. The mean higher high water elevation for the Blair Waterway is 11.8 feet above MLLW, based on the National Oceanic and Atmospheric Administration tidal datum for the Tacoma tide gauge, located on Commencement Bay.

The Blair Waterway shoreline in the vicinity of the TOTE Marine Vessel LNG Fueling System site is developed with wharves, piers, and riprap armored slopes. It is generally sloped at approximately 40 to 60 percent and is covered with various slope protection materials, including riprap, concrete and asphalt pieces, and various debris. Several existing in-water structures in the Blair Waterway are associated with existing TOTE operations, including one timber T-pier, three concrete piers, and one concrete breasting dolphin.

PSE Natural Gas Distribution System

Four waterbodies cross under the paved roadways where the two new distribution pipeline segments are proposed. These waterbodies are all within existing culverts where they cross under the roadways. Table 3.3-3 summarizes the main characteristics of these four waterbodies.

Table 3.3-3 Existing Drainages Crossing New Distribution Pipeline Segments

Name	Pipeline Milepost	USGS Hydrologic Unit Code (HUC)	WRIA	Flow Type	Stream Width	WDNR Stream Type	Proposed Crossing Method
Kaiser Ditch	A1.58	17110019	10 Puyallup-White	Intermittent	Culvert	X	Horizontal Bore or Drill
Fife Ditch	A2.24	17110019	10 Puyallup-White	Intermittent	Culvert	X	Horizontal Bore or Drill
Unnamed Drainage Ditch	A2.76	17110019	10 Puyallup-White	Ephemeral	Culvert	X	Horizontal Bore or Drill
Unnamed Drainage Ditch	A3.25	17110019	10 Puyallup-White	Ephemeral	Culvert	X	Horizontal Bore or Drill

Key:

WDNR = Washington Department of Natural Resources
WRIA = Water Resources Inventory Area
X = WDNR water type that identifies various water features (E.g., irrigation ditches, sanitation ponds, pipeline, etc.) that are not part of the S, F, Np, or Ns classifications.

Kaiser Ditch is connected to the Hylebos Waterway and appears to receive tidal influence from the Hylebos Waterway. Kaiser Ditch historically conveyed discharge from the former Kaiser Aluminum Smelter operations, and currently a large section of Taylor Way drains to Kaiser Ditch before discharging to the Hylebos Waterway. Kaiser Pond, a stormwater detention basin, discharges to Kaiser Ditch through a culvert under Taylor Way.

Fife Ditch is an artificially constructed channel that connects Wapato Creek to Hylebos Creek, which drains into the Hylebos Waterway. A pump station controls discharge to Hylebos Creek. Fife Ditch crosses under Taylor Way in a culvert.

An unnamed drainage ditch crosses under 54th Avenue East in a culvert. The ditch connects Fife Ditch to Hylebos Creek. Another unnamed drainage ditch crosses under 12th Street East in a culvert. The ditch discharges into Hylebos Creek.

Stormwater

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Stormwater runoff from existing properties on the western portion of the Blair-Hylebos peninsula typically is collected and conveyed via underground stormwater pipelines that discharge through stormwater outfalls to both the Hylebos and the Blair waterways. Generally, either the Port of Tacoma or the City of Tacoma has ownership of the stormwater outfalls. Outfall ownership depends on the location. The existing stormwater facilities located throughout the Blair-Hylebos peninsula were developed before modern-day stormwater quality treatment and quantity requirements had been established for new development. As a result, most stormwater runoff on the peninsula does not comply with modern-day stormwater quality or quantity requirements prior to discharging into the waterway waterbodies. With the recent redevelopment of properties and associated upgrades, the properties are coming into compliance with applicable modern-day stormwater quality treatment and quantity requirements.

The existing Tacoma LNG Facility site stormwater runoff is currently collected via conventional catch basins, then conveyed through an underground pipeline network and discharged through stormwater outfalls to the Hylebos Waterway. In preliminary investigative record drawing and field observation work, five existing outfalls are located along the shoreline, as shown in Appendix F. There may be potentially one to three more existing stormwater outfalls along the Hylebos Waterway frontage for the Tacoma LNG Facility. All of the existing stormwater outfalls that discharge to the Hylebos Waterway belong to the Port of Tacoma. All of the existing stormwater collection and conveyance systems appear to directly discharge to the Hylebos Waterway without stormwater treatment or quantity facilities. Some of the existing stormwater outfall pipelines are installed at elevations such that they are vertically influenced by the tides. During the higher tides, the outfall pipeline elevation may be partially or completely submerged from the tidal elevations. None of the existing outfall pipelines is provided with check valves, which are typical of newer outfall upgrades.

The existing TOTE site stormwater runoff is collected via conventional catch basins, conveyed through an underground pipeline network and discharged through stormwater outfalls to the Blair Waterway. Preliminary investigative record drawings indicate that there may be as many as 14 existing outfalls located along the riprapped shoreline, of which two or three may belong to the City. The majority of the existing site stormwater collection and conveyance systems appear to provide some stormwater runoff treatment via oil/water separator facilities. No other stormwater quality or quantity systems appear to be in place. Some of the existing outfall pipelines are tidally influenced, and some are provided with check valves.

PSE Natural Gas Distribution System

During heavy rainfall events, sheet flow enters the channels from the impervious road pavement. Stormwater infrastructure (lines, outfalls, and manholes) occur under and parallel to the roadway along

Taylor Way and Alexander Avenue, the proposed locations for Segments A. At Milepost A2.3, Pipeline Segment A would cross Highway 509 into the City of Fife jurisdiction. The intersection of State Route 509 and Taylor Way drains to Fife Ditch, where stormwater is discharged through a tide gate and pumping system to the mouth of the Hylebos Creek. Stormwater infrastructure parallels 54th Avenue East, 12th Street East, and 62nd Avenue. The outfall (end of pipe) at the intersection of 62nd Avenue and 12th Street East discharges to a swale on the southwest corner of the intersection. The outfall at the intersection of 54th Avenue East and 8th Street discharges to Fife Ditch.

Runoff from existing roadway and properties drains to a mix of open channel and closed pipe drainage lines parallel to roadways along the proposed pipeline alignments for Pipeline Segment B ultimately discharging to county outfalls. The proposed Golden Given Limit Station would be located on a previously developed parcel near the north end of Pipeline Segment B. The property currently is occupied by one 4,800-square-foot building and asphalt area, together totaling approximately 100 percent impervious surface, with no existing stormwater controls or infrastructure. The existing Frederickson Gate Station is located on gravel surface. During rainfall events, runoff infiltrates through the gravel surface.

3.3.3.3 Existing Contaminated Soils and Sediments

As described in Section 3.1.3 (Earth: Affected Environment), contamination associated with the historical industrial uses in the surrounding area may extend to locations within the construction footprint proposed for the Tacoma LNG Facility and portions of the proposed natural gas distribution pipeline (Pipeline Segment A) on the Blair-Hylebos peninsula.

Hylebos Waterway

Historically, the Hylebos Waterway has been contaminated from several industries, including chemical manufacturing plants, scrap metal recycling, log transfer facilities, and shipbuilding. The Port of Tacoma worked to extend the Hylebos Waterway in the 1960s to a 3-mile-long waterway, 200 feet wide (EPA 2011). EPA issued three unilateral administrative orders requiring four responsible parties to clean up the Hylebos Waterway, and sediment cleanup actions have been completed under EPA oversight. During the previous cleanup actions, sediment in the general vicinity of the Tacoma LNG Facility site was designated for monitored natural recovery. A 2014 EPA report reviewing the Hylebos Waterway indicates that aside from the Arkema and Occidental sites (located approximately 1 mile east and immediately west of the Proposed Action area, respectively, on the Blair-Hylebos peninsula), Hylebos cleanup has been completed (EPA 2014). The Hylebos Waterway is on the CWA 303(d) list for Diedrin and PCBs. Water in the Hylebos Waterway has been determined to contain up to two times higher concentrations of lead and copper and up to 43 times higher concentrations of zinc than seawater flowing into Puget Sound (Port of Tacoma 2009).

Blair Waterway

Historically, the Blair Waterway was part of the 10 to 12 square miles of what was named the Commencement Bay, Near Shore/Tide Flats on the National Priorities List as an EPA Superfund Site. This was primarily due to the Asarco Smelter Facility, which contaminated sediments and groundwater. Between 1993 and 1995, the entire Blair Waterway navigation channel was dredged as part of the Sitcum Waterway Remediation Project. After completion of this remediation, the EPA removed the Blair Waterway from the National Priority List. Although Blair Waterway is not included on Ecology's Category 303(d) list for water quality impairments (Ecology 2012), it has been determined to contain up to two times higher concentrations of lead and copper, and up to 43 times higher concentrations of zinc, than seawater flowing into Puget Sound (Port of Tacoma 2009).

3.3.3.4 Flood Hazards

Flood hazards identified by the Federal Emergency Management Agency and local jurisdictions are shown in Figure 3.3-3A and only encompass the Hylebos and Blair waterways at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. No flood hazard areas would be crossed by the PSE Natural Gas

Distribution system improvements except for four small crossings by Pipeline Segment A within the city of Fife.

3.3.3.5 Groundwater

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are underlain by a series of aquifers and aquitards. Neither site would be located within an aquifer recharge area, as shown in Figure 3.3-2A. No WHPAs or EPA sole-source aquifers occur within either site. Two WHPAs are located to the south of both sites on the Blair-Hylebos peninsula.

Surrounding surface waterbodies consisting of the Blair and Hylebos waterways, Hylebos and Wapato creeks, and Commencement Bay serve as regional groundwater discharge areas. Groundwater within the aquifers flows horizontally and vertically toward these waterbodies (Port of Tacoma 2009). As stated in Coastal Monitoring Associates (2006; cited in Port of Tacoma 2009), the aquifer systems under the site are as follows, from shallowest to deepest: Shallow Fill Aquifer (3 to 10 feet below ground surface [bgs], depending on the season and, in places, by local tide conditions); Intermediate Aquifer (200 feet bgs and subject to tidal influence by the Blair and Hylebos waterways); and Deep Regional Aquifer System (below 200 feet bgs). For the Shallow Fill Aquifer and the upper portion of the Intermediate Aquifer, groundwater flow is generally toward the nearest surface waterbody. Localized variations to this flow pattern occur at certain parcels, but overall, the groundwater flows horizontally within the aquifers from the center of the peninsula to the nearest surface waterbody, with groundwater seeps occurring along the banks and shorelines that discharge at variable rates.

Review of available data in the Ecology well log database identified no domestic or public water supply wells within 150 feet[5] of the of the Tacoma LNG Facility (Ecology 2013). The majority of the well reports reviewed in the Ecology database are for either geotechnical borings or monitoring wells.

PSE Natural Gas Distribution System

Pipeline Segment A would occur in an area with two main aquifer recharge areas. One is a circular area near the northern end of the pipeline segment centered on the tideflats monitoring well (Ecology Well ID #ACN703). This monitoring well withdraws water from the Deep Regional Aquifer System. Another aquifer recharge area is a large area near the southern end of Pipeline Segment A centered on the WHPAs of two deep water-supply wells, Wells 1 and 4, serving the Kaiser Aluminum and Chemical water system. These water wells withdraw water from the Deep Regional Aquifer System. This water system, originally used for minor domestic supply, is no longer used for domestic supply[6] and is now used for dust control and other minor uses (Port of Tacoma 2009). Pipeline Segment B, the limit station, and the gate station would be located in an aquifer recharge area that includes the Central Pierce County Sole Source Aquifer and Shallow Fill and Intermediate Aquifers as shown in Figure 3.3-2B,C.

Sole-source or principal aquifers are designated as aquifers that supply 50 percent or more of the drinking water for an area and for which there is no other reasonably available alternative source should the aquifer become contaminated.

Review of available data in the Ecology well log database identified no domestic or public water supply wells within 150 feet of the of the new distribution pipeline segments, limit station, or gate station. The majority of the well reports reviewed in the Ecology database are either geotechnical borings or monitoring wells for

[5] 150 feet is the Federal Energy Regulatory Commission (FERC) designated distance to identify groundwater supply wells within vicinity to a project site. According to 18 CFR 380.12 (d), minimum FERC requirements for project application include: (1) Identification of the location of known public and private groundwater supply wells or springs within 150 feet of proposed construction areas; and (2) Identification of locations of EPA or state-designated sole-source aquifers and wellhead protection areas crossed by the proposed pipeline facilities.

[6] WAC 173-505-030: "Domestic water use" includes uses such as potable water to satisfy the human domestic needs of a household or business, including water used for drinking, bathing, sanitary purposes, cooking, laundering, and other incidental uses.

nearby facilities. The nearest municipal drinking water well is approximately 0.28 mile east of Pipeline Segment B.

3.3.4 Impacts of the Proposed Action

Following is an analysis of potential impacts related to surface and groundwater resources. Impacts are discussed separately for construction and operation of development at the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System.

3.3.4.1 Construction Impacts

The Proposed Action and related construction procedures for the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System are described in Chapter 2 (Description of Proposed Action). General procedures for in-water construction at the Tacoma LNG Facility within the Hylebos Waterway would include demolition of existing in-water structures, construction of in-water structures including pile driving, and shoreline improvements. General procedures for upland construction of the Tacoma LNG Facility include demolition of upland buildings and structures, site preparation and grading, ground improvements and foundations, LNG storage tank construction, support facilities, site access and traffic, and hydrostatic testing of the LNG storage tank and piping.

Construction of the TOTE Marine Vessel Fueling System would include demolition and replacement of an existing over-water catwalk and installation of a pile-supported access trestle and an LNG loading platform within the Blair Waterway, as described in Chapter 2. A cryogenic pipeline would also be constructed to connect the Tacoma LNG Facility and TOTE in-water LNG loading platform.

Construction of the new pipeline segments would follow general pipeline construction techniques: horizontal boring, directional drilling, or trenching in existing roads; stringing, bending, and welding; trench backfill; hydrostatic testing; cleanup; and permanent erosion control. Pipeline segment construction would follow federal, state, and local permit conditions.

No previously undisturbed area would be developed, and no additional construction workspace would be required for the new limit station. The existing building and pavement would be removed as needed for construction of the proposed improvements. The specific improvements and components of the limit station would then be completed including some trenching for underground piping.

The upgrades to the existing Fredrickson Gate Station would occur entirely within the existing developed footprint. No previously undisturbed area would be affected, and no additional construction workspace would be required outside of the existing developed footprint.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potential impacts from construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are described below.

Surface Waters

The in-water structures on both the Hylebos and Blair waterways are specifically designed to avoid the need for dredging and thus minimize impacts to surface water. Construction surface water issues are discussed below.

Creosote-treated Timber Piling Removal

It is the policy of resource agencies, including the National Marine Fisheries Service and United States Fish and Wildlife Service, to require replacement of creosote-treated wood pilings with steel or concrete pilings where possible when new construction includes new pilings, because creosote is a carcinogen. Accordingly, to reduce the amount of creosote in the environment, approximately 508 creosote-treated timber piles would be removed from the Hylebos and Blair waterways Project-wide (the majority from the Hylebos) as part of the Proposed Action. The proposed method of extraction is with a vibratory hammer. Creosote-

treated wood would also be removed from the Hylebos Waterway as part of the shoreline improvement along the Tacoma LNG Facility. As described below (see "Fill," below), the existing creosote-treated timber bulkhead would be removed.

Given the limited polycyclic aromatic hydrocarbon (PAH) concentration information available for the Proposed Action site seafloor, it is difficult to predict what concentrations would be in the water column during creosote-treated pile removal. Nevertheless, it is reasonable to assume that PAH concentrations in the water column would be elevated somewhat for a short period of time throughout the entire duration of these activities, as a result of resuspension of contaminated sediments. It is also reasonable to assume that there would be short- and long-term elevated concentrations of PAHs in surface sediments in the vicinity of removed piles until natural sedimentation processes bury the contaminated materials below the depth of burrowing invertebrate species. Following the completion of removal activities, elevated PAH (including creosote) concentrations are likely to be greatly diminished within one or two tide cycles. The long-term consequence of this action cannot be quantified but would be qualitatively beneficial by improving sediment and water quality from the creosote source being removed from the environment.

Turbidity

Temporary increases in turbidity would be caused by suspended sediments during pile removal and pile-driving activities, as well as the regrading of 600 feet of shoreline in the Hylebos waterway. Increased suspended sediment loads associated with pile removal/driving would be minimal. Turbidity impacts would be relatively minor and would last only a matter of hours or a few days because tidal exchange quickly disperses turbid water. The veneer of silt deposition in adjacent areas near these types of activity is typically very thin.

Sediment cleanup actions have been completed in portions of Hylebos Waterway under EPA oversight. During the previous cleanup actions, sediment in the immediate vicinity of the existing pier adjacent to the Tacoma LNG Facility site was designated for monitored natural recovery.

Fill

The Proposed Action includes minimal amounts of marine-related direct fill effects. The existing shoreline at the site along the Hylebos waterway is constructed of gravel and soil fill material supported by a creosote-treated timber bulkhead, which is located at about elevation 11.8 feet MLLW. A new steel sheet pile bulkhead approximately 600 feet in length would be installed approximately 9 feet shoreward of the existing bulkhead. The existing creosote-treated timber bulkhead and supported fill material would be removed and replaced with light, loose riprap varying in size from 3 inches to ½ cubic yard, constructed at a 2:1 slope below elevation 11.8 feet MLLW. The work would require approximately 1,900 cubic yards of excavation and 690 cubic yards of fill within a 5,440-square-foot disturbance area. The onshore ends of the proposed piers on both waterways would land on an abutment and wingwall system constructed with land-based equipment and would not require any in-water work.

As described in Section 3.6 (Noise), the Proposed Action would remove existing creosote-treated piles via a vibratory hammer. Holes remaining following removal would be filled with clean sand or other habitat mix approved by the Washington Department of Fish and Wildlife. It is conservatively estimated that 25 percent of the piles to be removed from the Hylebos and Blair waterways would have some portion of a hole remaining following extraction. The total quantity of clean sand or other habitat mix needed to fill pile holes for the Project in both the Hylebos and Blair waterways is estimated to be no more than 360 cubic yards, including up to 340 cubic yards in the Hylebos Waterway and 20 cubic yards in the Blair Waterway.

Spills

Water quality impacts from spills of materials during construction, such as oil, gasoline, and hydraulic fluids, may occur. Hazardous materials entering waterbodies resulting from material spills being flushed into waterbodies with stormwater runoff or entering waterbodies directly from leaks or spills at the facility could

have an adverse impact on water quality and subsequent adverse impacts on fish and wildlife using the waterways.

Construction Water Use

Approximately 9 million gallons of water would be required during the temporary construction phase of the Proposed Action and would be supplied by Tacoma Public Utilities. Most of this water would be used to mix with grout for ground improvements. Concrete would be brought in ready-mix trucks from Tacoma suppliers in/near the Port of Tacoma. Construction water inadvertently discharged could temporarily impact water quality in the Hylebos and Blair waterways by fluctuating water temperature and pH. The Tacoma Public Utilities water system has the overall capacity to supply up to 292 million gallons per day and maintain approximately 140 million gallons in additional storage (Tacoma Public Utilities 2015).

Hydrostatic Test Water

Before being placed into service, the LNG storage tank at the Tacoma LNG Facility would be hydrostatically tested to ensure structural integrity. Hydrostatic testing is described in Chapter 2.

PSE would use approximately 5 million gallons of water from the Tacoma Public Utilities potable water system for hydrostatic testing of the LNG storage tank. At the proposed intake pumping rate of 1,000 gallons per minute, it would take approximately four days to fill the tank to the required level for testing, or approximately 1.25 million gallons per day. As described above, the Tacoma Public Utilities water system has the capacity to supply up to 292 million gallons per day (Tacoma Public Utilities 2015).

Test water would be batch discharged to the municipal stormwater system in coordination with the Port and City of Tacoma. The discharge points to the stormwater system would be determined as part of more detailed engineering design. Surface waters would not be impacted from any withdrawal of hydrostatic test water because a municipal system would be used as the source under the City's existing water right. Although hydrostatic test water discharged to the municipal stormwater system would eventually reach the Hylebos Waterway and, potentially, the Blair Waterway, these surface water would not be significantly impacted. No chemicals or additives would be added to the hydrostatic test water

Stormwater

During construction, temporary introductions of pollutants, including but not limited to, sediments, metals, oil and grease, and other organic compounds to the Hylebos or Blair waterways could occur from rainstorm runoff. This is specifically true during improvement activities along the shoreline of the Hylebos Waterway. PSE would implement code-required temporary erosion and sedimentation control measures or BMPs in an effort to mitigate or prevent such events from occurring.

Construction work, including implementation of erosion and sediment control BMPs, may account for the potential presence of other contamination and would be reviewed by EPA and Ecology to ensure compatibility with potential future remedial actions. An environmental site assessment was conducted in May 2014 to evaluate whether contaminated soil or groundwater is present within upland portions of the construction footprint proposed for the Tacoma LNG Facility. The results are discussed further in Section 3.1 (Earth)**.**

Flood Hazards

Figures 3.3-3A,B,C show that the only flood hazard areas shown in the vicinity of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are the Hylebos and Blair waterways. However, these waterways are part of the marine environment of Commencement Bay, which is tidally influenced. In addition, the Proposed Action would result in a net reduction in the amount of pilings present in the waterways. Thus, the Proposed Action would have no adverse impact these flood hazard areas.

Groundwater

Groundwater would not be consumptively used during construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, except for the construction water needs and hydrostatic testing of the LNG storage tank as previously described, which would obtain water from the Tacoma Public Utilities potable water system. A portion of the Tacoma Public Utilities potable water system is derived from groundwater wells. However, this would not impact the groundwater supply, as the majority of water use would be spread across the construction phase of the Proposed Action and the overall Tacoma Public Utilities system has the capability to supply approximately 292 million gallons per day.

Shallow groundwater could experience a minor disturbance from changes in overland flow and recharge caused by clearing, trenching, and grading of the proposed Tacoma LNG Facility site. Near-surface soil compaction caused by heavy construction vehicles also could reduce the soil's ability to absorb water. These impacts from demolition, trenching, pipe installation, clearing, or grading would be temporary and would not significantly affect groundwater resources or groundwater quality in the future.

Dewatering might be necessary in conjunction with excavation activities performed during construction of the Tacoma LNG Facility. Impacts on groundwater quality are anticipated to be negligible as a result of dewatering within the Tacoma LNG Facility. Installation of displacement-drilling grout columns at the Tacoma LNG Facility would include use of a vibratory hammer. These ground improvements would range from 80 to 100 feet bgs and likely would be deeper beneath the tank and along the shoreline. Groundwater displaced from vibratory activities would be stored on site for potential chemical analytical testing prior to handling. There are no adverse impacts on groundwater quality reasonably expected from Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System construction activities. Changes in groundwater recharge within the Shallow Fill and Intermediate Aquifers would not affect the recharge rates for the Deep Regional Aquifer system. Thus, the aquifer recharge areas in the general vicinity the Tacoma LNG Facility would not be significantly impacted (GeoEngineers 2009).

New Distribution Pipeline Segments

Potential impacts from construction of the two new distribution pipeline segments are described below.

Surface Waters

The two new distribution pipeline segments would be constructed entirely within the paved portion of existing road ROWs, as described in Section 2.3.3 (Description of Proposed Action: PSE Natural Gas Distribution System). The general construction technique where new pipeline is proposed would consist of open-cut trenching. All four waterbodies that would be crossed by the new pipeline segments are streams/drainages located within culverts and would be crossed perpendicularly by the proposed pipeline segments. The pipeline would be installed under existing culverts by using a horizontal bore or directional drill without disturbing the culverts. Pipeline crossings under the existing culverts would maintain at least 36 inches vertical separation from the bottom of the culverts to prevent damage during the installation. No other waterbodies or wetlands would be crossed during construction of the pipeline segments. Other issues related surface water are discussed below.

Hydrostatic Test Water

After construction of each pipeline segment and before the new pipeline segments are placed in service, the entire lengths would be hydrostatically tested with water to ensure structural integrity. The hydrostatic testing would require approximately 222,000 gallons for Pipeline Segment A and approximately 31,000 gallons for Pipeline Segment B. Discharge at the point of disposal has no significant impact to surface water.

Hydrostatic test water would be drawn from nearby fire hydrants and discharged to the municipal sanitary sewer. The water drawn from fire hydrants may need to be stored in a tank before use, but the only additive may be soap to remove grease and oil in the pipeline as necessary. The fire hydrant sources and discharge points to the sanitary sewer would be determined as part of more detailed engineering design. PSE would

obtain the requisite approvals for use of hydrants and discharge to sanitary sewer systems, before initiation of construction. Surface waters would not be impacted from any withdrawal of hydrostatic test water because a municipal system would be used as the source under existing water rights. Surface waters would not be impacted from hydrostatic test water discharge because no chemicals would be added and the discharge would be directed to the municipal sanitary system, where the water would receive treatment prior to discharge to surface water.

Spills

Equipment fueling and storage of oil, fuel, or other materials near waterbodies could create a potential water quality impact if a spill were to occur. Leaks from equipment and vehicles could also cause potential impacts to surface water. Because no surface water or wetlands are present in the pipeline segments, no adverse impacts are anticipated to occur from spills. There is a potential impact to wetlands or waters adjacent to work areas from spills that would be minimized through mitigation measures provided in Section 3.3.6 (Mitigation Measures), including appropriate spill containment efforts and other BMPs.

Stormwater

The two new distribution pipeline segments would be constructed entirely within the paved portion of existing road ROWs in dry summer months. Runoff could occur along the pipeline segments if significant precipitation occurs during the construction period. However, BMPs consistent with the conditions of the Project's coverage under the NPDES General Construction Stormwater Permit would be implemented to prevent erosion and sedimentation. Thus, stormwater during construction would not significantly impact surrounding waterbodies or wetlands.

Material excavated during construction from the pipeline trench would not be stockpiled. These materials would be hauled from the pipeline workspace areas and disposed of at approved sites. The pipeline construction contractor would import clean material from local commercial sources to use as backfill and pipe bedding. During construction, the open trench occasionally may accumulate water either from groundwater intrusion or precipitation. The trench would be dewatered periodically to allow for proper and safe construction. If trench dewatering is required during construction, the dewatering would be conducted in a manner that minimizes impacts to surface water, as described in Section 3.3.6 (Mitigation Measures).

Flood Hazards

Pipeline Segment A would involve four short crossings of flood hazard area in the vicinity of the city of Fife. However, no impacts would occur to flood hazard areas, as the new pipeline would be constructed entirely within paved roadway and no new fill would be placed within the 100-year floodplain.

Groundwater

The new pipeline segments would be constructed between 3 and 5 feet bgs in aquifer recharge areas as identified in county and city Critical Areas Ordinances. Pipeline Segment B would be located within the EPA Central Pierce County sole source aquifer. The depth to water in the shallow aquifer ranges from 10 to 30 feet along proposed Pipeline Segment B (Fort Lewis Directorate of Public Works 2010). However, no impacts are anticipated as the construction activities would be short term.

Pipeline installation may require localized pipeline trench dewatering in locations where groundwater may be encountered near the ground surface. The size and rate of these dewatering operations would not be extensive enough to impact the shallow groundwater beyond the immediate vicinity of the trench. Minor fluctuations in groundwater levels and turbidity may occur.

<u>Golden Given Limit Station and Frederickson Gate Station</u>

Potential impacts from construction of the new Golden Given Limit Station and upgrades to the Frederickson Gate Station are described below.

Surface Waters

Impacts on waterbodies and wetlands would not occur from construction of the Golden Given Limit Station and upgrades to the Frederickson Gate Station. No waterbodies or wetlands occur on the sites proposed for the new limit station or existing gate station. The limit station would occur entirely on an area previously developed as a building and paved parking area. Modifications to the existing gate station would occur entirely on previously developed area for the Frederickson Gate Station.

Neither the new limit station nor upgrades to the gate station would cross or occur within designated shoreline in any jurisdiction.

Equipment fueling and storage of oil, fuel, or other materials near waterbodies could create a potential water quality impact if a spill were to occur. Leaks from equipment and vehicles could also cause potential impacts to surface water. Because no surface water or wetlands are present where construction activities would occur at the limit or gate stations, no adverse impacts are anticipated to occur from spills.

The Golden Given Limit Station and upgrades to the Frederickson Gate Station would both be constructed on previously developed areas. Runoff could occur from both sites if significant precipitation occurs during the construction period.

Flood Hazards

Impacts on flood hazard areas would not occur from construction of the Golden Given Limit Station and upgrades to the Frederickson Gate Station. Designated flood hazard areas do not occur on the sites proposed for the new limit station or upgrades to the existing gate station.

Groundwater

Construction of the new limit station and improvements to the existing gate station would occur in aquifer recharge areas as identified in county Critical Areas Ordinances. The limit station and gate station are located within the EPA Central Pierce County sole source aquifer. Shallow groundwater (where encountered along the proposed pipeline segments) could experience a minor disturbance from changes in overland flow and recharge caused grading and trenching on the proposed site. Degradation of water quality would be unlikely and in the unlikely event that any temporary degradation were to occur, it would be limited to the immediate vicinity of the construction activity or borehole; thus, no significant impact would occur to groundwater resources during construction activities.

3.3.4.2 Operations Impacts

Potential impacts during operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are described below.

<u>Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System</u>

Surface Waters

Spills may occur during the processing and transmission of LNG and other chemicals used in the processing of LNG. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would include secondary containment for LNG and various other chemicals as required by federal and state law and described in Chapter 2 (Description of Proposed Action). Although highly unlikely, any LNG spill would be directed to spill containments consisting of below grade open top concrete sumps. This would include collection of LNG spills occurring on the over-water structures (trestles and piers) proposed in both the Hylebos and Blair waterways. For example, LNG spills emanating on the loading platform at the end of either pier would be collected in a concrete curbed area under the loading arms or hoses and piping, which would gravity drain to a concrete trench that runs the length of the pier back ashore. The trench would be directed to the marine loading sump. No other direct impacts to water quality would be anticipated from loading bunkering barges at the proposed Hylebos pier. Separate LNG containment would also be provided at the Tacoma LNG Facility in the vicinity of the LNG storage tanks, LNG process area and LNG truck loading area.

In addition to the LNG spill impoundments described above, the Tacoma LNG Facility would include other impoundments for collection of spilled mixed-refrigerant, heavy hydrocarbons, water/propylene glycol (WPG), amine, and equipment lubrication system and transformer oil. General features of these impoundments include curbed concrete containment and storage areas with sumps as necessary.

Vessels operations as part of the Proposed Action in the vicinity of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be tugs and barges. Vessel transport around the Blair-Hylebos peninsula at the Port of Tacoma includes the potential for fuel, oil and hydraulic fluid spills into the Hylebos and Blair waterways or Commencement Bay, which could contribute short-term water quality impacts. Both tugs and barges already operate within the Hylebos and Blair waterways as part of other existing operations and have minimal risk of fuel spills and neither require ballast discharges. Tugs would be fueled at other locations and would be subject to spill prevention plans at those facilities. In the unlikely event of leakage of LNG from a barge, the LNG would vaporize and not affect water quality. When exposed to ambient heat sources such as water or soil, LNG vaporizes rapidly.

As described in Section 2.2.1.7 (Description of Proposed Action: Other Process Facilities), cooling water consisting of 60/40 weight percent WPG would be utilized in a closed loop to provide heat rejection for various users within the facility. The source of water for the cooling water system would be potable water from the municipal water supply system.

The only water-based fire suppression system for the Project would be the hydrant loop on the Tacoma LNG Facility site. The hydrants would be flushed at a periodic interval every several years, and tested as required. The source of water for flushing and testing would be the municipal water supply system.

Stormwater

The existing Tacoma LNG Facility site does not currently have any on-site stormwater treatment. The Proposed Action would bring the site into compliance with current stormwater management requirements, including, but not limited to, the Port of Tacoma's 2014 Stormwater Management Plan, City of Tacoma Stormwater Management Manual and applicable Ecology Secondary Permittee requirements.

The Project would use existing stormwater systems as much as feasible, but would also install enhanced treatment facilities to improve the quality of stormwater discharged from the site to the Hylebos Waterway.[7] The Project also would upgrade the existing stormwater outfalls to include backflow prevention. The overall result would be much-improved stormwater quality in the Hylebos Waterway because the stormwater discharge from the Tacoma LNG site would be properly treated as compared to no treatment under existing conditions.

The TOTE Marine Vessel LNG Fueling System would convey rainwater from the new loading platform back onto the TOTE terminal property. The Project also proposes to provide applicable stormwater treatment facilities for the new loading platform facilities on the Tote site. The proposed loading platform stormwater treatment facilities would be separate from existing TOTE site infrastructure and facilities and would treat any stormwater before connecting existing stormwater facilities for discharge into the Blair Waterway.

Flood Hazards

Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would not result in any additional significant impacts to designated flood hazard areas.

Groundwater

There would be no adverse impacts on groundwater quality reasonably expected from stormwater infiltration that may occur during operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. The net effect of the proposed changes to the stormwater facilities at the Tacoma LNG Facility

[7] The project is not required to provide stormwater quantity facilities due to direct discharge to a salt water body reasons allowed by code.

would be a small increase in the recharge rate to the Shallow Fill and Intermediate Aquifers. The changes in groundwater recharge within the Shallow Fill and Intermediate Aquifers would not affect the recharge rates for the Deep Regional Aquifer system. Aquifer recharge areas near the site would not be significantly impacted.

The potential for spills during operations to reach groundwater is unlikely and would have no adverse impact to groundwater quality due to spill impoundments as described above. Any observed spills or stained surfaces would be cleaned up according to the site's approved Spill Prevention, Containment, and Countermeasure (SPCC) Plan.

PSE Natural Gas Distribution System

The operation of the two new distribution pipeline segments, new limit station, and upgrades to the gate station would not result in any impacts on surface water quality or flood hazard areas. During operation, the pipeline segments would be underground and within paved roadway surfaces in their entirety. The limit and gate station sites do not contain and are not directly adjacent to waterbodies, wetlands, or floodplains.

During operations, impacts from stormwater runoff would be unchanged along the new pipeline segments and at the new limit station and upgraded gate station. Site conditions along the pipeline segments would be restored as closely as possible to preexisting conditions following construction. The existing limit station site is almost entirely impervious and consists of a building and paved parking lot. At the limit station site, the Proposed Action would include demolition of the existing facilities and construction of smaller buildings creating less overall impervious surface. Additionally, perimeter vegetation screening with native plantings would incorporate low impact development stormwater management techniques to retain stormwater on site through infiltration into the ground rather than running off into Pierce County's stormwater utility system currently present in the adjacent 99th Avenue East ROW. The surface at the upgraded gate station would remain gravel, which matches existing conditions.

Operation of the two distribution pipeline segments, new limit station, and upgrades to the gate station would have no adverse impacts on groundwater quality unless maintenance activities resulted in a spill or leak from maintenance equipment or vehicles. In such cases, the impacts would be isolated and likely small considering the type of equipment used to perform maintenance activities. An isolated spill during maintenance activities would be cleaned up immediately consistent with PSE's existing operations plans and procedures.

3.3.4.3 Decommissioning Impacts

Decommissioning of the Project components would cause surface water and groundwater impacts similar to those discussed in Section 3.3.4.1 (Construction Impacts). Potential impacts include those related to in-water, upland, and shoreline disturbances, but would be temporary and would likely be less severe than those experienced during construction. PSE anticipates that in-water and shoreline improvements would remaining in place during decommissioning, therefore limiting impacts to the removal of upland structures.

3.3.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and there would be no impacts to water resources related to the Proposed Action. No additional stormwater treatment measures would be taken.

3.3.6 Avoidance, Minimization, and Mitigation

This section presents mitigation measures proposed to alleviate potential impacts during construction and operation of the Project. The Project would be water-dependent, and therefore, impacts to waterbodies cannot be fully avoided. The LNG from the Proposed Action is intended to be made available for the marine transportation industry as a cleaner burning fuel than traditional diesel fuel. Thus, direct access to the water is a necessity. However, specific Proposed Action components were selected to avoid impacts, which could

occur from alternative options. For example, siting the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System in a developed industrial port site and constructing the pipeline segments within existing road ROWs would avoid many new impacts on water quality and resources.

Another aspect of impact avoidance integrated into the Project's design is the avoidance of dredging. In-water structures in both the Hylebos and Blair waterways, including the Tacoma LNG Facility pier and TOTE Marine Vessel LNG Fueling System loading platform, have been configured to avoid the need for dredging.

As described further below, impacts that could not be avoided would be minimized through implementation of specific measures.

3.3.6.1 Construction

Before initiating construction, PSE would prepare an Environmental Construction Plan and Procedures document specifically applicable to the Proposed Action. This document would provide a variety of information such as the following:

- Construction and environmental requirements;
- Erosion and sedimentation control including construction Stormwater Pollution Prevention Plan (SWPPP);
- Pipeline construction methods;
- Site-specific construction plans; and
- SPCC Plan.

PSE would prepare and approve the SWPPP before construction to address applicable water quality requirements of the NPDES Construction Stormwater General permit. BMPs identified for use during construction may include erosion control measures such as silt fence, straw/hay bales, temporary cover, and catch basin protection in accordance with an approved SWPPP.

As part of the Environmental Construction Plan and Procedures, the SPCC Plan would outline specific preventive measures and procedures to minimize hazardous or regulated waste spills, as well as actions to be undertaken in the event of accidental spills. For example, fueling of construction equipment would not occur within 100 feet from designated aquatic resources or 150 feet from water supply wells.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The following BMPs would be implemented to minimize potential impacts to water quality and resources, including the Hylebos and Blair waterways, stormwater quality, and groundwater.

General Best Management Practices

- Wet or uncured concrete would not be allowed to enter waters of the state.
- Excess or waste materials generated during construction would not be disposed of or allowed to enter waters of the state. Excess or waste materials would be collected and recycled or disposed of at an approved upland facility. Demolition and construction materials would be stored where wave action or upland runoff cannot cause materials to enter surface water.
- Land-based staging areas for activities such as storage of machinery, equipment, materials, and stockpiled soils in shoreline areas or waterward of shoreline areas would be prohibited. Land-based staging areas would be located a minimum of 50 feet from surface water. A silt fence would be installed around the perimeter of the upland locations where machinery, materials, and stockpiled soils are situated.
- Silt fences would be installed. The silt fencing would be delineated on the final plans, and fences would be installed and remain on site until the Project is completed. Silt fences and/or coir rolls would be

installed above the shoreline slope adjacent to the work area to prevent silt from entering the waterway.

- Any temporary stockpiles would be covered when not in use.
- Water trucks and dust controlling agents would be used to control dust in work areas, and temporary access road entrances and exits would consist of gravel.
- Work barges would not be allowed to ground on the shoreline during construction.
- All equipment that would operate over water or below the mean high higher water mark would be cleaned of accumulated grease, oil, or mud. All leaks would be repaired prior to arriving on site. Equipment would be inspected daily for leaks, accumulations of grease, etc., and any identified problems would be fixed before operating over water or below the mean high higher water mark.

Spill Prevention

- Vessels, construction equipment, fuel hoses, oil drums, oil or fuel transfer valves and fittings, and other equipment components would be checked regularly for drips or leaks and would be maintained and stored properly to prevent spills; the contractor would have a spill kit with oil-absorbent materials on site to be used in the event of a spill or in the event that any petroleum product is observed in the water; and the contractor would be responsible for the preparation of an SPCC Plan to be used for the duration of construction.
- Fueling of upland and land-based construction equipment would not occur within 100 feet of surface water.
- Any spills related to maintenance would be cleaned up by PSE personnel consistent with their existing system operations plans and procedures. Corrective actions would be taken in the event of any discharge of oil, fuel, or chemicals into the water, including:
  - In the event of a spill, containment and cleanup efforts would begin immediately and completion would occur as soon as possible, taking precedence over normal work. Cleanup would include proper disposal of any spilled material and used cleanup material.
  - In the event of an oil or hydraulic spill during transport, the barge would employ containment measures such as floating absorbent booms.
  - The cause of the spill would be assessed and appropriate action would be taken to prevent further incidents or environmental damage.
  - Spills of oil or hazardous materials would also be reported immediately to the National Response Center at 1 (800) 424-8802, to Washington's Emergency Management Division at (800) 258-5990, and the Ecology Regional Office at (360) 407-6300.

Surface Waters

The following mitigation measures would be implemented to minimize potential impacts to the Hylebos and Blair waterways.

Turbidity Minimization. Water quality standards and procedures that limit the impact of turbidity would be observed (WAC 173-201A-210(1)(e)(i)). Turbidity monitoring requirements and mixing zones will be established in the CWA Section 401 certification conditions for in-water work. Turbidity monitoring requirements will also be described in the SWPPP monitoring plan as follows:

- The area of mixing established for marine waters is a 150-foot radius surrounding the in-water activity. Turbidity occurring outside that zone that is more than 5 nephelometric turbidity units (NTU) over

background when the background is 50 NTU or less, or a 20 percent increase in turbidity when the background turbidity is more than 50 NTU is a violation of the turbidity water quality standard.

- Visible turbidity anywhere at or beyond the 150-foot point of compliance from activity would be considered an exceedance of the standard.
- During and immediately after Project construction, PSE or its contractor would monitor for turbidity discharges at the point of compliance as specified in WAC 173-201A-210(1)(e)(i). A turbidimeter or visual gauging with photographic documentation of turbidity would be used.

Demolition of In-water Structures and Creosote-treated Timber Piling Removal. The following measures would be implemented as part of removing existing in-water structures and creosote-treated timber pilings.

- During demolition, including removal of existing piles in both the Hylebos and Blair waterways, containment booms would be used to surround the work areas. The booms would serve to contain and collect any oily material released, as well as floating debris. Oil-absorbent materials would be employed immediately if visible product is observed. The booms would remain in place until all in-water and shoreline demolition activities are complete. All accumulated debris would be collected daily and disposed of at an approved upland site.
- A silt curtain may be installed around the pile removal area to prevent sediment from migrating beyond the existing project footprint.
- Existing piles would either be fully extracted in a single slow and continuous motion using a vibratory hammer or cut 2 feet below the mud line should the piling break during extraction. If cut 2 feet below the mud line, the resulting holes would be filled with clean sand or other habitat mix approved by the Washington Department of Fish and Wildlife. Piling would not be broken off intentionally by twisting, bending, or other deformation.
- All creosote-treated wood would be contained during and after removal to preclude the entrance of sediments and any contaminated materials to the aquatic environment. Piles removed from substrate would be moved immediately from the water onto the upland or barge. The pile would not be shaken, hosed off, left hanging to drip, or any other action intended to clean or remove adhering material from the pile.
- The work surface on the uplands or barge would include a containment basin for piles and any liquid or sediment removed during pulling of the piling. Basins may be constructed of durable plastic sheeting with sidewalls supported by hay bales or support structure to contain all sediment and liquid. Water left in the basins would not be discharged into waters of the state.
- Creosote-treated wood and piles from demolition of existing structures would be disposed of at an appropriate upland facility, meeting the liner and leachate standards of the Minimum Functional Standards, WAC Chapter 173-304.
- Sediments spilled on work surfaces would be contained and disposed of with the pile debris at an approved upland disposal site.
- Hydraulic water jets would not be used to remove or place piles.

Shoreline Improvement. As described above, shoreline improvements to the Hylebos Waterway would include removal of a creosote-treated bulkhead structure to be replaced with a new steel sheet pile bulkhead. To minimize potential impact during construction of these shoreline improvements, the existing bulkhead would remain in place while the work behind it is completed. The existing bulkhead would provide a measure of erosion and sediment control during construction of the new cleaner bulkhead and regrading of the resulting shoreline.

Hydrostatic Test Water. Water for hydrostatic testing of the LNG storage tank would be drawn from the Tacoma Public Utilities potable water system. Disposal of used test water would occur through the sanitary sewer.

Stormwater. Before construction, BMPs, including many described above, would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the project's NPDES General Construction Stormwater Permit. The NPDES permit guides construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

Groundwater

The construction and operation of the Tacoma LNG Facility is not expected to affect groundwater quality. As described above, the SPCC Plan would provide standard guidelines to reduce the potential for groundwater contamination. Restrictions on refueling and storage of hazardous materials near groundwater sources would be enacted to prevent potentially affecting groundwater quality.

No drinking water wells were identified within 150 feet of the proposed Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites. Should any drinking water wells be subsequently identified within 150 feet of either site, these wells would be inspected for water quality and flow characteristics before and after construction, as required. In the unlikely event that construction activities temporarily impair well water production or quality, PSE would provide alternative sources of water or otherwise compensate the owner.

PSE Natural Gas Distribution System

In addition to the use of applicable measures from the General Best Management Practices and Spill Prevention sections above, the following additional mitigation measures would be implemented for construction of the new distribution pipeline segments, new limit station, and upgrades to the existing gate station.

Surface Waters

The following mitigation measures would be implemented for pipeline crossings under existing, culverted waterbodies located within paved roadways:

- The pipeline would be installed under existing culverts by using a horizontal bore or directional drill. The proposed crossing under Interstate 5 and Pacific Highway East would be directionally bored to minimize construction and transportation impacts in the city of Fife. Consideration would also be given to directionally boring portions of Taylor Way in the Port of Tacoma to avoid existing sources of contamination within the peninsula.
- Pipeline crossings under the existing culverts would maintain at least 36 inches vertical separation from the bottom of the culverts during installation.
- The SPCC Plan would outline specific preventive measures and procedures to minimize hazardous or regulated waste spills, as well as actions to be undertaken in the event of accidental spills during construction of the new distribution pipeline segments, limit station, or improvements to the gate station.
- Water for hydrostatic testing of the new distribution pipeline segments would be drawn from fire hydrants and discharged into sanitary sewer systems.
- If dust control is necessary, PSE would use water obtained primarily from municipal sources. The amount of water required for dust control could vary depending on the time and dryness of the year and specific site conditions.

- During trench dewatering, water would be pumped from the trench into stable, vegetated areas through an approved dewatering structure. The rate of flow from the pump would be regulated to prevent erosion from runoff. The structure would be maintained and sediment cleaned out as required.

As described above, BMPs would be implemented consistent with the conditions of the Project's NPDES General Construction Stormwater Permit to prevent erosion and sedimentation.

Groundwater

Impacts on private or public wells are not anticipated. No drinking water wells were identified within 150 feet of the proposed pipeline segments.

The SPCC Plan would outline specific preventive measures and procedures to minimize hazardous or regulated waste spills, as well as actions to be undertaken in the event of accidental spills during construction of the new distribution pipeline segments, limit station, or improvements to the gate station.

If pipeline trench dewatering is required during construction, the dewatering would be conducted in a manner that does not cause sediment to leave the site and would not result in exceedances of water quality standards. Groundwater encountered during construction would be placed into a tank and then discharged into a sanitary sewer system or decant facility in coordination with the applicable local jurisdiction.

If contaminated groundwater is encountered during trenching operations, the removed groundwater would be contained and disposed of at an approved facility in accordance with applicable federal, state, and local requirements.

3.3.6.2 Operations

The following operational mitigation measures would be implemented at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System:

- Spill impoundments for collection of spilled LNG, mixed-refrigerant, heavy hydrocarbons, WPG, amine, and equipment lubrication system and transformer oil design features would minimize impacts to surface water during operations.
- The stormwater management system would be designed to meet the water quality requirements of the Port of Tacoma's 2014 Stormwater Management Plan, Washington Industrial Stormwater General Permit, and applicable requirements from the Western Washington Stormwater Manual.
- Promptly remove motor oil and hydraulic fluids as a good housekeeping practice.
- Handle vehicle washing and maintenance off site.
- Conduct personnel training for general environmental awareness, spill management, hazardous waste management, and stormwater inspections in accordance with permit conditions.

No mitigation measures are proposed for operation of the new distribution pipeline segments, limit or gate stations. These components are proposed entirely on previously developed areas so any potential impact to water during operation would be negligible.

3.3.7 Conclusion

During construction of operation of the Project, some impacts to surface and groundwater quality would have the potential to occur; however, with implementation of the above mitigation measures, no significant unavoidable adverse water-related impacts would be expected to result from the Proposed Action.

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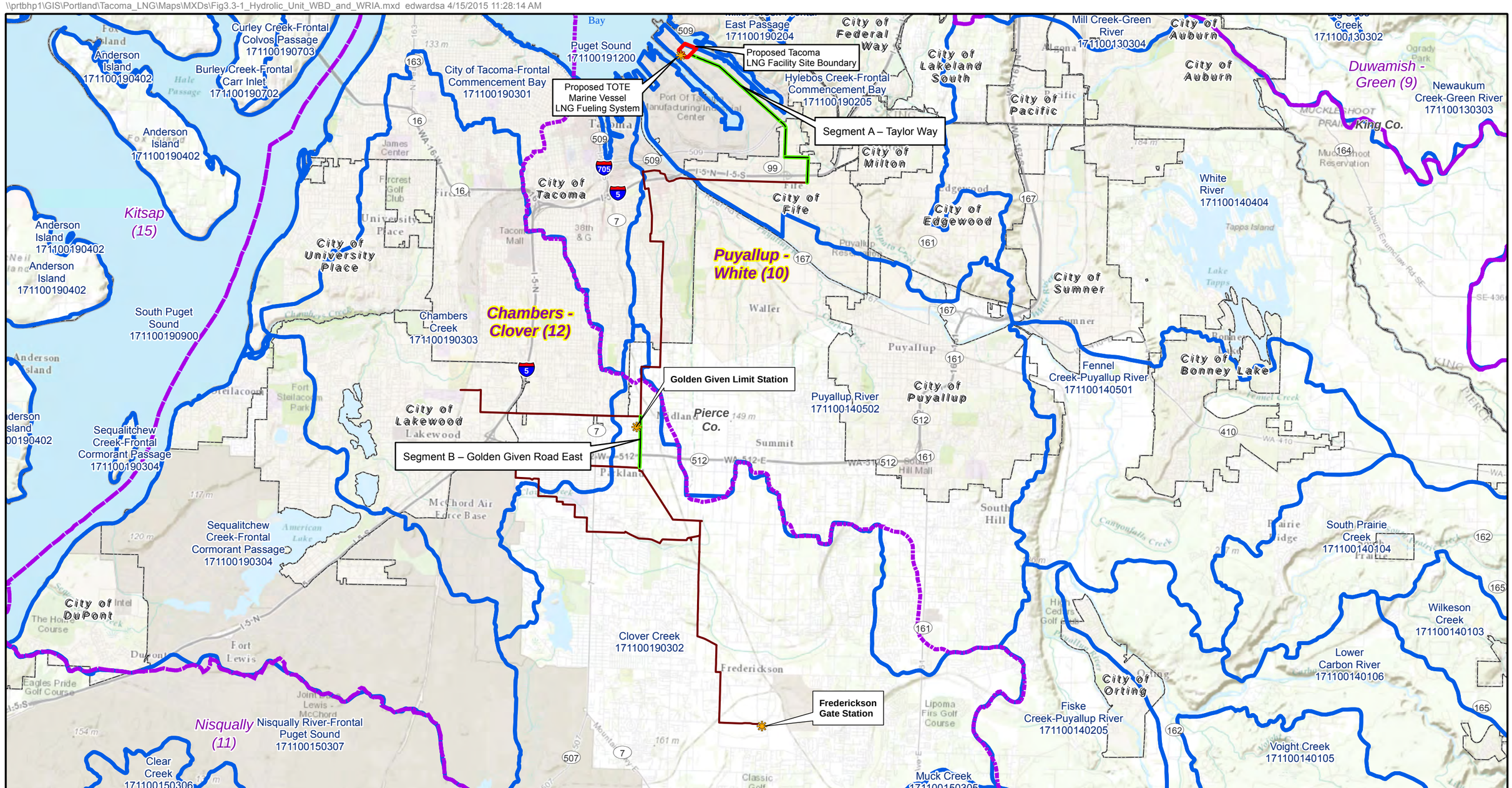

City of Tacoma

Figure 3.3-1
Hydrologic Unit Boundaries and Water Resource Inventory Areas (WRIA)
Tacoma LNG Project

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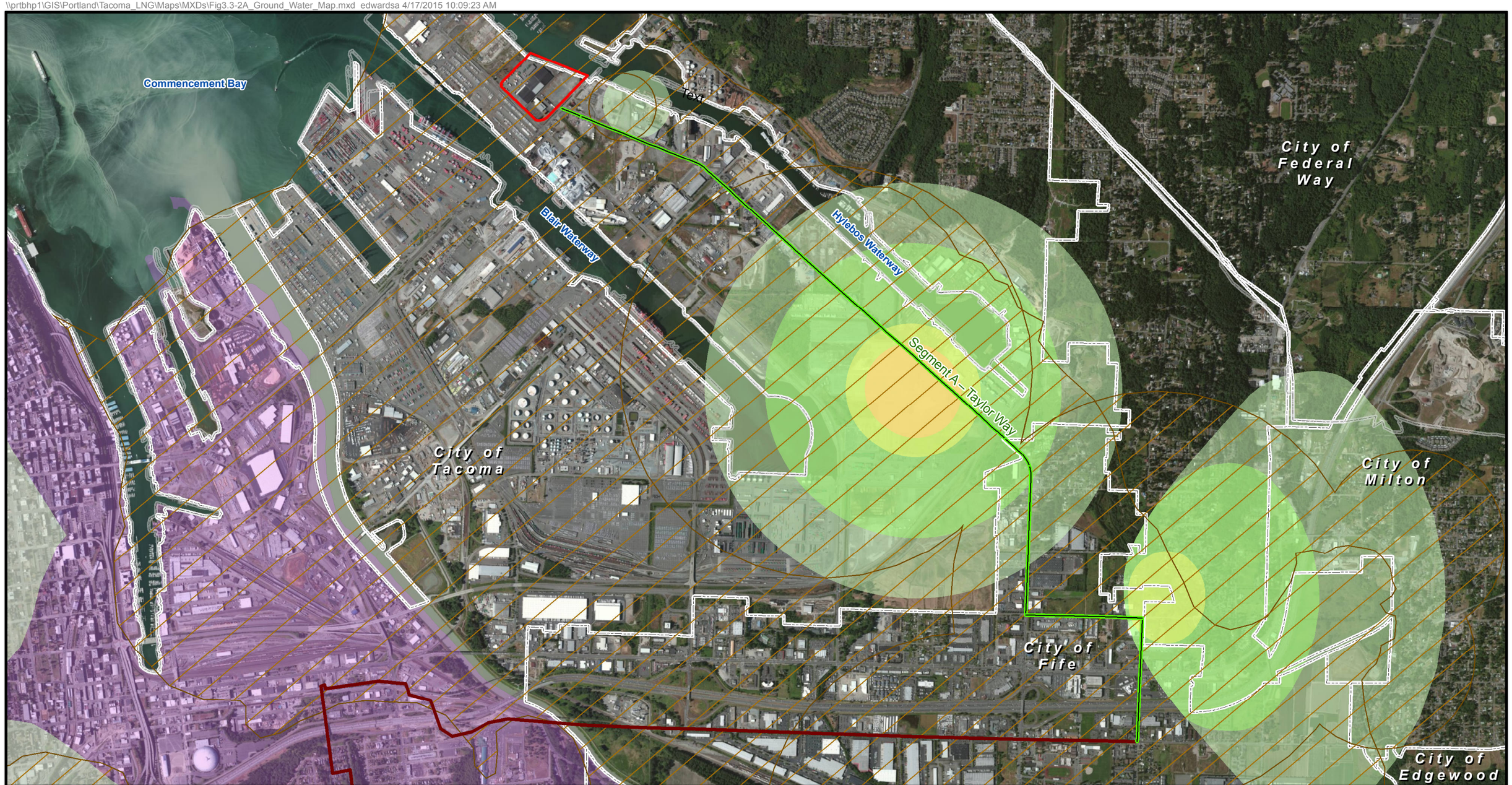

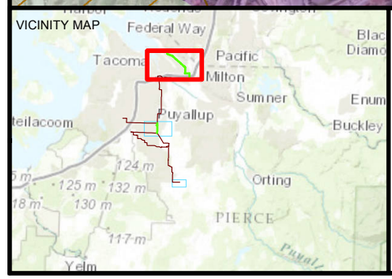

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Tacoma LNG Facility Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Aquifer Recharge Area

EPA Sole Source Aquifers

- Central Pierce County Aquifer Area SSA

Wellhead Protection Areas

- Wellhead Protection 6 Month
- Wellhead Protection 1 Year
- Wellhead Protection 5 Year
- Wellhead Protection 10 Year
- City Limit Boundary
- County Boundary

N W E S

0 1,250 Feet

Tacoma

City of Tacoma

Figure 3.3-2A
Groundwater Resources

Tacoma LNG Project

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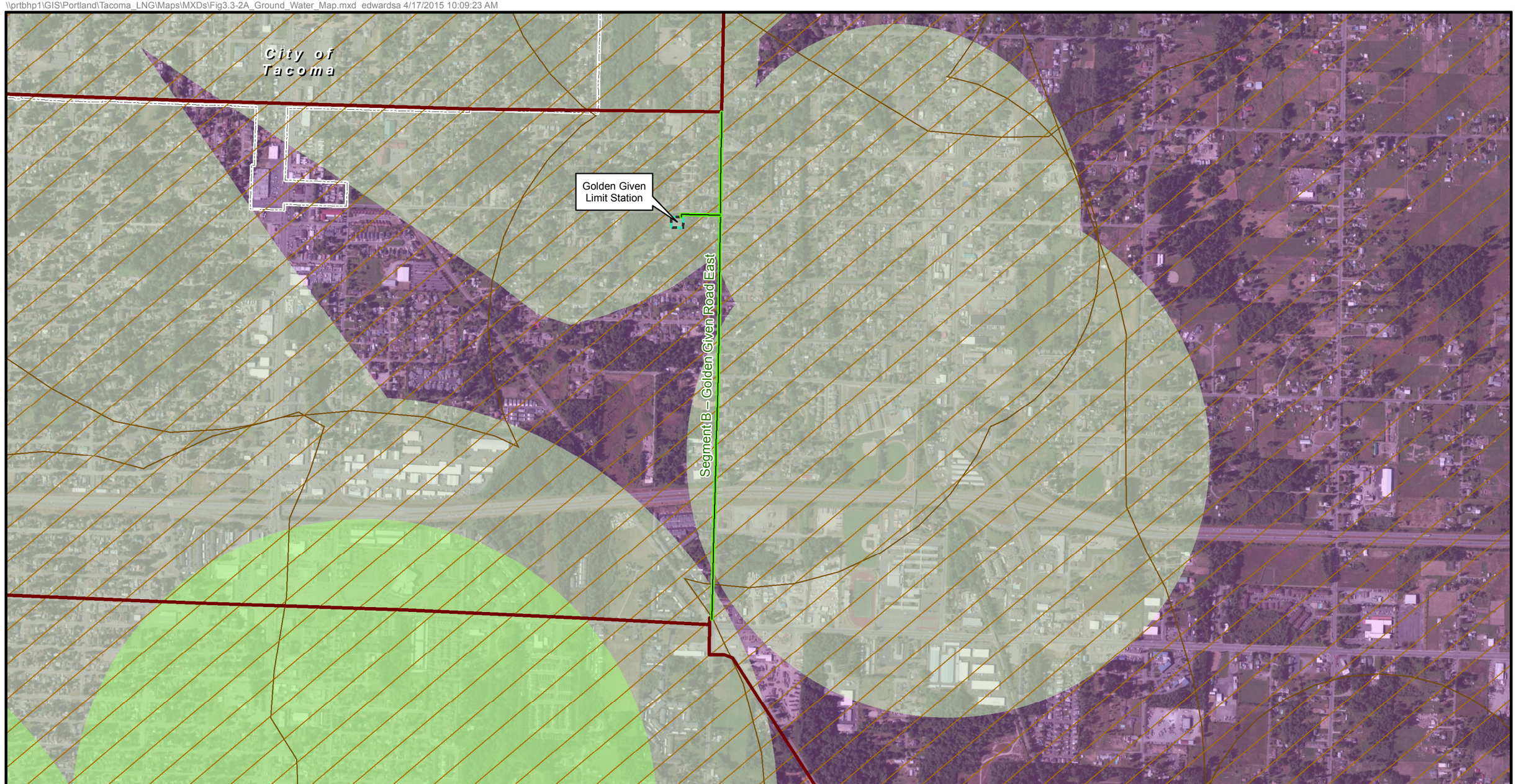
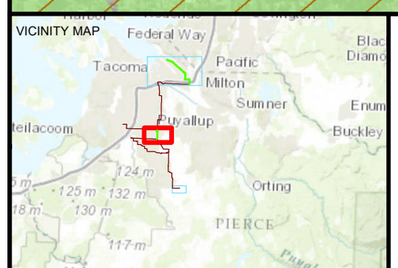




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Aquifer Recharge Area

EPA Sole Source Aquifers

- Central Pierce County Aquifer Area SSA
- Wellhead Protection 5 Year
- Wellhead Protection 10 Year
- City Limit Boundary
- County Boundary

N W E S

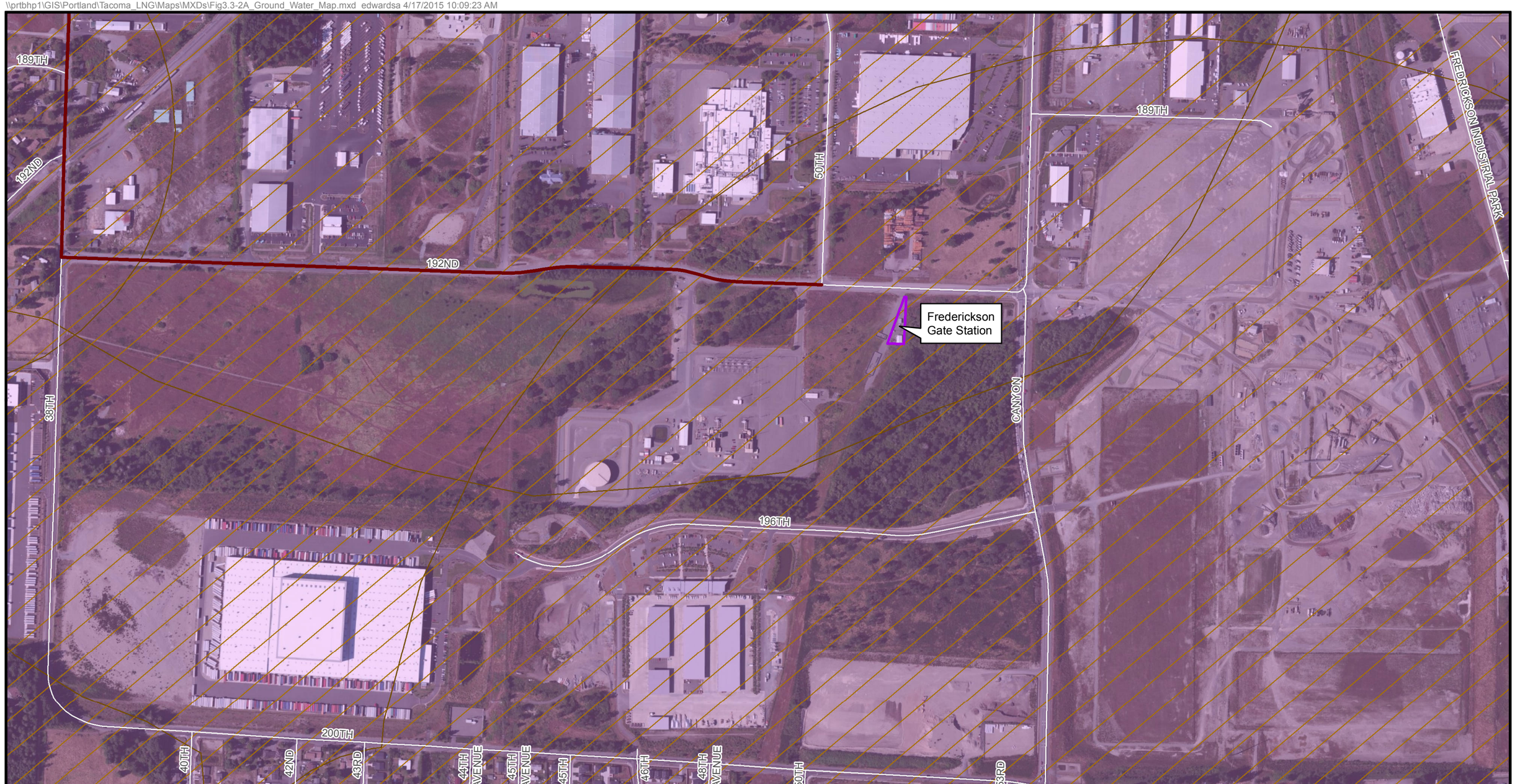
0 1,000 Feet

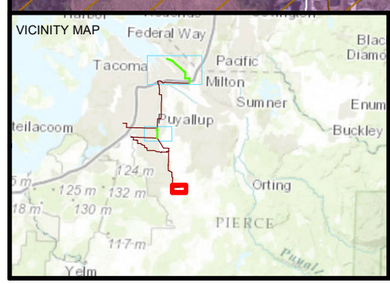
Tacoma

City of Tacoma

Figure 3.3-2B
Groundwater Resources

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Frederickson Gate Station
- Existing Pipeline
- Aquifer Recharge Area

EPA Sole Source Aquifers

- Central Pierce County Aquifer Area SSA
- County Boundary

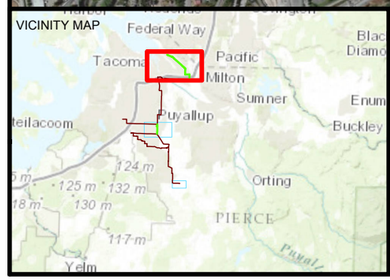
N W E S

0 500 Feet

City of Tacoma

Figure 3.3-2C
Groundwater Resources

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Tacoma LNG Facility Site Boundary
- Proposed New Pipeline
- Existing Pipeline

Federal Emergency Management Agency Flood Zone

- 100-Year Flood Zone
- The area waterward of the line of extreme low tide is a shoreline of statewide significance.

- City Limit Boundary
- County Boundary

N W E S

0 1,250 Feet

Tacoma

City of Tacoma

Figure 3.3-3A
Flood Zones and Shorelines of Statewide Significance

Tacoma LNG Project

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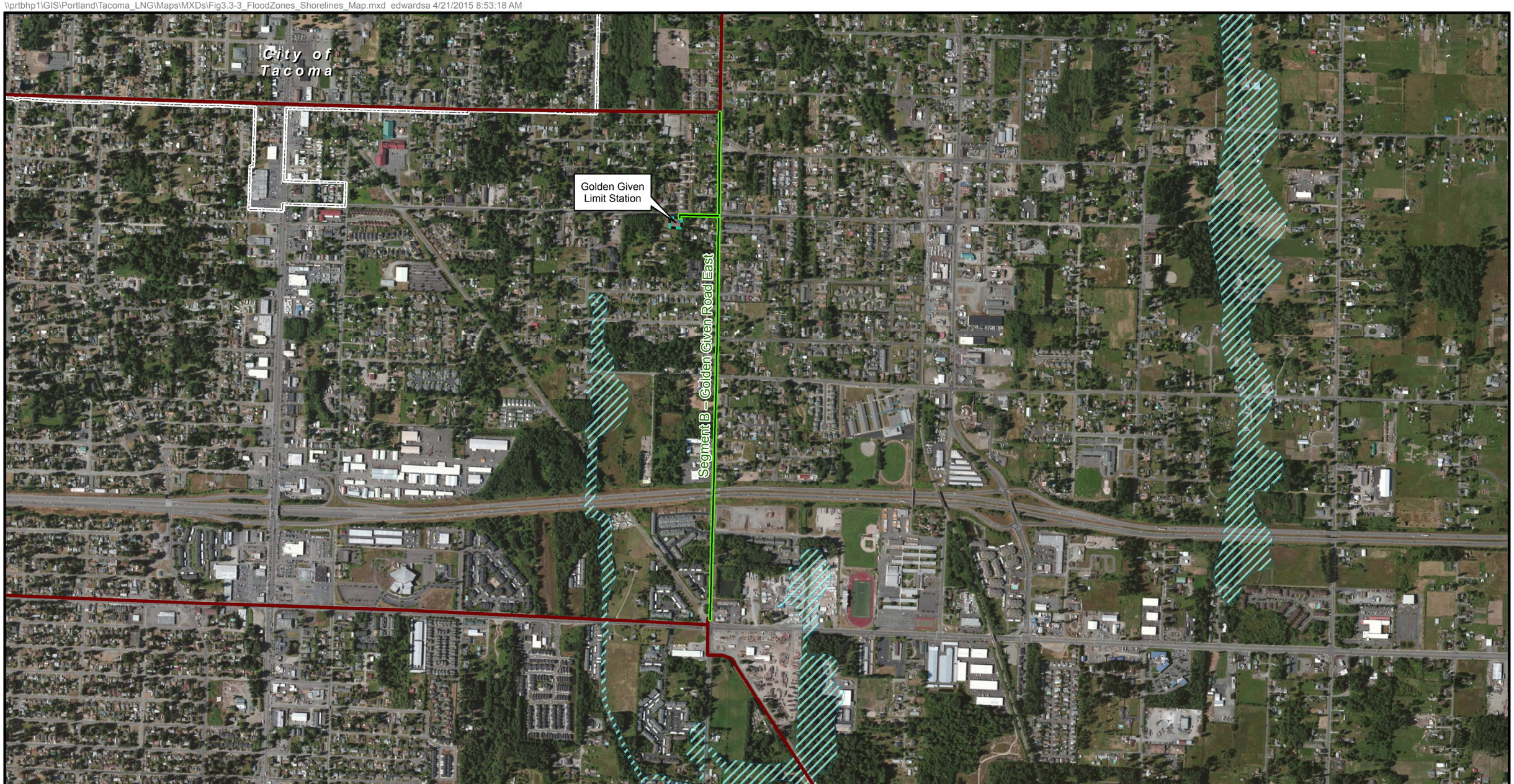

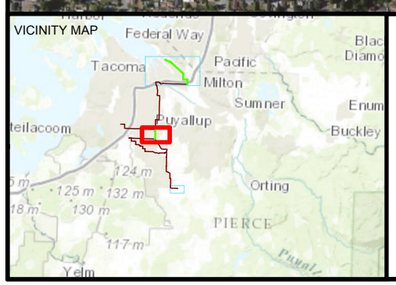

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline

Federal Emergency Management Agency Flood Zone

- 100-Year Flood Zone

- City Limit Boundary
- County Boundary

N W E S

0 1,000 Feet

City of Tacoma

Figure 3.3-3B
Flood Zones and Shorelines of Statewide Significance

Tacoma LNG Project

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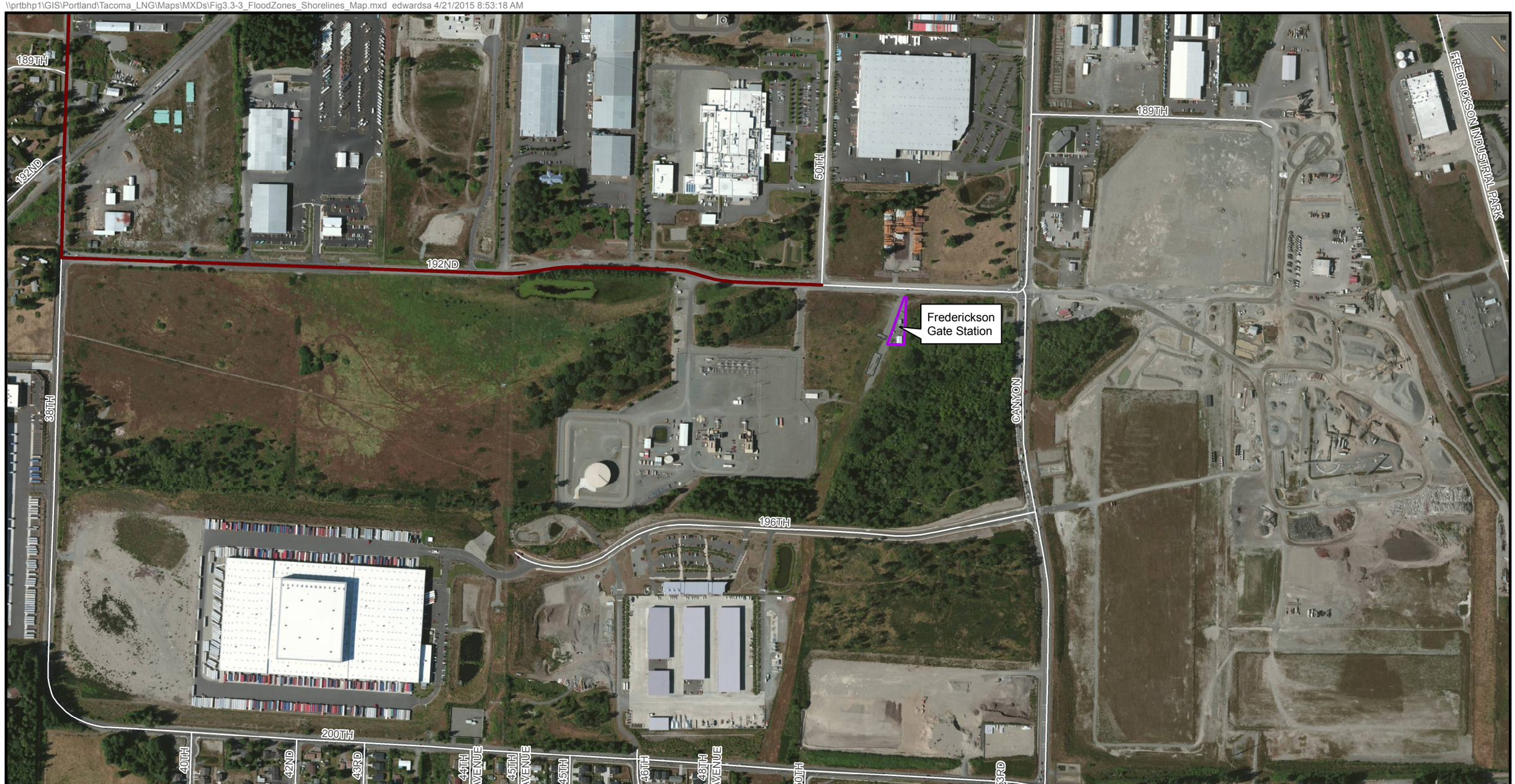
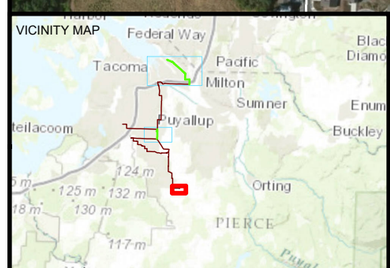




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Frederickson Gate Station
- Existing Pipeline
- County Boundary

N W E S

0 500 Feet

Tacoma

City of Tacoma

Figure 3.3-3C
Flood Zones and Shorelines of Statewide Significance

Tacoma LNG Project

3.4 Plants and Animals

This section summarizes the study methodology for surveying plants and animals on or adjacent to the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project); characterizes existing plant and animal habitats and conditions; identifies the potential impacts that the operation, construction, and decommissioning of the Project (herein referred to as the Proposed Action) may have on these resources; and proposes avoidance, minimization, and mitigation measures for these impacts.

3.4.1 Study Methodology

Due to the presence of special-status species, an action area for the Proposed Action was established and is defined as all areas that could be affected directly or indirectly by the Proposed Action and not merely the immediate area impacted by the action (50 Code of Federal Regulations [CFR] 402.02). The action area has both terrestrial and in-water components.

The study methodology for plants and animals combined desktop reviews of existing information resources with field data collection and survey activities. Information about special-status species and habitats in and surrounding the Proposed Action area was collected from the following resources:

- *Revised Plants and Animals Technical Report for the Blair-Hylebos Terminal Redevelopment Project* (Grette Associates 2009);
- Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) database records for sensitive habitats and state-listed species within 5 miles of all proposed facilities (WDFW 2012);
- StreamNet database for special-status fish species that might occur in the action area (StreamNet 2014);
- United States Fish and Wildlife Service (USFWS) online Information, Planning, and Conservation Web site for information about special-status fish, wildlife, and plant species (USFWS 2014);
- USFWS Critical Habitat Mapper to identify areas of designated and proposed critical habitat for federally protected species (USFWS 2015);
- National Marine Fisheries Service (NMFS) website of protected resources for information about special-status anadromous fish and marine mammals (NMFS 2014a) with potential to occur in the general Proposed Action area;
- *Federal Register* for identification of final designations of critical habitat (NMFS 2014b);
- City of Tacoma, City of Fife, and Pierce County resource maps;
- Low-altitude, high-resolution aerial photography; and
- *Draft Biological Survey Results for the Tacoma LNG Project*, a biological survey conducted on December 6, 2012 (CH2M HILL 2012). This survey identified potential wetlands, jurisdictional drainages, protected habitats, special-status species, and the potential for nesting birds.

3.4.2 Regulatory Framework

This section identifies and describes required federal, state, county, and city regulatory and permitting requirements applicable to the Proposed Action. The main federal and state requirements driving this analysis of plants and animals are described below, followed by a listing of other pertinent requirements at the federal, state, and local levels.

3.4.2.1 Federal Endangered Species Act

The federal Endangered Species Act (ESA) of 1973 (16 United States Code [U.S.C.] 1536) as amended in 1988, establishes a national program to conserve threatened and endangered species of fish, wildlife, and plants and to preserve the ecosystems on which they depend. This act is administered by the USFWS for wildlife and freshwater species, and by National Oceanic and Atmospheric Administration (NOAA) Fisheries for marine and anadromous species. It defines procedures for listing species, designating critical habitat for listed species, and preparing recovery plans and specifies prohibited actions and exceptions.

ESA Section 7 requires federal agencies to ensure that the actions they authorize, fund, and carry out do not jeopardize endangered or threatened species or their critical habitats. A federal agency is required to consult with the USFWS, NOAA Fisheries, or both agencies if it is proposing an action that may affect listed species or their designated critical habitat. If listed species or designated critical habitat are present and could be affected by the Proposed Action, Section 7 requires that the federal agency prepare a biological assessment to analyze the potential effects of the action on listed species and critical habitat and make an effect determination for each species.

3.4.2.2 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act of 1996 (MSA) and subsequent reauthorizations require that federal agencies consult with NMFS about any federally authorized activity that may adversely affect Essential Fish Habitat (EFH) (16 U.S.C. 1855(b)). “EFH” is defined as waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. “Waters” are characterized as aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish. “Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities. “Necessary” is defined as the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem (16 U.S.C. 1802; 50 CFR 600.10). NMFS must provide conservation recommendations for activities that may adversely affect EFH.

The MSA also requires Regional Fishery Management Councils to identify and describe EFH in fisheries management plans. The Pacific Fishery Management Council (PFMC) has created several management plans that designate EFH in waters that may be affected by the Project. These include plans for West Coast groundfish, salmon (Chinook and coho), and coastal pelagic species (PFMC 1998a, 1998b, and 1999).

3.4.2.3 Marine Mammal Protection Act

Under the Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. 1361 et seq.), the Secretary of Commerce is responsible for the protection of all cetaceans (whales, porpoises, and dolphins) and pinnipeds (seals and sea lions) except walruses, and has delegated authority for implementing the MMPA to NOAA Fisheries. Under Section 3 of the MMPA, all marine mammals are protected from “take,” which is defined as “harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal,” and “harassment” is defined as “any act of pursuit, torment, or annoyance that has the potential to injure marine mammal stock in the wild; or has the potential to disturb a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, including migration, breathing, nursing, breeding, feeding, or sheltering.”

3.4.2.4 Fish and Wildlife Conservation Act and Fish and Wildlife Coordination Act

The Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901 et seq.) encourages federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. In addition, the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) requires federal agencies undertaking projects affecting water resources to consult with USFWS and the state agency responsible for fish and wildlife resources.

3.4.2.5 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act of 1940 prohibits the taking or possessing of and commerce in bald and golden eagles, with limited exceptions (16 U.S.C. 668–668d, June 8, 1940, as amended 1959, 1962, 1972, and 1978). This act only covers intentional acts or acts in "wanton disregard" of the safety of bald or golden eagles.

3.4.2.6 Migratory Bird Treaty Act

The Migratory Bird Treaty Act implements various treaties and conventions between the United States and other countries, including Canada, Japan, Mexico, and the former Soviet Union, for the protection of migratory birds (16 U.S.C. 703-712, July 3, 1918, as amended 1936, 1960, 1968, 1969, 1974, 1978, 1986, and 1989). Under this act, taking, killing, or possessing migratory birds or their eggs or nests is unlawful. Most species of birds are classified as migratory under this act, except for upland game birds and nonnative birds such as ring-necked pheasant (*Phasianus colchicus*), house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), and rock dove (*Columba livia*).

3.4.2.7 Washington Endangered Species Act

The Washington State Endangered Species Act is administered by WDFW. Washington Administrative Code (WAC) 232-12-297 classifies wildlife species as endangered, threatened, and sensitive and outlines recovery and management priorities for listed populations.

3.4.2.8 City of Tacoma Critical Areas Preservation Ordinance

The purpose of the City of Tacoma's Critical Areas Preservation Ordinance (Tacoma Municipal Code 13-11) is based on best available science that classifies, protects, and preserves Tacoma's critical areas by providing standards to manage development in association with these areas and by designating some of these areas as environmentally sensitive in accordance with the Washington State Environmental Policy Act. Many critical areas provide a variety of valuable and beneficial biological and physical functions that benefit the city and its residents, while others may pose a threat to human safety or to public and private property. Critical areas include critical aquifer recharge areas, fish and wildlife habitat conservation areas, flood hazard areas, geologically hazardous areas, stream corridors, and wetlands.

3.4.2.9 Pierce County Critical Areas Ordinance

The Pierce County Code (PCC) includes a Critical Areas Ordinance (Title 18E Development Regulations – Critical Areas), which addresses protections for a variety of resources, including "certain fish and wildlife species and habitat." As part of its Critical Areas Ordinance, Pierce County adopted several mapping resources to meet its conservation goals, including the Washington Natural Heritage database of species and habitat and the PHS program and PHS maps.

3.4.2.10 Additional Regulations

The following is a list of federal, state, and local codes relevant to fish, wildlife, plants, and habitat in the Proposed Action area:

- 16 U.S.C. 757a–757g: Anadromous Fish Conservation Act;
- 16 U.S.C. 4701–4751: Nonindigenous Aquatic Nuisance Prevention and Control Act;
- Washington State Hydraulic Project Approval (HPA) authorized in 1943 by Revised Code of Washington (RCW) 77.55 and regulated through rules adopted in 1983 in Chapter 220-110 of the WAC. On November 7, 2014, the Washington Fish and Wildlife Commission adopted a comprehensive update to the HPA rules, which will replace those in Chapter 220-110.
- WAC 232-12-011: Wildlife classified as protected shall not be hunted or fished;
- WAC 232-12-014: Wildlife classified as endangered species;
- WAC 365-196-830: Protection of critical areas;

- Priority Habitats and Species List (WDFW 2008);
- Fife Municipal Code (FMC): FMC 17.15.040 – Fish and Wildlife Habitat Conservation Areas; and
- Pierce County Code (PCC:) PCC 18E.40.020 – Fish and Wildlife Species and Habitat Conservation Areas.

3.4.3 Affected Environment

The study area for plants and animals consists of the Project components as described in Chapter 1 (Purpose, Need, and Alternatives Considered) and Chapter 2 (Description of Proposed Action) and are summarized as follows.

The Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the City of Tacoma. The two new distribution pipeline segments would be located within the city of Tacoma and city of Fife (Segment A) and unincorporated Pierce County (Segment B). In addition, the Golden Given Limit Station and Frederickson Gate Station would be located within unincorporated Pierce County. A detailed description of the Proposed Action components is provided in Chapter 2.

The majority of the Proposed Action site consists of developed areas for the upland and aquatic/marine environments. The following discussion addresses each environment separately for the Tacoma LNG Facility and TOTE sites, and the PSE Natural Gas Distribution System.

3.4.3.1 Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System Sites

Descriptions of upland habitat, wetlands and stream habitat, and aquatic/marine habitat and the associated plant and animal species that may occur within the habitats are documented herein.

Upland Habitat

The majority of the ground surface on the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites is highly disturbed and is covered with built structures , pavement, or gravel. The site provides little wildlife habitat because of the lack of vegetation, isolation from larger tracts of habitat, and surrounding industrial land use. Riprap is present along the shorelines within the Proposed Action area. Non-special-status species are discussed here; for a discussion of special-status species, refer to “Special-Status Species and Protected Habitat,” below.

Plants

The upland habitat primarily supports weedy and noxious grasses and forb plant species. Vegetation along the top of the shoreline bank of the Hylebos and Blair waterways is minimal as most of the shoreline consists of riprap. A creosote-treated timber bulkhead is also a prominent feature along the Hylebos shoreline. Approximately nine trees (Google Earth 2015), including two cottonwood (*Populus balsamifera*) trees and one Douglas fir (*Pseudotsuga menziesii*) (CH2M HILL 2012) were observed along the Hylebos Waterway shoreline. There are no trees along the shoreline of the Blair Waterway at the Project site. Himalayan blackberry (*Rubus discolor*), Scotch broom (*Cytisus scoparius*), Japanese knotweed (*Fallopia japonica*), and butterfly bush (*Buddleia davidii*) were observed primarily along shorelines. Ornamental landscape trees also line a parking area along Alexander Ave E.

Animals

The upland habitat in the industrialized site provides limited habitat for wildlife. Terrestrial wildlife includes resident and migratory songbirds, raptors, wading birds (i.e., great blue herons [*Ardea Herodias*]), reptiles, small mammals (e.g., raccoon [*Procyon lotor*], opossum [*Didelphis virginiana*], and possibly coyotes (*Canis latrans*). (Port of Tacoma 2009)

Birds observed during the December 2012 biological survey of the Tacoma LNG Facility site included American robin (*Turdus migratorius*), American crows (*Corvus brachyrhynchos*), and European starlings (CH2M HILL 2012). A crow (American or Northwest) nest from the 2012 breeding season was observed in an

ornamental tree during the survey (CH2M HILL 2012). Trees on site may provide nesting and roosting opportunities for birds that are adapted to the high level of disturbance on the site, such as the American crow (CH2M Hill 2015). Killdeer (*Charadrius vociferous*) have the potential to nest in the Proposed Action area; killdeer are ground-nesting birds and may utilize gravely sites that are heavily disturbed (Jackson and Jackson 2000). Avian nesting habitat is generally poor, and no nests from the 2012 breeding season were observed on buildings or structures.

Because of the proximity to the Hylebos and Blair waterways and Commencement Bay, birds frequenting upland portions of the Proposed Action area include species such as wading birds and waterfowl. These species are covered in detail in the Estuarine Habitat section, below.

Suitable habitat for reptiles consists of unvegetated soil or grassy areas, which may be present along the shoreline of the proposed Tacoma LNG Facility and TOTE sites. Species that have the potential to occur include common garter snake (*Thamnophis sirtalis*), northern alligator lizard (*Elgaria coerulea*), painted turtle (*Chrysemys picta*), and western fence lizard (*Sceloporus occidentalis*). These reptiles are common in the Puget Sound region and are documented as occurring near the Hylebos Waterway (DNR, BLM, WDFW, and USFS 2011).

Wetlands and Stream Habitat

No wetlands or streams are located within the Tacoma LNG Facility or TOTE sites (CH2M HILL 2014a). Hylebos Creek flows into the Hylebos Waterway at the far southeastern end of the waterway, approximately 2 miles from the proposed Tacoma LNG Facility. Wapato Creek flows into the southeastern corner of Blair Waterway, approximately 1.8 miles from the proposed TOTE Marine Vessel LNG Fueling System.

Estuarine Habitat

Commencement Bay is a navigable, natural, deep-water embayment, trending northwest to southeast and located near the southern end of the main basin of Puget Sound. The east end of the bay is currently dominated by the Port of Tacoma industrial area, a large flat area of filled tidelands that supports a variety of industrial and commercial uses. The shoreline of Commencement Bay has been substantially altered since the 1880s as a direct result of urbanization and industrialization (USACE, EPA, USFWS, and NOAA 1993). The east end of the bay, once a broad tide flat formed by the Puyallup River delta and other small deltas, was dredged and filled between approximately 1920 and the late 1960s, resulting in channelization of the lower Puyallup River and the relocation of the Puyallup River Mouth.

The shorelines of Commencement Bay have been altered by shoreline and erosion protection materials (e.g., bulkheads, riprap) (Kerwin 1999). These modifications to the physical environment, combined with the introduction of runoff and waste discharges from developed shoreline uses, have resulted in a general degradation of water and sediment quality and habitat loss. The relict natural aquatic habitats that persist in Commencement Bay are typically small, isolated, and surrounded by extensive development. The remaining narrow margins of intertidal and shallow subtidal habitat that surround the bay are important migratory routes for salmon, waterfowl, and shorebirds; the edges of the waterways and peninsulas also provide habitat for these species. However, most, if not all, of the remaining aquatic habitat is of a lesser quality than what existed historically.

As discussed in Section 3.3.3.1 of Section 3.3 (Water), the inner portion of Commencement Bay, which includes the Hylebos and Blair waterways, is listed as impaired on the 303(d) list for dieldrin, polychlorinated biphenyls (PCBs), chlorinated pesticides, dichlorodiphenyltrichloroethane (DDT), and high molecular weight polyaromatic hydrocarbons. The Commencement Bay impaired listings on the Washington State Department of Ecology's current 303(d) list as approved by the United States Environmental Protection Agency include two areas within the Hylebos Waterway that are listed for impairment due to dieldrin, PCBs, chlorinated pesticides, and DDT (Ecology 2012). The inner Commencement Bay impaired listings also include one area listed for impairment due to both dieldrin and PCBs. Both waterways have twice the

concentrations of lead and copper and up to 43 times higher concentrations of zinc than the seawater flowing into Puget Sound.

Estuarine habitat in the vicinity of the Tacoma LNG Facility and TOTE sites is associated with central Puget Sound, including the Hylebos and Blair waterways and Commencement Bay. The estuarine conditions associated with the Tacoma LNG Facility and TOTE areas are typical of an industrial area and reflect the area's history as a maritime industrial and shipping center. Grette Associates (2009) reported that the area has been previously modified from its original state, resulting in the loss of special aquatic sites (mudflat, salt marsh). The shoreline consists of areas completely modified with riprap and a timber bulkhead along the Hylebos shoreline. Several existing in-water structures in the Blair Waterway are associated with existing TOTE operations: one timber T-pier, three concrete piers, and one concrete breasting dolphin. Existing in-water structures in the Hylebos Waterway in the Proposed Action area are limited to two timber-pile supported piers.

Plants

Shoreline and aquatic vegetation along Hylebos and Blair waterways is sparse. Macroalgae coverage is similarly sparse, consisting primarily of sea lettuce (*Ulva fenestrata*). At approximately +1 foot mean lower low water (MLLW), sea lettuce; sugar kelp (*Laminaria saccharina*); *Gracilaria* spp., and two species in the genus of red algae were observed during the December 2012 biological survey (CH2M HILL 2012). Species found along the top of the shoreline bank included Himalayan blackberry (*Rubus discolor*), Scotch broom (*Cytisus scoparius*), Japanese knotweed (*Fallopia japonica*), and butterfly bush (*Buddleia davidii*).

Animals

Estuarine habitat near the Tacoma LNG Facility and TOTE sites is associated with Hylebos Waterway, Blair Waterway, and Commencement Bay. Grette Associates (2009) noted that fish and wildlife species that may be present within the Proposed Action area were similar to those typically found in Puget Sound; however, the sparse shoreline vegetation and heavily industrialized and trafficked waters limit the amount of suitable habitat. Non-special-status species are discussed here; for a discussion of special-status species (e.g., marine mammals), refer to "Special-Status Species and Protected Habitat," below.

Birds

Wading birds and waterfowl forage in the intertidal and subtidal zones in central Puget Sound, including those of Commencement Bay and Hylebos and Blair waterways.

These birds may use the Hylebos and Blair waterways throughout the year, though species composition may change by season. Waterfowl and other aquatic birds observed in the Hylebos Waterway during the December 6, 2012, biological survey were bufflehead (*Bucephala albeola*), double-crested cormorants (*Phalacrocorax auritus*), and Barrow's goldeneye (*Bucephala islandica*) (CH2M HILL 2012). Other species of waterfowl potentially present during spring and fall migrations include American wigeon (*Anas americana*), greater scaup (*Aythya marila*), green-winged teal (*Anas carolinensis*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), pigeon guillemot (*Cepphus columba*), ring-necked duck (*Aythya collaris*), and western grebe (Grette Associates 2009). In addition, horned grebe (*Podiceps auritus*) and red-necked grebe (*Podiceps grisegena*) are known to use the Hylebos and Blair waterways (Kapantais 2012, personal communication). Both species are common in Commencement Bay during the winter and may move toward the mouth of the Port of Tacoma waterways during high tides. Western grebes (*Aechmophorus occidentalis*) are also common in Commencement Bay during the winter and may potentially occur in the marine waters that border the Tacoma LNG Facility site and dock.

Additional birds that are associated with open water and aquatic habitats and are potentially present within the Hylebos and Blair waterways and Commencement Bay include the following (Dames and Moore 1981, as cited in Grette Associates, 2009):

- Glaucous-winged gull (*Larus glaucescens*);
- Bald eagle (*Haliaeetus leucocephalus*) – further discussed in "Special-Status Species and Protected Habitat," below ;
- Peregrine falcon (*Falco peregrinus*) - further discussed in "Special-Status Species and Protected Habitat," below;
- Marbled murrelet (*Brachyramphus marmoratus*);
- Great blue heron;
- Osprey (*Pandion haliaetus*);
- Dunlin (*Calidris alpine);*
- Mew gull (*Larus canus*); and
- Common tern (*Sterna hirundo*).

Canada geese (*Branta canadensis*), cackling geese (*B. hutchinsii*), double-crested cormorants, several species of gull, and great blue herons roost on the existing docks and structures during high tide and transition to the shoreline and exposed mudflats during low tide (CH2M HILL 2012; Grette Associates 2009; Ehrlich et al. 1988; Kapantais 1998). Approximately 20 great blue herons were observed roosting on pilings at the dock and pier during high tide in December 2012 (CH2M HILL 2012). No great blue heron nests (i.e., rookeries) were observed within the Tacoma LNG Facility site. Several pairs may continue to nest on the bluff overlooking Hylebos Waterway and Commencement Bay located 0.8 mile north of the Tacoma LNG Facility site (PHS database and observations during the 1997 and 1998 breeding seasons per Kapantais 2012, personal communication).

Fish

Salmonids migrate through Hylebos and Blair waterways, returning to Hylebos and Wapato creeks during the fall months as adults destined for spawning areas in fresh waters. Their progeny travel through the waterway during the spring and early summer months as they migrate to the sea. The online StreamNet Interactive Mapper indicates that Hylebos Creek, which flows into the Hylebos Waterway, provides potential migration habitat for pink salmon (*Oncorhynchus gorbuscha*), chum (*Oncorhynchus keta*), winter steelhead, (*Oncorhynchus mykiss*), coho, (*Oncorhynchus kisutch*), and fall Chinook (*Oncorhynchus tshawytscha*) StreamNet 2014). Sea-run cutthroat trout may be present year-round in Hylebos Waterway. Wapato Creek, where it flows into Blair Waterway, is a potential migration corridor for winter steelhead, chum, coho (StreamNet 2014), and cutthroat (Nauer 2001, personal communication). Chinook, chum, and pink salmon juveniles migrating out of the Puyallup and White rivers are present briefly in Hylebos and Blair waterways during their migration out to the Pacific Ocean. This migration occurs during the months of late February through July. Bull trout (*Salvelinus confluentus*) associated with the Puyallup and White rivers may be present seasonally as well.

Other fish species that may be present in the Proposed Action area include those typically found in Puget Sound, including the following: (Dames and Moore 1981, as cited in Grette Associates 2009):

- Pacific herring (*Clupea pallasii*),
- Surf smelt (*Hypomesus pretiosus*),
- Threespine stickleback (*Gasterosteus aculeatus*),
- Bay pipefish (*Syngnathus leptorhyncus*),
- Shiner perch (*Cymatogaster aggregate*),
- Striped seaperch (*Embiotoca lateralis*),
- Pile perch (*Rhacochilus vacca*),

- Snake prickleback (*Lumpenus sagitta*),
- Crescent gunnel (*Pholis laeta*),
- Red gunnel (*Pholis schultzi*),
- Pacific sand lance (*Ammodytes hexapterus*),
- Pacific staghorn sculpin (*Leptocottus armatus*),
- Flathead sole (*Hippoglossoides elassodon*),
- Starry flounder (*Platichthys stellatus*),
- Ratfish (*Hydrolagus colliei*),
- Blackbelly eelpout (*Lycodes pacificus*),
- Speckled sanddab (*Citharichthys stigmaeus*),
- Rock sole (*Lepidopsetta* sp.),
- Dover sole (*Microstomus pacificus*),
- Sand sole (*Psettichthys melanostictus*),
- C-O sole (*Pleuronichthys coenosus*), and
- Many ground fish species.

Bivalves and Crustaceans

Bivalves and crustaceans are also expected to be present in the vicinity of the Proposed Action, but may be present in small numbers or not at all due to dredging of the waterways. Species include (Dames and Moore 1981, as cited in Grette Associates 2009):

- Butter clam (*Saxidomus gigantea*),
- Little neck clam (*Leukoma staminea*),
- Horse clam (*Tresus* sp.),
- Soft-shell clam (*Mya arenaria*),
- Cockles (several species, *Clinocardium* spp.),
- Geoduck (*Panopea generosa*),
- Purple crab (*Hemigrapsus nudus*),
- Graceful crab (*Matacarcinus gracilis*),
- Red rock crab (*Grapsus grapsus*),
- Dungeness crab (*Metacarcinus magister*),
- Pink shrimp (*Pandalus borealis*),
- Coonstripe shrimp (*Pandalus danae*), and
- Spot shrimp (*Pandalus platyceros*).

Special-Status Species and Protected Habitat

This section addresses threatened, endangered, and other protected species of fish, plants, and wildlife, and protected habitats that have the potential to occur in or near the Proposed Action area. Collectively, these species are referred to as special-status species. Principal regulatory authority for protection is provided for by the ESA, MSA, MMPA, Bald and Golden Eagle Act, and Migratory Bird Treaty Act at the federal level, and endangered species regulations at the state and local levels, including PHS species and habitats.

Little to no suitable habitat exists in the upland portions of the Tacoma LNG Facility site or the TOTE site to support listed or other protected species. No endangered, threatened, or other special-status plant species are documented to occur at the Tacoma LNG Facility or TOTE sites. No critical habitat is within the Proposed Action area.

Although they are not federally listed as endangered or threatened, the following special-status fauna have the potential to occur in upland portions of the Proposed Action area:

- **Bald eagle** is a state sensitive species and is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In Washington, bald eagles occur in similar numbers during the breeding season and winter months (Stinson et al. 2007). During the breeding season, bald eagles nest near marine environments and other open waters such as rivers and lakes. Winter habitat is dictated by foraging opportunities that include concentrations of waterfowl and fish.
- There is potential for bald eagles to use the Tacoma LNG Facility site and area year round for day roosts or foraging. One adult bald eagle was observed flying over Hylebos Waterway and the proposed facility site during the December 2012 biological survey (CH2M HILL 2012). A bald eagle nest was documented in 2007 approximately 0.6 mile from proposed Pipeline Segment A (WDFW 2013). WDFW confirmed an active bald eagle nest in 2013 approximately 0.5 mile northeast of the Proposed Action area.
- **Peregrine falcon** is a state sensitive species and is federally protected under the Migratory Bird Treaty Act. Peregrine falcons are found throughout Washington year round. Northern regions of Puget Sound contain some of the greatest numbers of breeding pairs (Hayes and Buchanan 2002). Similarly, the estuaries of the entire Puget Sound support significant populations of wintering peregrine falcons where they forage on concentrations of waterfowl and other birds. Peregrines typically nest on cliffs near aquatic habitats, but will nest on buildings and bridges in urban areas. Suitable man-made nesting habitat is within the region of the Proposed Action area. Peregrine falcons have historically nested within 0.2 mile of the Tacoma LNG Facility site near the Hylebos Waterway (WDFW 2013). Peregrine falcons may also use the area during the winter season to prey on waterfowl in nearby aquatic and marine habitats.

The following special-status fish species are potentially present near the Proposed Action area:

- **Chinook salmon** (Puget Sound Evolutionarily Significant Unit) is federally listed as threatened and listed as a state candidate in Washington. Hylebos Creek and the Puyallup River are the closest streams in which Puget Sound Chinook salmon are known to occur. Hylebos Creek supports a small run of Chinook salmon (approximately 20 to 30 fish), which spawn primarily in the Spring Valley reach of the West Branch (Russ Ladley, Puyallup Tribe of Indians, biologist, personal communication, 2005 and 2007, as cited in CH2M HILL 2011). Hylebos Creek enters Hylebos Waterway approximately 2 miles southeast of the proposed Hylebos Waterway pier. The mouth of the Puyallup River is located approximately 1 mile southwest.
- Juvenile Chinook salmon migrate along the shorelines of Commencement Bay. Some of these salmon can be expected to be migrating in the vicinity of the Hylebos and Blair waterways during late spring/ early summer on their way out to the open ocean.
- The Proposed Action area includes critical habitat for the Puget Sound Chinook salmon (see “Critical Habitat,” below).
- **Steelhead trout** (Puget Sound Distinct Population Unit) is federally listed as threatened. The Puget Sound steelhead trout are documented to occur within Wapato Creek (Fife Ditch), Commencement Bay, and the Hylebos and Blair waterways (StreamNet 2014). The proposed Pipeline Segment A would cross under Wapato Creek at Fife Ditch, approximately 1,000 feet south of where Fife Ditch enters the Hylebos Waterway near the confluence with Hylebos Creek.

  Adult winter-run steelhead generally occur in the Puyallup River system from November through May, with spawning occurring from March through June and peak spawning occurring in April and May. The species’ ‘presence in Commencement Bay, as adults, is expected to occur from approximately November through March. Juvenile outmigrants are generally present during March and April. Outmigrant steelhead quickly move out of nearshore areas and into deeper waters.

The Proposed Action area includes no designated critical habitat for Puget Sound steelhead. However, critical habitat was proposed in 2013 for the species within the action area. The proposed critical habitat consists of Wapato Creek (Fife Ditch) and Hylebos Creek. Proposed critical habitat for the Puget Sound steelhead does not include the nearshore zone of Puget Sound waterways, based on the known rapid movement of steelhead out of freshwater and into offshore marine waters.

- **Bull trout** is federally listed as threatened and listed as a state candidate in Washington. The Coastal-Puget Sound Distinct Population Segment of bull trout has been documented in the Puyallup River, Blair Waterway, and Commencement Bay (WDFW 2014). Hylebos Creek, located approximately 2 miles southeast of the proposed Hylebos Waterway pier, does not support a spawning bull trout population (WDFW 2014). The Proposed Action area generally provides potentially suitable foraging habitat for adult bull trout migrating from Commencement Bay into the Puyallup River watershed, as well as for juvenile rearing and outmigration. Most migratory bull trout leave freshwater and enter Puget Sound during late winter and spring, then return to freshwater during late spring and early summer (Goetz et al. 2004). Foraging adults and subadults are possible in the Proposed Action area from mid-February through mid-July. Adult and/or rearing juvenile bull trout could be present in Commencement Bay any time of year.

  During extensive sampling efforts in Commencement Bay, no juvenile bull trout were captured, and only four adult bull trout were captured (PIE 1999). These adults were captured in April, May, and June, which is when bull trout are expected to be present in Commencement Bay. In 2001, the USACE and the Puyallup Tribe conducted a juvenile fish sampling and radio-tagging study of bull trout/native char in the lower Puyallup River and Commencement Bay. Sampling conducted in the lower Puyallup River over a 10-week period between February 7 and April 20, 2001, resulted in the capture of one juvenile char on February 21 that was too small to tag (Ladley 2001). Based on this information, juvenile, adult, and subadult bull trout are unlikely to be present within Commencement Bay or the Blair or Hylebos waterways in substantial numbers at any time.

- The Proposed Action area includes critical habitat for the Coastal-Puget Sound bull trout (see “Critical Habitat,” below).

- **Canary rockfish** (*Sebastes pinniger*) is federally listed as threatened and listed as a state candidate in Washington. Canary rockfish have been documented throughout Puget Sound (Miller and Borton 1980), although absolute numbers are relatively low compared to other rockfish species (Palsson et al. 2009; NMFS 2008). There is some indication from recreational fishing records that canary rockfish have been occasionally caught around the Tacoma Narrows, but more so in north Puget Sound and around the San Juan Islands.

- This is a relatively deepwater species. However, the larvae are planktonic for approximately one year. The young settle out of the planktonic stage in places as shallow as intertidal areas. Initial residence is in habitats such as rocky reefs, kelp beds, and rocky and cobble areas. Settlement timing is variable but can be any time from early summer through fall. The young reside in shallow areas for several years before moving into deeper water. These life history traits suggest that canary rockfish juveniles may be present in the vicinity of Point Defiance. Because there is no suitable habitat for adults nearby (the Tacoma Narrows is the closest), and because the planktonic stage is extensive, dispersal would be great, resulting in the density or probability of larvae or juvenile residence in any one location being extremely small (NMFS 2003). Because spawning areas are in very deep water (outside of Commencement Bay) and because Commencement Bay experiences estuarine circulation, rockfish larvae are highly unlikely to settle out inside of the bay or waterways such as in the Hylebos and Blair waterways.

- There is no critical habitat designated for the canary rockfish within the Proposed Action area. However, nearshore critical habitat has been designated along the southern shoreline of Commencement Bay

outside of the action area. Designated deepwater critical habitat for canary rockfish in the Proposed Action area extends from outside of the waterways and into deep water.

- **Bocaccio** (*Sebastes paucispinis*) is federally listed as endangered and listed as a state candidate in Washington. Bocaccio have not been documented in Puget Sound since 2001; however, it is assumed that a population still exists (NMFS 2008). Historically, bocaccio were observed as bycatch in the southern portion of Puget Sound, including the area around Point Defiance and the Tacoma Narrows (NMFS 2009, 2008; Palsson et al. 2009), which are located on the south side of Commencement Bay.
- This is a relatively deepwater species. However, the young settle out of the planktonic stage in shallow areas. After a few weeks, they move into water depths of 60 to 100 feet. Thus, at least for the earlier stages of development, bocaccio may be present a few weeks each year in the vicinity of Point Defiance. This brief time period could occur any time between April and September, based on larval release and planktonic residence information (NMFS 2008). Because there is no suitable habitat for adults nearby (the Tacoma Narrows is the closest), and because the planktonic stage is extensive, dispersal would be great, resulting in the density or probability of larvae or juvenile residence in any one location in the Project vicinity being extremely small (NMFS 2003).
- Nearshore critical habitat for this species has not been designated within the Proposed Action area. However, critical habitat for the species was designated along the southern shoreline of Commencement Bay outside of the Proposed Action area. Designated deepwater critical habitat for canary rockfish in the Proposed Action area extends from outside of the waterways and into deep water.
- Nearshore critical habitat for juvenile bocaccio has been designated in the vicinity of Point Defiance. Nearshore habitat is described in the listing document as follows: “juvenile settlement habitats located in the nearshore with substrates such as sand, rock, and/or cobble compositions that also support kelp are essential for conservation because these features enable forage opportunities and refuge from predators and enable behavioral and physiological changes needed for juveniles to occupy deeper adult habitats” (NMFS 2014b).
- **Yelloweye rockfish** (*Sebastes ruberrimus*) is a federal threatened species and listed as a state candidate species in Washington. Little is known about yelloweye rockfish during their first year of life. It is known, however, that as they settle out of the surface-oriented ichthyoplankton stage, they seek areas as deep as 48 feet, or deeper, that are characterized as high-relief and rocky (Love et al. 2002). The habitats described above do not occur in the Hylebos and Blair waterways, nor do deep rocky habitats suitable for adults of the species. Suitable adult habitats are defined as “rugose” (rough) terrain of complex bathymetry and depths greater than 98 feet (NMFS 2014b). Habitat of this nature is present in the vicinity of Point Defiance at the mouth of Commencement Bay. As they grow, they move into deeper water. Because of their pelagic nature, larval yelloweye rockfish could occur within the vicinity of the Proposed Action area, though they are readily dispersed by currents after they are born, making the density or probability of presence of larvae in any one location extremely small (NMFS 2003). Because spawning areas are in very deep water (outside of Commencement Bay) and Commencement Bay experiences estuarine circulation, rockfish larvae are highly unlikely to settle out in nearshore areas inside the bay, such as in the Hylebos and Blair waterways.
- Nearshore critical habitat has not been designated for this species in the immediate vicinity of the proposed marine facilities on the Hylebos and Blair waterways, although it has been designated along the southern shoreline of Commencement Bay outside of the Proposed Action area. Designated deepwater critical habitat for yelloweye rockfish in the action area extends from the shallowest known habitat used by juvenile yelloweye rockfish (-48 feet MLLW) outside of the waterways and into deep water (Love et al. 2002).

- **Marbled murrelet** is federally and state listed as threatened. Marbled murrelets live primarily in a marine environment, but during the nesting season fly inland to nest in old-growth coastal forests and make daily flights to forage in a variety of nearshore marine environments. Adult marbled murrelets feed in Puget Sound throughout the year, with larger concentrations during the fall and winter. Open water areas near entrance channels off rocky shores or over reefs are important feeding locations (NOAA 2011). There are no PHS records for marbled murrelets within 1 mile of the Tacoma LNG Facility (WDFW 2013). Commencement Bay, within the western portion of the Proposed Action area, may provide suitable foraging habitat for marbled murrelets (USFWS 2006); however, there is no suitable nesting habitat for the species in the Proposed Action area. Reported occurrences in Commencement Bay are generally absent from the literature; however, a few anecdotal sightings have been reported, the nearest of which are from sites approximately 2.5 miles from the peninsula (Seattle Audubon 2014).

  No critical habitat has been designated within the Proposed Action area. The nearest critical habitats for marbled murrelet are approximately 30 miles away.

- **Purple martin** (*Progne subis*) has no federal designation but is a state candidate for listing as threatened or endangered. Purple martins are in the swallow family. They are found in emergent wetlands, open ponds and lakes, and mudflats and are often seen using nest boxes located in or over water. According to the PHS data, there are two nesting colonies within 1 mile of the Proposed Action (WDFW 2013). The first colony is located approximately 0.3 mile west-northwest of the Tacoma LNG Facility site, toward the mouth of Hylebos Waterway. The second colony is located 0.25 mile north of the location of the facility site pier on Hylebos Waterway, where the birds have been observed using tubes and boxes on dolphins and pilings.

- **Harbor seal** (*Phoca vitulina*) is protected by the MMPA, is common in Puget Sound and Commencement Bay, and has been observed close to the Proposed Action area. Harbor seals have been observed northeast of the Tacoma LNG Facility and TOTE sites at the Saltchuck Mitigation Site (Grette Associates 2009) and also within Hylebos and Blair waterways. Within Commencement Bay, approximately 0.9 mile northwest of the mouth of Hylebos Waterway, adult and pup harbor seals regularly use a log boom as a year-round haul-out (Jefferies et al. 2000). Approximately 10 harbor seals, including one pup, were observed using the log boom during the December 2012 biological survey. Adult and juvenile harbor seals have also been observed along the Hylebos Waterway directly in front of the proposed Tacoma LNG Facility site (CH2M HILL 2012).

- **Killer whale** (*Orcinus orca)* is federally and state listed as endangered and protected by the MMPA. Killer whales occur in Washington within four distinct populations; the “southern resident” and “transient” populations are known to occur within coastal or near-shore waters (Wiles 2004). Killer whales enter Puget Sound between June and October as they forage for salmon (USAR 2011). Southern resident killer whales are relatively rare in Commencement Bay, with only 13 sighting days over the 18-year record (Grette Associates 2013). The Southern Resident killer whales have the potential to occur within Commencement Bay. Based on a query of NMFS killer whale sighting data conducted for the Citadel Yachts Project in April 2013, Southern Resident killer whales are relatively rare in Commencement Bay, with only 13 sighting days over the 18-year record (Grette Associates 2013). Because of the high level of maritime and other industrial activity around the mouth of the Hylebos and Blair waterways, Southern Resident killer whales are not expected to use either of these waterways.

  Within the Proposed Action area, Commencement Bay and nearly all of Puget Sound are designated critical habitat for killer whales. The Hylebos and Blair waterways are not included as critical habitat.

Special-status wildlife species potentially present in Puget Sound, but unlikely to be present near the Proposed Action, include the following:

- **Steller sea lion (Eastern Distinct Population Segment)**. Steller sea lions (*Eumetopias jubatus*) of the eastern Distinct Population Segment (see "Critical Habitat," below) are federal species of concern and state-listed as threatened and protected by the MMPA. Steller sea lions use onshore sites for two activities: breeding and resting (Wiles 2015). Breeding occurs on rookeries, which are used from May to August. There are no rookery sites in Washington. Haul-out sites are used year-round or seasonally for resting and are located throughout Washington's coastlines. There are eight documented haul-outs in the central Puget Sound. The nearest haul-outs to the Proposed Action area are to the south, between Fox Island and the Nisqually River, and to the north near Bainbridge Island. There are no records of Steller sea lions in the Hylebos or Blair waterways (NOAA 1999). In January 2015, the WDFW recommended that the Steller sea lion be removed from the state threatened and endangered list (Wiles 2015). There are no records of Steller sea lions occurring in the Hylebos and Blair waterways (NOAA 1999) and Steller sea lions do not normally occur near the mouth of Commencement Bay. Therefore, Steller sea lions are unlikely to be present at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites.
- **Harbor porpoise** *(Phocoena phocoena)* is state listed as a candidate and a federal species of concern and protected by the MMPA. Harbor porpoises are found in the bays, estuaries, and harbors of Washington. Recent vessel surveys conducted in 2009 and 2010 have indicated a return and increase of harbor porpoises throughout the Puget Sound population, despite observed declines in southern Puget Sound in the mid-1990s (Calambokidis, no date, as cited in NOAA 2011; Hanson, no date, as cited in NOAA 2011). There are no documented reports of harbor porpoises in the vicinity of the Tacoma LNG Facility site.
- **Humpback whale** *(Megaptera novaeangliae)* is federally and state listed as endangered and protected by the MMPA. The National Marine Mammal Laboratory has documented humpback whales in Washington State waters in every month except February, March, and April. However, sightings of humpback whales remain uncommon along the coast of Washington and rare in Puget Sound, even more so in Commencement Bay. No documented reports exist for humpback whale sightings in Commencement Bay (Carretta et al. 2013). Humpback whales are extremely unlikely to be present at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites. In April 2015, NOAA proposed to identify 14 Distinct Population Segments of humpback whale and delist 10 of them, which includes humpback whales in the region of Washington (80 Federal Register 22304). No critical habitat has been designated for the humpback whale across its entire range.
- **Gray whales** *(Eschrichtius robustus)* of the Eastern North Pacific stock are a state sensitive species and protected by the MMPA. Gray whales are found mainly in shallow coastal waters in the North Pacific Ocean. Gray whales migrate in nearshore waters between their breeding grounds in Baja, California, and their summer feeding grounds in the Gulf of Alaska. Some gray whales do not make the full migration and are known to feed off the coasts of Oregon and Washington in the summer months (Angliss and Outlaw 2008). Gray whales have been observed in central Puget Sound, including Commencement Bay. Sightings in central Puget Sound have occurred as recently as March 2014, when a gray whale was spotted feeding in Possession Sound (Seattle Times 2014). Gray whales do not normally occur in southern Puget Sound and have not been documented in Commencement Bay. Due to the proximity to industrial uses in addition to lack of prey and no past sightings in Commencement Bay, the potential for gray whales to enter Hylebos or Blair waterways is very low. Therefore, gray whales are extremely unlikely to be present at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites.
- **Leatherback sea turtle** (*Dermochelys coriacea*) is federally and state listed as endangered. Leatherback sea turtles prefer deep water and are infrequently observed on the outer coast of the Olympic Peninsula. The closest documented sighting to Commencement Bay occurred at Port Angeles, more than 100 miles to the north (McAllister 1999, personal communication, as cited in NOAA 1999). Owing to the lack of documented occurrences in southern Puget Sound, the potential for leatherback sea turtles to

enter Hylebos or Blair waterways is effectively zero (NOAA 1999). Therefore, leatherback sea turtles are unlikely to be present at the Tacoma LNG Facility or TOTE sites. There is no critical habitat designated for the leatherback sea turtle within the region of the Proposed Action area.

- **Northern sea otter** (*Enhydra lutris kenyoni*) is a federal species of concern and state-listed as endangered. Sea otters generally occur within the marine waters of Washington State. A few isolated sightings of sea otters have occurred in inland Washington waters, in the eastern Strait of Juan de Fuca, the San Juan Islands, and southern Puget Sound near Olympia (Richardson and Allen 2000). However, no sightings have been reported in Commencement Bay (NOAA 2011), and the likelihood of occurrence in Hylebos or Blair waterways is low. Therefore, northern sea otters are unlikely to be present at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites.

Critical Habitat

As outlined in the sections above, critical habitat is federally designated within the Hylebos and Blair waterways for Chinook salmon and bull trout (USFWS 1999; NOAA 2006; NMFS 2014b). Critical habitat is proposed in the Proposed Action area for Puget Sound steelhead. Within Commencement Bay, but not within the Hylebos and Blair waterways, designated critical habitat is present for five species: the Southern Resident killer whale, steelhead, canary rockfish, bocaccio, and yelloweye rockfish.

- **Chinook salmon** – Designated critical habitat for Chinook salmon includes the Hylebos and Blair waterways, Commencement Bay, and areas contiguous with the shoreline from the line of extreme high water out to a depth no greater than 98 feet relative to MLLW.
- **Bull trout** – Designated critical habitat (Unit 2, Puget Sound) for the Coastal-Puget Sound bull trout includes Commencement Bay, Hylebos Waterway, and Blair Waterway. As specified in the revised critical habitat designation (USFWS 2010), the inshore extent of critical habitat in nearshore marine areas, including tidally influenced freshwater heads of estuaries, extends to the mean higher high water (MHHW) line. The offshore extent of critical habitat is limited to a depth of -33 feet (-10 meters) relative to MLLW.

Essential Fish Habitat

The Proposed Action area contains EFH for Pacific salmon, groundfish, and coastal pelagic species. Designated EFH for salmonid species in estuarine and marine areas includes nearshore and tidally submerged environments within state territorial water, out to the full extent of the exclusive economic zone (230.2 miles) offshore from Washington (PFMC 1999). Designated EFH for groundfish and coastal pelagic species includes all waters from the MHHW line along the coasts of Washington upstream to the extent of saltwater intrusion and seaward to the boundary of the United States exclusive economic zone (230.2 miles) (PFMC 1998a, 1998b).

Priority Habitats and Species Use Areas and Habitat

WDFW's PHS List is "a catalog of habitats and species considered to be priorities for conservation and management" (WDFW 2008). The PHS List was created by WDFW to identify fish and wildlife assemblages and habitats that are a priority for management and preservation. Since 1989, the PHS List has served as the backbone for the state's wildlife management program. The PHS List includes habitats and species that require additional guidelines for conservation and management. Typically, habitats and species included on the PHS List are sensitive to habitat disturbances; are listed as state endangered, threatened, sensitive, or candidate species; form congregations that are considered sensitive or vulnerable, such as breeding bird colonies or bat hibernacula; or have a commercial or tribal importance. A total of 20 habitat types, 155 vertebrate species, 41 invertebrate species, and 11 species groups currently are on the PHS List.

Table 3.4-1 shows PHS habitat polygons located within 1 mile of the Proposed Action area. No PHS habitat polygons are located within the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites. The

PHS habitat polygons within 1 mile are summarized in Table 3.4-1; this summary includes the pipeline segments that are discussed in more detail in Section 3.4.3.2, below.

Table 3.4-1 Priority Habitat and Species Polygons Located within 1 Mile of the Proposed Action

Proposed Action Feature	Distance in Miles	Type	Description
Tacoma LNG Facility	0.05	Wetlands	Wetlands associated with tributaries near Commencement Bay, including Hylebos Waterway and Wapato Creek drainages
Tacoma LNG Facility	0.1	Biodiversity Areas And Corridor	Hylebos Waterway bluff area consists of steep slopes and bluffs overlooking the Commencement Bay waterways
			Area provides raptor habitat and refugia for many bird and mammal species
Tacoma LNG Facility	0.2	Estuarine zone	Estuary associated with the Hylebos Waterway; intact intertidal estuary/mudflat
Tacoma LNG Facility	0.3	Wetlands	Region 4 saltwater wetland: Puget Sound coastal salt marshes, salt meadows, and brackish marshes
Tacoma LNG Facility	0.4	Estuarine zone	Rhone-Poulenc restoration site
		Pigeon guillemot breeding occurrence	Pigeon guillemots observed nesting in cliffs in 2001; nest holes still present in 2006
Segment A	0.8	Estuarine zone	Slip 5 restoration site; new intertidal habitat
Segment A	0.9	Waterfowl concentrations	Large regular waterfowl concentrations area, nonagricultural in Pierce County
Segment A	1.0	Waterfowl concentrations	Small waterfowl concentration area, agricultural
Segment A	1.0	Biodiversity Areas And Corridor	Steep slopes along the valley terrace that consist of native mixed forest associated with the Carbon River Open Space area
Segment B	0.2	Wetlands	Wetlands associated with Chambers Creek drainage
Segment B	0.7	Wetlands	Lower Puyallup River valley wetlands

Source: WDFW 2012. Priority Habitat and Species Digital Data.

3.4.3.2 Puget Sound Energy Natural Gas Distribution System

The locations for the PSE natural gas distribution system improvements were specifically selected where wetlands and waterbodies are not present or could be avoided by selecting specific construction techniques. The two new distribution pipeline segments would be constructed within the existing road rights-of-way (ROWs), either paved or shoulder, by using a horizontal directional drill or open trench method, as described in Section 2.3.3, (Puget Sound Energy Natural Gas Distribution System). The new pipeline would be constructed under four existing culverted stream crossings using a horizontal bore or drill to avoid impacts. Figures 2-18 and 2-19 show the location of the new distribution system pipeline segments. The PSE natural gas distribution system is located entirely within a non-estuarine environment.

Upland Habitat

The two new distribution pipeline segments presented in Section 2.3.3 (Puget Sound Energy Natural Gas Distribution System) would traverse through an urban environment. The majority of neighboring properties support industrial, commercial, and residential buildings, as well as associated impervious roadways and parking lots.

Plants

No plant assemblages occur within the proposed pipeline segments because the segments are proposed entirely within the paved portion of existing road ROWs. The areas adjacent to the proposed pipeline segments consist primarily of upland habitat that has been developed for residential and other urban uses, except on the Blair-Hylebos Peninsula, which is industrialized.

No upland habitat for special-status species occurs within the proposed Pipeline Segment A and B alignments. Pipeline Segment A would be located within the existing road prism of Taylor Way extending generally north to south from the facility to 20th Street East in Fife, just south of Interstate 5. Pipeline Segment B would extend north to south within Golden Given Road East between 96th Street East (north) and 112th Street East (south) in unincorporated Pierce County.

Habitat adjacent to proposed Pipeline Segment A and outside of the proposed workspace consists of isolated upland and wetland habitats, including Hylebos Marsh and Fife Ditch. Hylebos Marsh has several waterways and ponds supporting emergent vegetation that are separated by upland areas of forest, scrub-shrub, and weedy herbaceous areas. The Hylebos Marsh area provides some wildlife habitat because of the variety of vegetative structure. However, because the Hylebos Marsh is completely isolated from larger tracts of habitat by paved roads, buildings, and active marine terminals, its habitat value is severely limited. Habitat adjacent to proposed Pipeline Segment B consists of scattered upland areas (interspersed with development), with the exception of a small ponded area between 109th Street East and 112th Street East.

Animals

Because the developed nature of the sites considered for Project facilities results in a lack of natural habitat, few opportunities for wildlife to nest or forage occur within the Proposed Action area. The proposed pipeline segments would be confined to existing paved roads. Terrestrial wildlife may occur in habitats adjacent to the new pipeline segments. Small, isolated, remnant stands of deciduous and mixed forests occur adjacent to portions of the proposed pipeline segments. The existing urban environment surrounding the Proposed Action area in general means these areas are highly fragmented from surrounding habitats by commercial, urban, and residential developments and roadways. However, these areas still provide some isolated habitat for forest-associated resident and migratory songbirds, as well as hawks, owls, great blue herons, woodpeckers, reptiles, and mammals such as raccoon, opossum, and coyote. A large nest site, believed to be that of osprey, was observed during the December 6, 2012, biological survey approximately 0.2 mile from the proposed Pipeline Segment A alignment (CH2M HILL 2012). Ospreys using this nest site could forage within the Hylebos and Blair waterways and Commencement Bay.

Amphibians that may occur near the pipeline segments include northern red-legged frog (*Rana aurora*), Pacific tree frog (*Pseudacris regilla*), rough-skinned newt (*Taricha granulosa*), and western toad (*Bufo boreas*). These four species require aquatic habitats and lowland terrestrial habitats to provide shelter and access to moist microclimates or water. These species typically winter in either aquatic or mesic forest habitats, returning to still or slow moving wetlands, ponds, ditches, and streams to breed. They often shelter beneath vegetation or woody debris (Csuti et al. 1997). Northern red-legged frogs, Pacific tree frogs, rough-skinned newts, and western toads are all common and widespread in the Puget Sound region.

Common garter snakes, (*Thamnophis sirtalis*) painted turtles, (*Chrysemys picta*), and western fence lizards (*Sceloporus occidentalis*) are strongly associated with aquatic habitats (Csuti et al. 1997). Both common garter snakes and painted turtles require upland and aquatic habitats and are often found in sunny areas near water that provide basking structures. Common garter snakes prefer grassy habitats and forest openings, and are common in wetlands, ponds, lakes, creeks, and rivers. Painted turtles overwinter in wetlands or other waterbodies with soft bottom sediments, or inside flooded banks with dense emergent vegetation. Painted turtles migrate from their wintering waterbodies to nearby uplands in late spring to early summer to lay eggs. The Hylebos Marsh provides some wintering and basking habitat for these species.

Wetlands and Stream Habitat

Wetlands

There are no wetlands within the Proposed Action area associated with the new pipeline segments, which would be entirely within paved road ROWs. No wetlands occur on the sites proposed for the new limit station and gate station (see Appendix E). Previously disturbed wetlands near to or adjacent to the proposed pipeline segments would provide a mixture of herbaceous, shrub-scrub, and forested wetland habitats. These sites are used as breeding and foraging habitat for songbirds and small mammals and may provide habitat for waterfowl, amphibians, and reptiles.

Streams

A total of four waterbodies cross under the paved roadways where the two new distribution pipeline segments are proposed. These waterbodies are all within existing culverts where they cross under the roadways. These streams are discuss in Section 3.3.3.2 of Section 3 (Water), and Table 3.3-2 lists the four waterbodies along with other pertinent information.

An unnamed drainage ditch crosses under 12th Street East in a culvert. The ditch discharges into Hylebos Creek.

No waterbodies occur on the sites proposed for the new limit station and gate station (see Appendix E).

Special-Status Species and Protected Habitat

The pipeline segments would be proposed entirely within the paved portion of existing road ROWs. Because vegetation was previously removed during the process of roadway paving, habitat to support threatened, endangered, or other protected species does not exist within the PSE natural gas distribution system.

Plants

No endangered, threatened, or special-status plant species are present within the Proposed Action area associated with the new pipeline segments.

Animals

There is no suitable habitat to support listed or other protected animal species within the Proposed Action area associated with the new pipeline segments. However, the following species have potential to occur in suitable habitat adjacent to the pipeline segments:

- **Marbled Murrelet** (see description in Section 3.4.3.1 [Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System Sites). There is potential for marbled murrelet to fly over the Proposed Action area from aquatic habitat to inland critical habitats. There is no suitable habitat for this species within the Proposed Action area, and the nearest marbled murrelet critical habitats are approximately 20 miles away to the east and south.
- **Streaked horned lark** (*Eremophila alpestris strigata*) is federally listed as threatened and state-listed as endangered. Streaked horned larks are associated with bare ground or sparsely vegetated habitats and nest in grass seed fields, pastures, wetland mudflats, and disturbed habitats. However, streaked horned larks have evolved to prefer highly disturbed, early successional habitats and have been increasingly reported utilizing human-made disturbed areas. Streaked horned larks currently breed on six sites in the south Puget Sound, four of which are located on Joint Base Lewis-McChord and make up the 13th Division Prairie, Gray Army Airfield, McChord Field, and 91st Division Prairie (USFWS 2012). There is no nesting or foraging habitat within the paved roadways of the pipeline segments. However, there is potential suitable habitat adjacent to the road ROW. The nearest documented nest site is approximately 2.5 miles from proposed Pipeline Segment B. However, there is the potential for streaked horned like to forage in open areas and disturbed habitat adjacent to the ROW near Segment B. The closest designated critical habitat for streaked horned lark occurs approximately 80 miles west of the facility (USFWS 2015).

- **Taylor's checkerspot butterfly** (*Euphydryas editha taylori*) is both federally and state listed as endangered. Taylor's checkerspot butterflies occupy open habitat dominated by grassland vegetation throughout their range. Currently, 13 individual populations of Taylor's checkerspot butterflies are known to occur range-wide, with 10 located in Washington (USFWS 2012a). There were no PHS records within 5 miles of the Proposed Action site (WDFW 2013). There is no potential for host plants or nectar sources within the paved roadway where the pipeline segments would be located and very low potential in the open areas and disturbed habitat adjacent to the ROW. Therefore, Taylor's checkerspot butterfly is not discussed further in this report.
- **Mardon skipper** (*Polites mardon*) is a candidate for federal listing and is state listed as endangered. Mardon skippers are dependent upon grassland habitats that are dominated by native grass species. There are no PHS records within 5 miles of the Proposed Action site (WDFW 2013).There is no potential for host plants or nectar sources within the paved roadway where the pipeline segments would be located and very low potential in the open areas and disturbed habitat adjacent to the ROW. Therefore, Mardon skippers are not discussed further in this report.
- **Oregon vesper sparrow** (*Pooecetes gramineus affinis*) is a federal species of concern and a state candidate species. Oregon vesper sparrows are associated with grasslands and open habitats such as native prairies, hayfields, pastures, and other agricultural habitat types. There were no PHS records within 1 mile of the Proposed Action site (WDFW 2012). There is no potential for nesting or foraging habitat within the paved roadway where the pipeline segments would be located. However, Oregon vesper sparrows have the potential to occur in the open areas and disturbed habitat adjacent to the ROW.
- **Western gray squirrel** (*Sciurus griseus*) is a federal species of concern and is state listed as threatened. Western gray squirrels are associated with oak woodlands and oak habitat. The closest PHS record of the species is located approximately 2.5 miles from Segment B (WDFW 2013). There is no potentially suitable habitat for the species within the paved roadway where the pipeline segments would be located or in the adjacent habitats. However, oak habitat adjacent to the Frederickson Gate Station (see below) may be suitable for the species.

Priority Habitats and Species Use Areas and Habitat

Wetlands

Two PHS wetland habitat areas would be crossed by Pipeline Segment A (see Table 3.4-1 for the PHS habitat areas within 1 mile of the Proposed Action.) However, the new pipeline segments would be constructed entirely within paved road ROW, so these specific areas do not accurately portray wetlands where they would be crossed by the pipeline segment. Because these areas are already paved, no impacts are expected to priority habitats or species.

Oak Habitat

Pierce County has mapped oak habitat adjacent to the Frederickson Gate Station. This forested habitat parallels the eastern boundary of the gate station parcel. Construction would be limited to the existing developed areas of the parcel, and no trees would be removed.

3.4.4 Impacts of the Proposed Action

This section discusses potential impacts to existing plant and animal resources within the Proposed Action area from construction and operation of the Project.

3.4.4.1 Construction Impacts

Upland Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Site preparation for the land-based Project facilities would require grading activities within the construction footprint on both sites. Again, the vast majority of the ground surface on both sites is either paved or covered with gravel. The minimal existing vegetation or organic materials would be stripped; however, existing trees would be retained if possible. Existing concrete or asphalt within the footprint of the proposed improvements would be removed to expose the native ground surface, crushed for nonstructural fill, or disposed of in a permitted solid waste landfill. Existing concrete or asphalt outside the proposed footprint would remain in place.

Plants

Impacts to plants would be avoided or minimized because construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would take place on industrial sites that were previously paved or graveled. Scattered areas of landscaping and weedy areas provide little habitat value owing to a lack of diversity of vegetation species, predominance of invasive species (such as Himalayan blackberry and Scotch broom), isolation of the area from larger tracts of habitat, and proximity to busy roads and parking area. Riparian vegetation is virtually nonexistent. Clearing these areas would have negligible impact on overall upland wildlife habitat in the vicinity. Although few trees are present, a worst-case assumption is that one or two trees would be removed during construction to accommodate the facilities.

Animals

Impacts to terrestrial wildlife would be mostly avoided or minimized because construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would take place on paved industrial sites where no habitat of value has been identified. As indicated above, if trees are to be removed, and if removal would occur during the nesting season, a preconstruction nest survey would be conducted to identify any active nests for avoidance. No impacts would occur to migratory birds. Increased noise from pile driving would be the primary impact, which could cause some species to temporarily avoid the area. Construction of the new bulkhead along the Hylebos Waterway could result in some mortality of reptiles and amphibians. Collision mortality of birds is unlikely to occur because they are mobile species that can easily move out of the way of construction equipment.

Noise from construction of the facilities may reach up to 110 A-weighted decibels (dBA) during pile driving, which is predicted to attenuate to ambient levels within approximately 1,991 feet (see Table 3.4-2). While a regulatory disturbance threshold for herons has not been established, WDFW-recommended buffers for nesting colonies of this species have been used to assess potential impacts. WDFW recommends a seasonal (February to September) buffer around nesting colonies of 1,320 feet from extremely loud noises (e.g., blasting) and a year-round buffer around nesting colonies in urban areas of 197 feet (Azzerad 2012). Due to the location of the rookery approximately 0.8 mile from the Project site, both buffers are located well beyond the 1,991-foot noise impact area during construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. In addition, herons nesting in the vicinity of Port of Tacoma operations have likely become habituated to increased noise levels.

Special-Status Species

Terrestrial construction activities such as excavation, trenching, and pipeline installation would temporarily increase noise disturbance levels in the upland portions of the action area. Additionally, in-air noise would also be temporarily influenced by pile driving. As indicated in Table 3.4-2, terrestrial construction noise levels are anticipated to range from 83 dBA for construction equipment associated with the pipeline installation, and 89 dBA for other construction equipment associated with the construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System.

To address noise impacts associated with in-air noise, the methodology outlined in the Washington State Department of Transportation (WSDOT) *Advanced Biological Assessment Preparation Manual* was used (WSDOT 2014).

In-air noise effects from construction are presented in Table 3.4-2. In summary, maximum in-air noise levels from construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are predicted to result in no effects to marbled murrelets at >0.25 mile. Murrelets may still be affected between 0.02 and 0.25 miles, but the effects are unlikely to be adverse. There is a risk of harassment or harm to the species at distances of 120 yards or less.

Masking of marbled murrelet communication would be limited to the area within 138 feet (42 meters) of the pile-driving activities. Because of a lack of suitable nesting habitat, no marbled murrelets would be expected to be nesting within this distance. Therefore, no impacts would be expected to nesting murrelets as a result of construction of the Tacoma NG Facility and the TOTE Marine Vessel LNG Fueling System. In-water noise impacts to the species are discussed in "Estuarine Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System," below.

Table 3.4-2 Predicted Distance of In-Air Noise Effects to Marbled Murrelets in the Project Area from Construction

Sound Source	No Effects	No Adverse Effects	Harassment	Harm (Direct Injury or Mortality)
Pile driving	>0.25 mile	121 yards to 0.25 mile	≤120 yards	≤5 yards
Other construction equipment (Tacoma LNG Facility and TOTE)	>0.25 mile	111 yards to 0.25 mile	≤110 yards	N/A
Other construction equipment (in-road pipeline segments)	>0.25 mile	111 yards to 0.25 mile	≤110 yards	N/A

Source: USFWS, 2013b.

dBA = decibels on an A-weighted scale

N/A = not applicable

Upland Habitat: Puget Sound Energy Natural Gas Distribution System

Plants

Impacts to plants would be avoided because construction of the proposed pipeline segments would be entirely within the paved portion of existing road ROWs and would not contribute to increased urbanization or loss of plant habitat. Likewise, the site proposed for the limit station is currently developed in its entirety, with one building and a paved parking lot. There are no wetlands, waterbodies, or undisturbed upland habitat at the site. Construction activities, including staging and storage, would occur within the parcel boundaries at the limit station site. Modifications of the existing gate station would occur entirely on a previously developed and graveled area at the existing Frederickson Gate Station.

Animals

New impacts to wildlife habitat would be avoided because construction of the proposed pipeline segments, including temporary workspaces, would occur entirely within the paved portion of existing road ROWs. The site proposed for the limit station is developed in its entirety, with one building and a paved parking lot. There are no wetlands, waterbodies, or undisturbed upland habitat at the site. Construction activities, including staging and storage, would occur within the parcel boundaries at the limit station site. Modifications of the existing gate station would occur entirely within the previously developed area of the

existing Frederickson Gate Station. Noise associated with construction of the new gate station and upgrading the gate station would be temporary and similar to noise generated from construction of the existing residential, commercial and industrial development surrounding the limit and gate station sites. Therefore, no wildlife would be significantly impacted by construction noise from the limit and gate stations.

Based on the location of the heron rookery along Marine View Drive and distance from the Proposed Action site, herons continuing to nest in the rookery would not be disturbed by construction activities related to the PSE Natural Gas Distribution System. The rookery would not be located within direct line of sight from the pipeline segments, and potential noise impacts would be negligible because the colony would be approximately 0.8 mile from the Tacoma LNG Facility site and noise from construction of the pipeline segments would attenuate to background levels within 998 feet (see Table 3.4-2, above). However, herons do use the Hylebos and Blair waterways for foraging and roosting and could potentially be disturbed during construction activities associated with the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, as well as Pipeline Segment A. Refer to "Upland Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System," above, for a discussion of those impacts.

Bald eagles and other raptors that may use features such as pilings, tall trees, or utility towers near the Project facilities would not be disturbed by the Proposed Action. There are no established noise disturbance thresholds or management buffers for bald eagles; however, like great blue herons, eagles using the Proposed Action area have likely become habituated to high levels of ambient noise associated with Port of Tacoma operations.

No noise impacts would occur to the marbled murrelet as a result of construction of the natural gas distribution system because this species is not known to nest in or near the Proposed Action area.

Wetlands and Stream Habitat: Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and Puget Sound Energy Natural Gas Distribution System

No wetlands are present within the Proposed Action site; therefore, no construction impacts to wetlands would occur. Indirect impacts to wetlands adjacent or in the vicinity of the Proposed Action area are discussed in Section 3.3 (Water).

All four waterbodies that would be crossed by the new pipeline segments are streams located within culverts and would be crossed perpendicularly by the proposed pipeline segments, as discussed in Section 3.3.4.1 of Section 3.3. The pipeline would be installed under existing culverts by using a horizontal bore or directional drill without disturbing the culverts. Pipeline crossings under the existing culverts would maintain at least 36 inches vertical separation from the bottom of the culverts to prevent damage during the installation. No other waterbodies would be crossed during construction of the pipeline segments.

Estuarine Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Proposed Action would remove existing pier structures and replace new pier structures in aquatic/marine habitats. Existing creosote-treated wood pilings would be removed in their entirety via vibratory hammer. A creosote-treated wood bulkhead along the Hylebos Waterway shoreline would be removed and replaced with a new light, loose, riprap surface at a 2:1 slope. The new bulkhead would be constructed above elevation 11.8 feet MLLW and approximately 9 feet shoreward of the existing bulkhead and would result in the restoration of approximately 5,440 square feet of intertidal habitat. The existing bulkhead and supported fill material would be removed and replaced with light, loose riprap varying in size from 3 inches to ½ cubic yard, constructed at a 2:1 slope similar to the existing shoreline slope below elevation 11.8 feet MLLW and the existing timber bulkhead. New in-water structures would be constructed in the Hylebos and Blair waterways, including trestles and piers. In each waterway, these structures would be constructed on new steel pilings. The new pilings would be installed via vibratory hammer and proofed with an impact hammer. No dredging would be required. Machinery also has the potential for accidental spills of fuels, oil, or other potentially hazardous chemicals.

Habitat Alteration (Loss/Gain)

The in-water work proposed in both the Hylebos and Blair waterways would result in 532 fewer creosote-treated piles, a 4,095-square-foot reduction in creosote-treated material (including both pile and over-water structures) and an increase of 5,440 square feet of intertidal habitat. The majority of the in-water work associated with both removal of existing structures and construction of new structures is proposed for deep subtidal habitat (deeper than -14 feet MLLW) in both the Hylebos and Blair waterways. In addition, the new in-water structures in the Hylebos Waterway would be constructed within the footprint of the existing pier.

The new pilings in the Hylebos and Blair waterways would become encrusted with barnacles, jingles, mussels, and other encrusting filter feeders. Pilings' surfaces in the intertidal zone would support barnacle/mussel clusters, which can be 8 inches thick and form a substrate supporting a rich community of organisms, including amphipods, various worms, and crustaceans, and ultimately support larger shrimp, crabs, and fish living among the piles. The change in habitat is a small gain of soft substrate habitat from the difference between the footprint of the existing pilings and the footprint of the new pilings (gain of 307 square feet of seafloor), resulting in an increase in habitat.

To minimize potential impact during construction of these shoreline improvements, the existing bulkhead would remain in place while the work behind it is completed. The existing bulkhead would provide a measure of erosion and sediment control during construction of the new cleaner bulkhead and regrading of the resulting shoreline. Shoreline work, including demolition of the existing bulkhead, would occur in the dry season. The sloped shoreline would an improvement over the existing vertical bulkhead, as juvenile salmon are believed to be more vulnerable to predation along vertical bulkheads than sloped shorelines.

Turbidity and Sedimentation

Temporary turbidity would be caused by suspended sediments during pile removal and pile-driving activities, as well as the regrading of 600 feet of shoreline in the Hylebos waterway. Turbidity impacts would be relatively minor and would last only hours or a few days, because tidal exchange quickly disperses turbid water.

The potential resulting effects on salmonids and other fish include behavioral responses (e.g., disruptions to feeding or migration). Increased suspended sediment loads associated with pile removal/driving would be minimal and expected to be well below levels associated with direct mortality and sublethal effects (e.g., stress, gill damage, and increased susceptibility to disease) on salmonids and other fish.

The veneer of silt deposition in adjacent areas near these types of activity is typically very thin, perhaps 1/4 inch or less. Studies in Puget Sound have shown that benthic invertebrates and fish are unaffected by rapid sediment deposition of less than a few centimeters (Hirsch et al. 1978). Benthic invertebrates have planktonic larvae, which are part of the food web on which juvenile salmonids depend, especially when first entering marine waters. Most benthic animals can burrow out of such shallow sediment deposits (Maurer et al. 1978).

Sediment cleanup actions have been completed in portions of Hylebos Waterway under United States Environmental Protection Agency oversight. During the previous cleanup actions, sediment in the immediate vicinity of the existing pier adjacent to the Tacoma LNG Facility site was designated for monitored natural recovery.

Construction best management practices (BMPs) would be implemented to reduce the potential risk of increased turbidities and sedimentation impacts to habitat that supports local salmonid populations. One of these BMPs would be restriction of the construction period to the times when juvenile salmonids are absent, or present in very low numbers, in the waterways. Similarly, reduction of excessive turbidity through silt curtains or other mechanical measures would allow for adherence to established water quality standards by limiting the impact of turbidity to an established mixing zone. For instance, under a 401 Water Quality Certification and/or WAC 173-201A, required directives provide for managing off-site migration of

particulates and reducing impacts associated with turbidity and sedimentation to levels that are not significant.

Pile-driving Noise

The Project would include installation of 142 hollow steel pilings (maximum), 56 of which would be in the Blair Waterway and 86 of which would be in the Hylebos Waterway, ranging from 14 to 30 inches in diameter. Pile driving has the potential to impact both aquatic and upland species in the vicinity through the generation of in-water (underwater sound pressure waves) and in-air noise. Sound moves 4.5 times faster in water than it does in air, making it a very effective sensory mechanism for species that spend a large part, if not all of their lives, underwater.

The noise impact analysis for the Project employs the methodology described in the WSDOT *Advanced Biological Assessment Preparation Manual* (WSDOT 2014). That methodology uses the practical spreading model to calculate sound attenuation in water as a function of distance. The complete analysis, including step-by-step methodology and assumptions, is included under separate cover in the *Applicant-prepared Biological Evaluation for the Puget Sound Energy Tacoma LNG Project* (CH2M HILL 2014b). Three metrics are commonly used in evaluating hydroacoustic impacts on fish and marine mammals (ICF Jones and Stokes 2009; Illingworth and Rodkin 2007):

- Peak sound pressure level – The absolute value of the maximum variation from neutral
- Root mean square – The square root of the sum of the squares of the pressure contained within a defined period of time
- Sound exposure level – The constant sound level over 1 second.

The noise impact thresholds shown in Table 3.4-3 were developed by NMFS and USFWS using the best available science and based on consultations with the foremost experts (e.g., Hastings and Popper 2005; Popper et al. 2006). However, the scientific understanding of the potential effects of impulsive noise on aquatic animals is incomplete and still developing. The effect thresholds presented in Tables 3.4-2 and 3.4-3 are conservative estimates.

Figures 3.4-1 through 3.4-3 show the spatial extent of underwater (and in-air noise for marbled murrelets only) noise effects relative to the thresholds indicated in Table 3.4-3. These figures illustrate how underwater noise attenuates with distance. Underwater noise is also cut off by landforms, meaning that noise would be fully contained within Hylebos and Blair waterways.

It is assumed that wildlife using Hylebos and Blair waterways have become habituated to the heavy industrial use and existing shipping traffic. During a WSDOT study conducted near the Mukilteo Ferry Terminal, none of the diving birds that were observed before, during, and after pile-driving tests exhibited signs of distress or abnormal behavior (Laughlin 2007). However, it is important to note that the study did not include observations from a control site from which to compare behaviors. Some fish mortality may occur in the immediate vicinity of pile driving with impact hammers. However, this would likely be limited to the more susceptible species such as pile perch (*Rhacochilus vacca*) or shiner perch (*Cymatogaster aggregata*), which have swim bladders isolated from their throats. The Project would minimize in-water noise by maximizing the use of a vibratory hammer and through implementation of other noise mitigation measures described in Section 3.4.6 (Avoidance, Minimization, and Mitigation).

Table 3.4-3 Underwater Noise Effect Thresholds and Initial Sound Pressure Levels Associated with Impact Pile Driving (Proofing) in the Action Area

Assumes worst-case conditions (30-inch steel pilings with no noise reduction measures in place)

Taxon	Effect Category	Effect Threshold (dB)	Initial SPL (dB) (30-inch steel) (No BMPs)
Fish	Injury < 2 grams	183 SEL	186 SEL
	Injury > 2 grams	187 SEL	186 SEL
	Injury (peak)	206 peak	212 peak
	Behavioral disturbance	150 rms	195 rms
Marbled Murrelets[a]	Injury – Barotrauma	208 SEL	186 SEL
	Injury – Auditory	202 SEL	186 SEL
	Behavioral disturbance	150 rms	186 rms
	Effective quiet	150 rms	186 rms
Pinnipeds (e.g., whales)	Injury	180 rms	195 rms
	Behavioral disturbance (Impulsive)	160 rms	195 rms
	Behavioral disturbance (vibratory)	120 rms	152 rms[b]

Sources: WSDOT 2014, Laughlin 2011

Notes:

[a] In-air noise threshold for marbled murrelet, only

[b] timber piling extraction

Key:
BMP = best management practice
dB = decibel
rms = root mean square
SEL = sound exposure level
SPL = sound pressure level

Table 3.4-4 provides the calculated distances to which pile-driving noise levels attenuate down to the thresholds of disturbance or injury to protected species for a scenario with 30-inch hollow steel piles.

Table 3.4-4 Calculated Distances to Which Pile-Driving Noise Levels Attenuate Down to the Thresholds of Injury or Harm to Protected Species with 10-Decibel Noise Reduction

Species/Thresholds	Effect Threshold (db)	Distance to Threshold (meter)
Fish		
Injury (< 2 grams)	183 SEL	541
Injury (> 2 grams)	187 SEL	377
Injury (peak)	206 peak	5
Behavioral Disturbance	150 rms	2,154
Diving Marbled Murrelets		
Injury (auditory)	208 SEL	38
Injury (barotrauma)	202 SEL	15
Behavioral Disturbance	150 rms	2,154
Effective quiet	150 rms	541
Marine Mammals		
Injury	180 rms[a]	22

Table 3.4-4 Calculated Distances to Which Pile-Driving Noise Levels Attenuate Down to the Thresholds of Injury or Harm to Protected Species with 10-Decibel Noise Reduction

Species/Thresholds	Effect Threshold (db)	Distance to Threshold (meter)
Behavioral Disturbance (impulsive)	160 rms	464
Behavioral Disturbance (vibratory)	120 rms	N/A

Notes: Noise attenuation measures would not be employed during timber piling removal operations (vibratory extraction).
[a] 190 rms for pinnipeds
Key:
dB = decibels;
N/A = Not applicable
rms = root mean square
SEL = sound exposure level

Special-Status Species

Salmonids (Chinook salmon). Salmonids are assumed to be less susceptible to harm from impact pile driving when compared to other fish species because their swim bladders are openly connected to their throats. Salmonids would also be protected because of the timing of in-water construction, which would be scheduled to occur during the WDFW in-water work window for Commencement Bay (July 16 to February 14). Most juvenile salmonids would be absent from the site as a result of their seasonal migratory patterns. Adult salmonids do not appear to be adversely affected by pile driving. It should be noted that that the threshold for injury of salmonids is represented by knowledge of damage to the inner ear of other fish species and does not necessarily represent direct mortality of salmonids.

Only a few Chinook smolts are likely to be in the Proposed Action area after July 16. Those that are still present would be actively migrating through the action area. The rate of swimming speed of outmigrating salmon smolts is proportional to fish size and food availability. Food availability is assumed to be relatively low in the Hylebos and Blair waterways as a result of industrial development; thus, the fish would not spend much time in the vicinity of the project. As a result, Chinook salmon would not be significantly impacted by pile driving.

Steelhead trout. While tracking studies in marine waters are lacking, it is generally accepted that steelhead migrate out from river mouths quickly, without a nearshore residence period. Also, steelhead are typically larger than 2 grams when they outmigrate, making them less susceptible to pile-driving injury compared with smaller fish. In addition, steelhead outmigrate primarily in April, before the work window begins. As a result, steelhead would not be significantly impacted by pile driving.

Bull trout. Bull trout are generally protected from in-water work because of work windows. Adult amphidromous bull trout are known to leave marine waters prior to July 16 every year to stage for spawning upriver, but are very rare and can be expected to reside in marine waters where prey is abundant. The timing of the bull trout in-water work window reflects this. Subadult bull trout migrate back into freshwater in fall in preparation to over-winter in lower mainstem rivers. After mid-July, their primary prey, juvenile salmon, are out of the action area. Likewise, subadult bull trout can be expected to be elsewhere. The likelihood of their presence in the injury zone from pile driving during bulkhead installation is remote. As a result, bull trout would not be significantly impacted by pile driving.

Canary rockfish, Bocaccio, and Yelloweye rockfish. These fish are deepwater species, and adults require habitats and depths outside of the potential zone of pile-driving impacts associated with the Project and outside of Commencement Bay. Larval rockfish and bocaccio are planktonic and distributed widely. However, they are surface oriented during this stage of their lives. The nature of estuarine circulation is outwards away from river mouths on the surface. Commencement Bay has a powerful degree of estuarine

circulation effect. This means that larval fish would be carried away from areas such the Commencement Bay waterways. They can be expected to settle out as juveniles elsewhere in Puget Sound.

Juvenile bocaccio may reside in shallow water for a brief period (two weeks) before moving into deep water (Love et al. 2002). However, habitat in the Hylebos and Blair waterways is extremely marginal at best for juvenile bocaccio, and again, estuarine circulation would preclude their settlement in the upper reaches of Commencement Bay, including the two waterways. Thus, it is highly unlikely that bocaccio would be present in the zone of pile-driving impacts at any time.

Juvenile canary rockfish reside for several months in shallow water (Love et al. 2002). By the end of summer, they move into deeper water. The pile-driving zone of impact associated with the Project contains a small amount of extremely marginal juvenile habitat (kelp beds). As with the other rockfish species, estuarine circulation would preclude settlement in the upper reaches of Commencement Bay. Thus, it is highly unlikely that canary rockfish would be present in the zone of pile-driving impacts at any time.

As a result, canary rockfish, bocaccio, and yelloweye rockfish would not be significantly impacted by pile driving.

Marbled murrelet. In-water noise from construction equipment associated with installation of the steel piles would, with the use of 10 decibels (dB) of noise reduction (mitigation), reach the level of auditory injury (208 dB sound exposure level) for diving murrelets at approximately 38 meters (125 feet) from the source, whereas permanent injury from barotrauma could occur within 15 meters (49 feet) of pile-driving activities. Murrelets have never been reported in the waterways where pile driving would occur, and they are very unlikely to occur within the disturbance distances where noise impacts would occur. Based on a lack of past observations of the species, and the existing levels of disturbance from industrial ship traffic near the Proposed Action area, it is assumed that the species will not occur during in-water construction activities. Therefore, no impacts would occur from Project-related pile-driving activities.

Maine Mammals. Marine mammals would be injured within 22 meters (72 feet) of pile-driving activities with use of 10 dB of noise reduction (CH2M HILL 2014b). Behavioral disturbance would occur to marine mammals within 464 meters (1,522 feet) of impact pile driving. However, given the uncommon or rare occurrence of marine mammals occurring within either the Blair Waterway or Hylebos Waterway, no impacts would occur from Project-related pile-driving activities.

Essential Fish Habitat.

The Proposed Action has the potential to affect EFH for Pacific salmon, groundfish, and coastal pelagic species (CH2M HILL 2014b). The potential effects on managed fish species habitat (salmonids and rockfish) are applicable to all three of the fisheries. These effects include impaired water quality conditions during in-water and shoreline work, temporarily elevated noise levels within the Proposed Action area during pile removal and installation, and the direct disturbance and temporary loss/reduction of the benthic community assemblage. There is also potential for leaks and spills of fuel, hydraulic fluids, lubricants, and other chemicals from equipment and storage containers associated with the Project. Discharge of vehicle and equipment wash water and other substances could also add pollutants to the soil that would then be delivered to both waterways.

The Proposed Action would result in a net gain of approximately 307 square feet of benthic habitat after removal of the old piles and installation of the new ones. The change in habitat is a small gain of soft substrate habitat from the difference between the footprint of the existing pilings and the footprint of the new pilings. This gain will increase the area available for benthic communities (both fauna and flora).

Dredging/Filling

The in-water structures on both the Hylebos and Blair waterways are designed to avoid the need for dredging.

As described above, the Project would improve the Hylebos shoreline, requiring some fill. As previously described, the existing Hylebos shoreline is constructed of gravel and soil fill material supported by a creosote-treated timber bulkhead. A new steel bulkhead would be installed approximately 9 feet shoreward of the existing bulkhead. The existing bulkhead and supported fill material would be removed and replaced with light, loose riprap varying in size and constructed at a 2:1 slope below elevation 11.8 feet MLLW. The work would require approximately 1,900 cubic yards of excavation and 690 cubic yards of fill but would result in an increase of 5,440 square feet of intertidal habitat in place of the existing creosote-treated timber bulkhead.

The Proposed Action would remove approximately 532 existing creosote-treated piles using a vibratory hammer. Holes remaining following removal would be filled with clean sand or other habitat mix approved by the WDFW. It is conservatively estimated that 25 percent of the piles to be removed in the Hylebos Waterway (127 piles) and Blair Waterway (six piles) would have some portion of a hole remaining following extraction. The total quantity of clean sand or other habitat mix needed to fill pile holes for the Project in both the Hylebos and Blair waterways is estimated to be no more than 360 cubic yards, including up to 340 cubic yards in the Hylebos Waterway and 20 cubic yards in the Blair Waterway.

Because of the low levels of expected turbidity and the timing, the Proposed Action represents a negligible risk to salmonids (construction timing would occur in mid-July through mid-February when juvenile salmon are not abundant). Filling would also cause a short-term change in the characteristics of the benthic and epibenthic communities; however, these communities are expected to recover rapidly after filling, based on the results of studies in other areas (McCauley et al. 1977; Swartz et al. 1980; Albright and Borithilette 1981; Parametrix 1985, 1996; Hiss et al. 1990; Jones & Stokes Associates 1990a, 1990b; Romberg et al. 1995; Wilson and Romberg 1996; Pacific International Engineering and Parametrix 1998; Pacific International Engineering 2000).

Special-Status Species and Habitat: Puget Sound Energy Natural Gas Distribution System

Impacts on special-status species and habitat as a result of the construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are discussed in the previous sub-section; this section focuses on the PSE Natural Gas Distribution System.

Potential construction impacts from the Proposed Action on bald eagle and peregrine falcon include indirect impacts from increased noise levels. Direct impacts are not expected because suitable nesting and foraging habitat does not exist within the Proposed Action area. Although nuisance noise resulting from industrial activities already exists at the Port of Tacoma, demolition of the existing buildings would result in increased noise levels. Demolition and other construction activities would involve temporary bursts of sound that would be likely to startle bald eagles and peregrine falcons that may be foraging near the Proposed Action area and cause them to leave the immediate area. However, these startle impacts would be temporary, and both species would be expected to use the site again following the completion of construction activities. Therefore, construction activities within the Proposed Action area are not expected to adversely impact threatened, endangered, or other protected species that may be present in upland habitats.

Direct impacts to streaked horned lark and Oregon vesper sparrow would be avoided because construction of the new distribution pipeline segments would occur within existing paved road ROWs and thus would not contribute to loss of nesting or foraging habitat. Although there is potential for streaked horned larks to forage in the disturbed roadside adjacent to Segment B and for Oregon vesper sparrows to forage in the disturbed roadsides adjacent to both new pipeline segments, construction noise is expected to be negligible because highway and road noise is already present.

3.4.4.2 Operations Impacts

Upland Habitat: Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and Puget Sound Energy Natural Gas Distribution System

No operational impacts to plants are expected to result from the Proposed Action because the Proposed Action area would be contained within existing developed areas and previously disturbed ROWs. No operational impacts to terrestrial wildlife would occur from the Proposed Action because it would be contained within existing developed areas and previously disturbed ROWs. Given the elevated noise levels associated with existing operations within the Port of Tacoma, noise from Project operation would not be expected to exceed levels to which wildlife species are currently habituated in the vicinity of the Port of Tacoma.

Wetlands and Stream Habitat: Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System

No wetlands are present within the Proposed Action area; therefore, there would be no operational impacts to wetlands. No operational impacts to streams are expected from the Proposed Action because the Proposed Action area would be contained within existing developed areas and previously disturbed ROWs. The pipeline segments would operate at least 36 inches below the four culverted streams, which also run under the paved ROW.

Estuarine Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Overwater Shading

The Project would result in some shading impacts over the Hylebos and Blair waterways. These impacts would involve the loss or reduction of primary productivity within the footprint of new overhead structures. The components of the proposed in-water structures on both the Hylebos and Blair waterways, which would be directly supporting equipment used for conveyance of LNG, are required to be constructed of concrete panels. Concrete panels are required to meet the requirements of 49 CFR 193, *Liquefied Natural Gas Facilities* and National Fire Protection Association Standard 59A, *Standard for the Production, Storage, and Handling of Liquefied Natural Gas* (NFPA 2013). However, the new Hylebos Waterway pier would have a slightly smaller but similar footprint to the existing structure. That structure is relatively narrow and currently allows some light under the decking. The new structure would do the same.

The new trestle and platform in the Blair Waterway would shade approximately 5,500 square feet of sea floor, including the dolphins. It is assumed for this analysis that all shaded areas currently supporting macroalgae would result in the loss of those resources within that footprint. The primary habitat for ESA-protected rockfish species in the action area is macroalgae-covered riprap. A 33-foot-wide strip of this riprap would be eliminated as a result of the new trestle in Blair Waterway.

Steel grating is proposed for in-water structures where concrete is not required. This grating is proposed for the various catwalks on the Hylebos Waterway proposed between the pier and dolphins. Steel grating would also be used for the catwalk proposed on the Blair Waterway. This would allow some light to penetrate the structures in these areas and thus minimize primary productivity loss or, in the case of the Hylebos facility, improve existing conditions. It is assumed that the steel grating to be used would allow at least 40 percent light transmission through the various catwalks.

Productivity

The use of the water surrounding the proposed Project facilities by fish would be similar to that at the existing pier structures at the site. The new pier would have approximately one third the surface area of the existing pier and approximately the same length. There would be far fewer pilings (88 versus 508), but they would be of higher quality for encrusting organisms to attach to (concrete and steel versus creosote-treated wood). The new trestle and platform in the Blair Waterway would shade approximately 5,500 square feet of sea floor, including the dolphins. It is assumed that all shaded areas currently supporting macroalgae, which

provides primary habitat for ESA-protected rockfish species in the action area, would result in the loss of those resources within that footprint. However, productivity would benefit from replacement of 24 creosote pilings with 36 steel pilings for construction of the trestle and platform. Colonization is rapid on this type of surface. Habitat for fish that have an affinity for pilings, such as pile perch, striped perch *(Perca flavescens)*, and lingcod *(Ophiodon elongates)*, would remain at the site.

Pier/Platform Structure Effects on Juvenile Salmon

Research indicates that fish distribution, habitat and assemblage structure varied with proximity to the shade cast by piers compared to more natural areas not modified by piers and bulkheads." Species assemblages at modified sites were significantly different from those at reference beaches. At modified sites, fish distribution and assemblage structure varied with proximity to the shade cast by piers; overall fish abundances were reduced under piers, and the greatest abundances were observed at high tides in areas directly adjacent to piers." (Stuart H. Munscha, et. Al. "Effects of Seawalls and Piers on Fish Assemblages and Juvenile Salmon Feeding Behavior," North American Journal of Fisheries Management, Volume 34, Issue 4, 2014.

However, It is unlikely that the proposed Hylebos Waterway pier and the platform in Blair Waterway would significantly impede juvenile salmon migrating along the shorelines of Hylebos or Blair waterways. This determination is based on three studies that focused on the threshold of light penetration under piers as it relates to salmon nearshore passage. The study at the Manchester fuel pier (Dames & Moore and Biosonics 1994) showed that approximately 50 percent of the migrating chum salmon would pass under the 70-foot-wide Manchester fuel pier. A study at the Edmonds Ferry Terminal by Toft et al. (2007) showed that juvenile Chinook would pass under a 92-foot-wide pier at low tide, but not at high tide. The study by Pentec (1997) specifically focused on underpier salmon passage at the Port of Everett. In that study, most of the pink, chum, and Chinook juveniles moving along the shoreline passed under and not around a 120-foot-wide finger pier at the Port of Everett.

The proposed trestles connecting the Hylebos Waterway pier and the Blair Waterway platform would be 33 feet wide. It is likely that shoreline-oriented juvenile Chinook salmon would pass under, rather than around, these relatively narrow marine structures. As such, adverse impacts associated with shading are unlikely and discountable.

Increased Vessel Traffic

Proposed bunkering barge and associated tugboat traffic around the peninsula is expected to be infrequent (twice per week) and at speeds of 5 miles per hour in the Hylebos and Blair waterways, as required by the City of Tacoma (Tacoma Municipal Code, Section 4.10.130). Additionally, ship traffic is already present in the Hylebos Waterway and the mouth of Commencement Bay. Therefore, operational impacts to marine fish and wildlife are expected to be negligible.

Potential for Water Quality Impacts from Vessel Traffic

The only vessels that would operate as part of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be tugs and LNG bunkering barges. Neither of these vessel types have much risk of fuel spills and neither have ballast discharges. Tugs would be fueled at existing fueling stations and be subject to spill prevention plans at those facilities. As noted above, vessel speed would be limited to a nominal speed of 5 miles per hour, which would greatly reduce the potential for collisions and thus spills.

Artificial Lighting

The Proposed Action would increase lighting on the Tacoma LNG Facility shoreline. High-intensity lighting that is directed at the water surface has the potential to alter the migratory behavior of juvenile salmonids (Prinslow et al. 1979) or their prey organisms, possibly affecting growth or survival during a critical life history stage. However, such effects have only been detected at light intensities that exceed those typical for container most port facilities, including this one. Furthermore, the surrounding shoreline of the Blair-

Hylebos peninsula already supports extensive artificial lighting for the existing port activities and development of Proposed Action is unlikely to make an appreciable difference in the existing lighting regime.

Special-Status Species and Habitat: Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System and PSE Natural Gas Distribution System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in an existing industrial setting at the Port. Operations at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would not alter the character of the setting. Therefore, upland operational impacts to threatened, endangered, or other protected species would not change from current conditions.

Marine Mammals

Most vessel strikes on marine mammals occur between 13 and 18 knots (Laist et al. 2001; Jensen and Stilber 2003; NOAA 2004). The LNG barges and tugboats would be traveling at speeds under the threshold where strikes are known to occur. Additionally, ship traffic is already present in the Hylebos and Blair waterways and mouth of Commencement Bay, and the addition of two additional round trips per week would be an insignificant increase in overall use. Therefore, operational impacts to marine mammals are expected to be negligible.

Birds

- **Marbled murrelet and purple martin**. The slight increase in ship traffic caused by LNG barges and tugboats would result in a slightly increased potential for disturbance. However, ship traffic is already present in the Hylebos and Blair waterways and the mouth of Commencement Bay, and murrelets/ purple martins are mobile species that can move out of the way of vessels. The Proposed Action would not be expected to alter prey or the aquatic habitat. Therefore, operational impacts to marbled murrelets are expected to be negligible.
- **Other migratory birds.** The Proposed Action would not be expected to result in a take or killing of migratory bird species within the meaning of the MBTA during operation.

Fish

- **Chinook salmon, steelhead trout, and bull trout**. The Proposed Action is not expected to result in long-term adverse impacts to these species. Habitat alteration at the Tacoma LNG Facility and TOTE sites would result in improved conditions. The creosote-treated pilings would be removed, resulting in a decrease in pollutant loading.
- **Canary rockfish, bocaccio, and yelloweye rockfish**. Canary rockfish and bocaccio can live in shallow water for a brief period just after settlement out of the upper water column (at about one year old). Shallow water habitats would be improved with the removal of the creosote-treated pilings. As a result, habitat conditions for these species would be improved. Yelloweye rockfish would not be affected by the Proposed Action; they are a deepwater species with no life stages other than planktonic larvae living in water less than 80 feet.

The new distribution pipeline segments would be buried in the roadways, and any required maintenance would occur in the paved ROWs. Therefore, no operational impacts to threatened, endangered, or other protected species, or their designated critical habitat, are expected.

3.4.4.3 Decommissioning Impacts

Impacts from decommissioning the Project would likely be minor compared to impacts from Project construction. It is assumed that all in-water structures would remain in place, but facilities on the upland portion of the Proposed Action area would be removed. Therefore, noise levels from decommissioning would be significantly lower than noise levels during construction, as there would be no pile driving. No fill would likely be required during decommissioning.

3.4.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and there would be no impacts to plants and animals related to the Proposed Action.

3.4.6 Avoidance, Minimization, and Mitigation

Siting the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System in a developed port-industrial site and constructing the new distribution pipeline segments within existing roads rights-of waysand the gate and limit stations within previously disturbed areas would avoid new impacts to plants, wildlife, and their habitat. This section includes measures, which would alleviate other potential impacts during construction (Section 3.4.6.1) and operation (Section 3.4.6.2) of the Proposed Action. In addition to the specific measures described below, the marine mammals, fish, and associated in-water habitat would directly benefit from the water quality avoidance, minimization, and mitigation measures described in Section 3.3.6 of Section 3.3 (Water), specifically, the measures related to general best management practices, spill prevention, turbidity minimization, demolition of in-water structures and creosote-treated timber piling removal and shoreline improvement. The water quality–related measures included in Section 3.3.6 are not repeated again here.

3.4.6.1 Construction

Direct impacts to upland plants and animals at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be avoided because construction would take place on a developed industrial site. Impacts to herons and bald eagles would be avoided because no nesting habitat would be impacted and because no nest sites are in proximity to points of noise generation. As noted above, any herons and eagles using the area are likely to be habituated to the elevated noise levels associated with Port of Tacoma operations. Construction of the new distribution pipeline segments, including temporary workspaces, would take place within existing road right-of-ways, thereby avoiding new impacts to wildlife habitat. Impacts to stream habitat along the new pipeline segments would be avoided by using trenchless technology to install the pipeline under existing culverts. Construction of the limit station and Frederickson Gate Station would occur within previously disturbed sites with no habitat for special-status species. Therefore, no impacts are expected to biological resources.

Removal of 532 creosote-treated timber piles in the Blair and Hylebos waterways, to be replaced with up to 142 steel piles, is expected to improve water quality as a result of removing creosote from the aquatic environment.

Pile-driving and Noise Abatement

The installation of new steel piles in both the Hylebos and Blair waterways would generate noise, particularly in-water (underwater). In-water and in-air noise from impact pile driving would be minimized using the following measures:

- To limit the amount of impact pile driving, pilings would be installed initially with a vibratory hammer to 90 percent-plus of their design depth (within 10 feet of design tip elevation). Impact hammering would then be employed until load-bearing or pile-tip elevation specifications have been met. When impact hammering is initiated, hammer force would start low, with light tapping, then increase to full force gradually.
- One or more other noise attenuation methods (e.g., wood blocks, nylon blocks) would be used during impact installation or proofing of all steel pilings. The sound attenuation device would include the placement of a sound block between the hammer and the pilings during pile driving.
- Intertidal pilings would be installed during dry or shallow water tide stages to the extent practicable.

Monitoring Impact Pile Driving

If required during impact pile driving, an observer qualified to monitor the activity of humpback and killer whales would be employed. This would be a land-based monitoring activity using observers trained as needed by both the USFWS and NMFS. The observers would have the authority to halt impact pile driving if humpbacks or killer whales are observed within the distances at which behavioral disturbance may occur.

In-water Work Window

Timing restrictions specifying that construction must occur when juvenile salmonids are absent or present in very low numbers in the Hylebos and Blair waterways would be strictly observed. Pile removal and installation would be conducted within approved work windows to protect salmonids from coming into contact with these construction activities. Pile removal and installation would be restricted to the in-water work window for Commencement Bay (period between July 16 and February 14). Work above MHHW would not be restricted to the in-water work window.

3.4.6.2 Operations

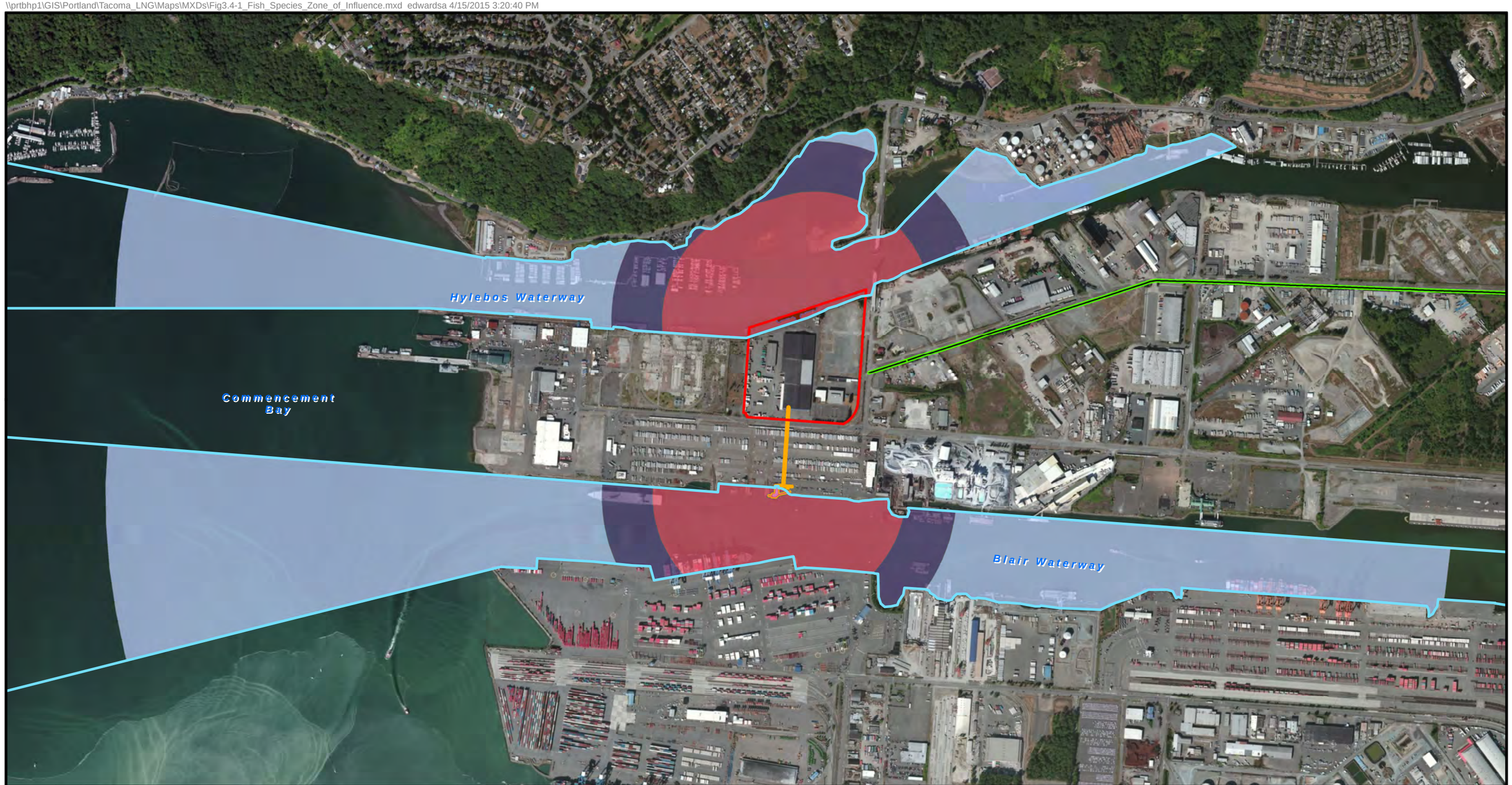
Potential impacts to aquatic and terrestrial habitat from stormwater runoff are addressed in Section 3.3.6.2 of Section 3 (Water).

Tugs and bunkering barges associated with the Proposed Action and traveling in the vicinity of the Port of Tacoma are unlikely to strike marine mammals. While the presence of whales, the most vulnerable marine mammal, in the vicinity of the Port is rare, maintaining slow speeds (less than 5 miles per hour) would be a measure to avoid strikes.

No avoidance, minimization, or mitigation measures are proposed for operation of the new distribution pipeline segments, limit station, or gate station. These components are proposed entirely on previously developed areas, so any potential impact to animals or their habitat resulting from operation of the new distribution pipeline segments and limit station would be negligible.

3.4.7 Conclusion

No significant, permanent, unavoidable adverse impacts to plants and animals are anticipated to result from the Project because the majority of the Proposed Action footprint would be contained within existing developed areas, largely port-industrial sites and paved road ROWs. Potential impacts to aquatic/marine habitat in the Hylebos and Blair waterways would be mitigated with proposed avoidance, minimization, and mitigation measures, including those related to pile driving and others that are associated with water quality, as discussed in Section 3.3.6 (Water).



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Proposed Loading Platform
- Proposed Pier
- In-Water Action Area

Fish impact distance from pile driving

- Fish Injury (Peak) 5 meters (16 feet)
- Fish Injury (>2 g.) 377 meters (1,237 feet)
- Fish Injury (<2 g.) 541 meters (1,775 feet)
- Fish Behavioral Disturbance 2,154 meters (7,067 feet)

N W E S

0 1,000 Feet

City of Tacoma

Figure 3.4-1
Spatial Extent of In-water Noise Relative to Fish Disturbance and Injury Thresholds
Tacoma LNG Project

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Proposed Loading Platform
- Proposed Pier
- In-Water Action Area

Whale impact distance from pile driving

- Whale Injury 22 meters (72 feet)
- Whale Behavioral Disturbance (impulsive) 464 meters (1,524 feet)
- Whale Behavioral Disturbance (vibratory) 1,359 meters (4,459 feet)

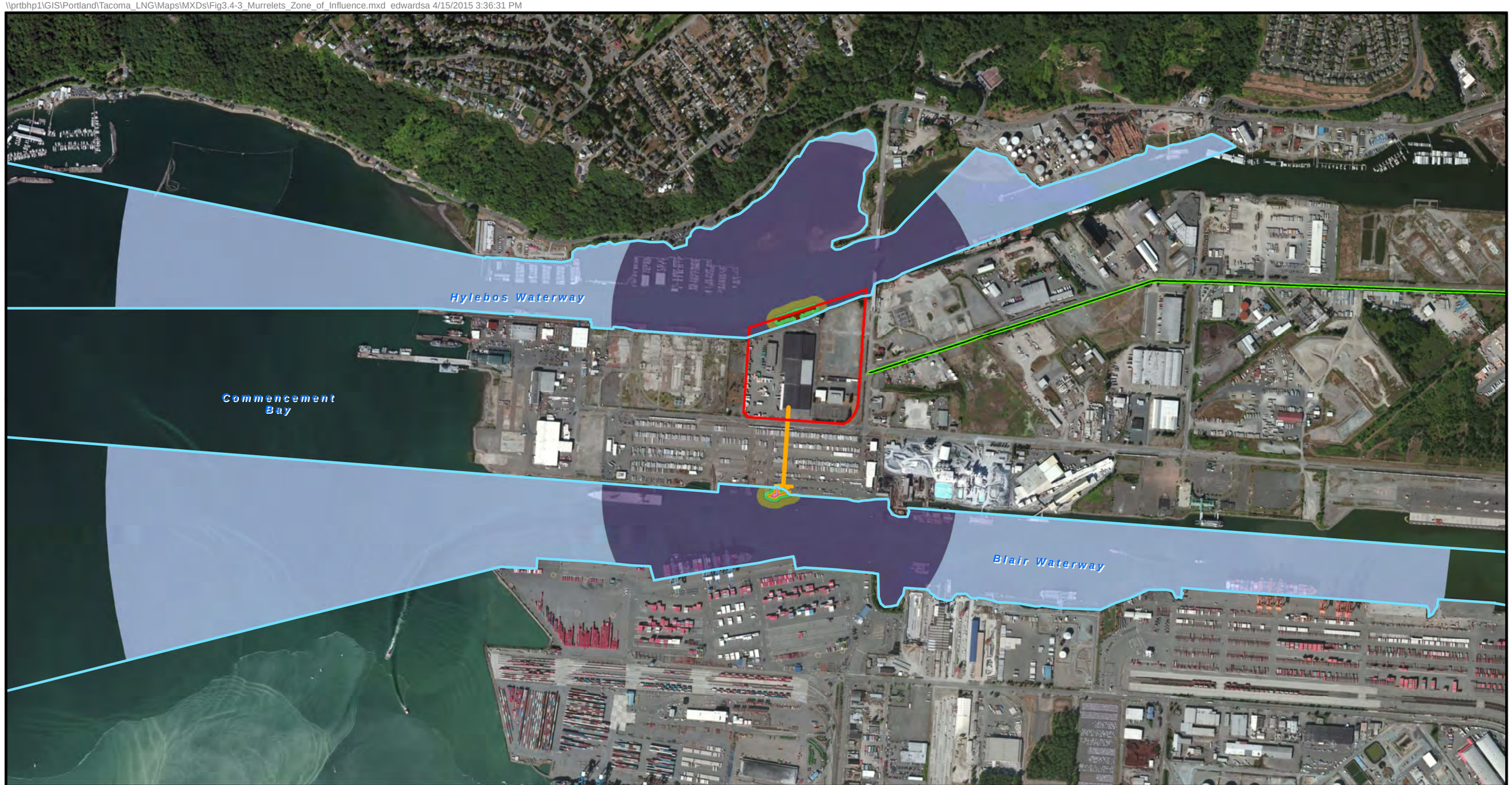
N E S W

0 650 Feet

City of Tacoma

Figure 3.4-2
Spatial Extent of In-water Noise Relative to Marine Mammal Disturbance and Injury Thresholds

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Proposed Loading Platform
- Proposed Pier
- In-Water Action Area

Diving Marbled Murrelets impact distance from pile driving

- Diving marbled murrelets (Injury - barotrauma) 15 meters (49 feet)
- Diving marbled murrelets (Injury - auditory) 38 meters (125 feet)
- Effective quiet 541 meters (1,775 feet)
- Behavioral Disturbance 2,154 meters (7,067 feet)

N W E S

0 1,000 Feet

Tacoma

City of Tacoma

Figure 3.4-3
Spatial Extent of In-water Noise Relative to Marbled Murrelet Disturbance and Injury Thresholds
Tacoma LNG Project

3.5 Health and Safety

This section describes potential health and safety impacts that may result from the proposed Tacoma Liquefied Natural Gas (LNG) Project and related natural gas pipeline (referred to herein as the Project) during its construction, operation, and decommissioning (herein referred to as the Proposed Action).

A description of LNG properties in general provides useful context for this discussion of health and safety as related to the proposed Project. LNG properties typically function as follows (see also Section 2.2.1.1 [Overview]).

- LNG is natural gas in its liquid state. To reach the liquid state, natural gas is cooled to -260 degrees Fahrenheit (°F). Similar to natural gas in a vapor state, LNG is odorless, colorless, noncorrosive, and nontoxic. LNG has a density of approximately 26.5 pounds per cubic foot and is neither flammable nor explosive. Upon conversion to liquid form, LNG collapses to occupy a volume that is 1/600 the original volume in its gaseous form. In a liquid form, LNG is stored at or near atmospheric pressure (less than 3 pounds per square inch gauge [psig]).
- LNG vaporizes rapidly on contact with a temperature greater than its own. At -259°F, LNG becomes a vapor. Between -259°F and -160°F, LNG vapor is heavier than air and pools at the ground level in collection pools or sumps. Vapor captured in the sumps continues to warm, and, at -160°F, becomes buoyant, rises, and rapidly disperses into the atmosphere.
- In the type of system that would be used by the proposed Project, LNG is produced using a mixed refrigerant design process. This closed loop system employs a specific, but adjustable, mixture of methane, ethylene, propane, isopentane, and nitrogen as the refrigerant. The refrigerant passes through heat exchangers to cool the gas stream to liquid (cryogenic) temperature.

3.5.1 Study Methodology

This section describes the methodology used to determine potential impacts to health and safety with the Proposed Action area. The Project would cross the jurisdictions of the City of Tacoma, City of Fife, and unincorporated Pierce County (see Figure 1-2 in Chapter 1 [Purpose, Need, and Alternatives Considered]). Potential impacts to health and safety were evaluated based on the applicable federal, state, and local regulations for both LNG facilities and natural gas pipelines. As discussed in Section 3.5.2 (Regulatory Framework), a review was conducted of the applicable health and safety regulations for these activities in both marine and terrestrial environments. This section examines the safety and health implications of delivering natural gas to the Tacoma LNG Facility and the processing of natural gas into its liquefied state. It also addresses handling of the product, including unplanned incidents of release of natural gas in a vapor or liquefied form and the release of other hazardous materials.

3.5.2 Regulatory Framework

3.5.2.1 Siting and Design of LNG Facilities

As detailed in Chapter 2 (Description of Proposed Action), Tacoma LNG would consist of three major components: (1) Tacoma LNG Facility, (2) Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System, and (3) associated improvement to the existing Puget Sound Energy (PSE) Natural Gas Distribution System. Each major component would be subject to federal, state, and local regulations focused on siting, design, construction, operation, maintenance, and security for these components.

With regard to health and safety, these regulations and their referenced codes ensure that the facility would be (1) sited to minimize risk to the general public, (2) designed, operated, and maintained to minimize the risk of inadvertent release and to implement safety mechanisms for protecting worker and public safety, and (3) secured against threats of intentional acts of destruction. The federal, state, and local regulations

affect facility design and implementation across numerous elements of the natural and built environment, including the following:

- Siting, design, construction, operation, and maintenance of the Tacoma LNG Facility are federally regulated by the Pipeline Hazardous Materials Safety Administration (PHMSA) under LNG Facilities: Federal Safety Standards (49 *Code of Federal Regulation* [CFR] 193 et al.), which incorporate by reference the National Fire Protection Association (NFPA) Standard for the Production, Storage, and Handling of LNG (NFPA 59A), in addition to many other national standards.
- Design, construction, operation, and maintenance of the marine loading of LNG to vessels are federally regulated by the United States Coast Guard (Coast Guard) under Waterfront Facilities Liquefied Natural Gas (33 CFR 127 et. al.) and Liquefied Hazardous Gas (33 CFR 127 et. al.), as well as by the LNG Facilities: Federal Safety Standards (49 CFR 193).
- Facility security for the proposed Project is regulated by the USCG under Maritime Security: Facilities (33 CFR 105), as well as LNG Facilities: Federal Safety Standards (49 CFR 193).
- Tanker truck loading activities would be required to meet the United States Department of Transportation requirements under 49 CFR 172, 173, and 177.
- The Washington Utilities and Transportation Commission (WUTC) adopted by reference the federal LNG facility standards (49 CFR 193) under Washington Administrative Code (WAC) 480-93, Gas Companies - Safety. Under certification by PHMSA, the WUTC Pipeline Safety Office would provide oversight of the proper design and construction of the proposed Project, as well as ongoing oversight of Project operations.
- The City of Tacoma also implements NFPA 59A (currently the 2009 edition) through its adoption of the Washington State Fire Code adopted in the Tacoma City Code, Title 3 - Fire.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Proposed LNG development activities in relation to environmental health, safety, and security are federally regulated by PHMSA and the Coast Guard. In addition to federal regulations, there are also state and local regulations related to the health and safety aspects of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System.

Federal

The federal government is primarily responsible for developing and enforcing LNG facility safety and siting regulations. The following federal regulations apply to the Project:

- Title 49 CFR 193 – LNG Facilities: Federal Safety Standards. The Proposed Action must comply with the provisions of 49 CFR 193 and the numerous standards and codes that are incorporated by reference, including NFPA 59A Standard for the Production, Storage, and Handling of LNG. NFPA 59A incorporates by reference the requirements of more than 25 additional NFPA standards and requirements, including:
  - American Concrete Institute
  - American Petroleum Institute
  - American Society of Mechanical Engineers
  - American Society for Testing and Materials
- Compliance with these federal regulations and related standards and codes is under the jurisdiction of PHMSA. Enforcement authority is delegated to the WUTC, as an agent for PHMSA.
- Title 33 of the CFR, Parts 1 through 199, provide for the Coast Guard to exercise regulatory authority over various aspects of waterfront facilities. The most relevant sections of 33 CFR are as follows:

– Part 127 Subparts A and B - Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas. These subparts ensure that a minimum level of safety is provided for LNG transfer operations conducted between shore structures and marine vessels. The subparts outline requirements pertaining to general information, general design, equipment, operations, maintenance, firefighting, and security.

  As noted in "Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System," above, Coast Guard marine safety programs are described in Navigation and Vessel Inspection Circular 01-11 *Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities*, dated January 24, 2011, and in 33 CFR 127. In compliance with these programs, new LNG waterfront projects (facilities transferring LNG to or from vessels) must perform a waterway suitability assessment (WSA) developed in collaboration with the Coast Guard, prior to the Coast Guard issuing a Letter of Recommendation to operate. In accordance with 33 CFR 127, the WSA must consist of a Preliminary WSA and a Follow-on WSA, as described in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

  PSE submitted a Preliminary WSA in December 2014. The Coast Guard Safety and Security Risk Assessment Exercise was conducted over two days in March 2015. The WSA will be revised to incorporate comments received from the Coast Guard on the previous submittal, as well as to incorporate the results of the risk assessment. The next WSA revision is expected to be submitted in May or June 2015 and will be revised periodically over the life of the proposed Project, per Coast Guard requirements.

- Part 105 – Maritime Security: Facilities. This part requires vessels and port facilities to develop security plans and conduct assessments of facility vulnerabilities.
- 49 CFR 172, 173, 177 and 29 CFR 1910: These parts regulate the transport of LNG by highway, and provide safety standards applicable to various activities that would be conducted at the Tacoma LNG Facility.

See Table 3.5-1. for Key Elements in the Federal Regulations, Codes, Standards, and Guidelines.

Table 3.5-1 Key Elements Required Under Each Regulation, Code, Standard or Guidelines of EPA, PHMSA, and NFPA

Key Elements	Coast Guard 33 CFR 127	PHMSA 49 CFR 193	NFPA 59A
Emergency Response Program			
Emergency Response Program: Preplanning and training to make employees aware of, and able to execute, proper actions in the event of an emergency.	✓	✓	✓
Operations Manual			
Operating Manual: Comprehensive documentation addressing full scope of bunkering operations, including operating conditions, required equipment, equipment compatibility, mooring, prestart checks, connection, transfer, disconnection, shutdown, safety equipment, training, communications, simultaneous operations and emergency operations.	✓		✓
Operating Procedures: (Similar to Operating Manual and can be in a combined document) Documents providing clear instructions for safely conducting activities, which covers operating limits and steps for conducting each operating stage.		✓	✓

Table 3.5-1 Key Elements Required Under Each Regulation, Code, Standard or Guidelines of EPA, PHMSA, and NFPA

Key Elements	Coast Guard 33 CFR 127	PHMSA 49 CFR 193	NFPA 59A
Mechanical Integrity/Maintenance Program: Establish and implement written procedures to maintain the on-going integrity of pressure vessels, storage tanks, piping systems, valves, relief/vent systems, emergency shutdown systems, controls and pumps.		✓	✓
Training and Credentials: Establish training program to ensure all personnel are aware of hazards, safe work practices, and understand all tasks for normal, non-routine and emergency operations.	✓	✓	✓
Vessel Fuel Transfer Procedures: Documents providing clear instruction for safely conducting transfers from the facility to the vessel.		✓	✓
Compliance Audits: Periodic certification evaluating compliance with the provisions of the regulation. Audit must be developed and documented noting deficiencies that have been corrected.	✓		
Safe Work Practices: Documentation describing how to safely perform a task with minimum risk to personnel, equipment and the environment.		✓	
Contractor Safety Program			
Contractor Safety Program: Program to ensure contractor employees are trained in safe work practices, awareness of chemical hazards and emergency response.			
Non-routine Work Authorizations: Permit describing steps to personnel must follow to obtain the necessary clearance to start the job.			
Process Hazard Program			
Process Hazard Analysis: Thorough, orderly, systematic approach for identifying, evaluating, and controlling the hazards of processes involving highly hazardous chemicals.			
Process Safety Information: Compilation of written information on chemicals, technology, and equipment used in the process			
Risk Management Plan			
Risk Management Plan: Plan that includes: (1) an assessment of potential effects of an accidental chemical release, (2) a prevention program and (3) an emergency response program			
Waterways Suitability Assessment: Assessment of the safety and security risks associated with LNG vessel operations within the port and if necessary, recommendations to mitigate identified risks.	✓		
Incident Investigation Program			
Incident Investigation Program: Identification of the chain of events and causes of an incident that resulted in, or could reasonably have resulted in, a catastrophic release of highly hazardous chemicals in the workplace, so that corrective measures can be developed and implemented.			
Incident Investigation Team: Team consisting of at least one person knowledgeable in the process and other persons with appropriate knowledge and experience to investigate and analyze the incident.			

Table 3.5-1 Key Elements Required Under Each Regulation, Code, Standard or Guidelines of EPA, PHMSA, and NFPA

Key Elements	Coast Guard 33 CFR 127	PHMSA 49 CFR 193	NFPA 59A
System to Address Corrective Actions: Establish system to address and resolve the incident report findings and recommendations.			
Communication/Follow-up: Document resolutions and corrective actions for review by all affected personnel whose job are relevant to the incident findings.			
Incident Reporting: Notification of all security breaches, spill, safety incidents, and safety related conditions and annual pipeline summary data.		✓	
Security Planning			
Security Assessment: Documentation of security background information, on-scene survey, analysis of vulnerabilities and recommendations.		✓	
Security Plan: Plan that identifies Facility Security Officer addresses each vulnerability identified in the assessment and describes security measures.	✓		✓
Safety Management System			
Safety Management System: System enabling proactive identification, evaluation and mitigation or prevention of chemical releases that could occur as a result of failures in process, procedures or equipment that could expose employees and surrounding populations to serious hazards.			
Fire Hazard Evaluation			
Fire Hazard Evaluation/Risk Assessment: Assessment of the fire risk at an LNG terminal by identifying fire scenarios of interest, their likelihood of occurrence and their potential consequences, and if necessary, identification of risk reduction measures.			✓
Hot Work Permit: Issued for hot work operations conducted on or near a covered process.	✓		
Siting Study: Quantification of the risks to populations outside the facility to ensure they do not exceed acceptable levels.		✓	✓

Source: Adapted from ABS (not dated), Table 14 "Key Elements of Applicable Regulations, Codes, Standards, and Guidelines for Bunkering Facilities."
Key:
CFR = Code of Federal Regulations
EPA = United States Environmental Protection Agency
LNG = liquefied natural gas
PMHSA = Pipeline and Hazardous Materials Safety Administration

State

The WUTC, as referenced above, has been granted enforcement authority by PHMSA to ensure compliance with federal regulations governing LNG facilities located in Washington State (PHMSA 2014a,b). The WUTC participates in the federal/state cooperative gas and hazardous liquid pipeline safety program under 49 United States Code (USC) Section 60105(a) Certification and acts as an Interstate Agent. This designation of regulatory duties is codified in WAC 480-93-999.

For elements of facility design that do not meet the specific requirements of 49 CFR 193 but meet the intent of the regulations, the WUTC may issue a state waiver pursuant to the WUTC's participation in the pipeline safety program under its certification authorized by 49 USC Section 60105 (PHMSA 2014a,b) and WAC 480-

For elements of facility design that do not meet the specific requirements of 49 CFR 193 but meet the intent of the regulations, the WUTC may issue a state waiver pursuant to the WUTC's participation in the pipeline safety program under its certification authorized by 49 USC Section 60105 (PHMSA 2014a,b) and WAC 480-93-230 – Exemptions from Rules in WAC 480-93. The Proposed Action may need a waiver to address design of the underground pipeline to transfer LNG to TOTE, which would be done in compliance with the most recent NFPA 59A safety standards that are not yet adopted by 49 CFR 193.

City of Tacoma

Pursuant to the provisions of the Revised Code of Washington (RCW) 35.21.180, the City of Tacoma has adopted by reference the 2012 edition of the International Fire Code under Title 3 – Fire, together with Appendices B and C published by the International Code Council, including all amendments and revisions in the Washington State Fire Code, WAC Title 51, Chapter 54A, effective July 1, 2013, subject to the amendments of Tacoma City Code sections 3.02.010 through 3.02.410.

PSE Natural Gas Distribution System

PSE operates and maintains a natural gas distribution system throughout portions of western Washington, including Pierce County. PSE designs, constructs, and operates its natural gas system to meet or exceed the most stringent federal and state requirements. Federal regulations include 49 CFR Part 192 (Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards), which are administered by the United States Department of Transportation – Office of Pipeline Safety. The WUTC, under an annual certification from the Office of Public Safety, assumes intrastate regulatory, inspection, and enforcement responsibilities for the regulations and also adopts and enforces additional state requirements.

The WUTC regularly inspects PSE facilities to ensure compliance with WUTC regulations. In accordance with federal regulation, all natural gas distributed by PSE is odorized to ensure that a leak is readily detectable and natural gas pressure is regulated by mechanical equipment to ensure that system pressure is less than or equal to the maximum design pressure of the system. As with all pressure-regulating stations, the Golden Given Limit Station would have overpressure protection to ensure that the facility operates safely.

Bunkering Operations

Bunker vessels arriving at the Tacoma LNG Facility would not be under PSE's control, but they would be subject to various design requirements and regulations ensuring the safety of LNG transfer operations.

Transfers of LNG from the Tacoma LNG Facility to a bunker vessel would be conducted in accordance with the following regulations:

- 46 CFR 154 – Safety Standard for Self-Propelled Vessels Carrying Bulk Liquefied Gases: delineates requirements for vessels carrying LNG, such as inspection and testing requirements; design, construction, and equipment requirements; special design requirements; and operating requirements.
- 46 CFR Chapter I, Subchapter B – Merchant Marine Officers and Seamen: provides credentialing requirements for United States merchant mariners working on LNG bunkering vessels, including training requirements.

3.5.2.2 Worker Safety

Worker safety is governed by federal and state regulations. At a federal level, the Occupational Safety and Health Act established the Occupation Safety and Health Administration (OSHA) to govern worker safety. At the state level, the Washington Industrial Safety and Health Act (WISHA) delegated authority for governing worker safety to the Washington State Department of Labor and Industries (L&I). A summary of the regulatory scope of these two agencies is provided below.

Occupational Safety and Health Administration: OSHA ensures safe and healthful working conditions by setting and enforcing standards and providing training, outreach, education, and assistance to workers (OSHA 2014). Employers are required to provide a safe workplace for their employees by following all

relevant OSHA health and safety standards, identifying and addressing hazards, abiding by chemical hazard communication requirements, providing workers with personal protective equipment, and reporting and record-keeping consistent with OSHA requirements (OSHA 2014).

Washington Industrial Safety and Health Act: WISHA (RCW Chapter 49.17) was established to ensure that employers provide their workers with safe and healthy workplaces at a state level. WISHA is administered by L&I through the Division of Occupational Safety and Health (L&I 2013).

3.5.3 Affected Environment

3.5.3.1 Safety History of the LNG Industry

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located on the Blair-Hylebos peninsula within the Port of Tacoma, an area that has been heavily developed for maritime and industrial use over the past 75 years.

Public safety is of paramount importance in siting, approving, constructing, and operating any LNG facility. The LNG industry, both in the United States and worldwide, has had an exceptionally good safety record, indicating that the regulations governing LNG siting and operation are effective.

In the 70+ year operating history of United States LNG facilities, only two LNG safety-related incidents have occurred that resulted in adverse effects to the public or environment: a fire at an LNG facility in Cleveland, Ohio, on October 20, 1944, and an ignition of enclosed vapors in Lusby, Maryland, in 1979. The LNG tank involved in the 1944 Cleveland incident was not constructed of 9 percent nickel steel because of a shortage of this metal during World War II, when the facility was built, and there was no berm or other containment to contain LNG released from the tank. The LNG tank failed, resulting in a release of LNG (Elliott et al. 1946). As a result of this incident, the codes were revised to specify the material used for tank construction and to require berms or containment for LNG tanks that are not fully contained. The proposed Project facilities would be designed, constructed, and operated in compliance with all applicable codes, use required materials for safe construction, and utilize a full-containment tank design.

In the more recent operational accident in 1979 at the Cove Point LNG facility in Lusby, Maryland, a seal failed on an LNG pump, resulting in gas vapors entering an electrical conduit. The conduit then conveyed this gas vapor to an enclosed electrical switchgear building. When a worker switched off a circuit breaker in the switchgear building, the gas ignited, resulting in damage to the building and a worker fatality. Lessons learned from this accident resulted in modifications to the National Electric Code, which is incorporated by reference in the local fire code. As noted above, the proposed Project facilities would be designed, constructed, and operated in compliance with applicable codes, including adopted fire codes.

The LNG industry has a strong commitment to public safety that is evidenced by the safety enhancements implemented as a result of lessons learned. With more than 110 functioning LNG facilities in the United States today, and an operational history beginning in the 1940s, the industry has a good safety record.

3.5.3.2 Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potential health and safety impacts from the Tacoma LNG Facility include thermal radiation from a fire or a vapor cloud from a release of LNG. PHMSA regulations establish the potential credible events (i.e., “accident scenarios”) to be modeled for thermal and vapor events. The boundaries of potential impact areas would include the parcels containing the PSE plant and the portions of the TOTE site under the control of PSE, and specified areas extending over waterbodies where LNG is present, provided that they cannot extend to areas where groups of 50 or more people assemble. The regulations that define these boundaries include 49 CFR 193.2057 and by incorporation, section 2.2.3.2 of NFPA 59A for thermal radiation, and 49 CFR 193.2059 and by incorporation, sections 2.2.3.3 and 2.2.3.4 of NFPA 59A for a vapor cloud. The Tacoma Fire Department also has jurisdictional authority of NFPA 59A (currently 2009 edition) as it pertains to siting, design and construction of the facility.

Any thermal radiation is limited to 1,600 British thermal units per hour per square foot at the boundary limit. The vapor cloud cannot exceed 50 percent of the lower flammability limit at any property line that can be built upon. Seismic design criteria are discussed in the geotechnical report titled *Geotechnical Engineering Services, Tacoma LNG Project* (GeoEngineers 2015).

3.5.3.3 PSE Natural Gas Distribution System

The affected environment encompasses the distribution system owned and operated by PSE in Pierce County and beyond. Distribution pipelines form part of the core business of PSE, which is the state of Washington's largest provider of residential and commercial natural gas. The company maintains more than 12,000 miles of natural gas main in the state. PSE distribution pipelines must be designed, built, maintained, and operated to meet applicable federal and state safety standards. The Proposed Action includes installation of two pipeline segments that connect to PSE's existing distribution network in the city of Tacoma, city of Fife, and unincorporated Pierce County. In addition, a limit station is proposed near the intersection of 99th Street and Golden Given Road in unincorporated Pierce County to regulate pipeline pressure. Modifications to regulate pipeline pressure at the Frederickson Gate Station are also proposed as part of the Project.

3.5.4 Impacts of the Proposed Action

Construction and operation health and safety regulations applicable to the Proposed Action are those promulgated by OSHA pursuant to the Occupational Health and Safety Act, 29 USC Chapter 15; the Washington Industrial Safety and Health Administration pursuant to WISHA, RCW 49.17, and approved contractor safety plans.

3.5.4.1 Construction Impacts

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

As part of the Proposed Action, certified hazardous materials contractors would remove asbestos-containing material or lead-based paints in the World War II-era buildings to be demolished. Before demolishing the building, an asbestos, lead-based paint, and universal waste survey would be performed. The waste survey would be performed to identify the hazardous materials that could be encountered by the workers or released to the environment during demolition of the buildings. Both structural and nonstructural controls would be in place to protect workers from exposure to hazardous materials and to comply with the OSHA and WISHA regulations. In addition, L&I requires the asbestos abatement to be performed by a certified contractor, who must notify L&I 10 days prior to performing the abatement. All abatement would conform to the requirements of WAC-296-62-0777, which contains provisions for worker safety during asbestos abatement. In addition, the requirements set forth in WAC 365-230 would be adhered to during demolition should lead-based paint be encountered.

As discussed in Section 3.1.3.4 (Existing Contaminated Sites and Remedial Actions), a work plan would be developed outlining the actions that would be taken if contamination is encountered during construction activities. This plan would address necessary characterization of impacted media, protection of worker health and the environment, temporary storage of impacted media, and proper reuse or off-site disposal of contaminated soil in accordance with local, state, and federal regulations.

PSE has adopted "Nobody Gets Hurt Today" as one of the company's core values. The expectation that nobody will be injured applies to all PSE personnel, as well as contractors and subcontractors through the requirement that safety plans be included in all contracts for work with PSE. These safety plans require observance of construction standards designed to avoid injury on the work site, including injury from moving equipment.

PSE Natural Gas Distribution System

PSE operates and maintains a natural gas distribution system throughout portions of western Washington, including Pierce County. PSE designs, constructs, and operates the natural gas system to meet or exceed the

most stringent federal and state requirements. Federal regulations include CFR Title 49, Part 192 (*Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards*), which are administered by the United States Department of Transportation Office of Pipeline Safety. The WUTC adopts and enforces additional state requirements. As noted above, the WUTC regularly inspects PSE facilities to ensure compliance with WUTC regulations. In accordance with federal regulation, all natural gas distributed by PSE is odorized to ensure that a leak is readily detectable, and natural gas pressure is regulated by mechanical equipment to ensure that system pressure is less than or equal to the maximum design pressure of the system. As with all pressure-regulating stations, the Golden Givens Limit Station would have a 100 percent redundancy backup regulator system to ensure that the facility operates safely.

In addition to the safety plans associated with PSE's "Nobody Gets Hurt Today" policy, standardized construction protocols (see Appendix XX, Selected Standard Protocols for PSE Construction Contracts) include developing routing plans that locate and avoid all existing utilities. In areas of brownfield development, construction plans contain methods for handling hazardous materials if encountered. Once all utilities are located and design plans are complete, the company applies for and acquires all permits needed for installation. This includes traffic control plans and other environmental impact avoidance and mitigation plans. The WUTC may conduct safety inspections at any time during the construction process. Completed pipe is subjected to and must pass pressure testing before placement into service.

Standard construction techniques within jurisdictional rights-of way (ROWs) encompass excavation, removal, and 100-percent haul-off of subsurface material; pipeline preparation, including welding and placement in the excavation; followed by proper backfill placement and compaction. Construction would occur beneath or within the paved surface or graveled road shoulder of the ROW as appropriate in consultation with the jurisdiction. The *Manual on Uniform Traffic Control Devices* would be utilized to minimize traffic impacts and provide safe working conditions (FHWA 2009). PSE would strictly adhere to local jurisdictional traffic control requirements to minimize traffic impacts, which may include nighttime work or reduced-duration daytime schedules to avoid rush hour traffic. Horizontal directional drill installation under Interstate 5 would not impede freeway traffic as the drilling and receiving pits would be located outside of the Interstate 5 ROW.

3.5.4.2 Operations Impacts

Tacoma LNG Facility and Tote Marine Vessel LNG Fueling System

Potential safety hazards that could occur at the Tacoma LNG Facility relate to the specific characteristics of LNG and the conditions under which it would be handled and stored, and associated operations that are conducted involving other hazardous materials used at the facility. As described in Section 2.2.1.1 (Overview), LNG consists of natural gas that has been pretreated to remove impurities and liquefied to cryogenic temperatures. The potential hazards of most concern at the Tacoma LNG Facility are those related to the potential flammability of any vapors released from an LNG spill and the cryogenic liquid nature of LNG.

Operation, Maintenance, and Emergency Procedures

Operation of the Tacoma LNG Facility would not pose a potential public hazard if strict design and operational measures to control potential accidents were applied. The primary concerns regarding public safety are events that could lead to an LNG spill of sufficient magnitude to create an off-site hazard. Stringent requirements are in place for the design, construction, operation, and maintenance of the facility, as well as the extensive safety systems to detect and control potential hazards. In addition to the operation and maintenance procedures that are required by both 49 CFR 193 Subpart F and NFPA 59A, emergency procedures are also required. All of the procedures (operation, maintenance, emergency) would be developed and documented prior to commissioning. With specific reference to the emergency procedures, elements that would be addressed include recognizing an emergency situation, responding to an emergency, and issuing the appropriate notifications to emergency responders. The overarching goal of all

of these procedures would be to ensure the safety of personnel through sound operation and maintenance procedures and monitoring of the various safety systems located throughout the facility.

Subpart F provides prescriptive requirements for operating procedures, emergency procedures, personnel safety, operating records, and other requirements for the ongoing operation of the facility. PSE would prepare all procedures in advance of plant operation. Each procedure would be reviewed and approved by the WUTC Pipeline Safety Office as the duly-appointed delegate of PHMSA. These procedures and records would be subject to ongoing audits by the WUTC for the life of the Project.

LNG Hazards

LNG's principal hazards result from its low temperature (-260°F), asphyxiation potential, and flammability. Each of these hazard characteristics is described in the following sections. Often, the hazards associated with LNG are compared with, and mistakenly assumed to be more severe than, diesel fuel, gasoline, propane, and compressed natural gas. This is not an accurate assessment because LNG vapor is lighter than air above temperatures of -160°F, which means that vapor at ambient temperature will rise and dissipate, thereby reducing vapor concentration such that ignition is not possible.[8] In contrast, gasoline and diesel vapors, and any other hydrocarbon vapor, are much heavier than air at ambient or normal temperatures, and so remain concentrated with a higher potential for ignition.

Low Temperatures

Although LNG can cause "freeze burns" and, depending on the length of exposure, more serious injury, its low temperature does not present a significant hazard to the public because all low temperatures are confined to the site. As a cryogenic liquid, LNG will quickly cool materials it contacts and may cause thermal stress and brittleness in materials not specifically designed for cryogenic temperatures.[9] These hazards, however, are not substantially different from the hazards associated with the storage and transportation of liquid oxygen (-296°F), liquid nitrogen (-321°F), and several other cryogenic gases that are routinely produced, used, maintained, and transported safely in the United States.

Areas with potential for cryogenic spill would all be located on the LNG plant site and in areas under PSE's control at the TOTE terminal. As described in Section 2.2.1.7 (Other Process Facilities), in the unlikely event of an LNG spill, LNG would be directed to various spill containments consisting of below-grade, open-top concrete sumps. LNG spills on the loading platform at the end of the pier would be collected in a concrete curbed area under the loading arms or hoses and piping, which would gravity-drain to a concrete trench that runs the length of the pier back ashore. Sumps would be sized for a maximum design spill pursuant to federal regulations. There would be no public access to either of these facilities.

Asphyxiation

Methane, the primary component of LNG, is colorless, odorless, and tasteless, and its vapor is classified as a simple asphyxiant. As such, methane can cause health hazards, including death from lack of oxygen at concentrations above 50 percent, as described on OSHA's website.[10] Asphyxiation, like low temperature, is a risk only in confined spaces and, as a result, normally represents a minimal risk to employees and even less risk to the public, which has no access to the facility. The facility design includes strategically placed gas detection devices that are monitored on a continuous basis and trigger alarms at levels well below those that could pose a human health hazard. Further, the siting and design of the facility are configured so that, however unlikely, any vapor cloud forming would stay on site. Operating procedures and training would address this risk to employees.

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[8] For ignition to occur, vapors must be at a concentration of 5 to 15 percent of ambient air.

[9] Concrete, nickel steel, and stainless steel can withstand cryogenic temperatures without damage.

[10] https://www.osha.gov/dts/chemicalsampling/data/CH_250700.html

Thermal Radiation, and Vapor Dispersion

To define the extent of thermal vapor dispersion and thermal radiation exclusion zones to ensure the public's safety requires quantitative modeling. When LNG is released from a container and comes in contact with air, it vaporizes and produces methane vapor. For any methane vapor to ignite (not only LNG, but any fuel containing methane), two conditions must simultaneously occur: (1) the methane vapor must be at a concentration of 5 to 15 percent in air, and (2) an ignition source must be present. If such a methane vapor-air mixture from an LNG spill ignites, the LNG flame front will either burn back to the release location (if the vapor concentration along this path is sufficiently high to support the combustion process) or, if the vapors dissipate quickly enough, the flame will burn out for lack of fuel.

For Tacoma LNG, vapor dispersion analyses have been conducted for credible spill scenarios, using the methodologies and computational models prescribed by PHMSA and approved on similar facilities. The modeling conclusively demonstrates that exclusion zones defined by federal regulation 49 CFR. § 193.2059 and, by reference NFPA 59A (2001), remain within the property lines of the proposed site. Keeping all spilled LNG (and any potential resulting flammable vapor clouds) within the property boundary eliminates the risk of off-site ignition.

LNG is not explosive in the manner that it is normally transported and stored. Any flammable vapor will develop an overpressure if ignited while in a confined space, but there is no evidence suggesting that LNG vapor will develop an overpressure in unconfined, open areas (ABS Consulting 2004). Experiments to determine if unconfined methane-air mixtures can explode have all demonstrated that, even for combustion initiated with a blasting cap, the shockwave (the characteristics of an explosion) quickly dies out, as unconfined methane combustion and flame front will not support overpressures (ABS Consulting 2004). In other words, unconfined methane-air mixtures will burn but will not explode.

A rapid-phase transition (RPT) can occur when a portion of LNG spilled onto water changes from liquid to gas, virtually instantaneously. Unlike an explosion that releases energy and combustion products from a chemical reaction as described above, an RPT is the result of heat transferred to LNG, inducing a change to the vapor state. The rapid expansion of LNG from the liquid to vapor state can cause locally large overpressures. RPTs have been observed during LNG test spills onto water. In some test cases, the overpressures generated were strong enough to damage test equipment in the immediate vicinity of the LNG release point. However, the sizes of the overpressure events have generally been small. Such a small overpressure is not expected to cause significant local damage, nor is it expected to endanger the public. With regard to testing, RPTs have not been observed when methane content is greater than 95 percent. The LNG to be produced by the proposed facility is expected to have methane content greater than 95 percent (Cleaver et al. 2013).

A common misconception of the flammability of LNG with respect to LNG tanks damaged by impact or impinged directly by flames is that this scenario has the potential to create a boiling liquid expanding vapor explosion (BLEVE). LNG storage tanks are not susceptible to BLEVEs (Ditali and Fiore 2008). The LNG storage tank is a tank within a tank with 3 feet of insulation between the two. Even with direct flame impingement on the outer tank, the inner tank would not experience an increase in temperature. Further, LNG stored in the tank is at or near atmospheric pressure; LNG stored in the tank would be less than 3 psig.

The primary safety concern of an LNG terminal is a fire from the release of LNG caused by equipment failure or spill. The siting and design of the facility would incorporate containment features, such as sumps to which a release of LNG would be directed. If a release and subsequent ignition were to occur, the fire hazard would be localized. LNG vaporizes rapidly on contact with a temperature greater than the LNG itself. At -259°F, LNG becomes a vapor. Between -259°F and -160°F, LNG vapor is heavier than air and pools at the ground level in collection pools or sumps. In the unlikely event of an LNG spill at the Project site, LNG would be directed to various spill containments consisting of below grade open top concrete sumps. LNG spills on the loading platform at the end of the pier would be collected in a concrete curbed area under the loading arms or

hoses and piping, which would gravity drain to a concrete trench that runs the length of the pier back ashore. Sumps would be sized for a maximum design spill pursuant to federal regulations.

At -159°F, LNG vapor is lighter than air. Any spilled LNG not collected in a sump would rise. LNG is flammable as a vapor, as stated above, between approximately 5 and 15 percent concentration of gas in air. LNG is less flammable than other fuels such as propane and gasoline and requires a higher ignition temperature (1,004°F). If a flammable vapor-air mixture from an LNG spill is ignited, it may result in a flash fire, which is a short-duration fire that burns the vapors already mixed with air in flammable concentrations. The flame front will burn back through the vapor cloud to the spill site, provided the vapor concentration along this path is high enough to continue burning (AcuTech 2007).

PSE Natural Gas Distribution System

PSE would operate proposed Pipeline Segments A and B of the natural gas distribution system in the affected jurisdictions at pressures of up to 250 and 500 psig. Pipeline Segment A would consist of approximately 4 miles of 16-inch pipe, and Pipeline Segment B would consist of approximately 1 mile of 12-inch pipe. Both the 16-inch pipe and the 12-inch pipeline segments would operate at a hoop stress below 20 percent Specified Minimum Yield Strength. This constitutes a safety factor of 5, which exceeds the applicable federal and state requirements.

All natural gas in distribution lines is odorized for ready detection in the event of a leak. The building density in the area where a pipeline is proposed determines the required safety factor to which a pipeline must be built. These standards are determined by Class Location 1 through 4, with the lower number representing less densely developed locations, and the highest number representing heavily urbanized locations. Pipeline Segments A B would be built to exceed the highest design factor for a Class 4 location.

With regard to minimum depth of cover over high-pressure distribution lines, federal standards require at least 24 inches. PSE designs to meet a minimum cover of 36 inches over high-pressure distribution mains.

For the operational lifetime of distribution pipelines, federal and state regulations require that leak surveys be conducted every five years unless the pipelines are located within business districts, where they undergo a leak survey annually. PSE conducts leak surveys annually on all business district pipelines and higher-pressure distribution mains; all other locations undergo leak surveys every three years.

The pressure of the gas at the proposed Golden Given Limit Station would be reduced to less than 250 psig to match the downstream pipeline. The Frederickson Gate Station is where natural gas is delivered from Northwest Pipeline to PSE. At this location, the gas is measured for custody transfer, the pressure is regulated to system pressure, and the gas is odorized so that any unintended release can be detected by the public. PSE operates its facilities, including the proposed Golden Given Limit Station and Frederickson Gate Station, in accordance with all applicable federal and state regulations.

3.5.4.3 Decommissioning Impacts

This section describes the procedures proposed to address potential decommissioning impacts associated with the end of the design life of the Project. Accounting for each Project component, the estimated total design life of the Project is 50 years. Decommissioning of the Project components would generate impacts similar to those discussed in Section 3.5.4.1 (Construction Impacts).

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Decommissioning activities would require construction worker safety training and safety plans designed to prevent workers' exposure to vapors or other contaminated media that may pose an unacceptable risk exposure scenario. Similar safety training and safety plans would be appropriate to construction workers operating in and around equipment at the decommissioning site.

During decommissioning of the facility, hazardous materials would be stored, handled, and used in accordance with plans prepared for the safe management of such materials.

Decommissioning the plant would involve removing all aboveground equipment to its foundations and demolishing the LNG tank. At the discretion of the property owner (Port of Tacoma), buildings and foundations could also be demolished. Underground utilities (e.g., stormwater, firewater) typically are abandoned in place. Any decommissioning would be conducted following consultation with the Port of Tacoma, as the removal and decommissioning of the facilities are covered in the lease between PSE and the Port of Tacoma. All necessary permits would be obtained prior to activities subject to regulatory requirements, including environmental review as required at that time.

PSE Natural Gas Distribution System

It is unlikely that the pipelines would be removed following decommissioning of the LNG liquefaction facility. The pipeline is an integral part of an existing natural gas distribution system serving both commercial and residential natural gas customers.

3.5.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action–related impacts to health and safety would not occur. Under this scenario, there would be no new, economically feasible, and consistent supply of cleaner fuel. If the Tacoma LNG facility is not constructed, vessels reliant on LNG as a fuel in the Port of Tacoma would have to either use more costly modes of delivery or relocate their fueling activities outside of the Port of Tacoma. Relocation of fueling infrastructure and activities outside the Port of Tacoma would carry with it the attendant evaluation of relocation of other enterprise activities for entities whose operations are dependent on completion during the fueling time frame.

3.5.6 Avoidance, Minimization, and Mitigation

3.5.6.1 Design and Construction

This section describes the primary construction mitigation measures that would be implemented to address health and safety during Project construction.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

- A Fire Protect Evaluation per the requirements of NFPA 59A 9.1.2 has been submitted to the City of Tacoma for review.
- To ensure evacuation routes (including Alexander Avenue, 11th Street and Taylor Way) in the vicinity of the project will remain open in the event of an LNG release, the facility design will incorporate mitigation measures to ensure that thermal radiation and vapor dispersion do not extend beyond the land portions of the PSE and TOTE property lines.
- A construction worker health and safety plan would be developed to conform to the applicable federal and state regulations for worker health and safety
- A Contaminated Media Management Plan would be developed that outlines the proper protocol that would be implemented should contaminated media be encountered during excavation or grading activities.
- Lead-based paint and asbestos abatement would be completed in accordance with applicable federal and state regulations and would be performed only by qualified and certified contractors. Hazardous materials would be stored, handled, and used in accordance with best practices for storage and management of hazardous materials. These best practices include, as appropriate, storing materials in a centralized construction staging area within secondary containment.
- Fueling and routine maintenance of construction-related equipment would occur within dedicated areas equipped with spill kits.

- The LNG storage tank would be a full-containment design, including a concrete roof and an outer, secondary concrete tank.
- Piping connections to the LNG storage tank would be from the top, with no penetrations of the inner or outer tank below the liquid level.
- LNG-containing piping would be designed as primarily all-welded construction with a minimum number of flanges.
- Piping would be either pneumatically or hydrostatically tested in accordance with appropriate codes and procedures before placement into service.
- Piping and equipment containing any liquids (e.g., LNG, refrigerant, lubricating oil) would be provided with spill-collecting troughs and area curbing to direct any potential spills to spill collection basins.
- Mixed-refrigerant components would be stored in tanks mounded in sand to prevent fire impingement.

PSE Natural Gas Distribution System

- Trench boxes, bracing, sump pumps, and other associated construction safety equipment and procedures would be utilized as required by applicable federal and state regulations, such as WAC 296-155 (Safety Standards for Construction Work).
- Appropriate engineering and construction techniques would ensure that the proposed natural gas main is properly installed.
- A construction worker health and safety plan would be developed in accordance with applicable federal and state worker health and safety regulation.
- A Contaminated Media Management Plan would be developed, outlining the proper protocol that would be implemented should contaminated media be encountered during installation of the distribution system.
- Hazardous materials would be stored, handled, and used in accordance with best practices for storage and management of hazardous materials. These best practices may include, as appropriate, storing materials in a centralized construction staging area within secondary containment.
- Fueling and routine maintenance of construction-related equipment would occur within dedicated areas equipped with spill kits.

3.5.6.2 Operations

This section describes the primary mitigation measures that would be implemented prior to or during operations to address health and safety, as follows:

- Cooperatively develop a Joint Emergency Response Plan for local first responders (e.g., local fire department, emergency medical services, and law enforcement agencies) and facility owners/operators that would include, at minimum:

  Section 1.0 Introduction

  Section 2.0 Incident Command Organization

  Section 3.0 Response Procedures

  Section 4.0 Detection, Shutdown, and Suppression Systems

  Section 5.0 Emergency Notification and Communication Systems

Section 6.0 Notifications Required

Section 7.0 Site Management of Media/Public

Section 8.0 Incident Termination

Section 9.0 Emergency Response Plan Reviews, Updates, and Training

Section 10.0 Identifying and Preventing Specific Emergencies

Section 11.0 Procedures for Responding to Specific Emergencies

Section 12.0 Public Evacuation and Mutual Aid Association

- During LNG fueling in the Blair Waterway or barge loading activities on the Hybelos Waterway PSE should consider establishing public exclusion zones around the operating area.
- The facility would be installed with a variety of fire and gas monitoring systems throughout the facility that would provide detection of flammable gas releases or fires. The monitoring system would include detectors for flammable gas, low temperature, ultraviolet/infrared flame, and smoke. The system would be strategically located in potentially affected areas. Fire and gas monitoring systems would be hard-wired from the field devices to the control room fire and gas panel.
- The facility would be provided with a fire protection system. The control building would be fully equipped with a fire sprinkler system, and numerous portable dry chemical extinguishers would be located throughout the plant. Sprinkler connections would be compatible with local municipal fire department equipment. The power distribution center (switchgear/motor control center room) would be equipped with fire suppressant systems.
- Critical operating parameters would be continuously monitored and controlled by means of a distributed control system that included programmable logic controllers and local control panels. This system would include alarms to notify operating personnel in the event of abnormal operations.
- The facility would be provided with a safety-instrumented system, independent of the main control system, to allow for the safe, sequential shutdown and isolation of the facility.
- The facility would be provided with an emergency shutdown system that included shutdown and control devices designed to leave the facility in a safe state. This system would be used for major incidents and would result in total plant shutdown, as well as shutdown of ship loading, sendout system, and individual pieces of equipment, depending on the type of incident.
- A diesel-driven standby generator would be provided to deliver back-up power for critical loads in the event of complete loss of external power. In the event of loss of normal power, the essential loads would automatically be transferred to the standby generator source.
- An uninterruptible power supply would be provided for critical instrumentation and controls in the event of a power failure. The uninterruptible power supply would allow for the orderly shutdown of the facility upon a power failure, as well the continued monitoring of critical parameters during the power outage.
- Underground metal structures and buried piping would be protected from corrosion through cathodic protection systems as required.
- A comprehensive quality control and quality assurance program would be implemented to ensure that all items installed in the facility meet the established quality standards.
- Facility maintenance procedures would be developed and implemented in accordance with Subpart G of 49 CFR 193, which delineates detailed requirements for maintenance manuals, recordkeeping, and inspections for certain plant elements.

- A maintenance program for the facility and its constituent parts would be developed with vendor and construction contractor input. The maintenance program would include a schedule for evaluating critical facility constituent parts to assess their condition, which would inform the need for possible overhaul or replacement. Detailed documentation of all work required, tested, and completed would be maintained.
- Operations and maintenance personnel training programs and appropriate documentation thereof would be developed and implemented in accordance with Subpart H of 49 CFR 193, delineating detailed requirements for personnel qualifications and training. These programs would be designed to maximize personnel involvement to decrease the opportunity for a hazardous situation to develop.
- Training would be validated through testing and certification.
- Regular safety meetings with operations and maintenance personnel would be conducted.
- Emergency procedures would be developed per the requirements of 49 CFR 193 and 33 CFR 127 to provide for responding to any emergency that may reasonably be expected to occur at the facility. These procedures include provisions for contacting and coordinating with local agencies as needed to protect public safety in the event of an incident at the facility.

3.5.6.3 Decommissioning

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The relevant mitigation measures for protecting worker safety and hazardous material handling that may occur during the decommissioning of the facility are similar to the mitigation measures discussed in Section 3.5.6.1 (Construction), as decommissioning of the facility would utilize similar techniques.

PSE Natural Gas Distribution System

The distribution system infrastructure would not likely be decommissioned following the termination of the LNG liquefaction facility operation. However, relevant mitigation measures for protecting worker safety and hazardous material handling that could occur during the decommissioning of the distribution system would be similar to the mitigation measures discussed in Section 3.5.6.1, as decommissioning of the distribution system would employ similar techniques.

3.5.7 Conclusion

Siting, design, construction, operation, and maintenance of the Tacoma LNG Facility would be federally regulated by the PHMSA under the Federal Safety Standards (49 CFR 193 et al.) and also by the Tacoma Fire Department as the authority having jurisdiction under the stated adopted fire code which incorporate by reference the NFPA Standard for the Production, Storage, and Handling of LNG (NFPA 59A), in addition to many other national standards. The WUTC adopted by reference the federal LNG facility standards. Under certification by PHMSA, the WUTC Pipeline Safety Office would provide oversight of the proper design and construction of the Project, as well as ongoing oversight of Project operations. A variety of ongoing operations, maintenance, and emergency response trainings would be conducted throughout the lifetime operations of the facility to remain not only in compliance with applicable laws and regulations, but also to stay abreast of emergent industry- and agency-based information.

Potential impacts from the facility include thermal radiation from a fire or a vapor cloud from a release of LNG. PHMSA regulations establish the potential credible events (i.e., “accident scenarios”) to be modelled for thermal and vapor events. The boundaries of potential impact areas would include the parcels containing the LNG facilities, the portion of the TOTE site under the control of PSE, and specified areas extending over water bodies where LNG is present, provided that they cannot extend to areas where groups of 50 or more people assemble. The regulations that define these boundaries are 49 CFR 193.2057 and, by incorporation, Section 2.2.3.2 of NFPA 59A for thermal radiation, and 49 CFR 193.2059 and, by

incorporation, Sections 2.2.3.3 and 2.2.3.4 of NFPA 59A for a vapor cloud. There will be no public access to the proposed facilities, and defined impacts will be limited to the controlled areas.

Washington, as a jurisdictional state, the WUTC, Office of Pipeline Safety (OPS) has been delegated PHMSA authority for siting and technical assessment of the design, construction, and operational compliance as specified in the 2001 edition of NFPA 59A. The Coast Guard has responsibility for a design review of the ship to shore interface, marine transportation and maritime facility security. The City of Tacoma Fire Department (TFD) also has statutory authority to ensure that the Project meets the state adopted Fire Code that requires LNG facilities be sited and designed to the 2009 edition of NFPA 59A. Although the UTC and PHMSA siting, design, construction and operational criteria are based on the 2001 edition of NFPA 59A the UTC and the TFD may determine to use whichever edition has the most stringent criteria for the siting, design, construction and operations of the Tacoma LNG project. To coordinate efforts on the LNG facility, the UTC has identified four phases of the project that necessitate coordination meetings with TFD and will ensure staffs are available to answer questions and discuss the project as requested.

The four key phases are as follows:

I. Decision by PHMSA on underground pipeline waiver

The decision by PHMSA on the request by PSE to place the LNG pipe underground leading to the TOTE facility will be critical for PSE in the final design process and will need to be factored into the inspection process. The UTC and TFD will coordinate meetings, work with PSE and may require guidance from PHMSA on the waiver decision.

II. Receive and Review of Design Documents

After the UTC receives the design documents for the project from PSE, UTC will reach out to Tacoma to discuss key safety elements that are being reviewed. PHMSA and PSE may be consulted during this process as well.

III. Construction Process Coordination

The UTC will coordinate with TFD on its inspection schedule, findings and concerns during the construction process. As the UTC is meeting with TFD, there may be a need to ask PHMSA and/or PSE to attend the meetings to answer technical questions.

IV. Ongoing Communication on Life of Facility

If completed, the UTC will have the responsibility for continued inspections of the facility. The UTC will be available to TFD to answer any questions and will set up periodic meetings (as requested by TFD) to review recent inspection reports, any concerns found during inspection and any issues concerning inspection schedule.

Conclusions of Braemar Engineering Technical Review

Braemar Engineering and Ecology and Environment, Inc., conducted a review of the preliminary facility design and engineering and the results of the preliminary thermal radiation and vapor expansion modeling completed for the Project. The preliminary modeling for vapor dispersion used Phast Consequence Modeling software that depicts the maximum concentration cloud footprint (i.e., worst case footprint) and potential effect zone when considering a release in any direction.

Tacoma LNG and Chicago Bridge & Iron (CB&I) have given significant effort to design a code-compliant and safe LNG facility suited to the site and local conditions. Braemar Engineering's comments are based on the preliminary nature of the Project, and the level of detail has not reached the point where many of the issues are addressed in complete detail. However, it is likely that most will be addressed by Tacoma LNG and CB&I as the design progresses. Below, is a checklist of pending conditions to be confirmed when the design is complete; however, a few are recommendations of conditions noted for improving safety or reliability.

- The pipeline design, construction, and integrity testing are compliant with 49 CFR Part 192. The design should be reviewed when complete to confirm that all conditions for the installation have been met.
- Codes for new LNG facilities are held to a very high standard to avoid unsafe conditions within the facility and to the public. The permitting and review process is rigorous and thorough, and the stipulated requirements can be relied upon.
- Standards for civil site preparation are strict to prevent facility component settlement, flooding, and damage from wind and seismic events.
- The technical design of the Project was found to be sound engineering.
- The preliminary LNG design, construction, and integrity testing are compliant with 49CFR Part 193, NFPA 59A, and Coast Guard regulations. The design should be reviewed when complete to confirm that all conditions for the installation have been met.
- Preliminary siting studies were performed for Tacoma LNG using basic modeling tools: Degadis for vapor dispersion and LNG Fire III for thermal radiation. More advanced modeling is required later in detailed engineering when the design is further defined using Computational Fluid Dynamic (CFD) software. The updated CFD models should be reviewed when they are complete to confirm that all vapor dispersion and thermal radiation conditions for the installation have been met and accepted by PHMSA.
- The underground cased LNG corridor design concept was found to be acceptable and code compliant, but expensive, if installed as proposed.
- The aboveground pipe rack and TOTE dock are located in a congested area with vapor dispersion and thermal radiation (VTDR) going beyond the security fence to adjacent unrelated dock work areas. An LNG release vapor or fire incident at this location would have greater consequences due to crowding, as well as impacts on dock workers unaffiliated with the LNG facility operation. For an LNG incident scenario involving release of LNG at or near the dock, VDTR will extend beyond the security fence to the adjacent property. Workers entering this area will require an audible and visual warning system to alert them if an unsafe condition exists, training to know the extent of the high consequence area, and what they should do if an incident occurs. Automatic systems for emergency process shutdown, warning systems, and delineation of the high consequence areas should be reviewed when the design is complete to confirm that adequate layers of protection exists for the conditions at this location.
- The proposed dock east of the LNG facility on the Hylebos Waterway is lacking in design details and should be reviewed for compliance when the design is complete, ship size, and loading rates are better defined.
- The Tacoma LNG Fire Protection Study, Plant Safety Systems, and Emergency Response Plan should be reviewed for compliance when complete.

3.6 Noise

This section describes the existing noise environment in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential noise-related impacts that may result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). A technical report titled *Noise Report* was prepared for the Blair-Hylebos Terminal Redevelopment Project and provides background information used to help form this analysis (Widener & Associates 2009).

3.6.1 Fundamentals of Acoustics

Acoustics is the study of sound, and noise is defined as unwanted sound. Airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure. Technical acoustical terms used in this section are defined in Table 3.6-1.

Table 3.6-1 Definitions of Acoustical Terms

Term	Definition
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient level is typically defined by the A-weighted equivalent continuous noise level (L_{eq}).
Background noise level	The underlying ever-present lower level noise that remains in the absence of intrusive or intermittent sounds. Distant sources, such as traffic, typically make up the background. The background level is generally defined by the L_{90} percentile noise level.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, tonal content, the prevailing ambient noise level, and the sensitivity of the receiver. The intrusive level is generally defined by the L_{10} percentile noise level.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-weighted sound level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Equivalent noise level (L_{eq})	The average A-weighted noise level, on an equal energy basis, during the measurement period.
Day–night level (L_{dn} or DNL)	The day-night noise level (L_{dn} or DNL) is a 24-hour average L_{eq} where 10 dBA is added to nighttime levels between 10:00 p.m. and 7:00 a.m. For a continuous source that emits the same noise level over a 24-hour period, the L_{dn} will be 6.4 dB greater than the L_{eq}.
Percentile noise level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (e.g., L_{90}).

Source: Beranek and Vér 1992

The most common metric for sound is the overall A-weighted sound level (dBA) measurement that has been adopted by regulatory bodies worldwide. The A-weighting network measures sound in a similar fashion to the way in which a person perceives or hears sound. There is consensus that A-weighting is appropriate for estimating the hazard of noise-induced hearing loss. With respect to other effects, such as annoyance, A-weighting is acceptable if there is largely middle and high frequency noise present, but if the noise is unusually high at low frequencies or contains prominent, low-frequency tones, the A-weighting may not provide a valid measure. Compared with other noise sources in the area, the Proposed Action is not anticipated to be a substantial source of unusual levels of low-frequency noise. Rather, it is expected to be

broadband and not the source of strong low-frequency tones. Therefore, A-weighting provides a good measure for evaluating acceptable and unacceptable sound levels for projects such as the Proposed Action.

A-weighted sound levels typically are measured or presented as equivalent sound pressure level (L_{eq}), which is defined as the average noise level on an equal energy basis for a stated period of time, and is commonly used to measure steady-state sound or noise that is usually dominant. Statistical methods are used to capture the dynamics of a changing acoustical environment. Statistical measurements are typically denoted by $L_{xx,}$ where xx represents the percentile of time the sound level is exceeded. The L_{90} is a measurement that represents the noise level that is exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

The effects of noise on people can be categorized in three ways:

- Subjective effects of annoyance, nuisance, and dissatisfaction;
- Interference with activities, such as speech, sleep, and learning; and
- Physiological effects, such as startling and hearing loss.

In most cases, environmental noise may produce effects in the first two categories only. However, workers in industrial plants may experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily due to the wide variation in individual thresholds of annoyance and habituation to noise. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

Table 3.6-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels. Because the human ear can detect such a wide range of sound pressures, sound pressure is converted to sound pressure level, which is measured in units called decibels (dB). The decibel is a relative measure of the sound pressure with respect to a standardized reference quantity. Because the dB scale is logarithmic, a relative increase of 10 dB represents a sound pressure that is 10 times higher. However, when comparing similar sounds (traffic with traffic), humans do not perceive a 10-dBA increase as 10 times louder. Instead, they perceive it as twice as loud. Similarly, a 3-dBA change is generally considered the threshold of a perceivable difference.

Table 3.6-2 Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier deck jet operation	140 130	 Pain threshold
Jet takeoff (200 feet)	120	
Auto horn (3 feet)	110	Maximum vocal effort
Jet takeoff (2,000 feet) Shout (0.5 foot)	100	
N.Y. subway station Heavy truck (50 feet)	90	Very annoying Hearing damage (8-hour, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight train (50 feet)	70 to 80	
Freeway traffic (50 feet)	70	Telephone use difficult Intrusive
Air conditioning unit (20 feet)	60	
Light auto traffic (50 feet)	50	Quiet

Table 3.6-2 Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Living room Bedroom	40	
Library Soft whisper (5 feet)	30	Very quiet
Broadcasting studio	20 10	Recording studio Just audible

Adapted from Table E, New York Department of Environmental Conservation (2001).

It is also important to note that decibels cannot be directly added, that is, 50 dBA + 50 dBA does not equal 100 dBA. When two sources of equal level are added together, the result will always be 3 dB greater; that is, 50 dBA + 50 dBA = 53 dBA, and 70 dBA + 70 dBA=73 dBA. If the difference between the two sources is 10 dBA, the level will not increase; that is, 40 dBA + 50 dBA=50 dBA, and 60 dBA + 70 dBA=70 dBA. The decrease in sound level due to distance from any single sound source normally follows the inverse square law (i.e., the sound level changes in inverse proportion to the square of the distance from the sound source). In a large open area with no obstructive or reflective surfaces, it is a general rule that at distances greater than the characteristic dimension of the source (i.e., 50 feet from a typical piece of construction equipment), the sound level from a point source of sound drops off at a rate of 6 dB with each doubling of the distance from the source. Sound energy is absorbed in the air as a function of temperature, humidity, and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. The drop-off rate will also vary based on terrain conditions and the presence of obstructions in the sound's propagation path.

3.6.2 Regulatory Framework

This section describes the noise regulations and agency guidelines for evaluating potential environmental noise impacts and mitigation.

3.6.2.1 State of Washington

Washington State noise regulations (Washington Administrative Code [WAC] 173-60) specifically exempt daytime construction activities under WAC 173-60-050(3)(a). Limited nighttime construction may include soil stabilization activities and building construction. The following text and tables describe the requirements of WAC 173-60.

WAC 173-60 establishes maximum permissible sound levels based on the environmental designation for noise abatement (EDNA), which is defined as "an area or zone (environment) within which maximum permissible noise levels are established." The three EDNA designations (WAC 173-60-030) roughly correspond to residential, commercial/recreational, and industrial/agricultural uses:

- Class A – Lands where people reside and sleep (such as residential);
- Class B – Lands requiring protection against noise interference with speech (such as commercial/recreational); and
- Class C – Lands where economic activities are of such a nature that higher noise levels are anticipated (such as industrial or agricultural).

As used in this section, noise-sensitive areas are equivalent to Class A EDNA areas. Table 3.6-3 summarizes the maximum permissible levels applicable to noise received at noise-sensitive areas from an industrial facility (Class C EDNA).

Table 3.6-3 Maximum Permissible Noise Levels from a Class C EDNA (dBA)

	Class A EDNA Receiver[a]	
Statistical Descriptor	**Daytime (7 a.m. – 10 p.m.)**	**Nighttime (10 p.m. – 7 a.m.)**
L_{eq}	60	50
L_{25}	65	55
$L_{8.3}$	70	60
$L_{2.5}$	75	65

Source: State of Washington noise regulations (WAC 173-60-040)
Note:
[a] Standard applies at the property line of the receiving property sources.
Key:
dBA = A-weighted decibel
EDNA = environmental designation for noise abatement

3.6.2.2 Local

The Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System are proposed on the Blair-Hylebos peninsula at the Port of Tacoma. The Tacoma LNG Facility would receive natural gas from Puget Sound Energy's (PSE's) existing natural gas pipeline system. To do so, PSE would need to improve its existing natural gas distribution system, including constructing two new distribution pipeline segments at the Port of Tacoma, City of Tacoma, City of Fife, and unincorporated Pierce County. The Port of Tacoma is subject to City of Tacoma jurisdiction for noise regulations. This section identifies regulations for each pertinent jurisdiction.

City of Tacoma

The Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and improvements to the PSE Natural Gas Distribution System that would occur within City of Tacoma limits would be subject to City of Tacoma jurisdiction. City of Tacoma Municipal Code (TMC) Chapter 8.122 (Noise Enforcement) states under TMC 8.122.080(A) that "no person shall make, continue, or cause or permit to be made or continued any sound attributable to any device that increases the total sound level" outdoors by 10 dBA during daytime hours (7 a.m. to 10 p.m.) or 5 dBA during nighttime hours (10 p.m. to 7 a.m.).

In addition, no impulsive sounds are allowed that increase "the total sound level by 15 dBA or more above the ambient sound level, when there are [fewer] than 10 impulses per hour between the hours of 7 a.m. and 10 p.m., [or fewer] than four impulses within 1 hour between 10 p.m. and 7 a.m. If the number of impulses" during daylight hours exceeds 10, the sound level limits discussed above apply [TMC 8.122.080(B)].

Construction activities conducted between 7 a.m. and 9 p.m. during the week and 9 a.m. and 9 p.m. on the weekend are exempt from these requirements [TMC 8.122.080(D)].

Pierce County

The Proposed Action is expected to have limited noise emissions in Pierce County, primarily limited to temporary construction activities from the natural gas distribution system improvements. Pierce County Code (PCC) Chapter 8.76 (Noise Pollution Control) states under PCC 8.76.060 that "No person shall cause or permit noise to intrude into the property of another person which noise exceeds the maximum permissible noise levels." The maximum permissible noise levels are equivalent to the levels specified under Chapter 173-60 WAC [PCC 8.76.060(B)]. Sounds originating from temporary construction sites as a result of construction activity are exempt between 7 a.m. and 10 p.m. [PCC 8.76.070(C)(1)].

City of Fife

The Proposed Action is expected to have limited noise emissions in the City of Fife, primarily limited to temporary construction activities from the natural gas distribution system improvements that occur within the City of Fife. City of Fife Municipal Code (FMC) Chapter 9.56 (Noise Control) states under FMC 9.56.060 that "no person shall cause or permit noise to intrude into the property of another person which noise exceeds maximum permissible noise levels." These noise levels are identical to the Chapter 173-60 WAC requirements [FMC 9.56.060(A)]. However, "if the background sound level is above the maximum permissible environmental levels, then the maximum permissible sound source level in excess of the background sound level shall be 10 decibels, measured at or within a receiving property" [FMC 9.56.060(E)].

Sounds created by blasting are exempt between 7 a.m. and 10 p.m. [FMC 9.56.070(A)(3)]. Sounds originating from temporary construction sites as a result of construction activity are exempt within Class A EDNAs between 10 p.m. and 7 a.m. [FMC 9.56.070(C)(1)], except that no construction, excavation, hauling or removal of fill shall be permitted before the hour of 9 a.m. on Saturday or Sunday [FMC 9.56.060(D)].

3.6.3 Affected Environment

The noise study area encompasses the following main components of the proposed Project, which are further described in Chapter 2 (Description of Proposed Action):

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System (see Figure 2-1 in Chapter 2 [Description of Proposed Action).
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities, and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 2-1 of Chapter 2.
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments, a new Golden Given Limit Station, and an upgrade to the existing Frederickson Gate Station (see Figures 2-18 through 2-20 in Chapter 2).

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the City of Tacoma. The two new distribution pipeline segments would be located in the city of Tacoma and the city of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are the primary noise sources associated with the Proposed Action.

A general description of existing site conditions at the Blair-Hylebos peninsula is provided in Section 3.6.1 (Affected Environment) of the *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* (Port of Tacoma 2009). The existing noise environment on the Blair-Hylebos peninsula where the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and new distribution Pipeline Segment A would reside is consistent with that of an industrial marine port. The sources of noise emitted from shipping ports like the Port of Tacoma are varied, but generally include components of industry, such as cargo vessels, semi-trucks, freight trains, engines/generators, container loading and offloading equipment, horns, and loudspeakers. All of these sources contribute to the overall noise level in and around the Blair-Hylebos peninsula and Port of Tacoma and can operate at various levels throughout the day or night in response to demand.

3.6.4 Impacts of the Proposed Action

Development of the Proposed Action would generate noise during both construction and operation. This section describes impacts by activity.

3.6.4.1 Construction Impacts

Typical construction equipment generally emits noise in the range of 80 to 90 dBA at 50 feet and will dissipate at a rate of 6 dBA per doubling of distance. Daytime construction activities are exempt from the various noise regulations in the Proposed Action area, including those at the state and local levels. Therefore, by regulatory definition, there would be no daytime construction noise impacts.

One method of ground improvement under consideration involves driving a temporary pile used to inject grout into the earth to form a grout column. This method would entail approximately 7,100 small-diameter pile insertions. Work would be accomplished during the daytime construction hours allowed by code. Other soil improvement methods under consideration do not require driven piles, and the impact on ambient noise would be minimized with those methods.

Pile driving would be required to install piles for the in-water components of the Project in both the Hylebos and Blair waterways. The specific in-water components, including number and type of proposed piles, are described in Chapter 2 (Description of Proposed Action). There are two primary pile-driving methods: impact and vibratory. Both methods would be used for the Project and typically result in a sound level on the order of 100 dBA at 50 feet. The pile-driving sequence would be as follows: first, vibratory-drive the piles to approximately 90 percent of their design depth (typically within 10 feet of design tip elevation); second, proof the installation with an impact hammer until load-bearing or pile-tip elevation specifications are reached. It is anticipated that up to 80 blows per foot may be required for proofing.

A vibratory hammer, which is somewhat quieter than impact driving, would be used for installing the majority of the in-water piles. Vibratory pile drivers are clamped to the pile and use motors to generate vibrations in the range of 2 to 25 Hertz. The vibrations reduce the frictional grip of the soil and permit the soil at the tip of the pile to be displaced, which, coupled with the weight of the pile itself or additional dead weights, allows the pile to advance into the ground. When needed, impact hammer blows would then be used to set the pile when it reaches appropriate bearing capacity.

Impact pile drivers typically utilize a weight (sometimes referred to as a piston or hammer) to impact the top of a pile to force it into the ground. The repetitive hammer blows drive the pile into the ground, similar to hammering a nail into a piece of wood. Piles are driven until the desired resistance is achieved (typically measured in blow counts per foot or inch) or the pile fails to advance (known as refusal). The primary sources of noise associated with impact driving are the impact of the hammer on the pile/drive cap and the noise radiated from the pile. The primary sources of noise associated with vibratory driving are the engine/motor and radiated noise from the vibrating pile. The noise from a vibratory driver is a continuous or steady noise. The airborne noise from the vibratory method can be substantial and has been reported to be louder than impact drivers when driving sheet piles.

The intensity of underwater acoustic disturbances depends on many factors, including the type and size of the pile, the firmness of the substrate, the depth of water, and the type of hammer. Driving a hollow steel pile with an impact hammer results in greater sound intensities than driving a concrete pile with a vibratory hammer. The numbers, locations, and construction materials of the pilings are presented in Chapter 2 (Description of Proposed Action). It is anticipated that the majority of the pile driving would be conducted with a vibratory pile driver, which is known to result in less underwater acoustic energy. Impact piling is expected to be limited to that required for proofing or assessing the final bearing capacity of vibratory-driven piles.

Although abundance of juvenile Chinook salmon and other fish species is low during the in-water work period when pile driving would occur for the Project, it is possible that some individual fish could be harmed

by acoustic disturbance generated by pile driving. To minimize the potential for harm, the Project would incorporate mitigation specified and required by the applicable permitting agency (i.e., National Marine Fisheries Service). Bubble curtains have been shown to reduce the sound energy transmitted through the water from pile driving and are one potential measure that could be deployed during pile driving (Hardyniec and Skeen 2005; California Department of Transportation 2004). Additional assessment of pile-driving impacts on fish and wildlife and proposed mitigation is provided in Chapter 3.4 (Plants and Animals).

3.6.4.2 Operations Impacts

Potential impacts during operation of the Project are described below.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The primary source of operational noise for the Project during typical operations would be the Tacoma LNG Facility. Noise sources at the facility would include bunkering barge mooring and loading, and the operation of a number of pumps, compressors, vaporizers, fans, and blowers.

Bunkering barge mooring and loading noise would be consistent with existing noise level of barge mooring and loading operations throughout the Port of Tacoma. Vendor-specific noise information is not currently available for the Tacoma LNG Facility. PSE would work with vendors to ensure that the facility complies with the applicable noise regulations, including the City of Tacoma noise limits. Sound reduction measures may include silencers, sound walls/barriers, and enclosures.

PSE Natural Gas Distribution System

When in operation, the two new distribution pipeline segments would be underground and under functional roadways. Thus, noise emission would not occur as a result of the new pipeline segments.

The primary source of noise from the PSE Natural Gas Distribution System would be the new Golden Given Limit Station in unincorporated Pierce County. The station would include a heater, a remote terminal unit, and pigging facilities. Vendor-specific noise information is not currently available and the specific size and layout of the limit station has not been finalized. However, PSE would ensure that its operation complies with the applicable noise regulations. Sound reduction measures that may be employed include enclosures, buildings, or sound walls/barriers.

3.6.4.3 Decommissioning Impacts

This section describes the various procedures used to address potential decommissioning impacts associated with the end of the design life of the Proposed Action. Accounting for each Project component, the estimated total design life of the Proposed Action is 50 years. Decommissioning of the Tacoma LNG Project components would generate impacts similar to those discussed in Section 3.6.4.1 (Construction Impacts). Potential noise impacts would be temporary and would end upon completion of the decommissioning activities. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Proposed Action components.

3.6.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and Proposed Action-related impacts from noise would not occur.

3.6.6 Avoidance, Minimization, and Mitigation

PSE is committed to employing a combination of noise mitigation methods, including equipment noise controls and administrative measures, to minimize construction and operational noise.

3.6.6.1 Noise Minimization Measure 1

Operational sound levels would comply with the applicable sound limit. Anticipated sound reducing design measures include, but are not limited to, the use of the following:

- Acoustically rated wall, ceiling, and door assemblies;
- Silenced building ventilation;
- Electric-drive compressor motors rather than combustion engines;
- Acoustical lagging/insulation;
- Acoustical enclosures;
- Low noise fans, blowers, motors;
- Acoustical barriers; and
- Acoustical silencers.

3.6.6.2 Noise Minimization Measure 2

Semi-permanent stationary equipment (e.g., generators and lights) might be available in “quiet” packages and would be stationed as far from sensitive areas as possible.

3.6.6.3 Noise Minimization Measure 3

Haul trucks and other engine-powered equipment would be equipped with adequate mufflers. Haul trucks would be operated in accordance with posted speed limits. Truck engine exhaust brake use would be limited to emergencies.

3.6.6.4 Noise Minimization Measure 4

PSE would establish a phone number or other effective means for the public to report any significant undesirable noise conditions associated with construction and operation of the Tacoma LNG Facility.

3.6.6.5 Noise Minimization Measure 5

Throughout Project construction and operation, PSE would document, investigate, evaluate, and attempt to resolve noise complaints related to the Tacoma LNG Facility. PSE or its authorized agent would:

- Document and respond to each noise complaint,
- Attempt to contact the person(s) making the noise complaint within 24 hours,
- Investigate to attempt to determine the source of noise related to the complaint,
- Conduct 24-hour noise monitoring at the location of the noise complaint, and
- If the noise complaint is legitimate, take measures to reduce the noise.

3.6.7 Conclusion

During construction and operation of the Project, some noise would be emitted. However, the resulting sound levels would comply with the applicable standards. In addition, with implementation of the above mitigation measures, no significant unavoidable adverse noise-related impacts would be expected for the Proposed Action.

3.7 Land Use and Recreational Resources

This section describes existing land use and recreational resources near components of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates the potential effects of the development and operation of the Project (referred to herein as the Proposed Action) on both resources. Analysis provided in this section evaluates the potential impacts to land use and recreational resources that could result from construction, operation, and decommissioning of the Project. Where appropriate, mitigation measures are identified to reduce or avoid these potential impacts. The impacts of no action are discussed as an alternative to the Proposed Action.

3.7.1 Study Methodology

This section describes the methodology used to determine the Proposed Action's potential impacts to land use and recreational resources within the Proposed Action area. The Project crosses the jurisdictions of the City of Tacoma, the City of Fife, and unincorporated Pierce County (see Figure 1-2 in Chapter 1, "Purpose, Need, and Alternatives Considered").

3.7.1.1 Land Use

The land use study area used for this analysis encompasses land crossed by the Project components, as well as lands within 400 feet of the boundary of each Project component (see Figure 3.7-1). The 400-foot distance used to analyze the Proposed Action's potential impacts to land use was derived from Section 13.05.020 (Table H) of the City of Tacoma Municipal Code (TMC), which requires notification of a public hearing to be issued to all property owners within 400 feet of a proposed development. Adopting the 400-foot public notice distance as the land use study area is appropriate because it extends to incorporated adjacent lands and complies with notice requirements in all local jurisdictions within the Proposed Action area. (City of Fife 2015a; City of Tacoma 2015a; Pierce County 2014a)

Potential impacts to land use were determined using aerial photography, using geographical information system (GIS) mapping, and by reviewing and comparing these data to applicable land use planning documents. Potential land use impacts were determined based on whether the Proposed Action would comply with and be compatible with applicable comprehensive plan designations, zoning classifications, and shoreline master program designations in the land use study area.

In addition, Section 3.7.3.2 includes a brief summary of potential land use issues relating to designated critical areas in the jurisdictions crossed by the Project. However, potential impacts to critical areas are discussed in detail in Section 3.1, "Earth"; Section 3.3, "Water"; and Section 3.4, "Plants and Animals".

The ancillary question of whether the Project Action would result in displacement of residents, workers, businesses, or other current site users is dealt with in Section 3.12, "Socioeconomics".

3.7.1.2 Recreational Resources

The recreational resources study area used for this analysis encompasses land crossed by the Project components, as well as lands within 0.25 mile of the boundary of each Project component (see **Figure** 3.7-2). The 0.25 mile distance was selected as a conservative approach to ensuring that all designated and informal recreational opportunities in the immediate vicinity of the Proposed Action are taken into account.

For the purpose of this analysis, recreational resources encompass federal, state, and local recreation areas such as wildlife refuges, scenic highways and roads, forests, parks, landmarks, campgrounds, hiking trails, golf courses, fishing and boating facilities, and other significant public and special interest areas. Recreational resources were identified based on aerial photography, the Washington State Parks and Recreation Commission website, and the recreational resources master planning documents from the three jurisdictions crossed by the Project (WSPRC not dated a; Hylebos Marina 2010; City of Fife 2008a; Metro Parks Tacoma 2006; Pierce County 2014b).

3.7.2 Existing Land Use and Recreational Resources

This section describes existing land uses within the land use study area. It also identifies recreational resources and active recreational waterway uses located within the 0.25-mile recreational resources study area.

3.7.2.1 Existing Land Use

Figure 3.7-1 (sheets 1 through 6) provides an aerial view of the existing land use on each Project component site and within 400 feet of the Proposed Action. The following sections provide a supplementary narrative description of land use with reference to Project components.

Tacoma Liquefied Natural Gas Facility and TOTE Marine Vessel Liquefied Natural Gas Fueling System

Industrial uses date back a century at the sites of the Project's proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. Adjacent areas are also industrial and include predominantly maritime cargo traffic in the Hylebos and Blair waterways. (Port of Tacoma 2014b)

Current tenants on the Tacoma LNG Facility site are PCC Logistics, EHW Constructors, and Safe Boats. PCC Logistics is a warehousing, trucking, distribution, and freight services company that has approximately 15 employees, while EHW Constructors uses the site for construction storage and has up to six employees working on site at any given time. Safe Boats leases the existing pier for testing new vessels. The Port of Tacoma Maintenance Department utilizes some areas for equipment storage.

The TOTE Marine Vessel LNG Fueling System would be constructed within one 68-acre parcel located along the Blair Waterway side of the Blair-Hylebos peninsula. The TOTE site currently consists of loading/unloading ramps; administration, maintenance, and warehouse buildings; and a paved trailer yard. The shoreline along the Blair Waterway is developed with wharves, piers, and riprap armored slopes. Several existing in-water structures in the Blair Waterway are associated with existing TOTE operations: one timber T-pier, three concrete piers, and one concrete breasting dolphin. Adjacent properties contain a mix of industrial, commercial, and storage uses, interspersed with some vacant parcels.

Regulated shorelines are located along Hylebos Waterway at the northeastern boundary of the Tacoma LNG Facility and along Blair Waterway at the southwestern boundary of the TOTE Marine Vessel LNG Fueling System. Much of the shoreline along the vicinity of each site is developed with bulkheads, wharves, piers, and riprap, which is typical of water-dependent, maritime industrial uses.

Puget Sound Energy Natural Gas Distribution System

The Puget Sound Energy (PSE) Natural Gas Distribution System includes proposed distribution pipeline Segments A and B, as well as the Golden Given Limit Station and the Frederickson Gate Station.

Segment A – Taylor Way. Segment A would extend approximately 4 miles in length. Figure 3.7-1 shows Segment A mileposts (MP A) that aid in the description of the location of land uses relevant to this component.

The land use study area adjacent to Segment A between MP A0.0 and MP A2.2 is located along the Blair-Hylebos peninsula and dominated by an industrial landscape. Adjacent land uses encompass maritime industrial uses interspersed with vacant parcels and commercial, industrial, manufacturing, and timber and lumber facilities. Specific examples of surrounding industrial land use include the Graymont Tacoma precipitated calcium carbonate plant located south of Segment A near the Tacoma LNG Facility site. This plant produces several different lime-based products for five paper companies operating seven separate mills in the surrounding area. Other industrial and commercial manufacturers such as Superlon, which manufactures polyethylene pipe, and Gardner Fields Company, which manufactures roofing and waterproofing materials, are immediately adjacent to Segment A southeast of Lincoln Avenue at approximately MP A0.7.

Between MP A2.3 and MP A2.6, the land use study area includes a mix of residential, commercial, and warehouse storage uses. Between MP A2.6 and MP A3.9, the land use study area includes predominantly commercial, manufacturing, and industrial uses, intermixed with vacant lots. The majority of the land use study area south of Interstate 5 between MP A3.9 and A4.0 supports commercial facilities. Commercial and residential uses are located to the east and southeast of MP A4.0.

Portions of Segment A would cross existing sections of railroad at 11 separate locations. Segment A would cross five sections of active rail and six sections of abandoned rail.

Certain areas within the land use study area, but outside of the Segment A centerline and workspace, include land held in trust for the Puyallup Tribe of Indians between approximately MP A3.7 and A3.8 (City of Fife 2012). Tribal lands are also located within the land use study area on the Blair-Hylebos peninsula, approximately between MP A1.0 and A1.5 (Port of Tacoma 2014b).

Segment B – Golden Given Road East. Segment B would extend approximately 1 mile in length. **Figure** 3.7-1 shows Segment B mileposts (MP B) that aid in the description of the location of land uses relevant to this component.

The land use study area within 400 feet of Segment B includes primarily single-family and multifamily residential uses, interspersed with neighborhood commercial and service facilities, light industrial uses, and scattered vacant parcels. Segment B between approximately MP B0.0 and MP B0.8 is lined predominantly by single-family residential uses. South of the intersection with State Route 512 (between MP B0.8 and MP B1.0), adjacent land uses include multifamily residential uses directly to the west and an auto-mechanic business and industrial and vacant lands to the east.

Golden Given Limit Station. The site proposed for the Golden Given Limit Station is currently operated as a commercial printing business. As currently developed, the parcel includes one 5,000-square-foot building and a paved parking lot. Land uses within the 400-foot boundary of analysis surrounding the proposed site of the Golden Given Limit Station are predominantly single-family residential uses, interspersed with some vacant parcels.

Fredrickson Gate Station. Land uses within 400 feet of the proposed Fredrickson Gate Station site include:

- To the north, across 192nd Street East, industrial uses predominantly controlled by Toray Composites, Inc., which develops and supplies carbon fiber materials;
- To the southwest, an existing PSE facility;
- To the south, across 196th Street East, the Pierce County Road Operations Division facility; and
- To the east and west, largely vacant lands.

3.7.2.2 Existing Recreational Resources

Existing recreational resources within 0.25 mile of the Proposed Action are shown in **Figure 3.7-2**. The following is a supplementary narrative description of recreational resources with respect to Project components.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are located between the Blair and Hylebos Waterways.

Minimal recreational use occurs on the Blair Waterway. No marinas or loading docks on the Blair Waterway are open to the public. Recreational fishing is unlikely to take place on the Blair Waterway. The Blair Waterway has no boat access to inland streams or sources of fresh water; the shoreline is heavily industrialized; container ships frequent the waterway; and no public boat launches exist on the waterway.

The Hylebos Waterway has two public marinas located on the northern side of the waterway. Recreational vessels that travel through Commencement Bay and beyond and originate at these two marinas must travel through a portion of the Hylebos Waterway to get to their destinations. The two public marinas have the following features:

- **Hylebos Marina** is a 170-slip marina that can accommodate yachts up to 80 feet in length. The marina provides electric services but does not provide live-aboard accommodations. The marina only serves long-term guests and cannot support short-stay boaters (Hylebos Marina 2010).
- **Chinook Landing Marina** is a 213-slip marina. Live-aboard accommodations are not provided (Chinook Landing Marina, pers. comm. 2013).

The Chinook Landing Marina is located north of the Tacoma LNG Facility site, across the Hylebos Waterway, and within the 0.25-mile boundary of this recreational resources analysis. Chinook Landing Marina is a private marina providing mooring for recreational watercraft. Chinook Landing Marina provides year-round public access to the facility's pump-out station (WSPRC not dated a). Tribal commercial fishing vessels also moor at the Chinook Landing Marina (Chinook Landing Marina, pers. comm. 2013).

The Hylebos Waterway is busiest with recreational users in the summer, particularly on weekends and holidays. Recreational boaters and kayakers can also access the Hylebos Waterway from other locations, such as community waterfront access and public boat launches located on the east side of Commencement Bay. Some recreational anglers use the Hylebos Marina and Chinook Landing Marina, but fishing pressure in the Hylebos and Blair waterways is anticipated to be low. The Hylebos Waterway connects to the Hylebos Creek to the east and, as such, the potential exists for pink salmon to use the Hylebos for migration up to Surprise Lake. However, fishing for pink salmon is not believed to be common, and salmon fishing would be closed in the area for the entire months of April, June, and July. Fishing for bottom fish is not advised. Squid potentially use both waterways, and a small number of recreation squid anglers may use the area to fish for them. Squid are fished during the night, when vessel traffic is significantly diminished. (Lothrop, pers. comm. 2013)

PSE Natural Gas Distribution System

Segment A – Taylor Way. Dedicated waterfront public access opportunities do not exist on the Blair-Hylebos peninsula as industrial development activity prohibits on-site access to ensure the safety and security of Port of Tacoma operations. Accordingly, the port provides opportunities for public access off site on property owned by the port. Portions of the Port of Tacoma's Place of Circling Waters would be located within the recreational resources study area in the vicinity of Segment A near MP A2.2 and MP A2.3, including the Place of Circling Waters. The Place of Circling Waters is a 30-acre habitat site consisting of intertidal marsh, stream channels, and forested open space inhabited by salmon, water birds, and other wildlife. Recreational opportunities on the site include a paved walkway and public overlook. (Metro Parks Tacoma 2015).

In addition, the terminus of Segment A is located within 0.25 mile of Fife High School., which is designated as a "recreational provider" in the *City of Fife Parks, Recreation and Open Space Plan*. Fife High School provides access to multiple athletic fields, tennis and basketball courts, and an eight-lane track and gymnasium. (City of Fife 2008a)

Segment B – Golden Given Road East, Golden Given Limit Station, and Fredrickson Gate Station. No recreational resources have been identified within 0.25 mile of Segment B, the proposed Golden Given Limit Station, or Fredrickson Gate Station. In addition, the *Pierce County Parks, Recreation and Open Space Plan* (PROS Plan) shows that the Project would not cross or come within 0.25 mile of national or state forest lands. (Pierce County 2014c)

3.7.3 Regulatory Framework

This section summarizes the land use regulatory framework within the land use study area, as defined by state, regional, and local land use regulations. It also summarizes the applicable plans and policies that guide recreational resources within the recreational resources study area. Relevant jurisdictions include the State of Washington, Puget Sound Regional Council, City of Tacoma, City of Fife, Pierce County, and Port of Tacoma.

Although a portion of one Project component (Segment A) would be located adjacent to lands held in trust for or otherwise belonging to the Puyallup Tribe of Indians (City of Fife 2012; Port of Tacoma 2014b), no portion of the Project would be constructed on any such lands. Therefore, no tribal regulations affecting land use or recreational resources would apply to the Proposed Action.

3.7.3.1 Land Use Framework

State of Washington

Land Use regulations deriving from State law are expressed through the development and adoption of local land use plans as mandated by the State of Washington Growth Management Act (GMA) and the Shoreline Management Act. The following is a brief description of those laws.

Growth Management Act

The GMA was originally adopted in 1990 and most recently amended in 2013. This law was created to help guide development in Washington by requiring that jurisdictions subject to the GMA must prepare and adopt comprehensive plans, countywide planning policies, and development regulations that adhere to those plans and policies. These plans, policies, and regulations must be updated every seven years to ensure consistency and compliance with the GMA as it is modified and jurisdictions evolve. (Revised Code of Washington [RCW] 36.70A)

A comprehensive plan is a land use document that sets forth a jurisdiction's long-range vision of its future development, including delivery of services, demographics, transportation, industry, and community socioeconomic development. A comprehensive plan guides the adoption of specific zoning ordinances and development regulations, which in turn regulate and control land use on a daily basis.

The 13 goals listed in the GMA to guide the development of comprehensive plans and development regulations relate to urban growth, sprawl reduction, transportation, housing, economic development, property rights, permits, natural resource industries, open space and recreation, environment, citizen participation and coordination, public facilities and service, and historic preservation (RCW 36.70A.020).

The GMA also requires the designation and protection of "critical areas" to prevent harm to the community from natural hazards and to protect natural resources. Each local jurisdiction adopts a critical areas ordinance to define critical areas and to regulate their protection.

Shoreline Management Act

The Shoreline Management Act (RCW 90.58) was most recently amended in 2013. Passed by the State Legislature in 1971 and adopted by voters in 1972, the overarching goal of this act is "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines."

The Shoreline Management Act regulates the shorelines of the state through Shoreline Master Programs (SMPs) within each applicable jurisdiction in the state. Shorelines of statewide significance are generally described in RCW 90.58.030 and include portions of Puget Sound and other marine waterbodies. Waterbodies in the Proposed Action area that are regulated under the Shoreline Management Act include the Puget Sound shorelines, Commencement Bay, and other smaller waterways as identified in local SMPs.

Regional

The Puget Sound Regional Council's Vision 2040 is a document prepared by Puget Sound Regional Council to outline a shared strategy for development throughout Puget Sound region, which covers Pierce, King, Kitsap, and Snohomish Counties, through 2040. As a regional plan, the concepts within Vision 2040 guide the development of local land use plans. (PSRC 2009)

Vision 2040 lists the Port of Tacoma as a regional Manufacturing/Industrial Center (M/IC). The plan defines regional M/ICs as "locations of intensive employment with facilities having large spaces for the assembly of goods, and areas suitable for outdoor storage" and "manufacturing and industrial land uses are concentrated, which cannot easily be mixed with other activities." Vision 2040 also provides goals and policies for the growth and development of regional M/ICs. (PSRC 2009)

The "Regional M/I Centers" section of Vision 2040 states that "the region will continue to maintain and support viable regional manufacturing/industrial centers to accommodate manufacturing, industrial, or advanced technology uses" (PSRC 2009). In order to reach that goal, Vision 2040 proposes one policy that is applicable to the Proposed Action: "Focus a significant share of employment growth in designated regional manufacturing/industrial centers (MPP-DP-8)."

Local

Each local jurisdiction within the land use study area regulates land use using a number of plans and policies, including Comprehensive Plans, zoning codes, SMPs, and Critical Areas ordinances. These plans, codes, policies, and ordinances are prepared taking into account applicable State law and regional plans, including the GMA, Shoreline Management Act, and Vision 2040.

Applicable comprehensive plan designations are portrayed in Figure 3.7-3. Applicable zoning and shoreline management designations are portrayed in Figure 3.7-4.

City of Tacoma

Project components located within the City of Tacoma include the Tacoma LNG Facility, the TOTE Marine Vessel LNG Fueling System, and Segment A (MP A0.0 through MP A2.2, approximately). These components are subject to the criteria and policies contained in the Generalized Land Use Element of the *City of Tacoma Comprehensive Plan* and to the regulations contained in Title 13 (Land Use Regulatory Code) of the TMC. These components are also subject to the shoreline management provisions contained in the City of Tacoma Shoreline Master Program codified in Chapter 13.10 (Shoreline Management) of the TMC and to the critical areas provisions provided in Chapter 13.11 (Critical Areas Preservation) of the TMC. (City of Tacoma 2013; City of Tacoma 2014; City of Tacoma 2015a).

City of Fife

Project components located within the city of Fife include Segment A (MP A2.3 through MP A4.0, approximately). This component is subject to the criteria and policies contained in the Land Use Element of the *City of Fife Comprehensive Plan* (City of Fife 2015b) and to the regulations contained in Title 19 (Zoning Code) of the City of Fife Municipal Code (FMC) (City of Fife 2015c). This component is also subject to the critical areas provisions under Title 17 (Environmental Protection) of the FMC (City of Fife 2015d).

A portion of the land use study area associated with Segment A extends into the City of Fife's Urban Growth Area (UGA). Under the GMA, each county must designate such UGAs where future growth is focused (RCW 36.70a.110). Per the *City of Fife Comprehensive Plan,* land use designations within the City of Fife UGA are maintained in a manner consistent with the policies and implementation strategies of Pierce County (City of Fife 2015b).

Pierce County

New pipeline Segment B of the PSE Natural Gas Distribution System, the newly proposed Golden Given Limit Station, and upgrades to the existing Fredrickson Gate Station are within unincorporated areas in Pierce County. Accordingly, these components are subject to the following:

- Criteria and policies contained in the Pierce County Comprehensive Plan, which is included as Title 19A (Comprehensive Plan) in the Pierce County Code (PCC) (Pierce County 2014c).
- Regulations contained in Title 18A (Development Regulations - Zoning) of the PCC (Pierce County 2014d).
- Critical areas provisions provided under Title 18E (Development Regulations—Critical Areas) of the PCC (Pierce County 2014e).

Port of Tacoma

The Port of Tacoma has developed a Land Use and Transportation Plan to guide future development in a manner consistent with the Port's Strategic Plan. Under this plan, the Port of Tacoma acknowledges the jurisdiction of the City of Tacoma and the appropriate land use and zoning designations for port areas, and supplements these with port-specific Development Designations. (Port of Tacoma 2014a,b).

3.7.3.2 Land Use Designations

Comprehensive Plan Designations

Comprehensive plan designations within the land use study area appear in Figure 3.7-3, are further summarized in this section, and are listed in Table 3.7-1.

City of Tacoma

Comprehensive Plan designations for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System components are illustrated in Figure 3.7-3 (sheet 1 of 6), and include:

- **Manufacturing/Industrial Center (M/IC).** Applies to both sites and the surrounding 400-foot land use study area.
- **High-Intensity Industrial Development (IDHI).** Applies to both sites and the surrounding land use study area, except for areas with a shoreline designation.
- **Shoreline High-Intensity Environment.** Applies to the portions of both sites and the surrounding land-use study area that have a shoreline designation (see "Shoreline Management Designations," below).

Similarly, the portion of proposed distribution pipeline Segment A (and all areas within the surrounding 400-foot land use study area) is located in the city of Tacoma on lands designated M/IC and IDHI.

Generally, the *City of Tacoma Comprehensive Plan* promotes growth in marine import-export activities to increase the port's prominence in the local, regional, state, and national economy.

- The M/IC designation, as described in the City of Tacoma Comprehensive Plan, protects and preserves the port industrial area for manufacturing and industrial uses (City of Tacoma 2014a).
- The intent of the IDHI designation, as described in the City of Tacoma Comprehensive Plan, is to support industrial uses that generate high-activity patterns and high traffic and require direct access to major highway and shipping routes (City of Tacoma 2014a).
- The Shoreline High-Intensity Environment designation provides for high-intensity, water-dependent industrial uses while protecting and restoring previously degraded ecological functions (City of Tacoma 2013).

Project components located in the City of Tacoma are consistent with the intent and purpose of all applicable land use designations under the *City of Tacoma Comprehensive Plan*.

City of Fife

The portion of proposed distribution pipeline Segment A located in the City of Fife would be constructed and operated in a workspace located entirely within existing road right-of-way (ROW) and not subject to Comprehensive Plan Land Use designations, as portrayed in Figure 3.7-3 (sheets 2 through 4 of 6). In addition, the Utilities Element in the *City of Fife Comprehensive Plan* promotes the collocation of utilities and existing ROWs by "encourage[ing] the joint use of utility corridors where lawful and in keeping with prudent utility practice" (City of Fife 2015b).

Therefore, Project components located in the City of Fife are not subject to comprehensive plan land use designations but are otherwise consistent with the relevant intent and policies of the *City of Fife Comprehensive Plan*. Areas within the surrounding land use study area have designations listed in Table 3.7-1.

Pierce County

Proposed distribution pipeline Segment B would be constructed and operated in a workspace located entirely within existing road ROW and not subject to comprehensive plan land use designations, as portrayed in Figure 3.7-3 (sheet 5 of 6). In addition, section 19A.90.010.C.2 of the *Pierce County Comprehensive Plan* "encourages the joint use of utility corridors" to foster cost-effective utility services (Pierce County 2014c).

Construction and operation of the Golden Given Limit Station would occur completely within a single parcel boundary designated Moderate Density Single-Family (MSF) by the *Pierce County Comprehensive Plan,* as portrayed in Figure 3.7-3 (sheet 5 of 6). Areas within the surrounding land use study area are generally designated MSF. Per section 19A.90.010.H of the *Pierce County Comprehensive Plan*, "utility facilities should be designed to be compatible with adjacent land uses", "to reasonably avoid or mitigate the impacts of utility facility development" and "be built at a residential scale." (Pierce County 2014c)

All upgrades to the Fredrickson Gate Station would occur within an area designated Employment Center (EC) by Pierce County. Areas within the surrounding land use study area are also designated EC, as portrayed in Figure 3.7-3 (sheet 6 of 6). Pierce County's EC designation supports industrial and manufacturing needs such as heavy industrial manufacturing and processing. (Pierce County 2014c)

Therefore, Project components within unincorporated Pierce County would generally be consistent with the intent and purpose of applicable land use designations and utilities policies, although Section 3.7.4 discusses potential impacts associated with compatibility of the Golden Given Limit Station design with adjacent land uses.

Table 3.7-1 Comprehensive Plan Land Use Designations within 400 Feet of the Proposed Action

Component of the Proposed Action	Jurisdiction/ Comprehensive Plan	Comprehensive Plan Designation
Tacoma LNG Facility	City of Tacoma	High-Intensity Industrial Development (IDHI) Manufacturing/Industrial Center (M/IC) Shoreline High-Intensity Environment
TOTE Marine Vessel LNG Fueling System	City of Tacoma	High-Intensity Industrial Development (IDHI) Manufacturing/Industrial Center (M/IC) Shoreline High-Intensity Environment
Pipeline Segment A	City of Tacoma	High-Intensity Industrial Development (IDHI) Manufacturing/Industrial Center (M/IC)
	City of Fife	High Density Residential Medium Density Residential Industrial

Table 3.7-1 Comprehensive Plan Land Use Designations within 400 Feet of the Proposed Action

Component of the Proposed Action	Jurisdiction/ Comprehensive Plan	Comprehensive Plan Designation
		Mixed Commercial/High Density Residential Mixed Medium Density Residential/Commercial Small Lot Single Family Residential
	Pierce County (City of Fife Urban Growth Area)	Moderate Density Single Family (MSF)
Pipeline Segment B	Pierce County	Employment Center (EC) High Density Residential (HRD) Moderate Density Single Family (MSF) Mixed Use District (MUD)
Golden Given Limit Station	Pierce County	Moderate Density Single Family (MSF)
Fredrickson Gate Station	Pierce County	Employment Center (EC)

Sources: City of Tacoma 2014a; City of Fife 2015b; Pierce County 2014c.

Zoning

Zoning classifications within the land use study area appear in Figure 3.7-4, are further summarized in this section, and are listed in Table 3.7-2 (which also includes shoreline designations).

City of Tacoma

The proposed Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and portions of proposed distribution pipeline Segment A located between MP A0.0 and MP A2.2, as well as all non-shoreline areas in the surrounding 400-foot land use study area, would be located on land zoned Port Maritime Industrial (PMI) - (City of Tacoma 2015b). A short portion of Segment A located between MP A2.2 and MP A2.3, and the surrounding land use study area, would be located on land zoned Heavy Industrial (M2). This is portrayed in Figure 3.7-4 (sheets 1 through 3 of 6).

A variety of uses are permitted in the PMI District, including Industry, heavy; Port, terminal and industrial (water-dependent or water-related uses); and Utilities. In addition, TMC 13.06.400.B.3 states that the PMI District is intended to allow all industrial uses and uses that are not permitted in other districts. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be water-dependent industrial uses as defined in the TMC. (City of Tacoma 2015a)

The M2 Heavy Industrial District is intended to allow most industrial uses. Utilities are listed as a permitted use in this district. (City of Tacoma 2015a)

Accordingly, Project components located in the city of Tacoma are consistent with uses permitted in the applicable zoning districts. See “Shoreline Management Designations,” below, for information on Shoreline Management Designations in this area.

City of Fife

The proposed underground pipeline (Segment A) would be located within existing road ROW and would therefore not impact development on surrounding lands along the length of the pipelines, regardless of the applicable zoning districts. Areas within the surrounding 400-foot land use study area are included in zoning districts designated by the City of Fife and Pierce County (City of Fife UGA), portrayed in Figure 3.7-4 (sheets 3 and 4 of 6), and listed in Table 3.7-2.

Pierce County

The proposed underground pipeline (Segment B), and areas in the surrounding land use study area, are located in a variety of zoning districts along Golden Given Road, including Single Family (SF), Moderate Density Single Family (MSF), Community Employment (CE), Mixed Use District (MUD), and Moderate High-

Density Residential (MHR), as portrayed in Figure 3.7-4 (sheet 5 of 6). These zoning districts are specific to the *Parkland-Spanaway-Midland Communities Plan* area. Per Table 18A.28.010 of the PCC, natural gas pipelines are a permitted use under all these districts (Pierce County 2014d). In addition, PCC Section 18A.05.025.B.6 states that "natural gas distribution lines (as opposed to transmission lines) and necessary appurtenant facilities and hookups" are exempt from the Zoning Code.

Construction and operation of the Golden Given Limit Station would occur completely on a single parcel zoned SF, as portrayed in Figure 3.7-4 (sheet 5 of 6). Areas within the surrounding land use study area are also generally designated SF. As with Segment B, this designation is specific to the *Parkland-Spanaway-Midland Communities Plan* area. Construction and operation of the Golden Given Limit Station, a natural gas distribution facility, is permitted as a conditional use in the SF zone under the Utilities Use Category provided in Table 18A.28.010 of the PCC. (Pierce County 2014d)

Upgrades to the Fredrickson Gate Station would be confined to the existing site within unincorporated Pierce County zoned EC. Land within the land use study area surrounding the site is also zoned EC within the *Frederickson Community Plan* area, as portrayed in Figure 3.7-4 (sheet 6 of 6). The natural gas distribution facility at the Fredrickson Gate Station is a permitted use in the EC zone under the Utilities Use Category provided in Table 18A.22.010 to the PCC. The upgrades would not preclude future development on surrounding lands.

Shoreline Management Designations

Portions of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are located in City of Tacoma Shoreline Management areas designated Shoreline District (S-10) Port Industrial Area and Shoreline District (S-13) Marine Waters of the State, as portrayed in Figure 3.7-4 sheet 1 of 6.

- The S-10 district forms a 200-foot buffer area from the ordinary high water mark landward along the Hylebos and Blair waterways. The purpose of the S-10 district is to allow the continued development of the Port Industrial Area while increasing the intensity of development and emphasizing terminal development within the City. (City of Tacoma 2013).
- The S-13 district area includes all marine waters waterward from the ordinary high water mark to the seaward city limit of the City of Tacoma. The purpose of the S-13 district is to maintain marine waters for public navigation, commerce, and recreation and to manage in-water structures consistently throughout the City's shorelines. (City of Tacoma 2013)

The Proposed Action would be consistent with the S-10 district, as S-10 shorelines surrounding the Hylebos and Blair waterways are classified as urban and are intended to accommodate high-intensity industrial uses at the Port. The Proposed Action would also be in conformance with the S-13 district, which permits water-dependent Port Industrial development, consistent with permitted development on the adjacent upland S-10 district. (City of Tacoma 2013)

The Tacoma Shoreline Master Program (SMP) requires that development on publicly-owned land such as land owned by the Port of Tacoma provide public access to the shoreline (Tacoma Shoreline Master Program, October 15, 2013). In circumstances where there are security or safety constraints that preclude the ability to safely provide public access there are three alternative means of meeting the public access requirements.

1) Developing public access at an alternative location pursuant to the Port of Tacoma's (2013) Shoreline Public Access Plan
2) Contributing to a project identified in the City's Public Access Alternatives Plan, or
3) Providing funds calculated in accordance with the formula contained in the Interlocal Agreement Authorizing a Flexible Approach to the Shoreline Public Access Provision between the City and the Port.

Table 3.7-2 Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action

Component of the Proposed Action	Jurisdiction	Zoning Designations
Tacoma LNG Facility	City of Tacoma	Port Maritime Industrial (PMI) Shoreline District (S-10) – Port Industrial Area (HI) Shoreline District (S-13) – Marine Waters of the State (A)
TOTE Marine Vessel LNG Fueling System	City of Tacoma	Port Maritime Industrial (PMI) Shoreline District (S-10) – Port Industrial Area (HI) Shoreline District (S-13) – Marine Waters of the State (A)
Pipeline Segment A	City of Tacoma	Port Maritime Industrial (PMI) Heavy Industrial (M2)
	City of Fife	Community Mixed Use (CMU) Industrial (I) High Density Residential (HDR) Medium Density Residential (MDR) Neighborhood Commercial (NC) Neighborhood Residential (NR) Public Use/Open Space (POS) Regional Commercial (RC)
	Pierce County (City of Fife Urban Growth Area)	Moderate Density Single-Family (MSF)
Pipeline Segment B	Pierce County (Parkland-Spanaway-Midland Communities Plan)	Community Employment (CE) Mixed Use District (MUD) Moderate-High Density Residential (MHR) Moderate Density Single-Family (MSF) Single Family (SF)
Golden Given Limit Station	Pierce County (Parkland-Spanaway-Midland Communities Plan)	Single-Family (SF)
Fredrickson Gate Station	Pierce County (Fredrickson Community Plan)	Employment Center (EC)

Sources: City of Tacoma 2013; City of Tacoma 2015b; City of Fife 2012; Pierce County 2014d.

Critical Areas

Under the GMA, local jurisdictions with land use authority must identify critical areas in consultation with the Washington State Department of Ecology, per the requirements of RCW 36.70A.050.

City of Tacoma

The City of Tacoma Critical Areas Ordinance is codified in Chapter 13.11 of the City of Tacoma Municipal Code (City of Tacoma 2015a). Critical areas discussed in this ordinance include critical aquifer recharge areas, fish and wildlife habitat conservation areas, flood hazard areas, geologically hazardous areas, stream corridors, and wetlands. Maps identifying critical areas are provided in the Environmental Policy Element of the City of Tacoma Comprehensive Plan (City of Tacoma 2014a). Potential development activities and their related impacts to critical areas are discussed in detail elsewhere in this draft environmental impact statement (DEIS), as indicated:

- Geologically hazardous areas and seismic hazard areas are discussed in Section 3.1, “Earth.” The area surrounding the Tacoma LNG Facility, the TOTE Marine Vessel LNG Fueling System, the portions of Segment A within the City of Tacoma, and surrounding areas in the land use study area are identified as highly vulnerable to volcanic hazards and highly susceptible to liquefaction. (City of Tacoma 2014a)

- Wetlands, critical aquifer recharge areas, and frequently flooded areas are discussed in detail in Section 3.3, "Water Resources." Wetlands and aquifer recharge areas are both located in close proximity to the proposed Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and Segment A within the land use study area (City of Tacoma 2014a).
- Fish and wildlife habitat conservation areas are discussed in detail in Section 3.4, "Plants and Animals." Such areas are located near but not within the land use study area (City of Tacoma 2014a).

City of Fife

Critical areas for the City of Fife are addressed in Chapter 17 of the FMC (City of Fife 2015d). Critical areas regulated in Chapter 17.05 include wetlands, critical aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas, geologically hazardous areas, and seismic hazard areas. The City of Fife has produced a "Critical Areas Mapset" portraying the location of potential critical areas (City of Fife 2008b). Potential development activities and their related impacts to critical areas are discussed in detail elsewhere in this DEIS, as indicated:

- Geologically hazardous areas and seismic hazard areas are discussed in **Section 3.1**, "Earth." The Critical Areas Mapset identifies the entire portion of distribution pipeline Segment A within the City of Fife, as well as the surrounding land use study area to be within an area exposed to seismic hazards and volcanic lahar hazards. However, other geological risks, such as landslides and erosion, do not appear to be a concern in this area. (City of Fife 2008b)
- Wetlands, critical aquifer recharge areas, and frequently flooded areas are discussed in **Section 3.3**, "Water Resources." The entire portion of distribution pipeline Segment A within the City of Fife, as well as the surrounding land use study area, are located within an aquifer recharge area and in a flood hazard area. The presence of wetlands and water bodies has been verified and inventoried along 12th St E between approximately MP A3.1 and MP A3.3. (City of Fife 2008b)
- Fish and wildlife habitat conservation areas are discussed in detail in **Section 3.4**, "Plants and Animals." Potential fish and wildlife habitat areas have been identified at several areas along Segment A within the City of Fife, and in particular in the vicinity of 12th St E and associated wetlands. (City of Fife 2008b)

Pierce County

Critical areas in unincorporated areas of Pierce County are defined in PCC Title 18E (Development Regulations—Critical Areas). Critical areas identified by the County include erosion, landslide, seismic, volcanic, mine, and flood hazard areas; streams; wetlands; certain fish and wildlife species and habitat; and aquifer recharge area s. Pierce County's PublicGIS system maps the location of potential critical areas under the categories "Flood Related," "Wetlands-Related Data," and "Possible Site Constraints" (Pierce County 2015). Potential development activities and their related impacts to critical areas are discussed in detail elsewhere in this DEIS, as indicated:

- Geologically hazardous areas and seismic hazard areas are discussed in Section 3.1, "Earth."
    - Segment B and Golden Given Limit Station: Potential landslide areas near State Route 512 along Segment B and in surrounding land use study area.
    - Fredrickson Gate Station: Potential erosion and landslide areas on site and in surrounding land use study area.
- Wetlands, critical aquifer recharge areas, and frequently flooded areas are discussed in Section 3.3, "Water Resources."
    - Segment B and Golden Given Limit Station: Some inventoried wetlands, and a potential flood hazard area in the land use study area near MP B1.0.

  - Fredrickson Gate Station: Some inventoried wetlands on undeveloped portion of site. Nearly whole site and surrounding land use area subject to flood hazard and wetlands review.

- Fish and wildlife habitat conservation areas are discussed in Section 3.4, "Plants and Animals."
  - Segment B and Golden Given Limit Station: No identified habitat areas within land use study area.
  - Fredrickson Gate Station: Potential fish and wildlife habitat in the vicinity of inventoried wetlands.

3.7.3.3 Recreational Resources

State and Federal

As shown in Figure 3.7-2, there are no state or federal recreational resources within the recreational resources study area. The nearest state park to the Project is Dash Point State Park in Federal Way, which is located approximately 2.5 miles north of the proposed Tacoma Liquefied Natural Gas Facility. The nearest federal recreational resource is Holiday Park FamCamp, which is located at Joint Base Lewis – McChord, approximately 3.5 miles southwest of new distribution pipeline Segment B. (US Military Campgrounds 2015; WSPRC not dated b)

Local

Local jurisdictions operating recreational resources in and around the recreation include Metro Parks Tacoma,[11] the City of Fife, and Pierce County. All three have adopted parks and recreation master planning documents to provide a long-term vision for the conservation, maintenance, and proposed improvements to park systems and recreational resources. The goals and objectives outlined in these planning documents align with the goals and policies provided in each jurisdiction's comprehensive planning document (Metro Parks Tacoma 2006; City of Fife 2008a; Pierce County 2014b).

- Metro Parks Tacoma's Strategic Parks and Program Services Plan was adopted in August 2006 and provides an inventory of regional, neighborhood, and community parks and facilities within the City (Metro Parks Tacoma 2006). The original vision of the Strategic Parks and Program Services Plan is updated and extended to 2030 through an interim update known as Green Vision 2030 (Metro Parks Tacoma 2012).
- The City of Fife Parks, Recreation and Open Space Plan was adopted in January 2008 and provides an inventory of community and neighborhood parks, natural areas and greenspaces, and special recreational facilities within city limits (City of Fife 2008a).
- The Pierce County Council adopted the 2014 PROS Plan on February 18, 2014, through Ordinance 2014-03. The 2014 PROS Plan contains the most recent inventory of park properties, regional trails, and recreational resources in Pierce County (Pierce County 2014b).

Nonetheless, while these plans for recreational areas are a type of land use, the regulatory framework for recreational resources is guided by the various land use ordinances approved and enforced by the City of Tacoma, City of Fife, and Pierce County. Accordingly, the land use regulatory framework described above under Section 3.7.3.1, above, also applies to recreational resources. Existing and proposed recreational resources are subject to comprehensive plan, zoning, shoreline management, and critical areas designations and review processes.

[11] This is a separate municipal corporation from the City of Tacoma, whose mission is specifically targeted as a Parks District. Its incorporated area covers the city of Tacoma and several adjacent areas not within the city of Tacoma.

- The Open Space Habitat and Recreational Element of the City of Tacoma Comprehensive Plan provides policies that encourage the development of opportunities for public access to Puget Sound for water-oriented recreation and enjoyment of shorelines, including access to both natural and human-made waterfront features (City of Tacoma 2014a). Shoreline and water access policies are provided through regulations in the City of Tacoma Shoreline Master Program described in TMC Chapter 13.10 (City of Tacoma 2015a).
- The Parks and Recreation Element of the City of Fife Comprehensive Plan identifies its Goal 11 as the implementation of the City of Fife Parks, Recreation, and Open Space Plan. As part of the Parks, Recreation and Open Space Plan, it appears that the City of Fife is considering an acquisition of land in the land use study area adjacent to proposed distribution pipeline Segment A. (City of Fife 2008a; City of Fife 2015b).
- The Facilities and Services Elements of the Parkland-Spanaway-Midland Communities Plan and Fredrickson Community Plan for the corresponding unincorporated areas of Pierce County both include a number of policies that encourage the general development and improvement of recreational opportunities within the recreational resources study area. The Parkland-Spanaway-Midland Communities Plan does not specifically identify areas for park acquisition in the vicinity of proposed distribution pipeline Segment B or the Golden Given Limit Station. The Frederickson Community Plan specifically lists a set of recommended site acquisitions for park development. The proposed Fredrickson Gate Station parcel is not one of those sites. (Pierce County 2008; Pierce County 2010).

3.7.4 Impacts of the Proposed Action

This section identifies the land use impacts potentially associated with construction, operation, and decommissioning of the Project, with reference to the questions posed in Section 3.7.1.

3.7.4.1 Construction Impacts

The primary construction activities and impacts that could occur under the Proposed Action are discussed in this subsection. A complete description of the construction activities associated with the Proposed Action is provided in Chapter 2, “Description of Proposed Action.” The duration of construction for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would include:

- Building demolition: approximately three months;
- Site preparation (soil improvement, grading, and installation of below-grade utilities): approximately seven months;
- Plant construction: approximately 42 months; and,
- Blair Waterway fueling platform: approximately seven months.

Some of these timeframes would occur concurrently. Site preparation and construction would begin in the third quarter of 2015 and completion would occur by the fourth quarter of 2018. The timing of shoreline developments, including the replacement of the exiting pier on the Hylebos Waterway, would depend on the future development of the LNG market.

Regarding the PSE Natural Gas Distribution System, the estimated duration of construction for each component would be:

- Segment A: approximately seven months;
- Segment B: approximately three months;
- Golden Given Limit Station: approximately three months; and,

- Fredrickson Gate Station: approximately three months;

As discussed in Section 2.3.3.2 (Special Construction Techniques), the horizontal directional drill (HDD) methodology may be utilized as an alternative to conventional standard pipeline open trenching construction for crossings of culverts, railroads, as well as under Interstate 5 and Highway 99E.

Site preparation and construction of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and improvements to the PSE Natural Gas Distribution System would result in direct impacts to the existing land use and structures within the development footprint and periodic indirect impacts to adjacent land use over the period of construction. Construction-related impacts to existing land use and structures are described below.

Land Use

During construction, land disturbances would occur entirely within the Project's development footprint. The development footprint includes the proposed Project sites, including the Tacoma LNG Facility site, the TOTE Marine Vessel LNG Fueling System site, the paved ROWs where pipeline segments would be constructed, and existing developed areas where the limit station construction and gate station upgrades would occur. No additional staging or storage areas would be needed outside the Project's development footprint. Further, public involvement and outreach efforts to minimize temporary access disruptions to adjacent landowners within the 400-foot land use study area during construction are described in Section 3.10, "Transportation" under Section 3.10.6, "Mitigation Measures."

Therefore, construction of Project components would not cause any impacts to land use in the vicinity of the Project, and would therefore be consistent with applicable comprehensive plan designations, zoning classifications, and shoreline master program designations in the land use study area.

Recreational Resources

Construction would not affect public access to the Chinook Landing Marina or Hylebos Marina. However, temporary vessel navigation impacts could occur during construction of in-water structures in both the Hylebos and Blair waterways; these impacts would be short term and limited to the duration of construction. Once the construction barges, equipment, and supplies arrive at either site, they would largely remain stationary and would not restrict recreational vessel movement up and down the remainder of the waterways.

Construction-related maritime traffic, as described in Section 3.10.3.11, "Maritime Traffic," would include materials staging on barges in the Hylebos and would occur in the vicinity of the existing pier but would not impede surrounding recreational vessel traffic in the rest of the waterway. Recreational vessel traffic would be restricted only in the immediate vicinity of the pier berth on the Hylebos Waterway where the barge-mounted crane (derrick) and support barge would be located. This limited restriction would only occur in a small portion of the overall Hylebos Waterway and would not exceed the construction period. Construction materials staging on barges in the Blair Waterway would occur in the vicinity of the existing TOTE facilities and would not impede surrounding recreational vessel traffic in the rest of the waterway. Construction-related maritime traffic would not restrict the limited recreational vessel use in either the Hylebos or Blair waterways.

As discussed in Section 3.10.4.1, "Traffic Volumes" and Section 3.10.4.1, "Level of Service", the traffic impacts associated with construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are anticipated to be very limited and concentrated during afternoon peak hours. Access to Chinook Landing Marina, Hylebos Marina, or the Place of Circling Waters would therefore not be significantly hindered by construction-related traffic. Furthermore, construction of pipeline Segment A would take place at night and would not contribute to peak hour traffic congestion. As a result, Project construction would have no impact on recreational resources at Fife High School.

No other direct or indirect impacts to recreational resources are associated with construction of the Project.

Thus, the only construction-related impacts to recreational resources caused by the Proposed Action would consist of temporary limitations on active recreational waterway uses within portions of the Hylebos waterway. This impact is not deemed significant enough to require mitigation.

3.7.4.2 Operation Impacts

Land Use

As shown in Section 3.7.3.2, above, the presence and operation of the constructed Project components would generally comply with and be compatible with all applicable comprehensive plan designations, zoning classifications, and shoreline master program designations in the land use study area.

The only exception concerns the proposed Golden Given Limit Station, which would be a conditional use under the SF zoning designation in *the Parkland-Spanaway-Midland Communities Plan* area of unincorporated Pierce County. Mitigation may therefore be required to ensure that this conditional use remains compatible with surrounding single-family residential development. Proposed mitigation measures are outlined in Section 3.7.6.

Recreational Resources

Operation of the Project would not directly affect recreational resources within the recreational resources study area or active recreational waterway uses in the vicinity of the Project. However the Project would restrict public access to the shoreline along the Hybelos and Blair waterways.

The Tacoma LNG Facility and its associated components would be seen from Chinook Landing Marina, but the facility and its components would be similar in character to that of the existing facility site, areas near it, and other maritime industrial land use along the Hylebos Waterway.

Project operations would not affect public access to the Chinook Landing Marina or Hylebos Marina. Operation-related maritime traffic, as described in Section 3.10.3.11, “Maritime Traffic,” would not restrict the limited recreational vessel use in either the Hylebos or Blair waterways. The proposed addition of two barge trips per week to fuel TOTE vessels would be a minor addition in comparison to existing maritime traffic on the two waterways as shown in tables provided in Appendix I. Therefore, the Project would have minimal, if any, impact on these recreational waterway uses during operation.

Operation of new pipeline Segment A would occur underground approximately 0.25 mile away from the Place of Circling Waters public overlook; however, its presence would not interrupt use of the site by recreationalists.

Because Fife High School’s athletic fields would be located approximately 550 feet to the west of Segment A, operation of Segment A would not directly impact recreational resources located on Fife High School property. Given that the pipeline would be located entirely within existing road ROW, the Proposed Action would not result in any permanent operational impacts to recreational resources along segments A and B.

In addition, operation of the new Golden Given Limit Station and operational improvements to the existing Fredrickson Gate Station would not occur within 0.25 mile of any designated recreational resources and would not result in any permanent operational impacts to recreational resources.

Furthermore, the Project components are not located on any parcels designated for future development of recreational facilities in the recreational resources study area in the City of Tacoma, City of Fife, or unincorporated Pierce County.

Therefore, no impacts to recreational resources are associated with operation of the Project. Thus, the presence and operation of the Project Components would not interfere with or displace any recreational uses.

3.7.4.3 Decommissioning Impacts

The estimated total design life of the Project is 50 years. Decommissioning of Project components would generate land use and recreational resource impacts similar to those discussed in Section 3.7.3.1, above.

Potential impacts include those related to land disturbance and shoreline and would likely be comparable to those experienced during construction. The potential for actions associated with decommissioning could be based on economic and operational aspects, conditions of the facility, and associated agreements or permits. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Project components.

3.7.5 Impacts of No Action

Under the No Action Alternative, current conditions would remain unchanged and Proposed Action–related impacts to land use and recreational resources would not occur.

3.7.6 Avoidance, Minimization, and Mitigation Measures

This study has identified the following impacts on Land Use and Recreational Resources that may require mitigation:

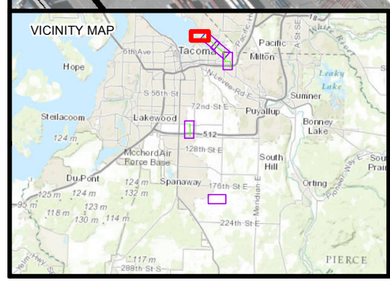
1) Development of the Golden Given Limit Station as a conditional use in an area zoned for single-family residential use. In consideration of these impacts, the following mitigation measure is proposed:
    - Per PCC 19A.90.010.H.1, “neighborhood [utility] facilities should be landscaped so as to be reasonably compatible with adjacent development” (Pierce County 2014c). Accordingly, existing vegetation bordering the site of the proposed Golden Given Limit Station should be maintained, or, where design requirements make that impossible, new row vegetation should be planted along the edges of the proposed fence, consisting of tall, dense, drought-tolerant species such as cypress, Douglas fir, or other species found in the neighborhood.
2) Development of the Project will restrict public access to the shoreline and pursuant to the requirements of the SMP PSE will work with the City to mitigate for the loss of public access by means of one of the following alternatives.
    - Developing public access at an alternative location pursuant to the Port of Tacoma’s (2013) Shoreline Public Access Plan
    - Contributing to a project identified in the City’s Public Access Alternatives Plan, or
    - Providing funds calculated in accordance with the formula contained in the Interlocal Agreement Authorizing a Flexible Approach to the Shoreline Public Access Provision between the City and the Port.

3.7.7 Conclusion

By and large, the Proposed Action would have very limited impacts on land use and recreational resources. The Proposed Action would result in the continuation of existing maritime industrial use of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites anticipated by City of Tacoma and Port of Tacoma land use plans and recreation master plans. The Proposed Action would maintain the existing character of the road ROW along the proposed distribution system improvements, as anticipated by the City of Tacoma, City of Fife, and Pierce County. Proposed pipeline segments A and B were designed to be within existing road ROW, and pipeline construction and operation would not result in the long-term alteration of existing use of the roads, surrounding lands, or recreational resources. Upgrades to the existing Fredrickson Gate Station would also not result in the alteration of existing land use or recreational resources on the Proposed Action area.

The only significant impact identified is associated with the operation of the Golden Given Limit Station as a conditional use within an area designated and zoned for single-family development. This study proposes

mitigating that impact by the use of tall, dense row vegetation bordering the site of the station, to ensure compatibility with adjacent land uses.



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

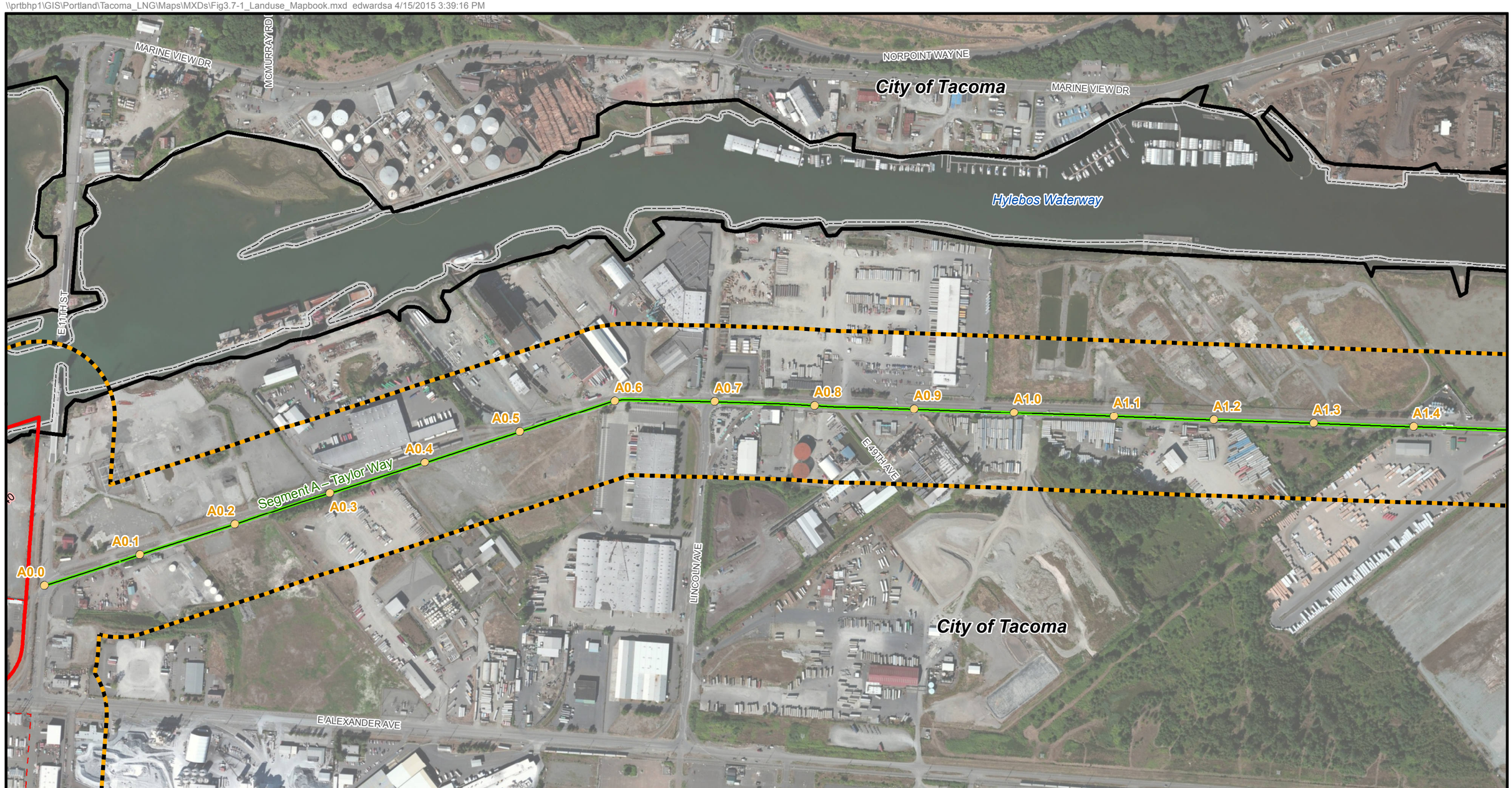
- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

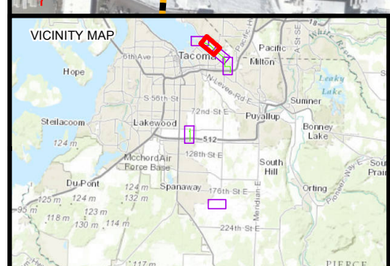
N W E S

0 500 Feet

City of Tacoma

Figure 3.7-1 (Sheet 1 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

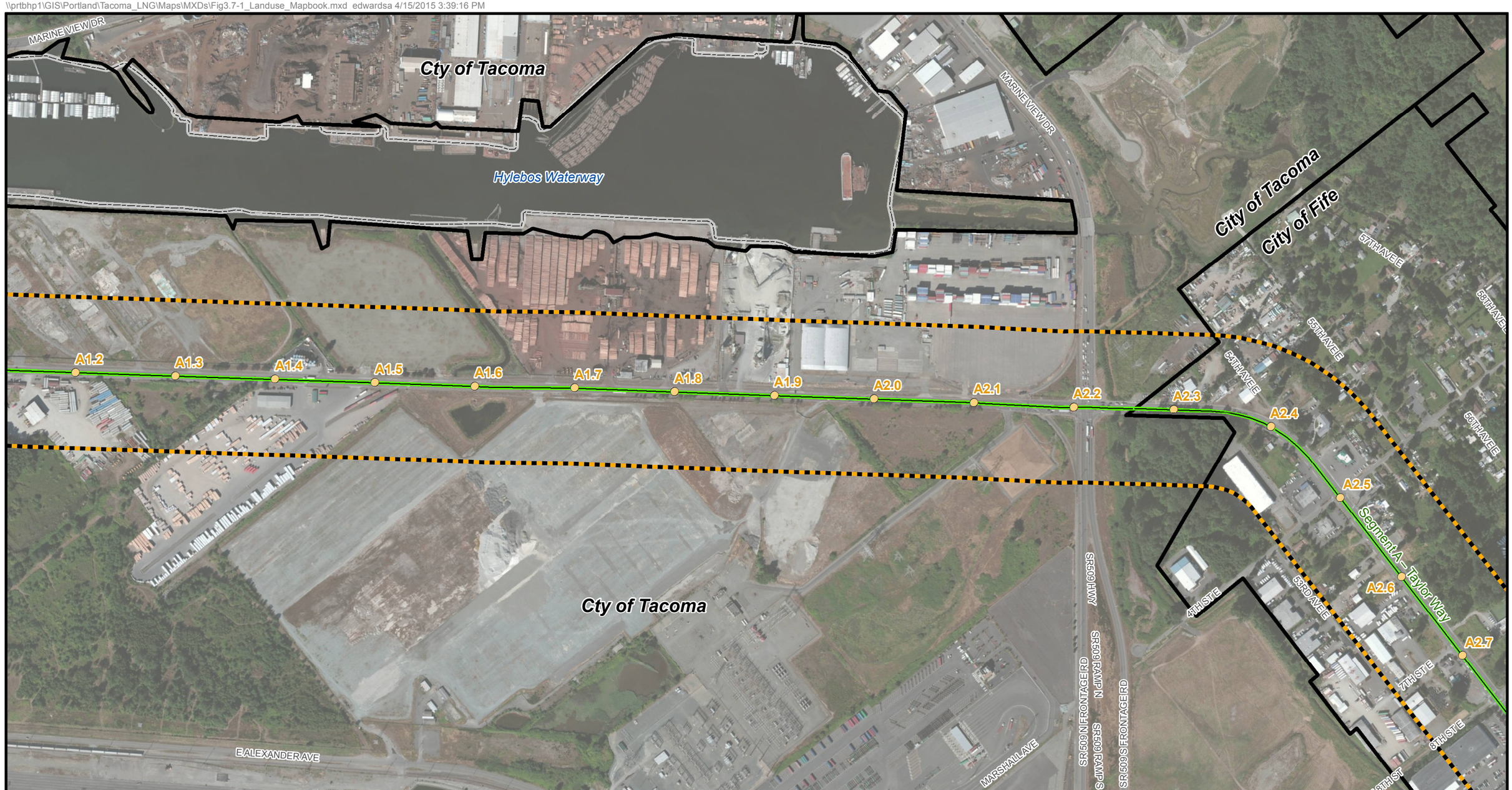
N W E S

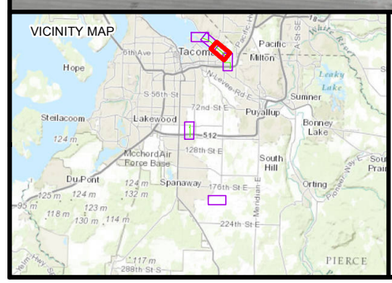
0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-1 (Sheet 2 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

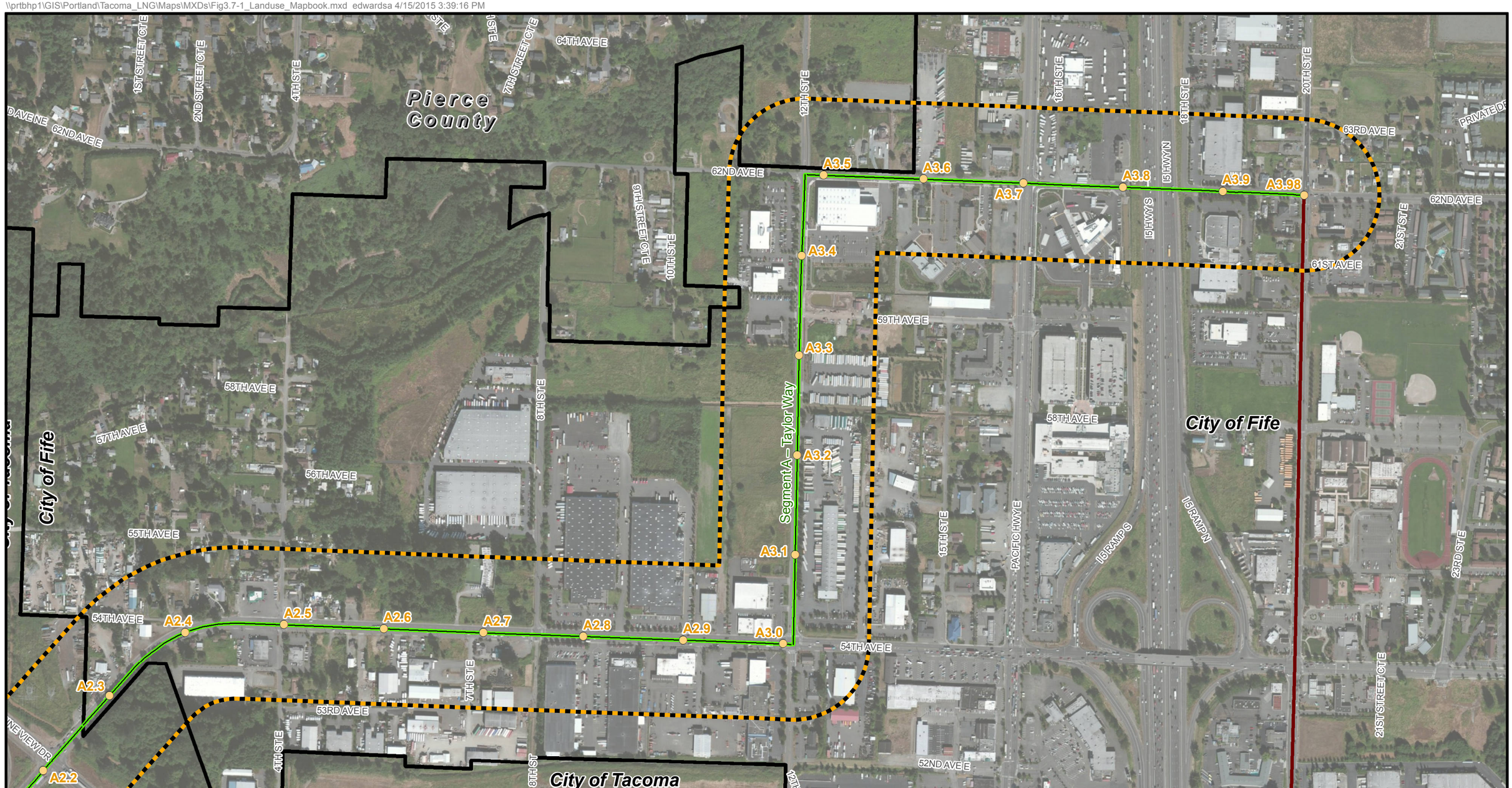
N E S W

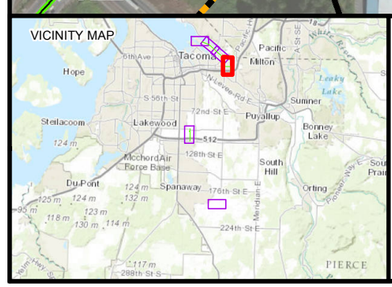
0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-1 (Sheet 3 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

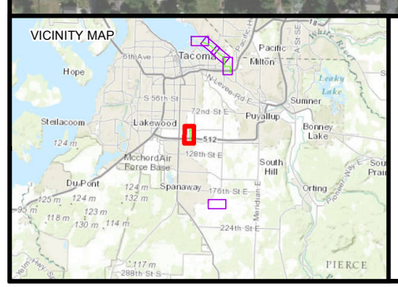
N W E S

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-1 (Sheet 4 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

N W E S

0 500 Feet

City of Tacoma

Figure 3.7-1 (Sheet 5 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project

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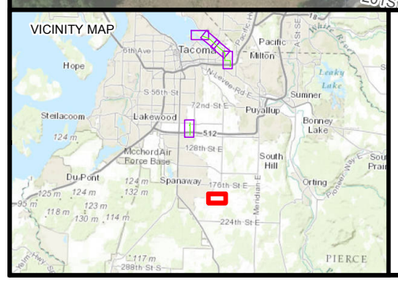


Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

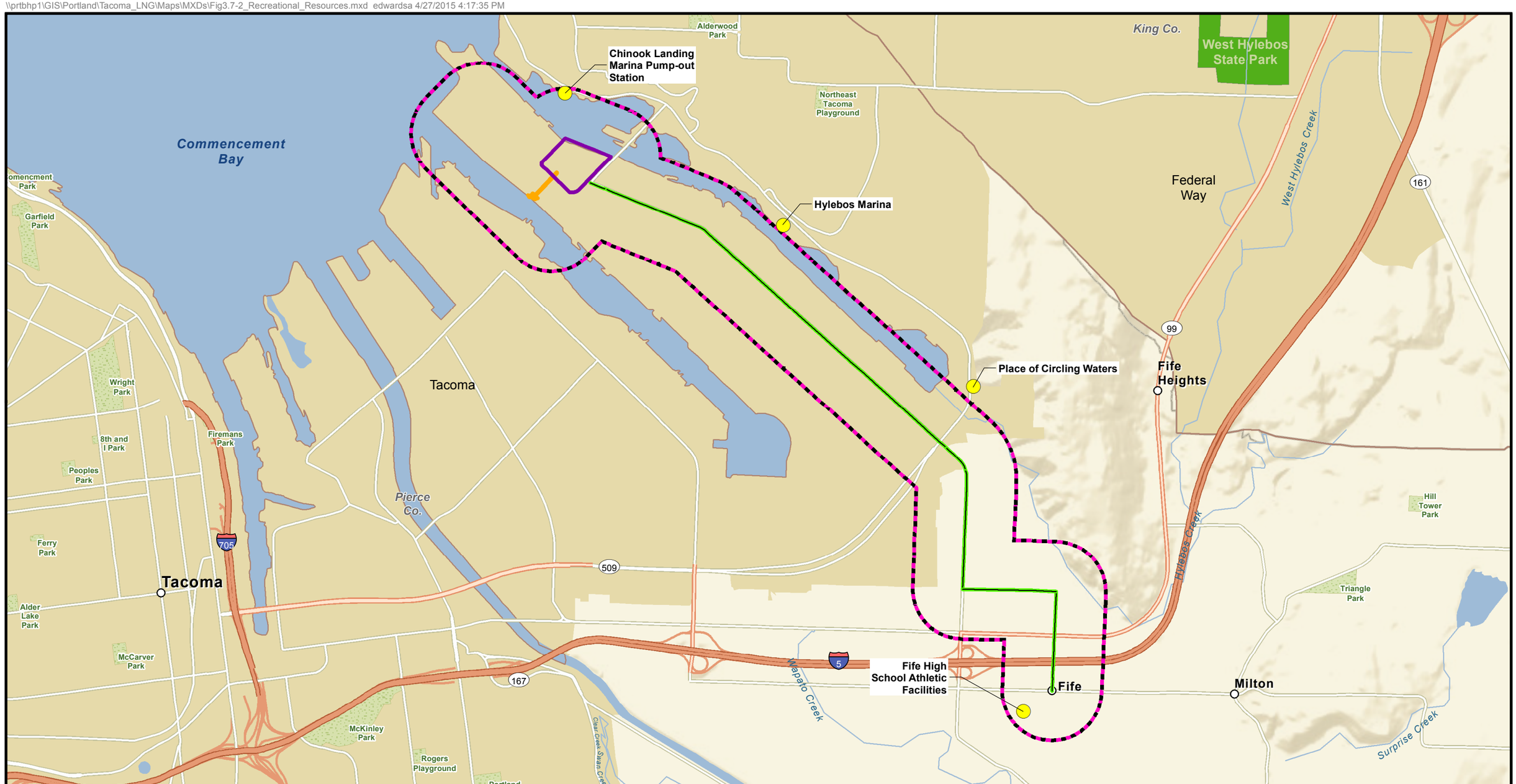
N W E S

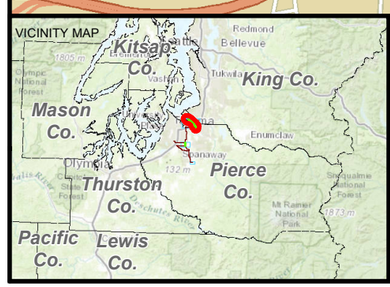
0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-1 (Sheet 6 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- Proposed New Pipeline
- Recreational Resource
- .25-Mile Recreational Resources Study Area
- State Park or Forest
- County Park
- Local Park

N W E S

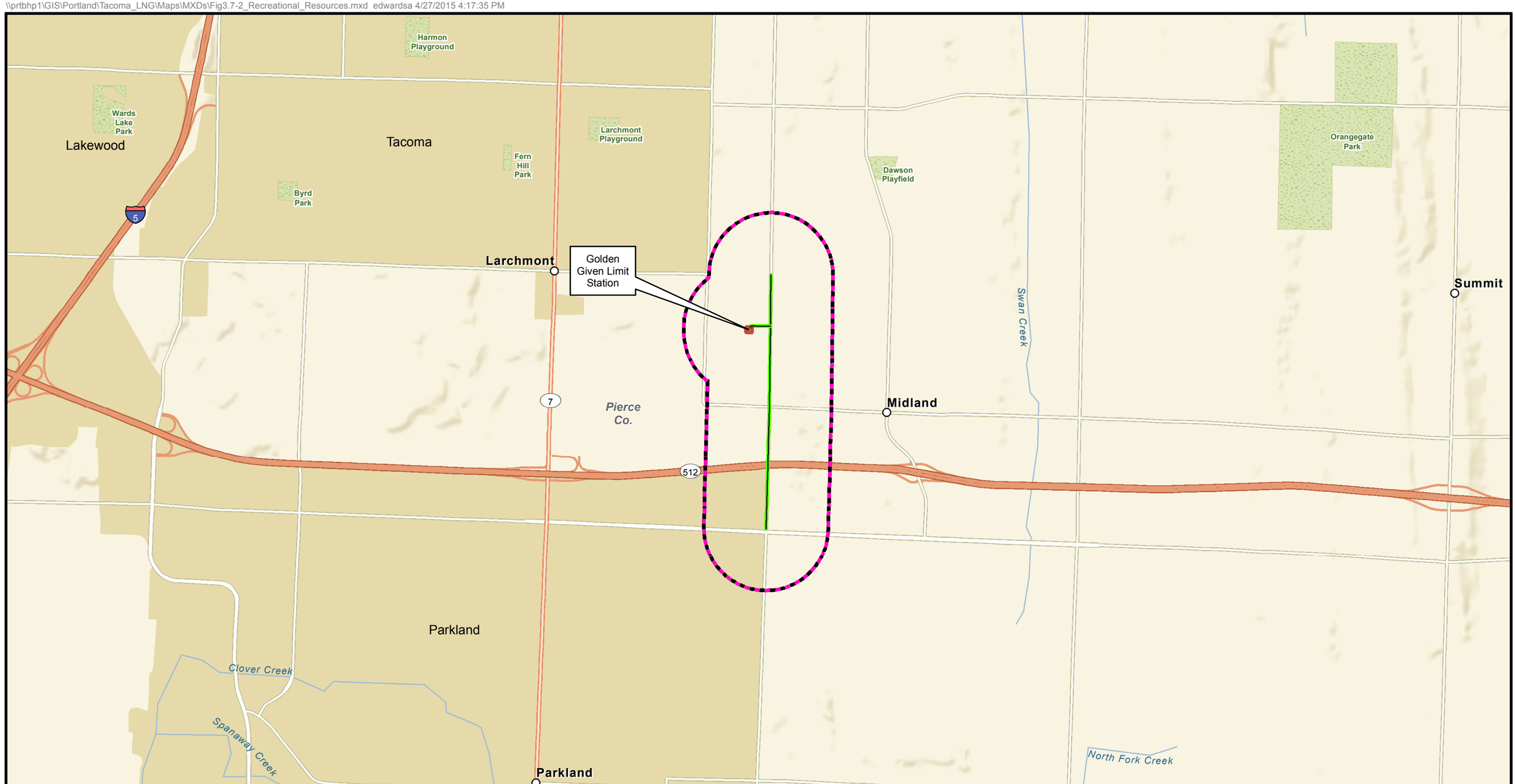
0 0.25 0.5 Miles

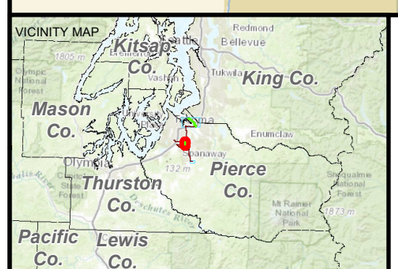
Tacoma

City of Tacoma

Figure 3.7-2A
Recreational Resources within 0.25 Mile of the Proposed Action

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- Proposed New Pipeline
- Recreational Resource
- .25-Mile Recreational Resources Study Area
- State Park or Forest
- County Park
- Local Park

N W E S

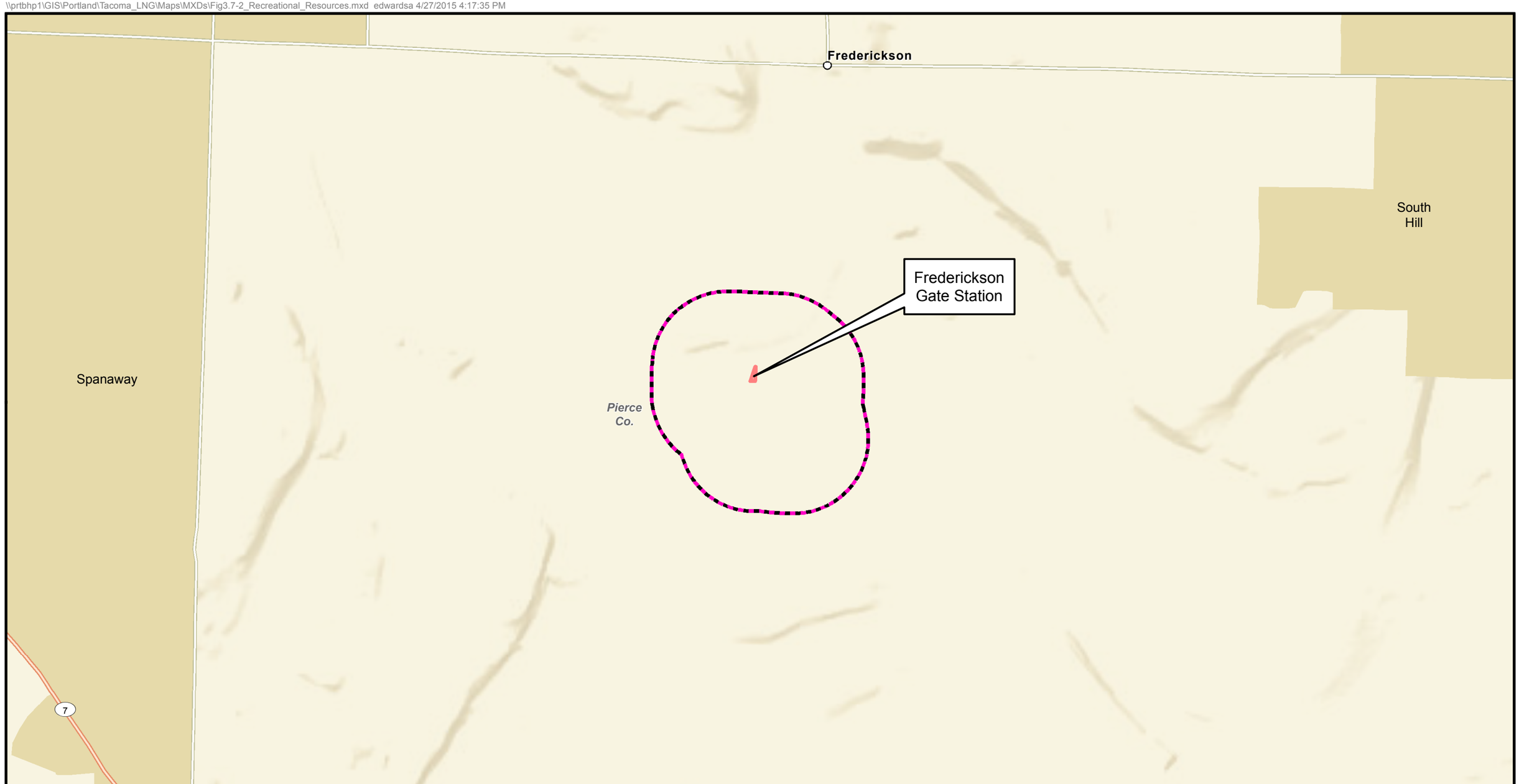
0 0.25 0.5 Miles

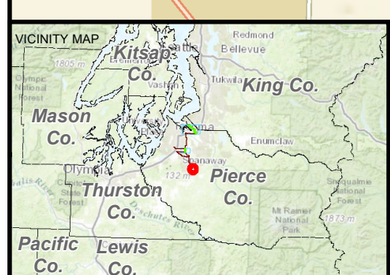
Tacoma

City of Tacoma

Figure 3.7-2B
Recreational Resources within 0.25 Mile of the Proposed Action

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- Proposed New Pipeline
- Recreational Resource
- .25-Mile Recreational Resources Study Area
- State Park or Forest
- County Park
- Local Park

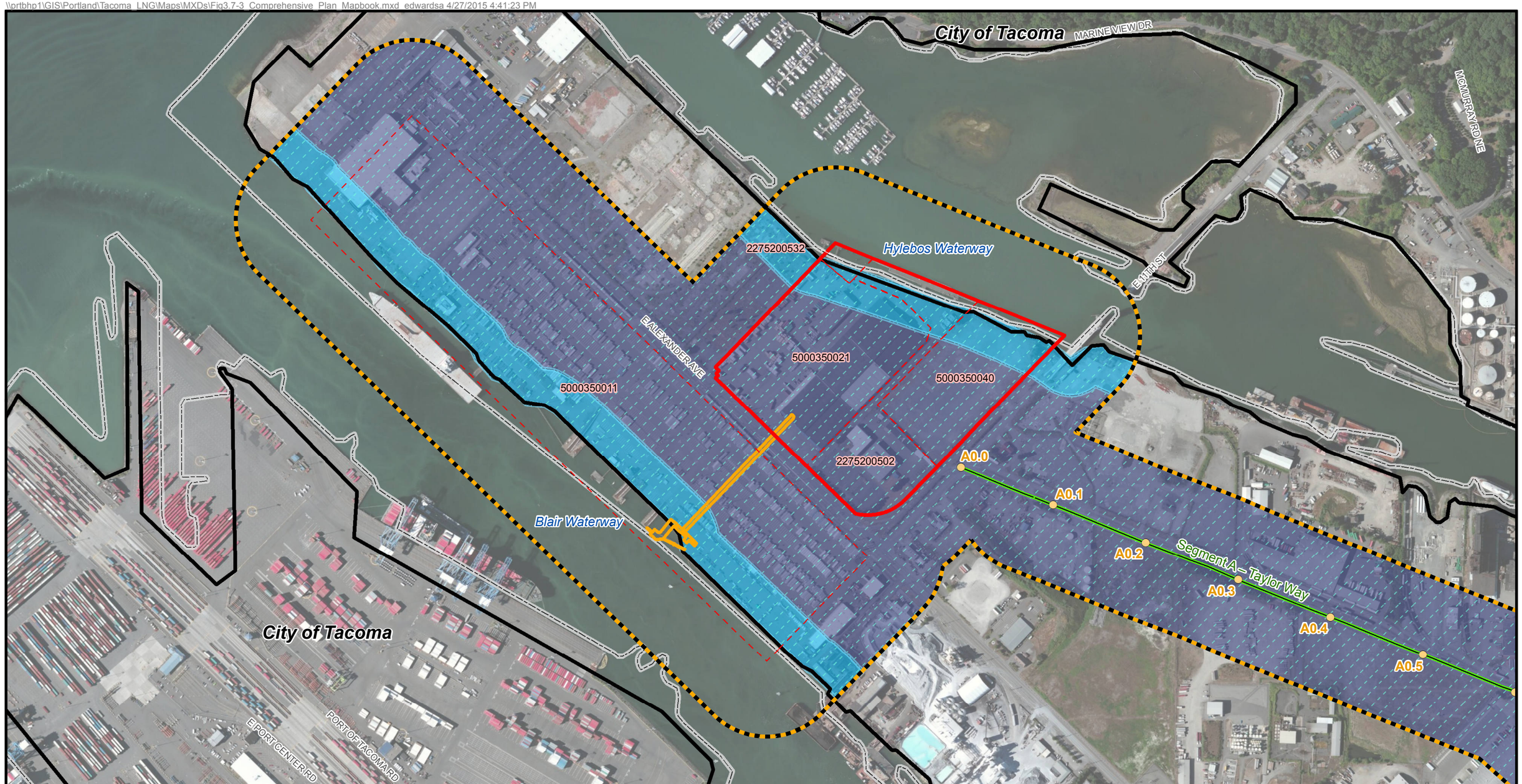
N W E S

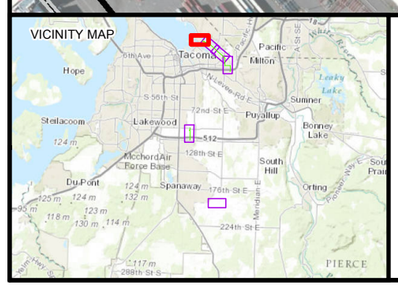
0 0.25 0.5 Miles

City of Tacoma

Figure 3.7-2C
Recreational Resources within 0.25 Mile of the Proposed Action

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

City of Tacoma Comprehensive Plan Designation

- Manufacturing/Industrial Center (M/IC)
- High-Intensity Industrial Development (IDHI)
- Shoreline High-Intensity Environment

N W E S

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-3 (Sheet 1 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project

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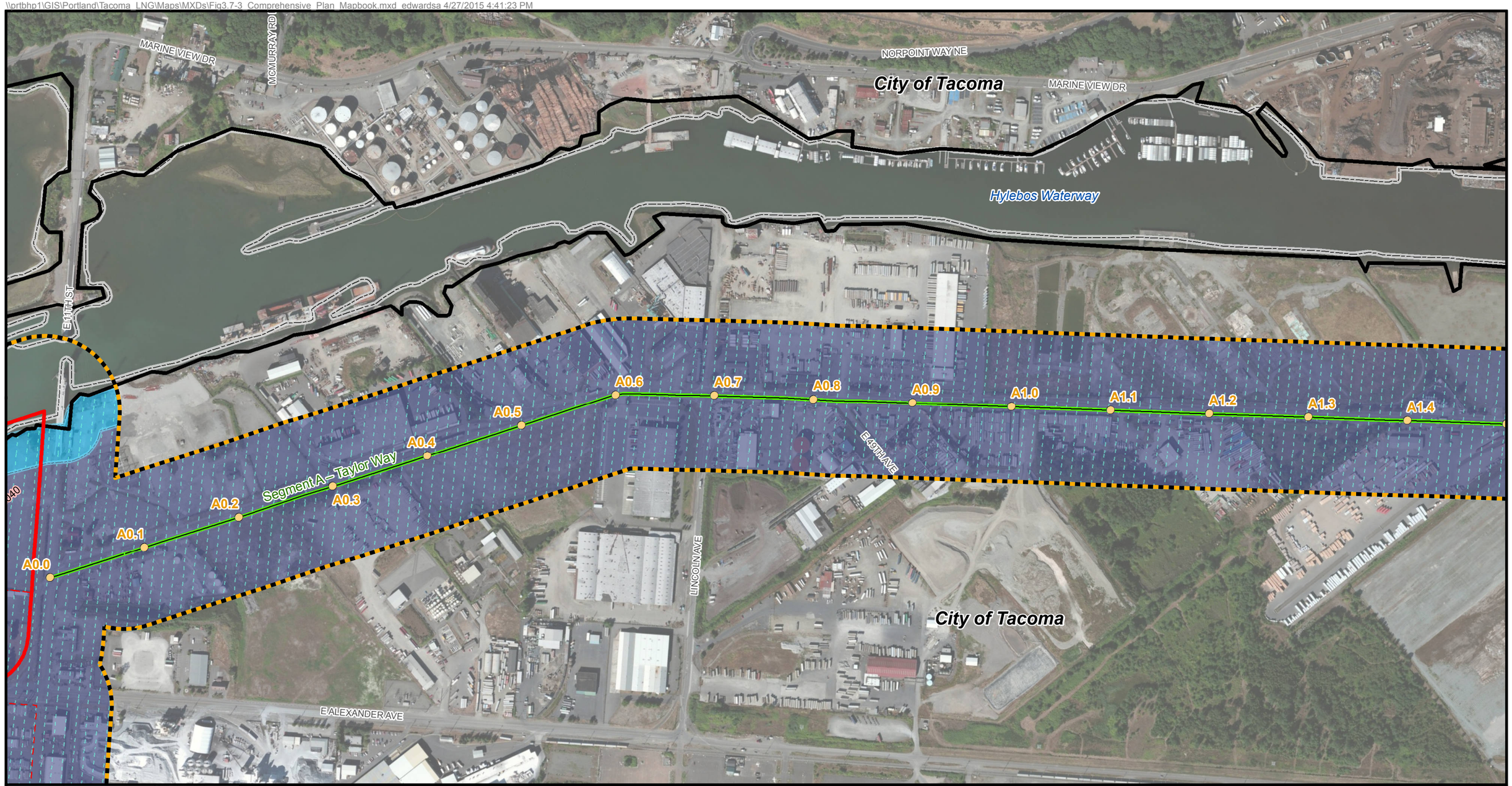
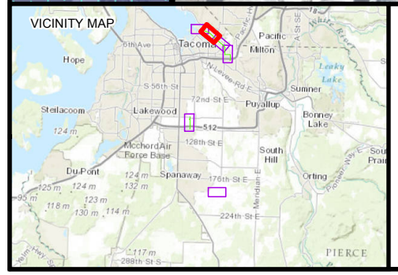




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

City of Tacoma Comprehensive Plan Designation

- Manufacturing/Industrial Center (M/IC)
- High-Intensity Industrial Development (IDHI)
- Shoreline High-Intensity Environment

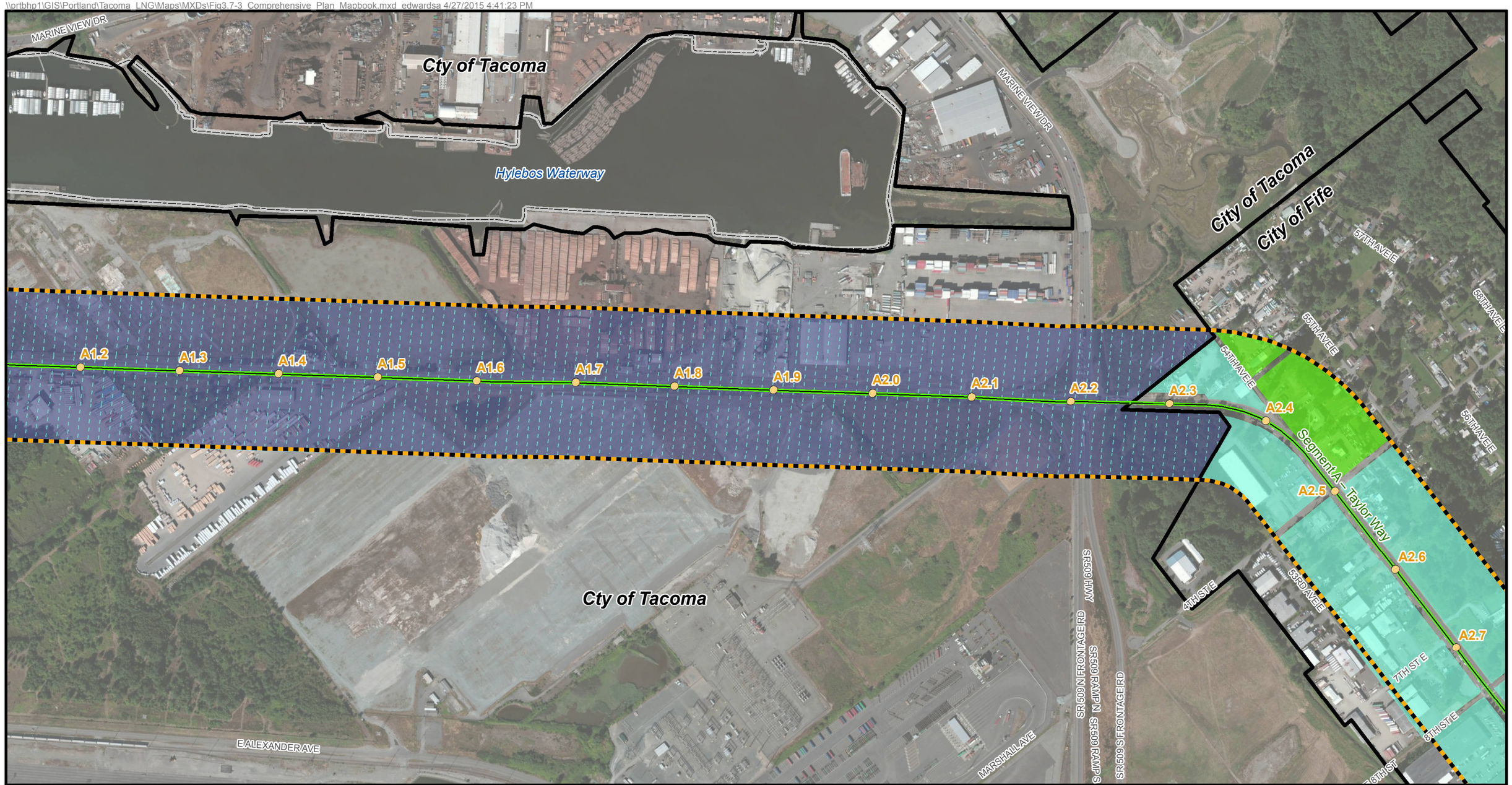
N E S W

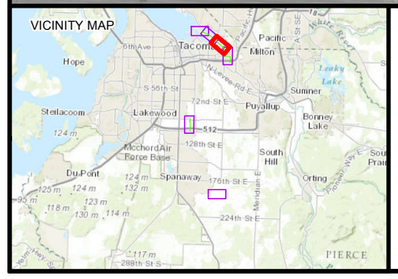
0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-3 (Sheet 2 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

City of Tacoma Comprehensive Plan Designation

- Manufacturing/Industrial Center (M/IC)
- High-Intensity Industrial Development (IDHI)

City of Fife Comprehensive Plan Designation

- Industrial
- Mixed Medium Density Residential/Commercial

N E S W

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-3 (Sheet 3 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project

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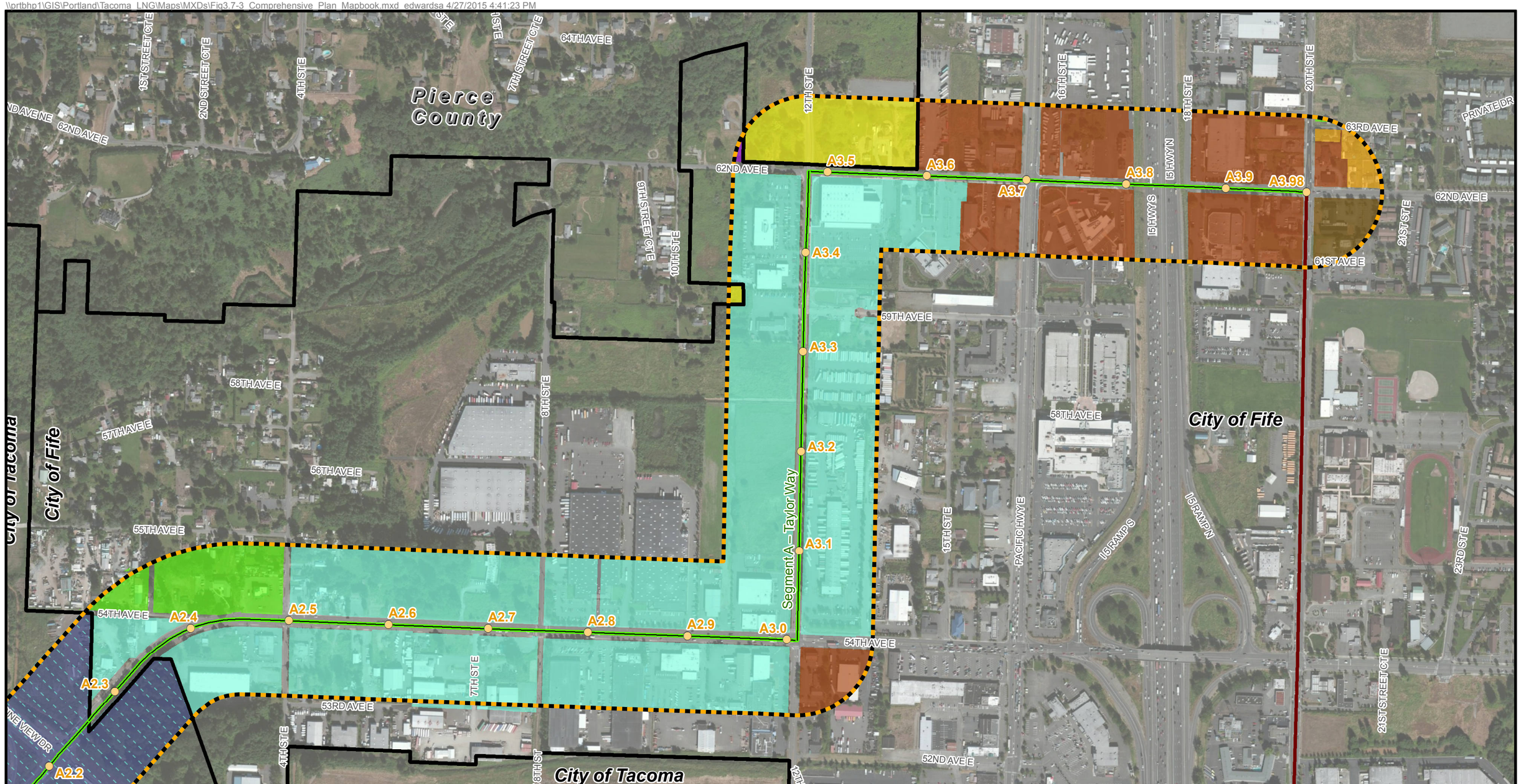


Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

City of Tacoma Comprehensive Plan Designation

- Manufacturing/Industrial Center (M/IC)
- High-Intensity Industrial Development (IDHI)

City of Fife Comprehensive Plan Designation

- High Density Residential
- Medium Density Residential
- Industrial
- Mixed Commercial/High Density Residential
- Mixed Medium Density Residential/Commercial

Pierce County Comprehensive Plan Designation

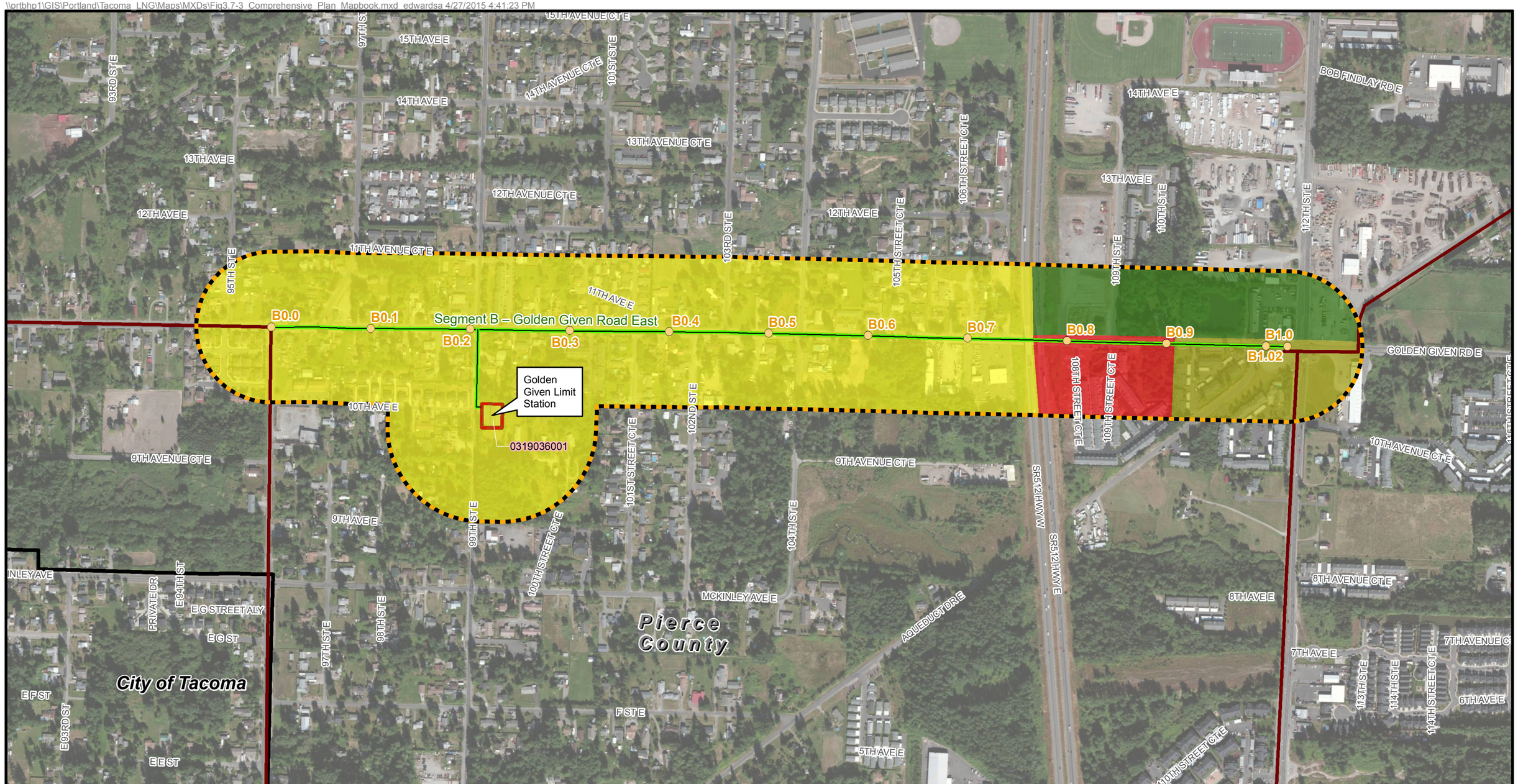
- Small Lot Single Family Residential
- MSF - Moderate Density Single Family

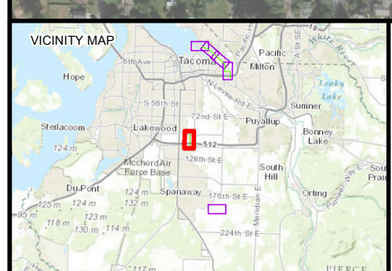
N W E S

0 500 Feet

City of Tacoma

Figure 3.7-3 (Sheet 4 of 6) Comprehensive Plan Designations within 400 Feet of the Proposed Action Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

Pierce County Comprehensive Plan Designation

- EC - Employment Center
- HRD - High Density Residential
- MSF - Moderate Density Single Family
- MUD - Mixed Use District

N W E S

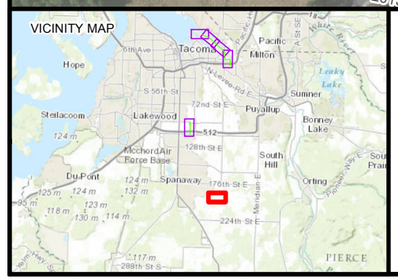
0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-3 (Sheet 5 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project

\\prtbhp1\GIS\Portland\Tacoma_LNG\Maps\MXDs\Fig3.7-3_Comprehensive_Plan_Mapbook.mxd edwardsa 4/27/2015 4:41:23 PM



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

Pierce County Comprehensive Plan Designation

- EC - Employment Center

N W E S

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-3 (Sheet 6 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project

City of Tacoma
MARINE VIEW DR
MCMURRAY RD NE
Hylebos Waterway
E 11TH ST
2275200532
E ALEXANDER AVE
5000350021
5000350040
5000350011
2275200502
A0.0
A0.1
A0.2
Segment A – Taylor Way
A0.3
A0.4
A0.5
Blair Waterway
City of Tacoma
E PORT CENTER RD
PORT OF TACOMA RD

VICINITY MAP

Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Puyallup Tribal and Future Tribal Lands (Port of Tacoma)

City of Tacoma Zoning

- PMI - Port Maritime Industrial
- S-10 - Shoreline District - Port Industrial Area (HI)
- S-13 - Shoreline District - Marine Waters of the State (A)

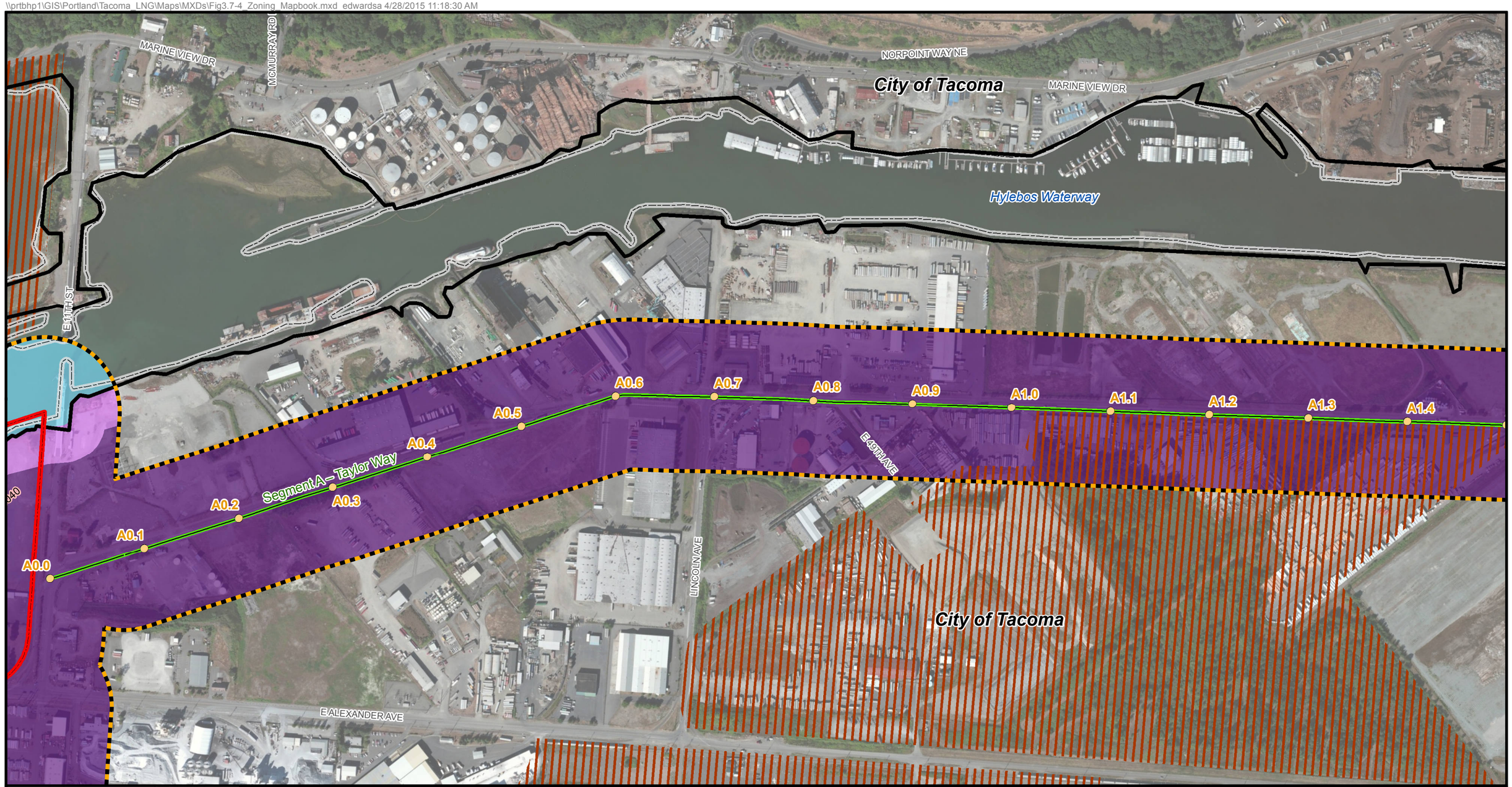
N W E S

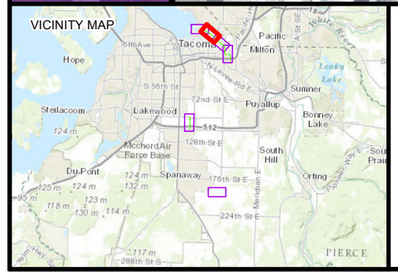
0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-4 (Sheet 1 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- Proposed Tacoma LNG Facility Site Boundary
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Puyallup Tribal and Future Tribal Lands (Port of Tacoma)

City of Tacoma Zoning

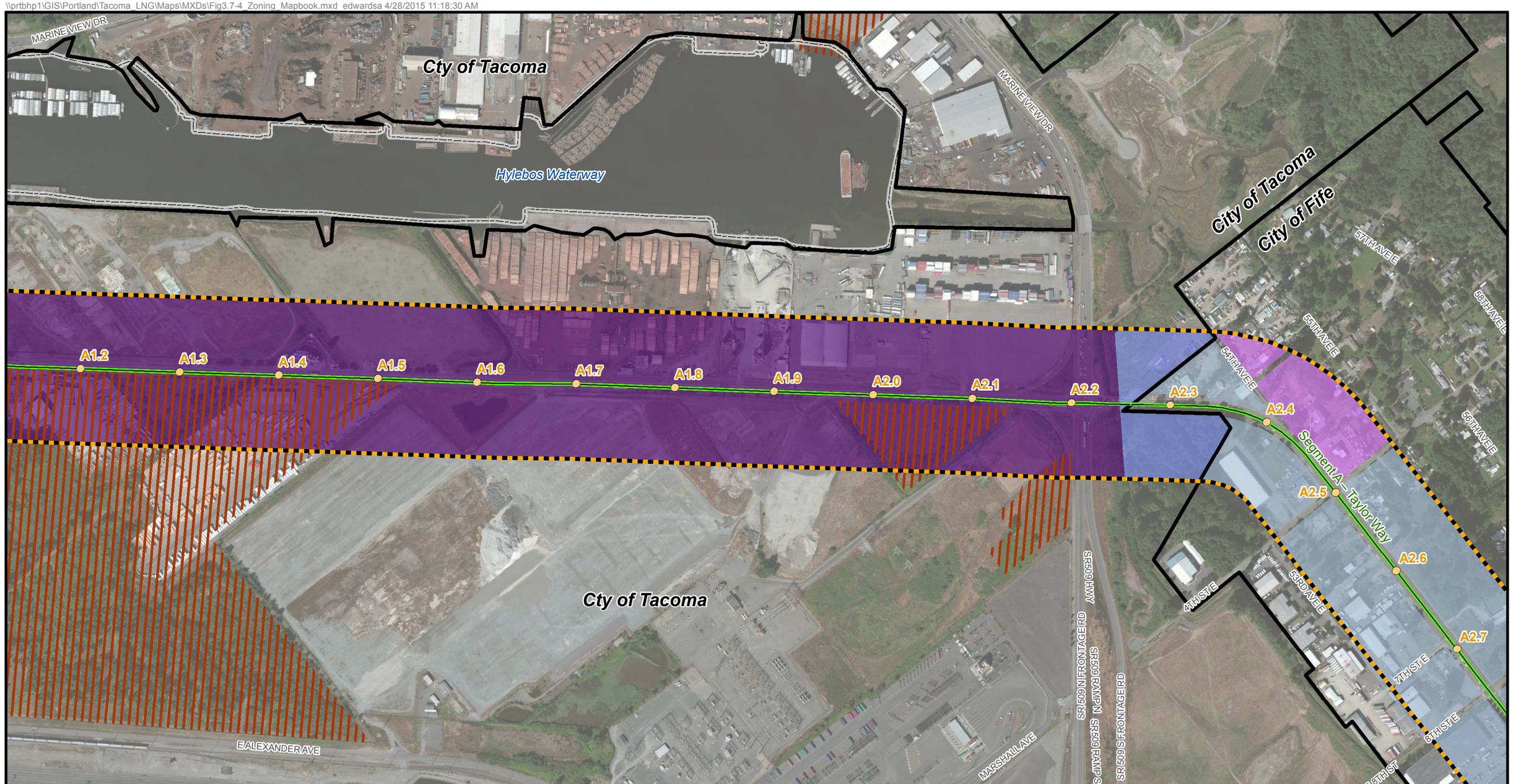
- PMI - Port Maritime Industrial
- S-10 - Shoreline District - Port Industrial Area (HI)
- S-13 - Shoreline District - Marine Waters of the State (A)

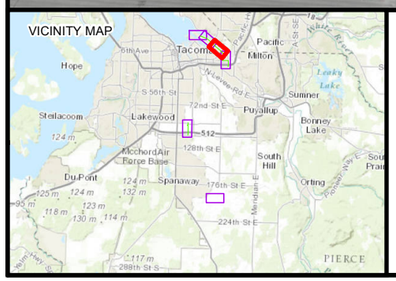
N W E S

0 500 Feet

City of Tacoma

Figure 3.7-4 (Sheet 2 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- 400-foot Land Use Study Area
- Proposed New Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Puyallup Tribal and Future Tribal Lands (Port of Tacoma)

City of Tacoma Zoning

- M2 - Heavy Industrial
- PMI - Port Maritime Industrial

City of Fife Zoning

- I - Industrial
- NC - Neighborhood Commercial

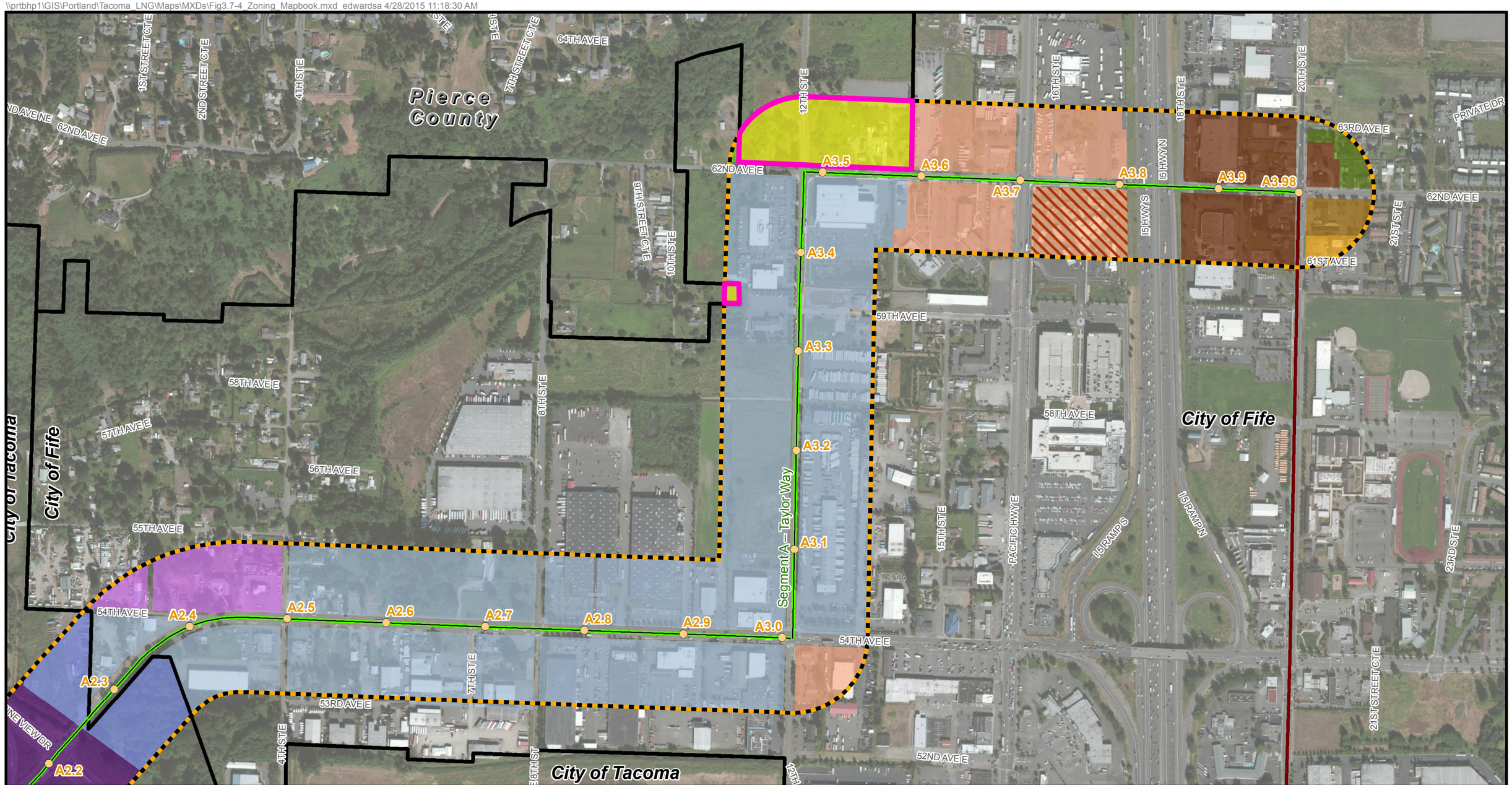
N W E S

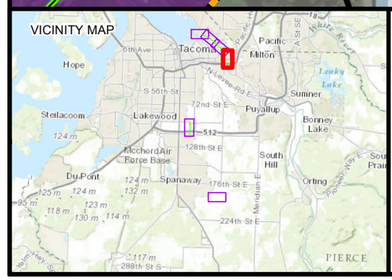
0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-4 (Sheet 3 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Puyallup Tribe of Indians Trust Land

City of Tacoma Zoning

- M2 - Heavy Industrial
- PMI - Port Maritime Industrial

City of Fife Zoning

- CMU - Community Mixed Use
- I - Industrial
- HDR - High Density Residential
- MDR - Medium Density Residential
- NC - Neighborhood Commercial
- NR - Neighborhood Residential
- POS - Public Use/Open Space
- RC - Regional Commercial
- City of Fife Urban Growth Area

Pierce County Zoning

- MSF - Moderate Density Single-Family

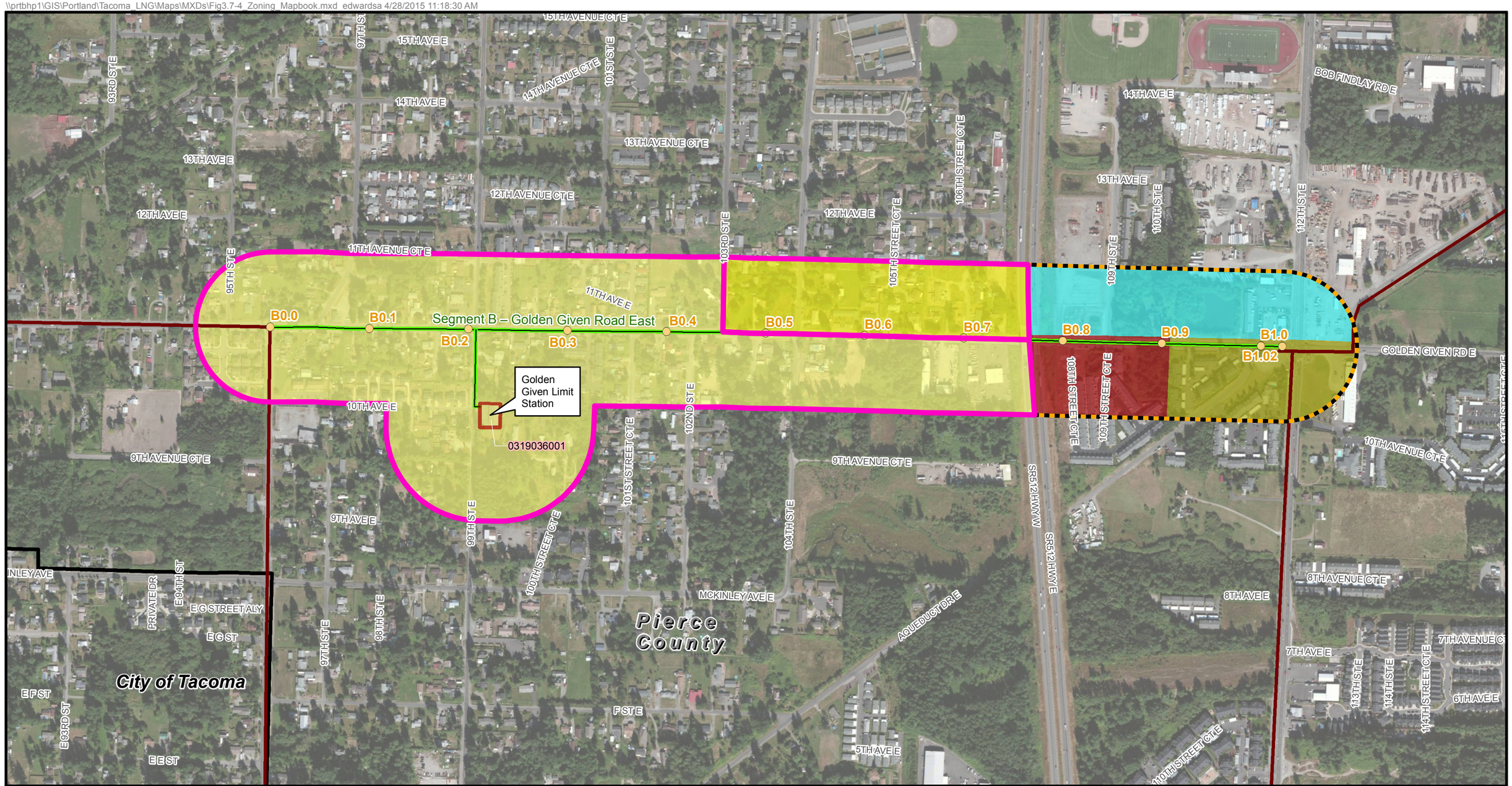
N E S W

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-4 (Sheet 4 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- Golden Given Limit Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- City of Fife Urban Growth Area

Pierce County Zoning

- CE - Community Employment
- MUD - Mixed Use Districts
- MHR - Moderate-High Density Residential
- MSF - Moderate Density Single-Family
- SF - Single-Family

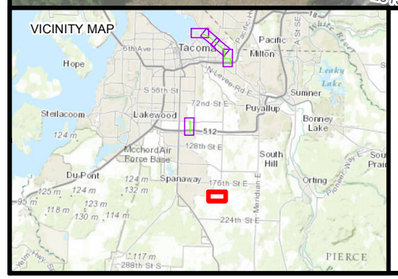
N E S W

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-4 (Sheet 5 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- Frederickson Gate Station
- 400-foot Land Use Study Area
- Existing Pipeline
- County Boundary

Pierce County Zoning

- EC - Employment Center

N W E S

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-4 (Sheet 6 of 6) Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action Tacoma LNG Project

3.8 Aesthetics/Light and Glare

This section assesses the potential impacts on aesthetics, light, and glare that may result from the construction, operation, and decommissioning (referred to herein as the Proposed Action) of the Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project). The geographic region for the assessment consists of areas within approximately 1 mile of the Tacoma LNG Facility site, and as needed to assess the improvements to the Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System and the Puget Sound Energy (PSE) Natural Gas Distribution System.

3.8.1 Study Methodology

The methodology used to address the Washington State Environmental Policy Act requirements for this assessment consists of the following six steps:

1. Establish the project's visual limits (viewshed).
2. Determine who has views of the project (viewers).
3. Describe and assess the landscape that exists before project construction (affected environment).
4. Determine and evaluate views of and from the project before and after project construction (using simulations).
5. Describe the potential visible changes to the project area and its surroundings that would result from the proposed project.
6. Assess the response of viewers looking at and from the project, before and after project construction (viewer sensitivity).

The methodology used for this analysis is a conventional approach to assessing impacts on aesthetics, light, and glare. The following terminology is used in this assessment and provides additional context for interpreting the analysis contained in this section:

- **Viewers** are people who potentially have views of a project and whose views near the project might be altered or obstructed by project elements. Viewers are usually discussed in terms of general categories of activities (such as residents, workers, recreationists [park users, boaters, or bicyclists], pedestrians, or motorists [both commuters and leisure travelers]). Viewers affiliated with categories of activities are referred to as "viewer groups."
- **Viewer sensitivity** is a combination of the following factors for a specific view:
  - What types of people see a view and for how long? Residents and recreationists typically have views of long duration, while bicyclists and motorists typically have views of shorter duration.
  - What is their likely level of concern about the appearance, aesthetics, and quality of the view? Level of concern, or viewer sensitivity, is a subjective response that is affected by factors such as the visual character of the surrounding landscape, the activity a viewer is engaged in, and their values, expectations, and interests. Low viewer sensitivity results when viewers are not particularly concerned about the view. High viewer sensitivity applies to viewers who see a view frequently or for a long duration and are likely very aware of and concerned about the view. Viewer sensitivity does not imply support for or opposition to a proposed project; it is a neutral term that is an important parameter in assessing visual quality. Generally, residents and recreationists are considered to be highly sensitive viewers, and local business staff and commuters are considered to be less sensitive.
- **Visual character** is an impartial description of what the landscape consists of and is defined by the relationships between the existing visible natural and built landscape features. These relationships are

considered in terms of dominance, scale, diversity, and continuity. Elements that influence visual character can include landform, waterbodies, vegetation, land use, open spaces, transportation facilities, utilities, and apparent upkeep and maintenance.

- **Viewing distance** is the distance between a viewed object and the viewer. The closer the viewer is to a viewed object, the more detail can be seen and the greater potential influence the object may have on visual and aesthetic resources.
- **Key Observation Points (KOPs)** are specific locations chosen to represent typical views of a proposed project or special, sensitive views. These are the locations from which photographs documenting existing views of a proposed project site are taken and for which photographic simulations depicting the proposed project are developed.

  Four KOPs were selected to represent views of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites from a variety of locations within the assessment area. These locations were selected after a site visit was conducted to take photographs of the assessment area. The four KOPs represent a good cross-section of views toward the Tacoma LNG Facility site, as follows:

  - KOP 1 represents an elevated view looking down at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites from the residential area northwest of the site.
  - KOP 2 was chosen to depict a level view of the Tacoma LNG Facility site from the northwest side of the Hylebos Waterway and East 11th Street.
  - KOP 3 is located on the Hylebos Bridge and was selected to depict views that people driving south on the bridge have of the site.
  - KOP 4 is located on the corner of East Alexander Avenue and East 11th Street and was chosen to depict one of the few land-based views of the Tacoma LNG Facility site.

Appendix G contains photographs that show existing conditions of the Tacoma LNG Facility site as seen from the four KOPs, as well as photographic simulations of how the site would appear after construction of the Project.

Appendix G contains a series of photographs that were taken from locations within the assessment area of the Proposed Action. The photographs are referred to as “character” photographs in that they illustrate the character of landscapes within the assessment area. A number of the photographs in Appendix G were taken looking toward the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites from locations within the assessment area to depict how visible, or not visible, these sites are from various locations. A number of the photographs were taken at twilight so that existing lights in the assessment area are depicted.

3.8.2 Regulatory Framework

The Washington State Environmental Policy Act establishes requirements for assessing environmental impacts, including impacts on aesthetic resources. Washington Administrative Code 197-11-960 provides guidance for assessing potential impacts from a proposed project on various resources and issues. Among the resources and issues that need to be addressed are aesthetics, light, and glare. Aesthetic requirements include the following:

1. Describing the height, materials, and appearance of the tallest proposed structures.
2. Identifying views in the immediate vicinity of a proposed project that would be altered or obstructed.
3. Identifying measures to reduce or control aesthetic impacts.

Requirements related to light and glare include the following:

1. Identifying off-site sources of light or glare that might affect a proposed project.
2. Describing the type of light and glare that would be associated with a proposed project and describing when it would occur (night or day).
3. Determining if light or glare could become a safety hazard.
4. Determining if light or glare could interfere with views and, if appropriate, identifying proposed measures to control light and glare.

Some jurisdictions have identified views, viewpoints, and scenic roads for which impacts from proposed projects must be assessed. The City of Tacoma has not identified protected views that are applicable to the Project. Because the Project would be located in a part of Tacoma that has been designated as the Port Maritime and Industrial District, the land use emphasis in the district is on supporting maritime and industrial uses.

The Urban Aesthetics and Design Element of the Generalized Land Use Element of the Tacoma Comprehensive Plan has a land use policy—LU-UAD-8 (Viewpoints, Gateways, and Focal Points)—of relevance to aesthetic resources. The policy instructs the City to "Designate key viewpoints, gateways, and focal points in the city. Create policies, standards, and guidelines that address the design and treatment of viewpoints, gateways and focal points to reinforce and/or enhance the unique character of neighborhoods and the city" (City of Tacoma 2013). To date, no viewpoints, gateways, or focal points in neighborhoods near the proposed Project have been designated.

Chapter 13.06 (Land Use Regulatory Code) of the Tacoma Municipal Code describes land use regulations for all zones within the city of Tacoma, including the Port Maritime and Industrial District and the Shoreline District (S-10) - Port Industrial Area (HI) designation under which the Project site would fall. Within this designation, no specific views are identified or mentioned, nor are regulations related to view preservation or visual quality.

The Port of Tacoma provides policies and procedures related to lighting in the *Port of Tacoma Environmental Compliance Program Manual* (Port of Tacoma 2014). The *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* (Port of Tacoma 2009) evaluated a site that overlaps with the proposed Project site and determined that the *Port of Tacoma Environmental Compliance Program Manual* should be used to mitigate light and glare impacts associated with *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* site development. Similarly, this analysis assumes that the Port of Tacoma aims to prevent impacts on the visual environment by minimizing glare, obtrusive lighting, and artificial sky glow associated with outdoor lighting. Where applicable, the Project would follow policies for the design, installation, and lighting management provided in the *Port of Tacoma Environmental Compliance Program Manual*.

Land Use Elements in the Comprehensive Plans of Pierce County and the City of Fife both include goals that maintain view protection associated with open space and natural areas. In addition, both Pierce County and the City of Fife have adopted the *Countywide Planning Policies for Pierce County, Washington* (Pierce County 2012), which calls for the identification and protection of significant visual resources that preserve community character. Significant visual resources may include federal, state, and locally designated historic sites, public views, landmarks, cultural landscapes, open space, parks, and other areas of special interest. These jurisdictions have not identified significant visual resources within the vicinity of the PSE Natural Gas Distribution System. In addition, Title 18A (Development Regulations – Zoning) of the Pierce County Code and Title 19 (Zoning) of the City of Fife Municipal Code do not designate or identify specific views related to view preservation or visual quality within the Proposed Action area.

The Container Port Element of the Tacoma Comprehensive Plan identifies a Core Area of port and port-related container industrial areas which include the Project site. This element seeks to protect the long-term function and viability of this area, and in so doing, "[t]he City recognizes the important role that the

Port of Tacoma plays in regional employment and economic development. Identification and long-term preservation of the Core Area ensures that the Port of Tacoma facilities and related industrial uses will have room to thrive in the City." Policy CP-6 - Noise, Odor, and Visual Character: In the Core Area, allows for localized impacts associated with industrial activities, including noise, odor, and visual character, that that are appropriate and expected in heavy industrial areas but would not be allowed in other parts of the city. Noise and odor may be associated with transportation and manufacturing facilities. Visual character may include outdoor storage, relatively large building mass, and impervious surface area. While localized impacts are permitted, the element states that the City will continue to require Core Area industrial uses to be developed in a manner that protects the environment and preserves public health and safety from a citywide and regional perspective.

3.8.3 Affected Environment

The Project would consist of the following main components:

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System.
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 1-2 in Chapter 1 (Purpose, Need, and Alternatives Considered).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), new Golden Given Limit Station, and an upgrade to the existing Frederickson Gate Station.

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the city of Tacoma. Pipeline Segment A would be located in the City of Tacoma and the City of Fife, and Pipeline Segment B would be located in unincorporated Pierce County. In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County. A detailed description of the Proposed Action area is provided in Chapter 2 (Description of Proposed Action).

The following sections describe the affected environment as it relates to aesthetics, light, and glare.

3.8.3.1 Aesthetics

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are located in a part of Tacoma that has been designated as Port Maritime and Industrial District. This designation and the resulting industrial and marine-oriented land uses found within the Blair-Hylebos peninsula greatly influence the landscape character of the peninsula and the sites for both Project components. The presence of ship-to-shore cranes loading and unloading ships of varying sizes and types, along with multiple waterways lining the peninsula; the storage of materials and goods in large-scale buildings or storage yards; and the presence of trains and trucks moving products all contribute to the working landscape character of the peninsula. Appendix G contains character photographs from throughout the assessment area of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites, as well as other parts of the Blair-Hylebos peninsula. The descriptions below provide site-specific information on the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System improvements.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility would be located on the Blair-Hylebos peninsula adjacent to the south side of the Hylebos Waterway. The TOTE Marine Vessel LNG Fueling System would be located within the existing TOTE

facility, directly adjacent and across Alexander Avenue East from the Tacoma LNG Facility site. Proposed aboveground components would potentially be seen from a fairly limited viewing area owing to the flatness of the peninsula and large-scale developments on the peninsula that tend to screen views within it and from the Hylebos and Blair waterways. The following three distinct geographic areas are used to describe the affected environment of areas near the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System (and to discuss potential impacts):

- Areas northwest of the Blair-Hylebos peninsula,
- Blair-Hylebos peninsula, and
- Areas southeast of the Blair-Hylebos peninsula.

The following discussion describes the context and character of the three areas and the views toward the Project from within each area.

Areas Northwest of the Blair-Hylebos Peninsula

Areas northwest of the Blair-Hylebos peninsula include the Hylebos Waterway and its adjacent shorelines, Marine View Drive, the steep slope north of Marine View Drive, and residential areas above the steep slope northwest of Marine View Drive. Although the context and character of each of these areas is slightly different, as are the types of people who would potentially view the Project, the maritime industrial character of the Blair-Hylebos peninsula and Hylebos Waterway is the same regardless of the location from which it is viewed. Large-scale facilities and vast areas used for storage are seen across the Blair-Hylebos peninsula, and the Hylebos Waterway is lined with piers, bulkheads, barges, and ships. These features reinforce the maritime industrial character of the landscape that is viewed from areas northwest of the Blair-Hylebos peninsula.

The Hylebos Bridge connects East 11th Street and the Blair-Hylebos peninsula with Marine View Drive (State Route 509), the Northeast Tacoma neighborhood, and Browns Point. The northwest end of the bridge and portion of East 11th Street beyond it are surrounded by mud flats (at low tide), some of which are being restored with native vegetation. This area (particularly the northwest side of the bridge) has a somewhat natural appearance. There are no formal public viewing areas near the bridge that provide views of the Hylebos Waterway, Tacoma LNG Facility site, or TOTE Marine Vessel LNG Fueling System site. The public can see both sites while driving, riding, or walking on the Hylebos Bridge.

Views toward the Tacoma LNG Facility site from shoreline areas, uplands, and the parts of Marine View Drive east of the Hylebos Bridge are restricted by shoreline development, the marina, and the Hylebos Bridge. Several small commercial, construction, and industrial properties on the north side of the waterway, as well as a large tank farm that contains approximately 30 tanks of varying types, colors (white and gray), heights (some approximately 85 feet high), and widths (several up to approximately 100 feet in diameter), block views toward the Tacoma LNG Facility site from this section of Marine View Drive. These tanks, which are generally metal in construction, are shown in the character photographs on page G-7 in Appendix G. The closest of the tanks to the Tacoma LNG Facility site is approximately 2,000 feet away.

West of the Hylebos Bridge and East 11th Street, Marine View Drive heads toward Browns Point on a narrow shelf of level land located between the waterway and the steep vegetated slope to the north. Along its way, the drive passes by two large marinas, one of which is abandoned. Several parking areas and pullovers are located along this portion of Marine View Drive. Views of part of the Tacoma LNG Facility site are possible from these areas, although parts of the site are screened by moored boats, boat storage sheds, and other marina facilities. The Tacoma LNG Facility site is located approximately 370 feet southeast of the closest moored boats and is clearly seen from parts of the marinas and the Hylebos Waterway.

The vegetated slope northwest of Marine View Drive is a generally undeveloped greenbelt that has few views to the south and east. There are one or two undeveloped and unpaved pullover areas on McMurray Road NE, but with these exceptions, there are few opportunities for the public to see the Blair-Hylebos

peninsula, the Hylebos Waterway, the Tacoma LNG Facility site, or the TOTE Marine Vessel LNG Fueling System site.

Areas northwest of the slope that Marine View Drive parallels include the neighborhoods of Northeast Tacoma and Browns Point (in unincorporated Pierce County). The only parts of these neighborhoods from which the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System components would potentially be visible are residences located next to the top of the slope and a segment of Browns Point Boulevard located near McMurray Ravine. The single-family residences (and at least one multifamily complex) located near the top of the slope have extensive views to the south that, depending on location, encompass Commencement Bay, the maritime industrial area (including the Tacoma LNG Facility site) located between Commencement Bay on the west and Interstate 5 on the east, downtown Tacoma, the Hilltop neighborhood, and areas beyond (including Mount Rainier). Maritime and industrial land uses dominate the viewed landscape from these residences. Viewed elements that can be clearly seen include large-scale maritime industrial buildings (most of which are single-story, metal-frame structures), asphalt and gravel-covered storage yards, parking areas, roads, railroad tracks, tall light standards, electrical transmission lines, storage containers, and cranes of various types and sizes. Along the waterways (primarily the Hylebos and Blair waterways) are features that can be seen such as piers, riprap shorelines, bulkheads, and ships and barges of varying sizes and types. Nighttime views of the industrial area include numerous building lights, lights for loading and unloading containers, lights for parking and outdoor storage areas, security lights, streetlights, and lights from trucks, automobiles, trains, and ships. Daytime and twilight (to depict existing lighting) photographs of the Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, and surrounding areas were taken from several locations along the edge of the slope (Appendix G).

Blair-Hylebos Peninsula

The Blair-Hylebos peninsula is located between the Blair Waterway, which is generally located to the south, and the narrower, longer, Hylebos Waterway located generally to the north. The peninsula has a strong maritime industrial character. Properties near the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites that abut Alexander Avenue East or East 11th Street (both of which pass by the site) comprise extensive areas used to store containers and materials, industrial uses, vacant areas awaiting redevelopment, and utilities. Large features that can be seen throughout the peninsula are cranes, tall storage structures, and large-scale buildings. Glimpses of the Blair and Hylebos waterways and the slope north of Marine View Drive are possible from some locations. Views toward the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites from within the flat peninsula tend to be blocked or screened by existing buildings and facilities.

The Tacoma LNG Facility site contains several buildings (one and two stories in height), including one exceptionally large (approximately 258,000-square-foot) building. The Tacoma LNG Facility site also contains extensive paved areas surrounding the buildings, a small dock, an approximately 590-foot-long timber pier, and a series of wood bulkheads adjacent to the Hylebos Waterway. The southwest corner of the Tacoma LNG Facility site currently has approximately 20 deciduous trees, planted as landscaping to line the existing parking area. Two to three trees also occur along the shoreline of the Hylebos Waterway. Edging the facility site are numerous utility transmission lines following both Alexander Avenue East and East 11th Street. The existing facility site is similar in appearance and character to areas near it and has a strong maritime industrial character.

The TOTE Marine Vessel LNG Fueling System site is proposed within the existing developed footprint used for TOTE's shipping operations. The entire site is paved and used for storage, loading, and offloading of cargo containers. The Blair Waterway includes five separate existing in-water structures, and the shoreline is entirely armored with riprap.

Areas Southeast of the Blair-Hylebos Peninsula

Areas southeast of the Blair-Hylebos peninsula include portions of the Blair Waterway, its shoreline, and the industrial area immediately south of the Blair Waterway. The Blair Waterway is used to load and unload container ships. Large cranes, bulkheads along the shorelines, and extensive paved areas where containers are stored are prominent visual features. The waterway, its shoreline, and adjacent lands have a strong maritime industrial character. There are no marinas along the waterway that cater to recreational boaters, no public boat launches for recreational boats, and no parks in the area. Consequently, public views toward the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are limited to roads such as Port of Tacoma Road that provide access into the interior of this area.

PSE Natural Gas Distribution System

Improvements to the PSE Natural Gas Distribution System associated with the Proposed Action would involve constructing two new distribution pipeline segments, constructing the new Golden Given Limit Station, and upgrading the existing Frederickson Gate Station. Both pipeline segments would be located within, or underneath, existing streets. The segments would be located in areas that have a variety of land uses (see Section 3.7 [Land Use]).

Golden Given Limit Station

The Golden Given Limit Station would be built south of the intersection of East 99th Street and East 10th Avenue near Golden Given Road East in unincorporated Pierce County. The limit station would be located on a previously disturbed and developed parcel near the north end of Pipeline Segment B. The limit station parcel is currently developed with an existing building and paved parking lot. Figure 2-19 in Chapter 2 (Description of Proposed Action) shows the location of the proposed new limit station.

Frederickson Gate Station

PSE operates existing equipment at the Frederickson Gate Station that provides natural gas and pressure regulation to the local distribution system. The Project would require facility changes to the existing Fredrickson Gate Station in order to provide sufficient gas supply to the Tacoma LNG Facility while maintaining operational reliability of the existing distribution system into Pierce County. Figure 2-20 in Chapter 2 (Description of Proposed Action) shows the location of the gate station.

3.8.3.2 Light and Glare

Surrounding Area Lighting

The land use designation of Port Maritime and Industrial District allows 24-hour operations to accommodate regional and international shipping and distribution schedules. As a result, many of the properties in the Blair-Hylebos peninsula contain extensive lighting systems. Appendix G contains several photographs from within the assessment area that were taken during twilight to show existing features and existing sources of light. The storage area on the TOTE property to the immediate southeast of the Tacoma LNG Facility site (across Alexander Avenue East) has a number of high, bright security lights. They appear to be metal-halide or mercury-vapor lights (which generally have a bluish-white appearance) and are visible from many viewing areas. Other storage container–loading and unloading facilities southeast of the Blair Waterway also have bright lights, as do most of the associated large cranes.

On-site Lighting

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites currently contain widely scattered overhead lights located above storage and parking areas, as well as a limited number of lights on the side of, or within, buildings. The existing large, approximately 258,000-square-foot building on the Tacoma LNG Facility site has a bank of lights near its southwestern corner to illuminate areas used for loading and unloading. The site appears to contain both metal-halide (or mercury-vapor) lights that produce intense white light and sodium-vapor lights that produce a yellowish-pinkish color.

Existing Glare Conditions

Glare is defined as "a harsh uncomfortably brilliant light" (Merriam-Webster, Inc. 2014). By this definition, most of the existing features in the viewed landscape of the Tacoma LNG Facility site and nearby areas do not produce glare. Although, as discussed in the previous subsection, high-intensity lights are located on properties in the vicinity of the Project site, their presence is consistent with maritime and industrial land uses and is not sources of glare to residences northwest of the Blair-Hylebos peninsula or to nearby motorists (which could be a safety issue if the glare were to distract motorists). Reflection of the sun can also be a source of glare. Few, if any, surfaces found within the existing site or on nearby properties are reflective enough of the sun to create uncomfortable glare conditions to residences northwest of the Blair-Hylebos peninsula or to nearby motorists.

3.8.4 Impacts of the Proposed Action

3.8.4.1 Construction Impacts

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would require activities such as demolition of existing site features, partial/limited vehicle access on nearby roads, materials and equipment deliveries and storage, pile driving, the presence of construction equipment, dust, and construction lighting. At the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites, construction staging, laydown, and material and equipment storage would occur within the sites themselves. No additional areas outside the limits of the sites would be needed.

The activities related to construction would occur in an industrial area visible from several locations with high viewer sensitivity in the surrounding area, including residential viewers above the slope adjacent to Marine View Drive and northeast of the Hylebos Waterway and recreationists using the Chinook Landing Marina areas along Marine View Drive north of the site. Although temporary and limited to the duration of construction, some construction activities would be long term, extending for over three years. During this time, construction activities are unlikely to obstruct views or produce substantial light or glare that would create a safety hazard; however, these activities are likely to be noticeable to and attract the attention of sensitive viewers. Demolition of existing buildings would require approximately three months; civil preparation, including removal of existing trees, soil improvement, grading, and installation of below-grade utilities, would take approximately seven months. Actual plant construction would require approximately 42 months, and construction of the fueling platform in the Blair Waterway would require approximately seven months. Some of these timeframes overlap, but in general, site preparation and construction are expected to begin in the third quarter of 2015 and end by the fourth quarter of 2018.

Other construction activities related to the Project include those associated with pipeline segments and with the limit and gate stations. Construction staging and laydown areas for pipeline work would be located within areas zoned for commercial and industrial uses. These areas would be used temporarily during construction. Constructing these facilities would result in temporary, localized impacts that would not substantially alter or obstruct views or produce light or glare that would create a safety hazard or interfere with views. Construction activities at the limit and gate stations would be completed within approximately three months. Pipeline Segment A would require approximately seven months for construction activities. Horizontal directional drilling may be constructed independently from standard pipeline trenching construction. Construction of Pipeline Segment B would require an estimated three months.

Because aesthetic impacts of construction activities and construction-related light and glare during the construction of the Tacoma LNG Facility has the potential to be substantial due to the long-term temporary duration and effects on sensitive viewers, mitigation measures have been identified that would reduce these impacts to less than significant levels (see sections 3.8.6.1 [Aesthetics] and 3.8.6.2 [Light and Glare]).

3.8.4.2 Operations Impacts

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The potential visual impacts associated with the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are presented in Table 3.8-1 and discussed in the following text.

Table 3.8-1 Tacoma LNG Facility Components With the Most Potential to Be Noticeable

Components	Description	Notes
LNG Storage Tank	Tank would be approximately 140 feet high by 130 feet in diameter.	Similar in industrial appearance to storage tanks in the tank farm northeast of the Hylebos Bridge on the northeast side of the Hylebos Waterway (the closest tanks are approximately 2,000 feet away from the LNG Facility site), but the LNG tank would be substantially taller and more massive in form.
Pipeline from Tank to Hylebos Pier	Approximately 600-foot-long, above-ground pipeline that extends across the Hylebos pier.	Would be similar to the existing industrial appearance of the surrounding area.
Elevated Flare for Upset Conditions	Approximately 80 feet in overall height (as measured from ground level) and 1 foot in diameter.	The elevated flare would not be used during normal operations; the only time flame would be visible is during an extreme emergency when a rapid evacuation of the process and/or refrigerant system is required. In this type of emergency situation, the flame is estimated to be 70 feet tall. A pilot flame for the upset flare may be visible, but its visibility would be minimal compared to other lights in the general vicinity and given its size and distance to viewers.
Enclosed Ground Flare System	Approximately 40 feet in overall height and 10 feet in diameter.	Flames would not be seen from the flare in the surrounding area. The ground flare is an enclosed system, and visible flame would be contained within the flare enclosure.
Pretreatment System: Amine Towers	Each of the two structures is approximately 80 feet in overall height and 4 feet in diameter.	These are components necessary as part of the pretreating the natural gas prior to liquefaction.
Control Building	An existing two-story office/shop building would be repurposed for administration, maintenance, and control room purposes. The building is approximately 26 feet in height at the peak of the roof.	Appearance of the building would not change significantly.
Storage Building	An existing 110-foot by 200-foot sheet metal building in the northwest corner of the site would be kept and maintained for material during construction.	Appearance of the building would not change significantly.
Compressor Building	New single-story, metal-frame building would be 100 feet by 60 feet. The building would be approximately 35 feet in height at the peak of the roof.	Would be similar in appearance to other utilitarian buildings in the immediate vicinity.
Power Distribution Center	New single-story, pre-manufactured building.	Would be similar in appearance to other utilitarian buildings in the immediate vicinity.
Hylebos Concrete Pier	New pier would be 60 feet long by 25 feet wide with a 68-foot-wide by 33-foot-long concrete access trestle and four 15-foot by 15-foot (225	Would replace existing creosote timber pier; fewer pilings and newer materials improve the aesthetic appearance over existing pier.

Table 3.8-1 Tacoma LNG Facility Components With the Most Potential to Be Noticeable

Components	Description	Notes
	square feet each) dolphins, positioned at either end of the pier.	
Cryogenic Pipeline	Approximately 1,200-foot-long underground pipeline that extends over water up to an approximately 20-foot-high fueling platform.	Would be similar to the existing industrial appearance of the TOTE facilities.
Fueling Barge	Approximately 200 feet in length and 52 to 58 feet wide.	Would be similar in appearance to barges currently providing bunkering services with other fuels.
Blair LNG Loading Platform	Concrete piling-supported concrete platform, approximately 81 feet by 33 feet, to support the pipeline to the ship's fueling flange; accessed by a ramp of adequate width to support fire response vehicle.	Would be similar in appearance to piers and other industrial structures within the Port of Tacoma.
Landscaping	Landscape buffers along East 11th Street and Alexander Avenue East.	If required, landscaping would follow City of Tacoma Land Use Regulatory Code Requirements for landscaping.

Aesthetics

Areas Northwest of the Blair-Hylebos Peninsula

The industrial maritime character of views of the Tacoma LNG Facility and its associated components, once operational, generally would be similar to the character of the existing views seen from the areas north and northeast of the Blair-Hylebos Peninsula, as described above.

The applicable zoning and development standards for the Port Maritime and Industrial District and the Shoreline District (S-10) - Port Industrial Area (HI) designation, which encompass the Tacoma LNG Facility site, do not establish a requirement or standards for the uniform appearance of structures. Nevertheless, the LNG storage tank proposed at the Tacoma LNG Facility would be an industrial vertical cylindrical structure set on a flat landform with adjacent buildings, utility infrastructure, and smaller vertical elements surrounded by waterbodies and a variety of structures with similar forms in the vicinity. The form of the single LNG storage tank would be similar to but substantially taller and more massive than tanks in the tank farm 2,000 feet northeast of the Hylebos Bridge on the northeast side of the Hylebos Waterway.

From KOP 1 (Browns Point Boulevard north of McMurray Ravine): The appearance of the existing Tacoma LNG Facility site seen from this elevated location would change when viewed from residential areas north of the slope above Marine View Drive such as KOP 1 (see photographic simulation in Appendix G). However, the site would retain its current maritime industrial character. From most elevated locations north of the slope above Marine View Drive, the roof of the 258,000-square-foot building, stored materials near the building, and the vacant lot to the east of the building are the primary features that are now seen. The large building would be removed, and within part of its footprint would be the LNG storage tank, buildings, the cryogenic pipeline and tanker truck loading area, and extensive areas of paving and gravel. The rebuilt piers, shoreline, and barges would remain visible.

The replacement of the large building and adjacent storage areas with the facilities previously described would change the appearance of the Tacoma LNG Facility site. The primary change would be that the existing wide (approximately 325 feet) 258,000 square-foot, 40-foot-tall building would be replaced with the narrower (approximately 130 feet wide), taller (140 feet) LNG storage tank and areas of paving and gravel. The existing building and its light-colored and reflective roof (which attracts attention when viewed from above) would be removed and replaced with the tall cylindrical concrete tank structure with a smaller

footprint. Tacoma LNG Facility components would be seen from areas north and northeast of the slope above Marine View Drive in foreground views by sensitive viewers (residents and recreationists).

Although the visual character of the area would not be significantly altered, views of the site would be somewhat degraded by introducing the large LNG storage tank. The tank would be similar in form to other storage tanks in the vicinity, but it would be substantially taller (140 feet versus 85 feet for the tallest tanks in the vicinity), greater in diameter (130 feet versus 100 feet), and more massive, with a volume more than twice that of similar tanks nearby. The contrast produced by the new, tall, cylindrical form and light gray color would be substantial. The LNG storage tank would be a dominant element that would attract attention and be highly noticeable in foreground views by residential and recreational viewers with high viewer sensitivity. Although tanks of similar form are located in the vicinity approximately 2,000 feet east of the site, they do not appear to be visible in views of the site from residences, the marina, and other sensitive viewing areas along Marina View Drive and the contrast produced by the LNG storage tank would be strong for views from this KOP.

For these reasons, the aesthetic impact of the LNG storage tank would be adverse for views from this area. Although the contrast produced by the form of the LNG storage tank would remain substantial, the overall aesthetic impact of the tank would be reduced by implementing mitigation measures identified in Section 3.8.6.1 (Aesthetics) that would use darker colored finishes to help blend it with its surroundings and reduce its strong vertical contrast and Section 3.8.6.2 (Light and Glare) that would minimize light reflection and help reduce its noticeability.

From KOP 2 (a parking area near a marina adjacent to Marine View Drive): The appearance of the Tacoma LNG Facility site when viewed from areas of similar elevation such as KOP 2 along the Hylebos Waterway and Marine View Drive would change compared to the existing condition, but would retain the current maritime industrial character (see photographic simulation in Appendix G). The existing low, wide (approximately 325 feet) 258,000-square-foot building would be replaced by the narrower (approximately 130 feet in diameter), but taller (140 feet) LNG storage tank. The tall cylindrical storage tank would add an additional vertical industrial element to tall elements (cranes and light standards) that are currently silhouetted against the sky.

Although the visual character of the area would not be significantly altered, views of the site and area would be somewhat degraded by introducing the large new LNG storage tank. The contrast produced by the tall, cylindrical form and light gray color would be substantial. Although other tall, vertical industrial elements are silhouetted against the sky, the LNG storage tank would be substantially more massive in form, and it would be a dominant element that would attract attention and be highly noticeable in foreground views by recreational viewers with high viewer sensitivity for views from the marina and other areas along Marine View Drive.

From KOP 3 (the Hylebos Bridge [East 11th Street]): Several Tacoma LNG Facility site components would be clearly visible from KOP 3, which is located on the Hylebos Bridge and East 11th Street (see photographic simulation in Appendix G). The LNG storage tank would be taller and more massive than the tallest current site features, but the site would retain its maritime industrial character. When viewed from the north end of the bridge, the LNG storage tank would appear in the foreground and intrude upon views of parts of the distant background including the hills beyond downtown Tacoma. The structural components of the two flares would be seen in front of the LNG storage tank. Rebuilt piers, offshore structures, shoreline structures, and barges being loaded would also be visible, and would be similar in appearance and character to features that are currently seen at the site and at other properties along the Hylebos Waterway. These proposed Tacoma LNG Facility site components would somewhat obstruct views of maritime industrial facility areas behind them and the hills beyond downtown Tacoma. The tall and massive form of the LNG storage tank would be silhouetted against the sky and low background hills and introduce a dominant and highly noticeable element in views from this area. Although some recreational viewers may use this area for boating and fishing, most viewers would consist of local workers and people commuting to or from work or

traveling for personal business along East 11th Street with low to moderate viewer sensitivity. Although the tall and massive LNG storage tank would produce strong contrast, viewer sensitivity would be low to moderate in views from this area, and therefore aesthetic impacts would be less than significant. Although overall aesthetic impacts of the Project would be less than significant for views from this area, impacts would be somewhat reduced by implementing mitigation measures identified in Section 3.8.6.1 that would use darker colored finishes to help blend it with its surroundings and reduce its strong vertical contrast and Section 3.8.6.2 that would minimize light reflection and help reduce the noticeability of the tank.

Blair-Hylebos Peninsula

Public views within the Blair-Hylebos peninsula are generally confined to the several streets that pass through the peninsula. The two streets that front the Tacoma LNG Facility site (East 11th Street and Alexander Avenue East) are lined with buildings and facilities that support industry and maritime operations. The viewers would see different structures, but the site's industrial character would not change.

From KOP 4 (the corner of East Alexander Avenue and East 11th Street): Some existing buildings seen from this KOP would be retained and repurposed. Others would be demolished and replaced with the infrastructure described above (see photographic simulation in Appendix G). The appearance of the Tacoma LNG Facility site would be consistent with the existing maritime industrial character of most of the Blair-Hylebos peninsula. Removal of several existing buildings would somewhat open up views of the slope north of Marine View Drive. The tall, massive LNG storage tank would be the most prominent site feature in views from this area and would intrude upon part of the hillside behind it. However, no sensitive or important views within the Blair-Hylebos peninsula would be significantly altered or obstructed by the LNG storage tank or other features associated with the Tacoma LNG Facility because most viewers would consist of local workers and people commuting to or from work or traveling for personal business with low to moderate viewer sensitivity.

Existing perimeter vegetation would be retained if allowed by regulators and some additional planting may be used to collect and treat stormwater. Both of these situations could have minor benefits to the visual setting of this corner. Infiltration of stormwater typically used to water plantings is discouraged by the Washington Department of Ecology and United States Environmental Protection Agency on contaminated sites. Additional plantings also create additional safety, security, and maintenance issues. Much of the existing site is covered by asphalt or gravel and would remain so to address maritime and LNG site security and safety regulations. Although the tall, massive LNG storage tank would produce strong contrast, viewer sensitivity would be low to moderate in views from this area, and therefore aesthetic impacts would be less than significant. Although overall aesthetic impacts of the Project would be less than significant for views from this area, the impacts would be somewhat reduced by implementing mitigation measures identified in Section 3.8.6.1 that would use darker colored finishes to help blend it with its surroundings and reduce its strong vertical contrast and Section 3.8.6.2 that would minimize light reflection and help reduce the noticeability of the tank.

Areas Southeast of the Blair-Hylebos Peninsula

The top of the LNG storage tank may be seen from some locations in the area south of the Blair-Hylebos peninsula and from the Blair Waterway. Because of the presence of large-scale buildings and other facilities between these areas and the Tacoma LNG Facility site, the LNG tank would be an additional industrial feature seen within this maritime industrial landscape. The LNG loading platform proposed within the Blair Waterway would be the visible feature from areas to the southeast as part of the TOTE Marine Vessel LNG Fueling System. However, the entire Blair Waterway, and the TOTE site specifically, already include numerous in-water features as seen within this maritime industrial landscape. The tall, massive LNG storage tank would be a dominant site feature in views from this area and would intrude upon part of the hillside to the north. However, no sensitive or important views within the Blair-Hylebos peninsula would be significantly altered or obstructed by the LNG storage tank or other features associated with the Tacoma

LNG Facility because most viewers would consist of local workers and people commuting to or from work or traveling for personal business with low to moderate viewer sensitivity. Because no sensitive or important views within the Blair-Hylebos peninsula would be significantly altered or obstructed by the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System features, aesthetic impacts would be less than significant for views from this area. Although overall aesthetic impacts of the Project would be less than significant for views from this area, the impacts would be somewhat reduced by implementing mitigation measures identified in Section 3.8.6.1 that would use darker colored finishes tank to help blend it with its surroundings and reduce its strong vertical contrast and Section 3.8.6.2 that would minimize light reflection and help reduce the noticeability of the tank.

Light and Glare

Safety and security lighting associated with the Tacoma LNG Facility would not be expected to produce more light or be brighter than existing lights on the site owing to the reduced overall footprint compared with existing development. The lighting would include downcast lighting on 30-foot poles, which is generally consistent or shorter than the lighting included with most existing industrial land uses on the Blair-Hylebos peninsula. Lighting associated with the Proposed Action would be visible from the residential area along the top of the slope north of Marine View Drive; however, the light produced by the Tacoma LNG Facility would not interfere with views from the residential area along the top of the slope north of Marine View Drive because it would be pointed downward and shielded as described in Section 3.8.6 (Mitigation Measures). A fully developed lighting plan would require the review and approval by the United States Coast Guard for maritime security regulations and by the Washington Utilities and Transportation Commission to meet Pipeline and Hazardous Materials Safety Administration regulations for lighting.

None of the materials or surfaces of the features at the Tacoma LNG Facility would be conducive to glare. Implementing mitigation measures identified in Section 3.8.6.2 that would use dark gray finishes on roofs and prominent features and minimize stray light and light reflection would ensure that impacts of light and glare would not be significant.

LNG Fueling Operations

The two methods for fueling TOTE's ships are described in Chapter 2 (Description of Proposed Action). Impacts from the first or barging method are discussed below. The second method involves an underground cryogenic pipeline from the LNG storage tank to the TOTE terminal. Owing to its underground nature, the pipeline would have no potential impacts on aesthetics and would not be a source of light or glare. The Tacoma LNG Facility would also have the capability of loading tanker trucks with LNG for transport to other places. This operation would be limited to the tanker truck loading area at the south end of the site near Alexander Avenue East and away from areas external to the Blair-Hylebos peninsula. Thus, the tanker truck loading would not be expected to impact aesthetics or light and glare.

The barge that would be used to transfer LNG to the TOTE terminal and to other customers and locations in Puget Sound would be similar in character to barges that currently service the TOTE terminal, TOTE vessels, and other industrial barges used in the Port of Tacoma. When in use, the barge would be docked at the PSE facility. The presence of the barge when active or moored would be consistent with the maritime/industrial facilities, activities and any associated lighting already occurring in the Blair-Hylebos peninsula and the Hylebos and Blair waterways. The barge would not impact views or the aesthetic setting of areas near these locations.

PSE Natural Gas Distribution System

Pipeline Segments. The pipeline segments would be installed below finished grade and covered by existing paved streets, and no lighting would be required. Therefore, the pipeline segments would result in no visual impacts once in operation.

Gate Station and Limit Station. The existing Frederickson Gate Station operates with equipment similar to what would be installed as part of the Proposed Action. Proposed upgrades to the existing gate station would maintain the general appearance of the gate station. The upgrades would not result in new impacts on views or the aesthetic setting of adjacent areas.

The site where the Golden Given Limit Station is proposed is currently occupied by a building and paved parking lot. Those would be demolished, and a new limit station of smaller footprint would be constructed. The limit station would include a heater, a remote terminal unit, and pigging facilities, likely within a building or behind a noise wall to mitigate noise and comply with noise regulations. Native vegetation would be added after construction to aesthetically improve the site. Therefore, the Golden Given Limit Station would result in a changed visual setting, but smaller new structures surrounded by native vegetation would be an improvement to the viewscape over that which currently exists.

3.8.4.3 Decommissioning Impacts

The estimated total design life of the Proposed Action is 50 years. Decommissioning of the Tacoma LNG Project components would generate impacts similar to those discussed in Section 3.8.4.1 (Construction Impacts). Potential impacts associated with decommissioning activities would be temporary and would not alter or obstruct views or produce light or glare that would create a safety hazard or interfere with views. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Project components.

3.8.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action-related impacts on aesthetics, light, and glare would not occur. However, a new and consistent supply of cleaner fuel with fewer air emissions than traditional fuels, as would be provided by the Proposed Action for marine and land transportation, would remain unavailable in the Proposed Action area. Further, the peak shaving capability of the Proposed Action would be unavailable to augment natural gas service to PSE customers.

3.8.6 Avoidance, Minimization and Mitigation

3.8.6.1 Aesthetics

The LNG storage tank would be a large-scale component of the Tacoma LNG Facility site similar in character to, but substantially taller and more massive than, storage tanks located in the tank farm approximately 2,000 feet northeast of the site and east of the Hylebos Bridge and East 11th Street. To somewhat reduce the dominance and noticeability of the LNG storage tank in views from the marina and residential areas to the north, it is recommended that the tank have a non-reflective concrete finish and a dark gray color that would be similar to the dark gray colors of adjacent asphalt paving areas and rooftops and walls of new buildings. The normally light gray color of the concrete could be darkened using integral color or other appropriate means to darken the finish surface of the tank. By having a non-reflective surface and a dark gray color, the concrete LNG storage tank would not contrast as much with the nearby areas as would a lighter-colored concrete or more reflective painted tank when viewed from the marina and elevated locations to the north. The roofs and walls of other buildings that would be constructed within the Tacoma LNG Facility site should also have non-reflective finishes and dark gray colors.

To further minimize the potential visual impacts associated with the Tacoma LNG Facility site, the following measures would be implemented during construction and operations:

- PSE would maintain all construction and operations sites viewable from residences, state and county highways and roads, parks, trails, and other public recreation areas and sensitive viewing receptors clean and orderly and shall ensure that materials, equipment, and vehicles are as inconspicuous as possible (i.e., screened or stored away from public view).

- To minimize visual impacts from residential neighborhoods looking down on the project area PSE would include landscaping around the LNG storage tank with a combination of gravel, larger boulders, and intermittent stands of drought resistant trees and shrubs. PSE would also keep this area free of invasive and noxious plants.
- To minimize impacts from street views along 11th Street and Alexander Way, to the degree possible, existing trees should be retained and additional landscaping provided.

3.8.6.2 Light and Glare

To minimize the potential nighttime visibility of lights associated with the Tacoma LNG Facility site, the following measures would be implemented (subject to safety and navigation-related regulations): PSE would use the minimum lighting necessary for safety and security during construction and operate and orient lighting required for safety and security at all construction areas, including storage and laydown areas, to mostly or fully eliminate off-site light spill at all times when the lighting might be in use and minimize the effect of increasing light pollution in the surrounding area.

- During construction, lighting for safety and security will be shielded and oriented downward, bare bulbs will be fully screened from view from sensitive viewing receptors such as residences, and on-demand lighting and/or timers will be used to minimize visual impacts of lighting.
- Exterior lighting fixtures would be attached to 30-foot-tall poles, which would be similar in height, or shorter than, most poles used for lighting in the area. Fixtures at the site would employ a full-cutoff design. A full-cutoff design means that the lamps are located inside the light fixture and a series of properly situated internal reflectors is used to direct the light in the desired direction and prevent the light from radiating out horizontally, or shade and shield accessories to prevent light spillover.
- Exterior nonpole (attached to buildings and other facilities) lighting would point downward and be shielded.
- Lighting would be provided with switches or automatic controls that would turn off lights when not required for Proposed Action operations. Photocells or timers would be considered to automatically control the use of light during daytime hours (lights can be quite visible during the times of the year when the hours of daylight are limited and dark conditions are common).
- The LNG storage tank could be unpainted dark gray concrete and any light reflection from it would be minor or nonexistent. The nonreflective, unfinished surface of the tank and the downward shielding of lighting would prevent most light spillover to off-site areas, and would result in minimal, if any, reflective visual impacts to sensitive viewers. The unfinished concrete surface of the tank would be less reflective than the existing tanks northeast of the site and Hylebos Waterway.

As a result of the reduced footprint of the Proposed Action compared to the existing site, the Proposed Action is not expected to produce more or brighter light than the existing lights at the site. Mitigation measures would minimize the potential nighttime visibility of lights at the site for lights associated with refueling, particularly from the residential area to the north where viewers are anticipated to be most sensitive to changes in the visual landscape. Several mitigation measures were devised specifically to reduce the visibility of light and glare to the residential areas to the north.

3.8.7 Conclusion

The existing site contains a variety of industrial structures of differing materials, sizes, and uses. The Proposed Action would replace those industrial structures with fewer but taller structures than the existing structures that are shorter, wider, and have a larger footprint. The site would remain industrial in use and character, as would surrounding areas. However, the LNG storage tank would be substantially taller and

more massive than other Project elements and existing features in the vicinity and would produce strong contrast in form. Compared to the previous site use, the tank would introduce a dominant new element that would be highly noticeable and attract attention in some foreground views for residential and recreational viewers with high viewer sensitivity. For these reasons, the overall visual impact of the Project would be significant and unavoidable. With implementation of design and other measures to avoid, minimize, and mitigate aesthetic impacts, the magnitude of these adverse impacts would be reduced. With implementation of design and other measures to avoid, minimize, and mitigate impacts of light and glare, the Proposed Action would not produce significant or unavoidable adverse impacts from light and glare.

3.9 Cultural Resources

Cultural resources are generally categorized as the historic-era built environment (buildings, structures, and modified landscapes) or archaeological resources (historic and prehistoric). This section describes existing cultural resources in the area of potential effect (APE) associated with the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and identifies the potential for impacts on these resources under the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). No eligible or potentially eligible historic-era resources were identified in the APE, and no eligible or potentially eligible archaeological resources are known or likely to be present within the APE.

3.9.1 Study Methodology

A site reconnaissance was conducted on December 6, 2012, to obtain a firsthand view of existing site conditions on the Blair-Hylebos peninsula, including the Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System sites and the Proposed Action APE.

Research for both the historic-era built environment and archaeological resources in the Proposed Action APE was conducted between December 26, 2012, and January 11, 2013, using the Washington Department of Archaeology and Historic Preservation's (DAHP) online Washington Information System for Architectural and Archaeological Records Data (WISAARD) database. The background research for historic-era resources encompassed an area extending 300 feet from the site boundary of the Proposed Action APE. Background research included a review of pertinent site distribution maps, site form files, and reports on previous archaeological research for the Proposed Action APE and for an area within 0.25 mile of the APE.

The Tacoma LNG Facility site has been previously investigated. A total of 20 archaeological investigations (surveys and site testing) have been carried out within 0.25 mile of the Proposed Action APE (Cultural Resources, Inc. 2009). Construction of the two new distribution-pipeline segments and the Golden Given Limit Station, and upgrades to the existing Frederickson Gate Station, would take place underneath existing surface streets or within paved and developed areas. Because is not practicable to conduct archaeological surveys under or within paved surfaces, no additional field surveys were conducted. However, an Unanticipated Discovery Plan, prepared by PSE, contains procedures for the unanticipated discovery of cultural resources and human skeletal remains and includes provisions for cultural resources sensitivity training for all construction personnel. DAHP staff and individuals from the Puyallup Tribe of Indians will be invited to contribute to this training. Letters of introduction and requests for a meeting regarding the proposed Project were sent to Bill Sterud, Chairman of the Puyallup Tribe of Indians, on August 8 and September 19, 2014, and to Virginia Cross, Chairwoman of the Muckleshoot Tribal Council on September 18, 2014. These letters are provided in Appendix H.

Table H-1 of Appendix H lists previous investigations carried out within 0.25 mile of the Proposed Action APE.

3.9.2 Regulatory Framework

Cultural resources in the Proposed Action area are protected by local, state, and federal regulations. Adherence to the City of Tacoma's Standard Operating Procedures for cultural resource surveys are required for projects subject to SEPA review and for projects within the 1873 Puyallup Tribe of Indians survey area. The Proposed Action is currently undergoing environmental review under Washington's SEPA and under the jurisdiction of Washington's statutory provisions found at Revised Code of Washington 68.60, 27.44, and 27.53 and in regulations contained in WAC 25.48. In addition to city and state requirements, the Proposed Action must comply with regulations of the City of Fife and the Pierce County charter because the Puget Sound Energy (PSE) Natural Gas Distribution System improvements are located in these areas. Both cities refer to state regulations (WAC 197-11-960) for implementation of SEPA rules. Pierce County addresses protection of cultural resources in the Pierce County charter, Chapters 19.40-60. The DAHP oversees regulatory compliance. Historic properties and criteria for evaluation are defined by Section 106 of the

National Historic Preservation Act. Traditional Cultural Properties are generally defined as properties that are eligible for listing in the National Register of Historic Places (NRHP) because of their association with cultural practices or beliefs of a living community that are rooted in that community's history.

3.9.3 Affected Environment

This section analyzes the potential for historic-era and archaeological resources in the Proposed Action APE.

3.9.3.1 Area of Potential Effects

The APE for the Proposed Action comprises the Tacoma LNG Project components. Project components associated with the Proposed Action are summarized as follows and further described in Chapter 1 (Purpose, Need, and Alternatives Considered) and Chapter 2 (Description of Proposed Action):

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System. The Tacoma LNG Facility APE is delimited by the facility site boundary (see Figure 2-1 in Chapter 2,"Description of Proposed Action").
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The TOTE system APE is delimited by the site boundary (see Figure 2-1 in Chapter 2).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments, a new limit station (the Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. The pipeline segments and their APEs are defined by the roadways on which they are centered, which are roughly 25 feet wide. The limit station and gate station APEs are defined by their site boundaries (see Figures 2-18 through 2-20 in Chapter 2).

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the city of Tacoma. The two new distribution pipeline segments would be located in the city of Tacoma and the city of Fife (Pipeline Segment A) and in unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County.

3.9.3.2 Site History

The Tacoma LNG Facility, TOTE Marine Vessel LNG System, and a majority of new distribution pipeline (Pipeline Segment A) would be located at the Port of Tacoma in an area that was zoned for industrial use more than 75 years ago and has been used consistently for intense maritime and industrial purposes since that time. Industrial development on the property and vicinity has substantially altered the delta, marsh, and tidal environments of Commencement Bay over the last century. The Port of Tacoma and private facilities occupy the upland portion of the area on the peninsula between the Hylebos and Blair waterways, on the west side of Blair Waterway, and south of the Blair Waterway turning basin. Since its initial construction, the Blair Waterway has been actively operated, managed, maintained, and improved as an industrial and commercial navigable waterway and is currently used for commercial cargo transport associated with the Port of Tacoma shipping facilities and other private commercial and industrial users. Between the 1920s and the 1960s, Hylebos Waterway was constructed by dredging a channel through the tidal marsh and using the dredged material to create the adjacent peninsula and the uplands on the east side of the waterway.

Cultural Resources Overview for the Blair-Hylebos Terminal Redevelopment Project, Tacoma, Pierce County, Washington (Cultural Resource Consultants, Inc. 2009) provides a detailed archaeological, historic, and ethno-historic contextual account of the area.

3.9.3.3 Results of Historic and Archaeological Resources Investigation

Historic-era Resources

Twelve structures within the Proposed Action APE were previously recorded and recommended as not eligible for listing on the NRHP (Cultural Resource Consultants, Inc. 2009). Three additional historic-era buildings have since been identified within the Proposed Action APE; these buildings are associated with former activities of the United States Navy. All were recorded and recommended as not eligible for listing on the NRHP. The buildings are described as follows:

- **Berthing Warf (Building 40)** is a 591-foot wood pier on the Hylebos Waterway. The berthing wharf was built in 1942 when the federal government acquired part of the Seattle-Tacoma Shipbuilding Corporation's shipyard for its Naval Industrial Shipyard. The wharf was used during World War II to berth naval vessels during the war years, and the Naval Reserve continued to use the wharf after the war. Substantially reconstructed in 1971, the wharf was recommended as not eligible for listing on the NRHP (Moore 2008a).
- **Berthing Wharf (Building 60)** was constructed at the same time and served the same function as the Building 40 berthing wharf. The T-shaped structure is situated on the Hylebos Waterway and features an approach ramp. It was recommended as not eligible for listing on the NRHP (Moore 2008b).
- **Boat Mooring Float (Building 61)** was built in 1953 for Naval Reserve use and consists of several timber mooring dolphins. It was recommended as not eligible for listing on the NRHP (Moore 2008c).

In addition to the properties described above, 17 properties meeting the NRHP 50-year minimum age requirement are located within 300 feet of the Proposed Action APE. Of those properties, one has been formally evaluated and determined not eligible for listing on the NRHP. The remaining 16 properties are unevaluated. All 17 properties are outside of the APE for the Proposed Action.

The list of historic-era resources within the 300-foot-wide search area is provided in Table H-2 of Appendix H.

Archaeological Resources

No archaeological sites of any kind have been recorded on WISSARD within the Proposed Action APE. Six previously recorded pre-contact and historic-era archaeological sites have been recorded within 0.25 mile of the Proposed Action APE. Of these six, one (45PI488) has been determined eligible for inclusion on the NRHP. The remaining five have not been evaluated. The complete list of archaeological sites within 0.25 mile of the Proposed Action APE is provided in Table H-3 of Appendix H, and Figure 3.9-1 (privileged and confidential—not for public distribution) depicts site locations.

3.9.4 Impacts of the Proposed Action

This section discusses potential impacts on any existing historic and cultural resources or potential resources in the Proposed Action area, related to construction and operation of the Proposed Project.

3.9.4.1 Construction Impacts

Historic-era Resources

The Proposed Action APE contains no properties determined or recommended as eligible for listing on the NRHP. Therefore, the Proposed Action would have no impact on the built environment.

Archaeological Resources

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are historic constructed landforms and therefore are unlikely to contain archaeological resources. No archaeological sites have been recorded in or directly adjacent to either of the two new pipeline segments, the Golden Given Limit Station site, or the existing Frederickson Limit Station. It is possible that currently undetected archaeological resources could be present under the current roadway surfaces proposed for pipeline construction and that

such construction, including directional drilling beneath those road surfaces, could result in adverse impacts on those sites.

3.9.4.2 Operations Impacts

Historic-era Resources

No eligible or potentially eligible historic-era resources are present in or directly adjacent to the Proposed Action APE; therefore, operations of the facility would not result in adverse impacts on any currently known historic-era resources.

Archaeological Resources

Operation of the Proposed Action would not result in adverse impacts on archaeological resources because no archaeological resources have been recorded in or directly adjacent to the APE of the Proposed Action and because no new land would be disturbed during operations.

3.9.4.3 Decommissioning Impacts

No eligible or potentially eligible historic-era resources were identified in the APE, and no eligible or potentially eligible archaeological resources or Traditional Cultural Properties are known or are likely to be present within the APE. Because decommissioning would occur within the APE developed for the Proposed Action, no decommissioning impacts on the historic-era built environment or on archaeological resources are anticipated.

3.9.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action-related impacts on historic and archaeological resources would not occur. However, a new and consistent supply of cleaner fuel with fewer air emissions than traditional fuels, which would be provided by the Proposed Action for marine and land transportation, would remain unavailable in the Proposed Action area. In addition, the opportunity to provide PSE's natural gas customers with peak shaving capability would not occur with the No Action Alternative.

3.9.6 Avoidance, Minimization, and Mitigation

3.9.6.1 Construction

Historic-era Resources

Because no properties eligible or recommended for the NRHP of the built environment are present in the APE of the Proposed Action, no mitigation measures are recommended.

Archaeological Resources

The following measures will be implemented to avoid impacts to archaeological sites or artifacts.

- Given that it is not practicable to conduct archaeological surveys for all areas that are to be excavated or are under paved surfaces, PSE will prepare an Unanticipated Discovery Plan. An Unanticipated Discovery Plan specifies key tasks and procedures for construction personnel and the Project Manager, outlines procedures in the event of a discovery, and identifies key contacts in the event of a discovery. The Unanticipated Discovery Plan for the Proposed Action is provided in Appendix H.
- Pipeline construction in areas near the base of the Blair-Hylebos peninsula at or near the natural shoreline that are deemed likely to have cultural importance would be monitored by a trained and experienced cultural resource expert.
- PSE will provide training in identifying cultural artifacts according to a training protocol developed by PSE and approved by the City after consultation with the Puyallup Tribe. In addition, PSE will ensure that crews involved in ground disturbing activities are familiar with the Unanticipated Discovery Plan. If suspected cultural artifacts are found, construction will be halted in the vicinity of the find until the

status of the artifact can be determined. In addition, PSE will notify a contact person provided by the Puyallup Tribe prior to commencement of ground breaking and the expected duration of any excavation.

3.9.6.2 Operations

Because no properties eligible or recommended eligible for listing on the NRHP are present in the Proposed Action APE, no mitigation is proposed.

3.9.7 Conclusion

3.9.7.1 Historic-era Resources

No historic-era resources of the built environment are present within the APE of the Proposed Action APE. Therefore, no significant unavoidable adverse impacts would be expected.

3.9.7.2 Archaeological Resources

No archaeological resources are known or are likely to be present within the APE of the Proposed Action. Therefore, no significant unavoidable adverse impacts are expected. It is possible that construction of pipeline segments could result in adverse impacts on currently undetected archaeological resources. As noted in Section 3.9.6 (Mitigation Measures), the Unanticipated Discovery Plan will help minimize the potential for, and degree of, impacts. Appropriate mitigation actions would be implemented if currently undetected sites were discovered during construction activities.

Figure 3.9-1 Archaeological Sites Recorded within 0.25 Mile of the Tacoma LNG Project Area of Potential Effect

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3.10 Transportation

This section describes the existing transportation network serving the area surrounding the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on the local and regional roadway system that may result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). Although the Project is primarily focused on LNG bunkering operations for Totem Ocean Trailer Express (TOTE) and an LNG barge loading facility, it also includes an LNG two-bay truck loading facility to truck LNG for off-site uses.

This section analyzes both potential impacts to land-based transportation and traffic and potential impacts to maritime traffic in the Hylebos and Blair waterways, which surround and would be used as part of the Proposed Action. It also proposes mitigation measures to offset these potential impacts.

3.10.1 Study Methodology

For the purposes of this analysis, the study area for transportation included roadways immediately adjacent to or crossed by the Project. A desktop analysis was performed that relied on existing data and transportation studies at or near the proposed Project site. Daily traffic volumes on state highways were gathered from the most recent version of the *Annual Traffic Report* published by the Washington State Department of Transportation (WSDOT 2014). Traffic volumes on local roadways were collected from the *Transportation Discipline Report—Blair-Hylebos Peninsula Terminal Redevelopment Project* (Transportation Discipline Report; DEA 2009) and the *Tideflats Area Transportation Study (TATS) Final Report* (Fehr and Peers 2011); the Washington State Department of Transportation (WSDOT) provided additional information related to traffic safety. In addition, information from the Tacoma Tideflats Emergency Response Study (Fehr and Peers 2015) was reviewed in assessing access and egress issues at the Hylebos peninsula (see also Section 3.11 (Public Services and Utilities).

This analysis estimated the maximum number of construction vehicle trips per day that may travel on public roadways within the traffic and transportation study area. Construction-related trips were estimated based on the anticipated construction material needs, construction workers, and support staff for the three main Project components described in Section 3.10.3 (Affected Environment). Information regarding construction material was provided by Puget Sound Energy (PSE) and supplemented with trips scaled from similar LNG facility studies. During operation, trip estimates were based on the number of expected employees and necessary deliveries or maintenance.

PSE developed assumptions regarding the distribution of trips generated by the Proposed Action on surrounding roadways based on existing traffic patterns. The estimated number of trips generated by the Proposed Action were compared to the most recent traffic volumes available. The resulting traffic operations were then compared with the level of service (LOS) estimates from the Transportation Discipline Report and congestion data from the Tideflats Area Transportation Study to assess the effects of the Proposed Action on traffic and, where appropriate, consider mitigation measures.

To assess potential impacts to maritime traffic, existing data were collected on vessel trips within the Hylebos and Blair waterways, including deep-draft vessel, tugboat, and barge operations. The data for existing conditions were then compared against the maritime trips that would be generated during construction and operation of the Project to assess the level of potential impact.

3.10.2 Regulatory Framework

This section describes plans, policies, and regulatory requirements that are relevant to the development of the Project in relation to traffic and transportation.

3.10.2.1 Growth Management Act 2013 Update

All cities within Pierce County are subject to the planning and regulatory requirements of the Growth Management Act, 2013 update (Revised Code of Washington 36.70A.070). The transportation requirements

specified in this act include adopting local comprehensive plans and their transportation elements, and ensuring that developments are consistent with these local plans. Transportation systems should be coordinated with local plans and priorities to appropriately support developments.

3.10.2.2 Pierce County Comprehensive Plan

The Pierce County Comprehensive Plan provides direction for the siting of public facilities, including transportation facilities. Countywide policies related to transportation include addressing concurrency (by providing transportation facilities to adequately accommodate new development) and managing roadway operations (through effective use of existing transportation facilities). (Pierce County 2012)

3.10.2.3 City of Tacoma Comprehensive Plan (amended 2013)

The transportation element of the City of Tacoma Comprehensive Plan (amended 2013) contains general goals and policies for the overall transportation system in Tacoma over the next 20 years (City of Tacoma 2013).

3.10.2.4 City of Fife Comprehensive Plan

The City of Fife Comprehensive Plan contains an assessment of current traffic operations, a summary of future projected traffic conditions, and recommended solutions to address expected deficiencies. It also provides community transportation goals and strategies to implement them. (City of Fife 2013)

3.10.2.5 Tideflats Area Transportation Study

The Tideflats Area Transportation Study looks at major roadway corridors and intersections near the Port of Tacoma. Transportation conditions in the study area were forecasted for the year 2030 and indicate that traffic conditions will deteriorate substantially by 2030. This study provides recommendations for improving transportation to better serve freight traffic in the area. (Fehr and Peers 2011)

3.10.2.6 Tideflats Area Emergency Response and Intelligent Transportation System Study

The City of Tacoma's Tideflats Area Emergency Response (ER) and Intelligent Transportation System (ITS) Study, currently underway, serves as a supplement to the Port of Tacoma's Tideflats Area Transportation Study. The ER/ITS study identifies the impacts from traffic congestion on emergency services, along with proposed mitigation measures. As explained by the City of Tacoma:

> *The proposed ER/ITS study is an outgrowth of concerns raised by the City and others resulting from proposed and previous Port area development as well as information contained in the Port of Tacoma's Land Use and Transportation and Strategic Plans and the Container Port Element of the City Comprehensive Plan. Existing development within the Tacoma Tideflats has significantly impacted emergency response capability.*
>
> *Using the ER/ITS study, the City proposes to model the impacts of known, planned and potential additional increases in business activity to measure the future impact to emergency response. The study also is expected to provide potential options for mitigation as well as recommendations for implementation of an ITS intended to enhance the capability of the existing and future transportation network in the Port area to inform and safely manage emergency response.* (City of Tacoma, not dated).

3.10.2.7 Port of Tacoma Land Use & Transportation Plan

The Port of Tacoma Land Use & Transportation Plan serves as a guide for future development at the Port of Tacoma and recommends infrastructure improvements for road, rail, and waterways (Port of Tacoma 2014).

3.10.3 Affected Environment

The transportation study area encompasses the following main Project components, which are further described in Chapter 2 (Description of Proposed Action):

- **Tacoma LNG Facility:** Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System.
- **Totem Ocean Trailer Express (TOTE Marine Vessel LNG Fueling System)**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges.
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), a new limit station (the Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station.

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the city of Tacoma. Local access to this area is obtained by arterial and collector roads under the jurisdiction of WSDOT, the City of Tacoma, and the City of Fife.

The two new distribution pipeline segments would be located in the City of Tacoma and the City of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County.

3.10.3.1 Roadway System

The Proposed Action would be served by an existing network of hierarchal, functionally classified roads consisting of principal arterials, minor arterials, and collector roads.

Principal Arterials. Principal arterials are typically of regional importance and are intended to serve high volumes of traffic traveling between major generators or population centers. These arterials can have a high degree of access control. Within the cities of Tacoma and Fife, principal arterials serving the Proposed Action study area are Interstate 5 (I-5), State Route (SR) 509, SR-99 (Pacific Highway East), Port of Tacoma Road, Marine View Drive, East 11th Street, and 54th Avenue East.

Minor Arterials. Minor arterials provide access between principal arterials and lower functioning roadways and typically have less access control than principal arterials. Taylor Way is the only functionally classified minor arterial providing site access.

Collector Roads. Collector roads provide for traffic movement between arterials and local streets and may also provide direct access to abutting properties. Collector roads serving the Proposed Action study area include East Alexander Avenue South and Lincoln Avenue.

Figure 3.10-1 shows the roadway network serving the Proposed Action study area. A description of this network is provided in the Transportation Discipline Report (DEA 2009) in Appendix I.

3.10.3.2 Traffic Volumes

Table 3.10-1 shows the existing average daily traffic (ADT) volumes on access roadways near the proposed Tacoma LNG Facility site. Traffic volumes were not available for the entire length of the proposed pipeline. Traffic volumes were obtained from several different sources, and the most recent traffic volume for each roadway is presented below. Traffic volume on different portions of I-5 has increased by 4 to 9 percent between 2008 and 2014, while volumes on different portions SR-509 have increased between 0 and 8 percent.

The 2008 ADT volumes on local roads were obtained from the Transportation Discipline Report (DEA 2009) while 2011 ADT volumes were obtained from the Tideflats Area Transportation Study (Fehr and Peers 2011). Table 3.10-1 shows that traffic volumes on local roads have generally decreased where data were available for both 2008 and 2011.

Table 3.10-1 Average Daily Traffic Volumes On Proposed Alternative Roadways

Roadway	2008 ADT	2009 ADT	2010 ADT	2011 ADT	2012 ADT	2013 ADT	2014 ADT
I-5 (west of 54th Avenue East Interchange)[a]	179,000	182,000	179,000	182,000	180,000	184,000	187,000
I-5 (east of 54th Avenue East Interchange)[a]	171,000	174,000	171,000	175,000	172,000	182,000	186,000
SR-509 (west of Port of Tacoma Road)[a]	26,000	24,000	25,000	25,000	27,000	27,000	28,000
SR-509 (east of Port of Tacoma Road)[a]	31,000	29,000	29,000	30,000	30,000	30,000	31,000
Marine View Drive /SR-509 (west of Norpoint Way)[a]	20,000	21,000	21,000	20,000	20,000	20,000	21,000
Marine View Drive /SR-509 (east of Norpoint Way)[a]	9,100	9,300	9,400	9,400	9,400	9,400	9,600
Pacific Highway East (between East Alexander Avenue and 54th Avenue East)[b]	N/A	N/A	N/A	19,700	N/A	N/A	N/A
Pacific Highway East (between 54th Avenue East and 62nd Avenue)[b]	N/A	N/A	N/A	19,600	N/A	N/A	N/A
Port of Tacoma Road (between Marshall Avenue and SR-509)[b]	N/A	N/A	N/A	8,500	N/A	N/A	N/A
Port of Tacoma Road (between East 11th Street and SR-509)[b]	9,900	N/A	N/A	8,500	N/A	N/A	N?A
Port of Tacoma Road (between SR-509 and Pacific Highway East)[b]	12,400	N/A	N/A	11,300	N/A	N/A	N/A
East 11th Street (between Taylor Way and East Alexander Avenue)[b]	3,500	N/A	N/A	N/A	N/A	N/A	N/A
54th Avenue East (between SR-509 and 8th Street East)[b]	18,100 – 19,300	N/A	N/A	16,400	N/A	N/A	N/A
Taylor Way (between Lincoln Avenue and SR-509)[b]	8,900	N/A	N/A	6,700	N/A	N/A	N/A
East Alexander Avenue (between Lincoln Avenue and SR-509)[b]	3,600	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln Avenue (between Taylor Way and East Alexander Avenue)[b]	4,400	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
[a] Source: WSDOT 2013, 2014.
[b] Source: DEA 2009 (2008 ADT), Fehr Peers 2011 (2011 ADT).
Key:
ADT = average daily traffic
Ave = Avenue
I-5 = Interstate 5
N/A = data are not available
SR-509 = State Route 509

The Tacoma LNG Facility site currently is used by PCC Logistics, a logistics, warehousing, trucking, distribution, and freight services company. PCC Logistics distributes cargo to and from the site. Existing cargo operations contribute up to 50 trucks and 15 employee vehicles to daily traffic surrounding the Port of Tacoma.

The Transportation Discipline Report identified 2008 peak-hour traffic volumes at select intersections surrounding the Proposed Action study area (see Figures 8A and 8B in Appendix I). The Transportation Discipline Report also estimated 2013 peak hour traffic volumes, based on the actual 2009 volumes (see

Figures 11A and 11B in Appendix I). Per the Transportation Discipline Report, the p.m. peak hour is the most concentrated traffic period of the day, making it the critical peak for analysis and occurred approximately between 4:15 and 5:15 p.m. (DEA 2009)

3.10.3.3 Level of Service

LOS generally describes traffic conditions at an intersection based on delay and perceived levels of congestion. Six LOS classifications, designated from "A" to "F," indicate various traffic conditions. LOS A indicates the best operating condition; vehicles are able to move through an intersection with little to no delay. LOS F generally indicates the worst operating condition; drivers are likely to experience long delays and, at signalized intersections, may have to wait more than one cycle before moving through.

The most recently available p.m. peak hour LOS at key intersections in the vicinity of the Proposed Action were obtained from the Transportation Discipline Report and are presented in Table 3.10-2. The Transportation Discipline Report used the methodology described in the 2000 Highway Capacity Manual (Reilly 1998). The Transportation Discipline Report estimated the 2013 peak-hour LOS based on 2008 peak-hour traffic volumes and LOS, and assumed an increase in traffic volumes on local roads to estimate the 2013 LOS. More recent data have shown that daily traffic volumes have actually decreased on some local roads. Table 3.10-2 also notes intersections identified in the Tideflats Area Transportation Study as congestion hotspots.

Table 3.10-2 Estimated 2013 p.m. Peak Hour Level of Service

Int. No.	Intersection	Traffic Control	Jurisdiction	Level of Service	Delay (seconds)
1	Port of Tacoma Road/North Frontage Road	Signal	Tacoma	C	33
2	Port of Tacoma Road/12th Street	Signal	Tacoma	D	40
3	Port of Tacoma Road/Pacific Highway East	Signal	Fife	**E***	**69**
4	Port of Tacoma Road/I-5 Southbound	Signal	Fife	C*	22
5	Port of Tacoma Road/I-5 Northbound	Stop	Fife	B*	14
6	Port of Tacoma Road/20th Street	Stop	Fife	**F***	**> 100**
7	Alexander Avenue East/SR-509 Southbound	Signal	Tacoma	C	33
8	Alexander Avenue East/SR-509 Northbound	Signal	Tacoma	B	19
9	Taylor Way/East 11th Street	Stop	Tacoma	A	8
10	Taylor Way/Lincoln Avenue	Signal	Tacoma	B	11
11	Taylor Way/SR-509	Signal	Tacoma	**E**	**56**
12	54th Avenue East/4th Street	Stop	Fife	**F**	**55**
13	54th Avenue East/8th Street	Signal	Fife	A	7
14	54th Avenue East/12th Street	Signal	Fife	B	13
15	54th Avenue East/Pacific Highway East	Signal	Fife	**F***	**> 100**
16	54th Avenue East/I-5 Southbound	Signal	Fife	C*	27
17	54th Avenue East/I-5 Northbound	Stop	Fife	C*	31
18	54th Avenue East/20th Street	Signal	Fife	D*	48

Source DEA 2009.
Notes:
Bold shaded results indicate intersections that exceed the LOS D standard for the city of Tacoma and city of Fife.
*Identified as a congestion hotspot (Fehr Peers 2011)
Key:
Int. No. = intersection number
I-5 = Interstate 5
SR-509 = State Route 509

The City of Tacoma stipulates that at least 85 percent of the arterial lane miles within the Port of Tacoma area must operate at LOS D or better. Within the city of Fife, the acceptable LOS standard is LOS D for all local roads. Four study intersections within the city of Fife and one intersection within the city of Tacoma exceed the LOS D threshold under existing conditions. Three intersections operate over their capacities at LOS F, including the intersection at 54th Avenue East/Pacific Highway East, which operates with more than 2.5 minutes of delay on average on all approaches. Taylor Way at SR-509 within the city of Tacoma operates at LOS E, which indicates that the intersection may be nearing its capacity threshold. Both intersections are located between I-5 and the main access to the Port of Tacoma.

Three of the intersections estimated in the Transportation Discipline Report as having a low LOS are also identified in the Tideflats Area Transportation Study as congestion hotspots: Port of Tacoma Road/Pacific Highway East, Port of Tacoma Road/20th Street, and 54th Avenue East/Pacific Highway East. The Tideflats Area Transportation Study identified five additional intersections as congestion hotspots and are noted in Table 3.10-2. Two of the congested intersections are located along the proposed route for Pipeline Segment A, at Taylor Way /SR-509 and 54th Avenue East/4th Street. (DEA 2009; Fehr and Peers 2011)

3.10.3.4 Traffic Safety

Safety conditions are typically described by the number of crashes at a certain location or area. Vehicular crash histories at intersections and corridors in the Proposed Action study area between January 1, 2011, and December 31, 2013, were collected from WSDOT and include accidents on city and county roads reported by local police.

No fatality crashes occurred within these three years at the specified locations, but some incidents occurred that involved speeding or following too closely, negligent driving, and other improper lane maneuvers, resulting in personal injury. Collision statistics are provided in Appendix I.

The Port of Tacoma ER/ITS study found no fire stations or emergency response units deployed in the Tideflats area and determined that response times were above recommended standards. Poor roadway surfaces in the study area require emergency vehicles to travel at lower speeds, which contributes to the longer response time. Total average response time has increased from 8.2 minutes in 2012 to 9 minutes in 2014. Historic response time to locations near the Tacoma LNG Facility site is even longer, at 12.7 minutes. It was also determined that evacuation due to an emergency at the proposed Project site would be difficult due to route limitations and traffic congestion (Fehr and Peers 2015; TriData 2015).

A number of non-gated at-grade rail crossings are located in the study area and are discussed in Section 3.10.3.8 (Rail Facilities). These present potential safety concerns from collisions between vehicles and rail cars and the potential for rail cars crossing or stopped at an at-grade crossing to increase response time and limit access for emergency vehicles.

As discussed in Section 3.10 (Public Services and Utilities), emergency response times in the Tideflats have been found to exceed the performance objectives of the Tacoma Fire Department. Traffic incidents occurring and requiring the intervention of emergency services may therefore experience longer response times than in other parts of the city of Tacoma.

3.10.3.5 Transit

The Port of Tacoma peninsula is not currently served by transit. A portion of proposed Pipeline Segment A would run north-south within 62nd Avenue East, which intersects both Pacific Highway East and 20th Street East. Pierce Transit Route 500 runs east-west along Pacific Highway East, and Route 501 runs east-west along 20th Street East. Proposed Pipeline Segment B would run north-south within Golden Given Road, which intersects with East 112th Street at the south end of the pipeline. Pierce Transit Route 410 runs east-west along East 112th Street.

3.10.3.6 Nonmotorized Facilities

Sidewalks are limited on the street networks within the Proposed Action study area. Sidewalks are present on the east side of Alexander Avenue East along the frontage of the proposed Tacoma LNG Facility site, but no sidewalks are adjacent to the remaining areas of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. No sidewalk improvements are expected on the Blair-Hylebos peninsula at this time.

Sidewalks are limited along portions of Taylor Way where Pipeline Segment A would be located. Sidewalks are present on the west side of Taylor Way between East 11th Street and Lincoln Avenue, but not along Taylor Way between Lincoln Avenue and SR-509. Sidewalks are present along the city of Fife's street network where the remaining portions of Pipeline Segment A would be located. Sidewalks are intermittent and discontinuous along the portion of Golden Given Road East where Pipeline Segment B would be located. Sidewalks are not present along the frontage of the proposed site for the Golden Given Limit Station, nor along the portion of 192nd Street East where upgrades to the Fredrickson Gate Station would occur.

Dedicated bicycle lanes and shared nonmotorized facilities do not exist in the immediate Proposed Action area (Pierce County 2013). Additional information on nonmotorized facilities and an inventory of existing sidewalk locations are included in Appendix I, the Transportation Discipline Report (DEA 2009).

3.10.3.7 Freight Movement

Taylor Way and Port of Tacoma Road between East 11th Street and SR-509 are designated as Heavy Haul Industrial Corridors by the City of Tacoma in Tacoma Municipal Code 11.55.020. The City of Tacoma has also applied this designation to portions of East 11th Street and Alexander Avenue in the vicinity of the Project. Heavy Haul Industrial Corridors are intended to provide access for large heavy haul trucks within the Port of Tacoma and the surrounding area. Fife has designated 54th Avenue East as a truck route. See Figure 9 in Appendix I-1 for the designated truck routes within the city of Fife. See Figure 4 of the Tideflats Area Transportation Study for approved truck routes within the city of Tacoma (Fehr and Peers 2011).

From I-5, trucks serving the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be directed to use the 54th Avenue East interchange to Taylor Way.

Although the peak-hour for overall vehicle traffic is during the afternoon, truck volumes generally peak in the morning when the port opens (Fehr and Peers 2011).

3.10.3.8 Rail Facilities

Multiple rail lines and facilities operate at the four intermodal rail yards at the Port of Tacoma. The Burlington Northern Santa Fe Railway Company and the Union Pacific Railroad offer services from Tacoma across North America. From the Port of Tacoma's rail yards, goods are transported throughout the region through three highway interchanges along I-5.

Multiple rail lines in the transportation study area cross the local street network at grade. Three existing rail lines run parallel to the road right-of-way (ROW) along Alexander Avenue East adjacent to the proposed TOTE Marine Vessel LNG Fueling System site and directly across Alexander Avenue East from the Tacoma LNG Facility site. One of these three rail lines includes two separate spur lines, which extend across Alexander Avenue East and into the Tacoma LNG Facility site.

Rail lines also intersect a portion of the proposed PSE Natural Gas Distribution System along the proposed alignment of Pipeline Segment A. However, no rail lines or facilities are located near Pipeline Segment B, the proposed Golden Given Limit Station, or the Fredrickson Gate Station.

Trains crossing or stopped at an at-grade crossing can create traffic delays and prevent emergency vehicles from accessing a site. The following at-grade crossings are located near the proposed Project sites:

- Alexander Ave crossings:
  - Northwest of the intersection with East 11th Street (three locations)
- East 11th Street crossings:
  - Immediately southeast of the intersection with Alexander Avenue East
  - Immediately northwest of the intersection with Taylor Way
- Taylor Way crossings:
  - Southeast of the intersection with East 11th Street (two locations)
  - Approximately halfway between East 11th Street and Lincoln Avenue
  - Northwest of the intersection with Lincoln Avenue
  - Southwest of the intersection with Lincoln Avenue
  - Approximately halfway between Lincoln Ave and SR-509 (two locations)
  - Approximately 1,000 feet northwest of the intersection with SR-509 (two locations)
  - Northwest of the intersection with SR-509

3.10.3.9 Parking

Based on aerial imagery, ample parking within the Proposed Action study area appears to be available within the individual parcels. Parking does not appear to be allowed or accommodated on area streets such as Alexander Avenue East or Taylor Way/54th Avenue on the peninsula.

3.10.3.10 Potential Future Transportation Improvement Projects

Potential transportation projects in the vicinity of the Proposed Action that are expected to be constructed after 2015 were obtained from the WSDOT Statewide Transportation Improvement Program (TIP), the City of Tacoma TIP, and the City of Fife TIP. A TIP is a prioritized list of transportation improvement projects, identified at the local level and consistent with regional plans; projects must be included in the Statewide TIP to be approved for federal transportation funds. The following projects near the proposed Project were included in the 2015–2018 Statewide TIP and could impact access and egress from Project components (WSDOT 2015):

- **Modifications at the Port of Tacoma Road interchange with I-5**: An interchange justification report was completed in 2012 for the Port of Tacoma Road interchange with I-5. This report describes the future interchange with a realigned I-5 southbound off-ramp to 34th Avenue East. Port of Tacoma Road and 34th Avenue East would also be modified to operate as a couplet with the new interchange configuration. However, no funding has been identified and no date has been set to start construction.
- **High-occupancy vehicle (HOV) lanes on I-5**: The portion of I-5 that passes through the study area would be widened to include HOV lanes in both directions between M Street and Port of Tacoma Road. The northbound HOV lane currently is under construction, as is the southbound HOV lane south of Portland Avenue. Construction of the remaining portion of the southbound HOV lane (from Port of Tacoma Road to Portland Avenue) is expected to begin when the northbound HOV lane is complete.
- **Puyallup River Bridge Replacement**: Two segments of the Puyallup River Bridge on the west shore of the Puyallup River would be replaced. An additional connecting bridge segment would also be replaced. The new structures would increase the existing three lanes to four.
- **SR 167 Extension Project:** The Tacoma to Puyallup-New Freeway received funding recently through the Connecting Washington transportation bill. Design of the SR 167 extension, six-lane facility (two general purpose, one HOV lane each direction) in Puyallup from SR 161 to I-5, and four lane facility (two general

purpose lanes each direction) from I-5 to SR 509, is about 15 percent complete. There is a new 70th Ave structure crossing over I-5. Currently, the project is preparing a NEPA Re-Evaluation for the Federal Highway Administration's approval. Design Documentation and Plans for Approval will be the next milestone document for this project. WSDOT is beginning efforts of scheduling an access hearing for spring 2016, which will result in new ROW plans for continued acquisition by September 2016. WSDOT has been allocated funds over the next four biennia (2015–2023) for the project, the key piece of which is completion of ROW acquisition throughout the corridor. Relocation of businesses once ROW is acquired will take approximately three years to complete. Construction of portions of the project (e.g., wetland mitigation or riparian restoration or stream relocation) could starts at early as 2017.

The most recent version of the City of Tacoma Six-Year Transportation Improvement Program dated November 12, 2013, includes the following potential projects in the vicinity of the Project that are not included in the Statewide TIP (City of Tacoma 2013):

- Improve the SR-509/Taylor Way/54th Avenue East intersection by adding a separate right-turn lane on northbound 54th Avenue East and incorporating double left-turn lanes in both directions of SR-509.
- Construct a half-diamond interchange at the interchange of SR-509 at East D Street. This public/private partnership project currently is on hold.
- Rehabilitate the east spans of the Puyallup River Bridge over Pacific Highway East.

The most recent version of the City of Fife TIP was adopted in August 2013 and includes the following potential projects that are not included in the Statewide TIP near the proposed Project Site (City of Fife 2013):

- Interconnect traffic signals on Pacific Highway East Signal between Willow Road East to 59th Avenue East.
- Improve the intersection of Pacific Highway East and 54th Avenue East, including adding a second westbound left-turn lane.
- Rebuild the interchange of 54th Avenue East with I-5.
- Reconstruct 20th Street East between 50th Avenue East and 59th Avenue East to include five lanes with sidewalks and bike lanes.
- Reconstruct 12th Street East between 62nd Street East and Alexander Avenue East.
- Reconstruct the north side of Pacific Highway East between 54th Avenue East and 65th Avenue East to include curbs, gutters, sidewalks, and bike lanes.
- Reconstruct 62nd Avenue East between Pacific Highway East and 12th Street and extend over I-5 from Pacific Highway East to 20th Street East.

In addition to projects identified in current TIPs, the ER/ITS study has identified a number of likely road projects in the vicinity of the Tideflats that would be anticipated by 2020 and 2035. These include, among others, the reconstruction of Taylor Way. (Fehr and Peers 2015)

Maritime Traffic

The Captain of the Port controls and adjusts maritime traffic in the waterways. The Port of Tacoma has advised that volumes of maritime traffic in 2015 are down from historically higher volumes. Furthermore, the imminent opening of the widened Panama Canal is expected to further reduce ship volumes in West Coast ports. Lower shipping costs available through the Panama Canal and United States East Coast ports would allow them to reroute cargo now being moved through West Coast ports (USDOT Maritime Administration 2013).

The Hylebos and Blair waterways are both used for commercial vessel traffic of various types. Large ships that use the Hylebos Waterway primarily carry logs and scrap metals, and tallow and finished lumber are loaded at the Manke and Northwest Terminals, Inc., docks. The Hylebos Waterway is most often traveled by commercial vessels outbound at the highest high tide (slack tide), when the chance of hitting the bottom of the waterway is reduced, while inbound vessels are able to traverse the waterway at any time, as they are lighter and sit higher in the water. The Blair Waterway primarily supports travel by commercial vessels such as container shipping and automobile import industries, as the navigable depth of the waterway is suitable for transit by the largest shipping vessels (McCollough et al. 2004).

The Hylebos and Blair waterways are generally divided between channels (managed by the United States Army Corps of Engineers) and berthing areas (generally managed by the Port of Tacoma), which include some private berthing areas (Warfield pers. comm., 2014). Each deep-draft vessel, or ship containing 300 gross tons or more of cargo that is usually piloted and includes all foreign-flagged vessels, is accompanied by two tugboats, one fore and one aft (Moffatt & Nichol, pers. comm. 2013).

Appendix I describes the deep-draft traffic on the Hylebos and Blair waterways according to available data. These tables reflect data that are recorded and available, but the actual number of deep-draft vessels using the waterways may be higher. Table O-2 shows that deep-draft vessels used some portion of the Hylebos Waterway for a monthly average of 4.1 arrivals between 2010 and 2014. As described above, each deep-draft arrival is supported by two tugboats; therefore, the 4.1 deep-draft arrivals in the Hylebos Waterway were supported by a monthly average of 8.2 tugboats. The tugboat data associated with deep-draft vessels on the Hylebos Waterway are not included in Table O-2. Table O-3 shows that deep-draft vessels used some portion of the Blair Waterway at a monthly average of 62.8 arrivals in 2014. The deep-draft arrivals in the Blair Waterway were supported by a monthly average of 125.6 tugboats. The tugboat data associated with deep-draft vessels on the Blair Waterway are not included in Table O-3.

Barge and associated tugboat traffic occurs almost daily in the Hylebos and Blair waterways related to many operations within the Port of Tacoma. Barge and tugboat traffic rates in the Hylebos and Blair waterways are shown in Appendix I, according to available data from the Foss Maritime Company (Wolf, pers. Comm. 2015). These tables reflect data that are recorded and available, but the actual number of barges and tugboats using the waterways is higher because multiple companies operate barges and tugboats in the waterways besides Foss Maritime Company. Table O-4 shows that 322 barges and 367 tugboats used some portion of the Hylebos Waterway in 2014 for monthly averages of 26.8 barges and 30.6 tugboats. Table O-5 shows that 410 barges and 415 tugboats used some portion of the Blair Waterway in 2014 for monthly averages of 34.2 barges and 34.6 tugboats.

Appendix I contains data for medium and large vessels that use the Hylebos and Blair waterways in support of commercial operations within the Port of Tacoma. Smaller vessels are not reflected in the tables. Thus, the actual number of total vessels, including smaller vessels, is larger and difficult to estimate.

Commercial Fishing

Both the Hylebos and Blair waterways are closed to commercial fishing (Lothrop, pers. comm., 2013). Tribal commercial fishing vessels do moor at the Chinook Landing Marina, which is located on the northern side of the Hylebos Waterway (Chinook Landing Marina, pers. comm., 2013).

Recreational Use

As described in Section 3.7.2.2 (Existing Recreational Resources), minimal recreational boating and fishing occur on the Hylebos and Blair waterways.

3.10.4 Impacts of the Proposed Action

This section presents potential transportation impacts that could result from construction, operation, and decommissioning of the proposed Project.

3.10.4.1 Construction Impacts

Potential impacts from construction could include an increase in daily and peak hour traffic volumes and a temporary closure of up to two lanes of specific roadway segments for pipeline construction, resulting in a temporary increase in traffic delays and change in traffic patterns. Heavy and oversized construction vehicles would also cause more damage to road surfaces than lighter passenger vehicles, shortening the life of the pavement and eventually leading to rutting and cracking. Additionally, some increase in maritime traffic in the Hylebos and Blair waterways may occur, but vessels would largely remain stationary near the site. Construction would begin in the second quarter of 2015. Peak truck traffic would occur within the first five months of construction, as cement/grout trucks are necessary for soil improvement and site preparation. The peak of general construction is expected to occur in the summer of 2016 and represents the combined peak of construction trucks, delivery vehicles, and workforce/personnel vehicles.

Traffic Volumes

The Proposed Action is expected to result in an increase in traffic on roadways surrounding the proposed LNG facility and pipeline. As described in Section 3.10.1 (Study Methodology), construction trips were estimated based on the preliminary construction schedule. During the peak of construction, traffic would likely increase within and around the Tacoma LNG Facility and TOTE sites and would include trucks with oversized loads, heavy-duty and light-duty delivery trucks carrying machinery and large equipment, and construction workers' vehicles. Assuming approximately 24 workdays per month of construction, 139 vehicles (including cars and small or light-duty delivery vehicles) associated with construction could be used on a typical day during the peak of construction. This traffic includes personnel entering or exiting the site at the beginning or end of a work shift.

Approximately 11 large or heavy-duty vehicles associated with construction could be used during a typical day of peak construction. These large vehicles would arrive at and leave the site throughout the day. Conservatively assuming that half of these large vehicles enter and exit the construction area during the peak hour, up to five vehicles would visit the site during the afternoon peak hour (resulting in five inbound trips and five outbound trips).

During construction of the pipeline segments, approximately 15 cars or small vehicles (carrying workforce personnel) and approximately 20 heavy vehicles or large trucks (transporting pipeline segments, large equipment, and materials) could be generated for each mile of pipeline on a typical day at the peak of construction. This estimated number of construction vehicles could be expected at each of the two pipeline segment locations.

Construction vehicles for Pipeline Segment A would likely use the same roadways as Tacoma LNG Facility construction vehicles. Pipeline construction could occur at night; therefore, pipeline construction trips would not overlap with Tacoma LNG Facility construction vehicles. Pipeline Segment B, the Golden Given Limit Station, and the upgraded Frederickson Gate Station would not be located in the same area as the Tacoma LNG Facility; therefore, trips associated with pipeline construction would not likely overlap with construction trips destined for the Tacoma LNG Facility.

The number of anticipated trips associated with construction of the proposed Project is shown in Table 3.10-3.

Table 3.10-3 Anticipated Trips Associated with Construction of the Proposed Project

	PM Peak Hour Trips (directional)		Daily Traffic Volumes	
	Cars/Small Vehicles	**Trucks/Heavy Vehicles**	**Cars/Small Vehicles**	**Trucks/Heavy Vehicles**
Tacoma LNG Facility	0 inbound, 139 outbound	5 inbound, 5 outbound	139 vehicles	11 vehicles
Pipeline Segment A[a]	0 inbound, 0 outbound	0 inbound, 0 outbound	15 vehicles	20 vehicles
Total	**0 inbound, 139 outbound**	**5 inbound, 5 outbound**	**154 vehicles per day**	**31 vehicles per day**

Note:
[a] Construction of the pipeline could occur at night; therefore, no vehicle trips are expected during the PM peak hour.
Key:
LNG = liquefied natural gas

The preferred route for construction-related trips to the Tacoma LNG Facility site is yet undetermined. This analysis conservatively looked at the total 154 daily construction trips on each roadway to identify the maximum potential change in daily traffic volumes. Table 3.10-4 shows the maximum increase in ADT on each roadway in the study area during construction. All of the roadways in the study area would experience less than a 5 percent increase in daily traffic volumes during construction. Eleventh Street East and Alexander Street East would see an increase in over 4 percent during construction. However, when the existing trips taken by PCC Logistics personnel that would cease once construction begins are taken into consideration, all roadways would experience less than a 3 percent increase in daily traffic volumes (see Table 3.10-4).

With the exception of Taylor Way, it is unlikely that construction vehicles would rely on a single road to access the site, and the change in daily traffic volumes would be less than what is presented in Table 3.10-4. Trucks and passenger vehicles would likely arrive from both directions of I-5 and SR-509. From I-5, construction-related trips would use both the Port of Tacoma Road interchange and the 54th Avenue East interchange to access the site. Trips generated by the Proposed Action are assumed to access the site via the intersection of Taylor Way and SR 509. Roughly 70 to 80 percent of trips would use 54th Avenue via I-5 to access the site, approximately 10 to 20 percent of trips would use Port of Tacoma Road via I-5, and up to 10 percent would use SR 509 (either via I-705 or I-5) to access the site.

Table 3.10-4 Average Daily Traffic Volumes on Proposed Alternative Roadways During Construction

Roadway	Existing ADT (no. of vehicles)	ADT During Construction (no. of vehicles)	Percent Change in ADT	ADT During Construction (no. of vehicles)[a]	Percent Change in ADT
I-5 (west of 54th Avenue East Interchange)[b]	187,000	187,154	0.1%	187,089	0.0%
I-5 (east of 54th Avenue East Interchange)[b]	186,000	186,154	0.1%	186,089	0.0%
SR-509 (west of Port of Tacoma Road)[b]	28,000	28,154	0.6%	28,089	0.3%
SR-509 (east of Port of Tacoma Road)[b]	31,000	31,154	0.5%	31,089	0.3%
Marine View Drive /SR-509 (west of Norpoint Way)[b]	21,000	21,154	0.7%	21,089	0.4%
Marine View Drive /SR-509 (east of Norpoint Way)[b]	9,600	9,754	1.6%	9,689	0.9%
Pacific Highway East (between East Alexander Avenue and 54th Avenue East)[c]	19,700	19,854	0.8%	19,789	0.5%

Table 3.10-4 Average Daily Traffic Volumes on Proposed Alternative Roadways During Construction

Roadway	Existing ADT (no. of vehicles)	ADT During Construction (no. of vehicles)	Percent Change in ADT	ADT During Construction (no. of vehicles)[a]	Percent Change in ADT
Pacific Highway East (between 54th Avenue East and 62nd Ave)[c]	19,600	19,754	0.8%	19,689	0.5%
Port of Tacoma Road (between SR-509 and Pacific Highway East)[c]	11,300	11,454	1.4%	11,389	0.8%
East 11th Street (between Taylor Way and East Alexander Avenue)[c]	3,500	3,654	4.4%	3,589	2.5%
54th Avenue East (between SR-509 and 8th Street East)[c]	16,400	16,554	0.9%	16,489	0.5%
Taylor Way (between Lincoln Avenue and SR-509)[c]	6,700	6,854	2.3%	6,789	1.3%
East Alexander Avenue (between Lincoln Avenue and SR-509)[b]	3,600	3,754	4.3%	3,689	2.5%
Lincoln Avenue (between Taylor Way and East Alexander Avenue)[c]	4,400	4,554	3.5%	4,489	2.0%

[a] Project-related construction trips minus existing PCC Logistics trips
[b] Source: WSDOT 2013, 2014.
[c] Source: DEA 2009 (2008 ADT); Fehr Peers 2011 (2011 ADT).

Poor roadway surface has been identified as an issue along Taylor Way, and it is possible that traffic from oversize and overweight construction trucks could cause additional damage to roadway surface conditions.

Level of Service

During construction of the Tacoma LNG Facility, the temporary increase in traffic volumes may result in some decrease in LOS during the afternoon peak hour. These construction trips would be dispersed throughout the peak hour and could result in slight increases to average vehicle delay times. Any effects would be minor and temporary and would only be expected during the peak of construction of the Tacoma LNG Facility.

Within the study area, five intersections currently operate at LOS E or F during the afternoon peak hour, three of which were identified as congestion hotspots: Port of Tacoma Road/Pacific Highway East, Port of Tacoma Road/20th Street, and 54th Avenue East/Pacific Highway East. Estimated daily traffic volumes on these roadways near these intersections (accounting for existing trips generated by PCC Logistics at the site), represent less than a 1 percent increase over existing daily traffic volumes. Therefore, Project construction would be unlikely to significantly affect LOS.

Construction of Pipeline Segment A would occur at night, when traffic volumes are typically low. This would be necessary in order to avoid traffic delay impacts along Taylor Way and 54th Avenue East, particularly near intersections with LOS E and F, including Taylor Way/SR-509 and 54th Avenue East/4th Street.

Construction of Pipeline Segment B may result in localized traffic impacts. Where the pipeline alignment coincides with an existing roadway, construction activities would be limited to one travel lane, but lane closures, detours, and reduced travel speeds would also be expected. During construction, traffic along certain segments may be directed to alternate routes, and delay times and congestion in the area would likely increase temporarily as a result. Where the ROW permits and traffic is allowed to proceed adjacent to the construction area, flaggers, and appropriate buffer zones would be implemented as necessary, resulting in lower operating speeds.

Safety

Total traffic volume on streets near Project components would increase slightly and temporarily during Project construction. Therefore, the marginal increased risk of additional transportation incidents from increased traffic in the area would be minimal. Nonetheless, the temporary closure of traffic lanes for pipeline construction may result in an increase in response time for emergency vehicles or prevent direct access of emergency vehicles to emergency sites.

Nonmotorized Facilities

Project construction would not significantly impact existing sidewalks along street networks within the Proposed Action area. Construction and temporary construction staging and storage areas would only occur within the Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, the paved ROWs needed to construct the pipeline segments, and the existing developed areas where the limit station construction and gate station upgrades would occur. Sidewalks affected by construction of the proposed Project would be restored to their original condition. Dedicated bicycle lanes and shared nonmotorized facilities do not exist in the immediate Proposed Action area and would not be impacted by construction of the Project.

Rail Facilities

Construction of the Project may disrupt rail traffic temporarily along the Blair-Hylebos peninsula, particularly where construction of Pipeline Segment A would intersect active railroad spurs crossing Taylor Way. Construction of Pipeline Segment A would occur underneath these rail lines. Mitigation measures to prevent construction activities along Taylor Way from impacting existing rail lines are provided in Section 3.10.6 (Mitigation Measures).

Construction of the Tacoma LNG Facility would remove one of the two rail spur lines on site, and the other spur line would be maintained for Proposed Action–related use. Removal of the one spur line on the Tacoma LNG Facility site would not impact existing rail service elsewhere in the Port of Tacoma.

Construction of the proposed TOTE Marine Vessel LNG Fueling System site would not alter the existing three rail lines adjacent to the site and parallel to Alexander Avenue East. Any potential construction-related delays to rail service along the three rail lines adjacent to Alexander Avenue East would be temporary and would not occur outside of the construction period for the TOTE Marine Vessel LNG Fueling System.

Maritime Traffic

The capacity of the Hylebos and Blair waterways to handle any additional water traffic should not be impacted to an appreciable level. TOTE vessels are now fueled by barges carrying bunker fuel. Those trips would stop and would be replaced by LNG barges fueling the TOTE vessels. No additional barging trips to the TOTE site are proposed beyond the bunker trips that are being replaced. PSE is communicating with the United States Coast Guard (USCG), Port of Tacoma, and TOTE regarding the proposed Project, and these parties have raised no concerns regarding the capacity of either waterway to handle additional water traffic. The Port of Tacoma has extensive capacity for existing and future water traffic.

Temporary vessel navigation impacts could occur during construction of in-water structures in both the Hylebos and Blair waterways as construction barges, equipment, and supplies are being transported to and from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. However, these impacts would be short term and limited to the duration of construction. Once the construction barges, equipment, and supplies arrive at either site, they would largely remain stationary and not restrict vessel movement up and down the remainder of the waterways. Any restricted vessel navigation during construction would be communicated through a notice to mariners by the USCG and posted by the Harbor Master at marinas in the vicinity of the Tacoma LNG Facility.

Construction of the in-water components in both the Hylebos and Blair waterways is anticipated to require a barge-mounted crane (derrick), a support barge, a diesel or hydraulic impact hammer, and various small

workboats. A tugboat may also be used to position the barges. Construction materials staging on barges would occur in the vicinity of the existing pier in the Hylebos Waterway and in the vicinity of the existing TOTE facilities in the Blair Waterway and would not impede surrounding vessel traffic in the rest of the waterway. Construction in the Hylebos and Blair waterways is estimated to result in two tug/barge roundtrips (in and out) of each waterway on a daily basis, and up to four small workboats would be working 10 to 12 hours per day. Due to constraints imposed by TOTE vessel operations, construction in the Blair Waterway would likely be limited to four days per week. Although these additional trips would increase the combined monthly average of the approximately 69.7 deep-draft vessels, barges, and tugboat arrivals that occurred on the Hylebos Waterway during 2014 (see Appendix I), and approximately 257.2 deep-draft vessels, barges, and tugboat arrivals that occurred on the Blair Waterway during 2014 (see Appendix I), these trips would be temporary and would not occur outside the construction period.

3.10.4.2 Operations Impacts

The Tacoma LNG Facility is expected to be complete and in operation by the fourth quarter of 2018. Impacts could result from workers and heavy trucks using local roads; however, the total daily trips generated would be fewer than what is currently generated at the site by PCC Logistics.

Traffic Volumes

Trips generated by the Tacoma LNG Facility after completion would likely include personnel vehicles (including passenger vehicles and light-duty trucks) and occasional delivery trucks. Personnel vehicles and truck volumes were estimated using the projected staffing and equipment required during operation.

During operations, up to 18 staff members would be employed by the facility 24 hours a day, 365 days per year. In addition, one delivery and one maintenance truck could each be expected to visit the site twice daily. Conservatively assuming that one visit would occur during the afternoon peak, coinciding with personnel shift changes, four large truck trips (two inbound, two outbound) during the afternoon peak hour would result.

Occasionally, merchant trucks carrying LNG would leave the Tacoma LNG Facility to deliver LNG using the existing roadway network. Up to two tanker trucks per day would arrive empty at the Tacoma LNG Facility and leave carrying LNG to market. Estimating conservatively, there would be one inbound and one outbound trip during the afternoon peak hour. The transport of the LNG by truck is regulated by the Federal Motor Carriers Safety Administration that requires a Hazardous Materials Safety Permit (49 CFR Part 385, Subpart E).

During the afternoon commute peak hour, up to 42 vehicle trips would be added to the traffic network during operations (18 inbound and 18 outbound personnel trips, two inbound and two outbound delivery/maintenance truck trips, and one inbound and one outbound tanker truck trips).

Per day, up to 60 vehicles would be added to the traffic network during operations, representing less than 1 percent of existing traffic volumes. As compared to daily traffic volumes on roadways in the vicinity of the Project (see Table 3.10-1), the addition of 60 vehicles would be insignificant.

The number of anticipated trips associated with operation of the proposed Project components is shown in Table 3.10-5.

Table 3.10-5 Anticipated Trips Associated with Operation of the Proposed Project

	PM Peak Hour Trips (directional)		Daily Traffic Volumes	
	Cars/Small Vehicles	**Trucks/Heavy Vehicles**	**Cars/Small Vehicles**	**Trucks/Heavy Vehicles**
Personnel	18 inbound, 18 outbound		54 vehicles	
Delivery/Maintenance		2 inbound, 2 outbound		4 vehicles
LNG Tankers		1 inbound, 1 outbound		2 vehicles
Total	**5 inbound, 9 outbound**	**3 inbound, 3 outbound**	**18 vehicles per day**	**6 vehicles per day**

Key:
LNG = liquefied natural gas

Level of Service

Traffic operations at the year of opening (2018) would likely remain unchanged as a result of Project operations. Background conditions are assumed to be similar to the existing conditions shown in Table 3.10-2 because relatively flat area-wide growth in traffic is predicted.

Up to 42 vehicle trips would be generated by operation of the Tacoma LNG Facility during the afternoon peak hour. These trips would likely access the site from Pacific Highway East and both directions of I-5 via 54th Avenue East. During the afternoon peak hour, traffic volumes on 54th Avenue East would increase by approximately 1 percent.

This small increase in peak hour traffic would be unlikely to impact the current LOS at the study intersections. Average vehicle delay times at study intersections would not likely increase as a result of operation of the Tacoma LNG Facility, and no adverse impacts to vehicle queues or congestion are expected during the afternoon peak hour.

Operation of the facility would add up to 60 vehicles daily to the roadway network surrounding the Port of Tacoma. These vehicles would increase daily traffic by less than 0.5 percent on 54th Avenue East. Based on this nominal increase, no impacts to traffic outside the peak hour are expected.

Operation of the two pipeline segments would not result in adverse traffic impacts. The pipeline would be located underground and would not require personnel to operate or interfere with traffic operations. Similarly, operation of the Golden Given Limit Station and upgraded Frederickson Gate Station would not result in adverse traffic impacts. The limit and gate stations would not result in the additional of daily traffic trips. Both stations would only generate traffic trips as part of periodic maintenance activities.

Safety

The number of vehicle collisions and the type of collisions within the Tacoma LNG Facility site are not expected to change as a result of the Proposed Action. The nominal increase in traffic volume would not be expected to cause increased traffic incidents, and no changes in traffic patterns are anticipated.

Introduction of LNG tank trucks on the roadways near the Tacoma LNG Facility site would not significantly affect safety. The Port of Tacoma currently experiences heavy truck traffic, and any new LNG tank trucks associated with the Proposed Action would be fewer than the number currently generated at the Tacoma LNG Facility site by PCC Logistics.

Site Improvements

Adequate parking for staff and visitors would be provided as part of Tacoma LNG Facility site development. Areas for arriving and departing operation-related trips would be designated and clearly signed to allow safe, efficient on-site truck maneuvers and prevent off-site queuing. Delivery vehicles would be given adequate queuing and maneuvering areas on site to prevent vehicles from backing up onto public roadways.

Safe on-site transport corridors with adequate sight distance and limited obstructions would be provided for all internal vehicle traffic. Any driveways providing access between the Tacoma LNG Facility site and the public roadway network would be designed to safely accommodate large, heavy trucks related to LNG deliveries.

Off-site improvements are not proposed or warranted as a result of Tacoma LNG Facility operation. Although some intersections in the study area exceed the current LOS threshold, traffic resulting from the Project's operations would be an insignificant addition to existing traffic levels.

Change in Traffic Patterns

No significant changes in traffic patterns on the roadway network surrounding the Tacoma LNG Facility site are expected to result from Project operations. Passenger vehicle and truck access to and from the Port of Tacoma would remain the same as it is currently. No new roads or intersections are suggested, and all existing roads would remain in place.

Non-motorized Facilities

Operation of the Project would not impact sidewalks along street networks within the Proposed Action area. Dedicated bicycle lanes and shared nonmotorized facilities do not exist in the immediate Proposed Action area and would not be impacted by operation of the Project.

Rail Facilities

Operation of the Project would not impact the various rail lines present along the Blair-Hylebos peninsula on the proposed Tacoma LNG Facility site. Although operation-related trips are expected to use Taylor Way and Lincoln Avenue to access the Tacoma LNG Facility site, rail would maintain ROW and would proceed ahead of passenger vehicles and trucks at these locations.

Roadway blockages caused by rail are not expected to increase at completion of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. Blockages would likely remain similar to those occurring under existing conditions, as increases in rail traffic are not anticipated, because Project operations would add only minimal traffic to the rail network. In addition, operation of the proposed PSE Natural Gas Distribution System improvements would occur underground and would not impact rail line traffic in the vicinity of the Proposed Action.

Maritime Traffic

The new LNG barge and tugboat trips introduced to the Hylebos and Blair waterways during operation of the proposed Project would not significantly impact commercial shipping. The new maritime activity resulting from Project operation would be limited to LNG barge and tugboat assists in the Hylebos and Blair waterways. Operation of the barge and tugboat assists to and from the Tacoma LNG Facility and TOTE sites would be consistent with federal marine safety regulations and USCG marine safety programs provided in the waterway suitability assessment described in Chapters 3.5 (Health and Safety) and 3.11 (Public Services and Utilities).

TOTE vessels would be fueled twice per week via the Project's bunkering barge. The bunkering barge and associated tugboats would travel from the Tacoma LNG Facility pier within the Hylebos Waterway, around the tip of the Blair-Hylebos peninsula, to the proposed LNG loading platform proposed within the Blair Waterway as part of the TOTE Marine Vessel LNG Fueling System. Under the Proposed Action, only one LNG bunkering barge is expected to be in use. The bunkering barge would travel back and forth to the TOTE site twice per week, for approximately eight to ten trips per month. The additional trips would be minor in comparison to existing maritime traffic on the two waterways. Although the data do not account for all commercial traffic on the two waterways, Appendix I shows that there are currently at least 69.7 deep-draft vessels, barges, and tugboat arrivals on the Hylebos Waterway per month and 257.2 on the Blair Waterway per month.

As a result of the limited commercial fishing and recreational vessel use in either the Hylebos or Blair waterways, the Proposed Action would have minimal, if any, impact on these uses during operation. Analysis of recreational boat use on the Hylebos and Blair waterways is provided in Section 3.7.2.5 (Existing Recreational Resources).

3.10.4.3 Decommissioning Impacts

This section describes the various procedures used to address potential decommissioning impacts associated with the end of the design life of the proposed Project. Accounting for each Project component, the estimated total design life of the proposed Project is 50 years. Decommissioning of the Project components would likely generate impacts comparable to those resulting from construction, as discussed in Section 3.10.4.1 (Construction Impacts), though the in-water and shoreline improvements would not likely be decommissioned. Potential impacts to transportation and traffic would be temporary and would end upon completion of the decommissioning activities. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Project components.

3.10.5 Impacts of No Action

Under the No Action Alternative, the proposed Project would not be built, current conditions would remain unchanged, and Proposed Action–related impacts to transportation would not occur.

3.10.6 Avoidance, Minimization, and Mitigation

3.10.6.1 Construction

During construction of the proposed Project, mitigation measures would be considered where appropriate and when necessary. While safety-related impacts are not expected during construction, temporary, minor impacts to traffic delay could occur. Potential mitigation measures that could be implemented by the applicant and that would alleviate temporary impacts to local traffic could include the following:

- A detailed traffic management plan would be developed prior to construction activities. PSE would meet with staff from appropriate jurisdictions (including the City of Tacoma, City of Fife, Pierce County, Tacoma Rail, and Port of Tacoma) to identify potential traffic conflicts and outline traffic management measures to minimize construction-related traffic impacts. The traffic management plan would, at minimum, include specific designated routes for construction-related vehicles, as well as any measures related to procedures for traffic control, lane closures detours, and use of flaggers.
- Applicable governmental permits or approvals would be obtained, including, but not limited to, those for access to state, county, or city roads as needed; construction within appropriate ROWs; overweight and oversize loads; use of weight-restricted bridges and structures; and haul route agreements.
- Public involvement and outreach efforts, including communications and notices to adjacent landowners, would be undertaken prior to construction to help minimize access disruptions.
- Carpooling among construction workers and personnel would be encouraged to reduce traffic volume to and from the Tacoma LNG Facility site.
- Where Pipeline Segment A is proposed to cross active rail lines, it would be constructed without disturbing the tracks, using a horizontal drill or bore construction technique. PSE would coordinate Segment A construction in the vicinity of existing tracks with the applicable rail owner/operator. If horizontal drill or bore construction is not possible or would cause any damage to rail lines, PSE would restore impacted rail segments to their original condition.
- All roads and other transportation infrastructure impacted by construction would be videotaped prior to construction to document pre-construction conditions.

- Following installation of the pipeline, roads would be restored by repaving the travel lane impacted by the pipeline construction pursuant to the appropriate plans and specifications adopted by Tacoma Public Works, City of Fife Public Works, and Pierce County Public Works.
- For the 2 miles of Taylor Way from SR 509 to the Project site, an approach that results in rebuilding of Taylor Way to "heavy haul" stands has been agreed upon by PSE, the Port of Tacoma, and the City of Tacoma. Utility conflicts, utility separation requirements, and subsurface soils conditions will determine the alignment of the gas main within the Taylor Way roadway.

3.10.6.2 Operations

Project operations are not likely to have an adverse impact on vehicle delay times, vehicle queues, or congestion during the afternoon peak hour. Impacts on traffic outside the peak hour are not expected based on the Project operation's nominal effect on traffic volumes. However, the Project does add a new and health and safety risk to an area of the City that currently does not meet the City's standard for emergency services' response time. The following mitigation measures would help improve emergency services' ability to respond to emergencies on the Blair/Hybelos peninsula and the Project site. Section 3.5 (Public Health and Safety) also addresses the increased public health and safety risks.

- The ER/ITS Study concluded that improving Taylor Way to meet current City standards will improve emergency response travel time. PSE, the Port of Tacoma and the City has agreed to an approach to assist the City in upgrading Taylor Way to heavy haul standards.
- Construction of Phase I of the planned ITS Infrastructure is needed for basic information sharing among stakeholders, as defined in the ER/ITS study.

3.10.7 Conclusion

With the implementation of the construction mitigation measures identified in Section 3.10.6.1 (Construction), construction of the proposed Project is not likely to result in significant and unavoidable adverse traffic impacts.

Unavoidable adverse impacts on traffic and transportation are also not expected as a result of operating the Project. The need for additional access for emergency services to a site with increased public health and safety needs during operation of the Tacoma LNG Facility would be addressed by the mitigation measures defined in Section 3.10.6.2.

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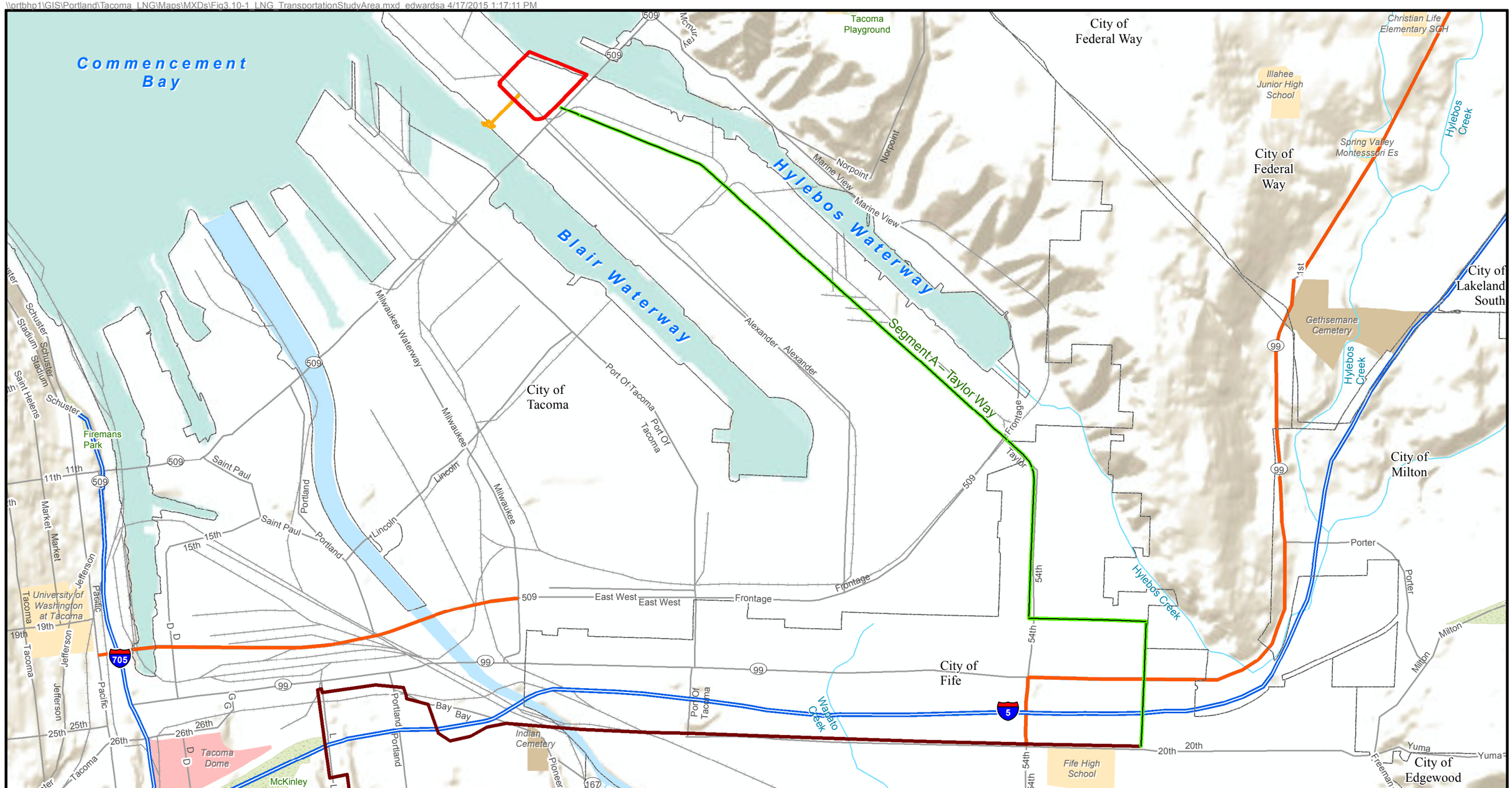

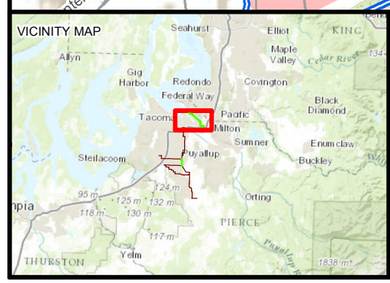

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Frederickson Gate Station
- Golden Given Limit Station
- TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary

N W E S

0 1,000 2,000 Feet

Tacoma

City of Tacoma

Figure 3.10-1A
Tacoma LNG Project
Transportation Study Area

Tacoma LNG Project

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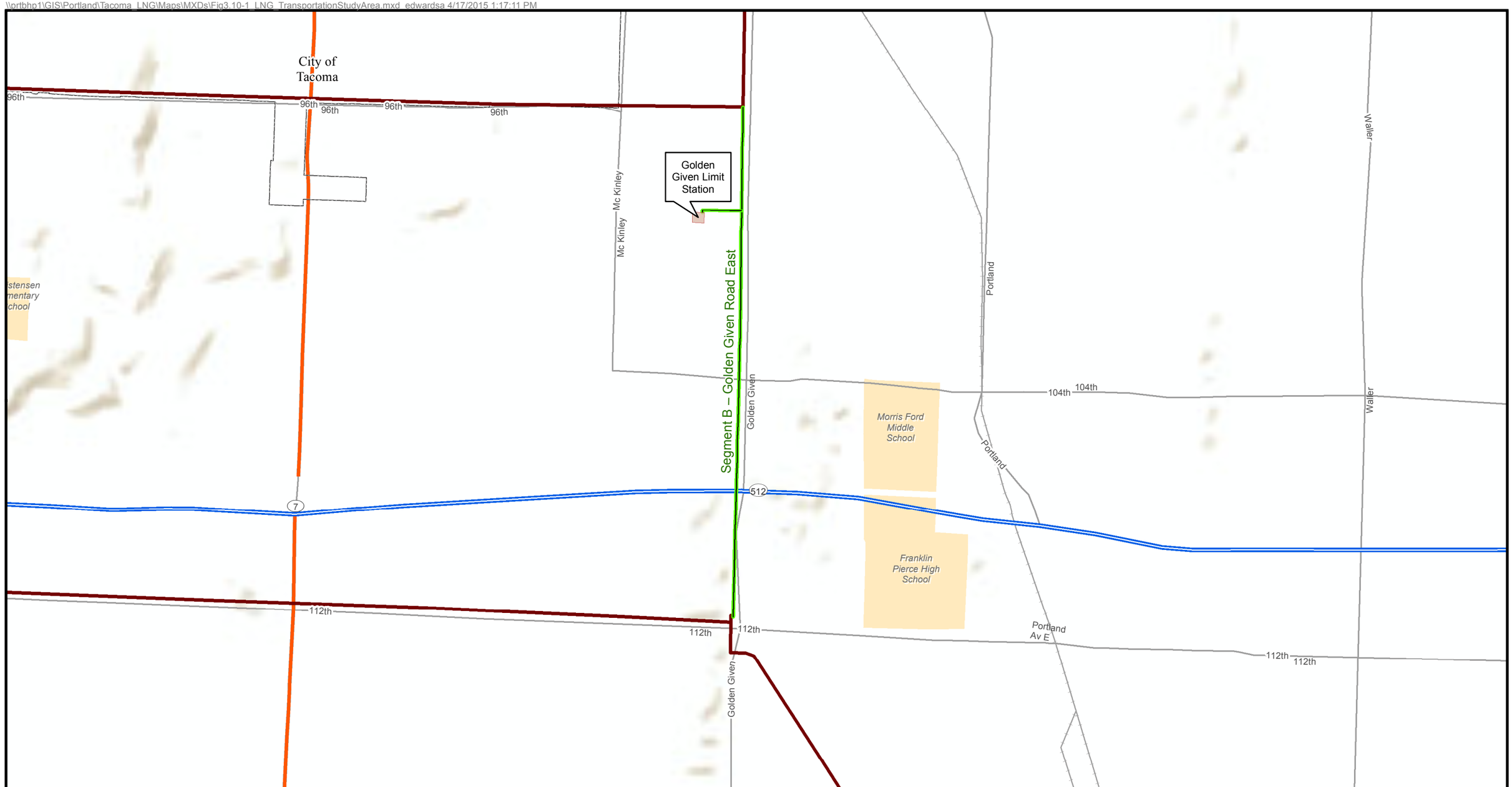

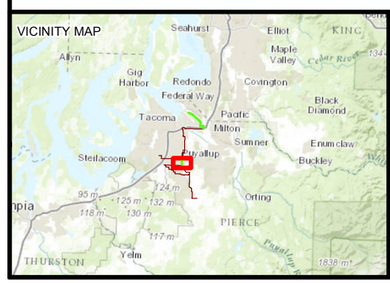

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Frederickson Gate Station
- Golden Given Limit Station
- TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary

N W E S

0 1,000 Feet

City of Tacoma

Figure 3.10-1B
Tacoma LNG Project
Transportation Study Area

Tacoma LNG Project

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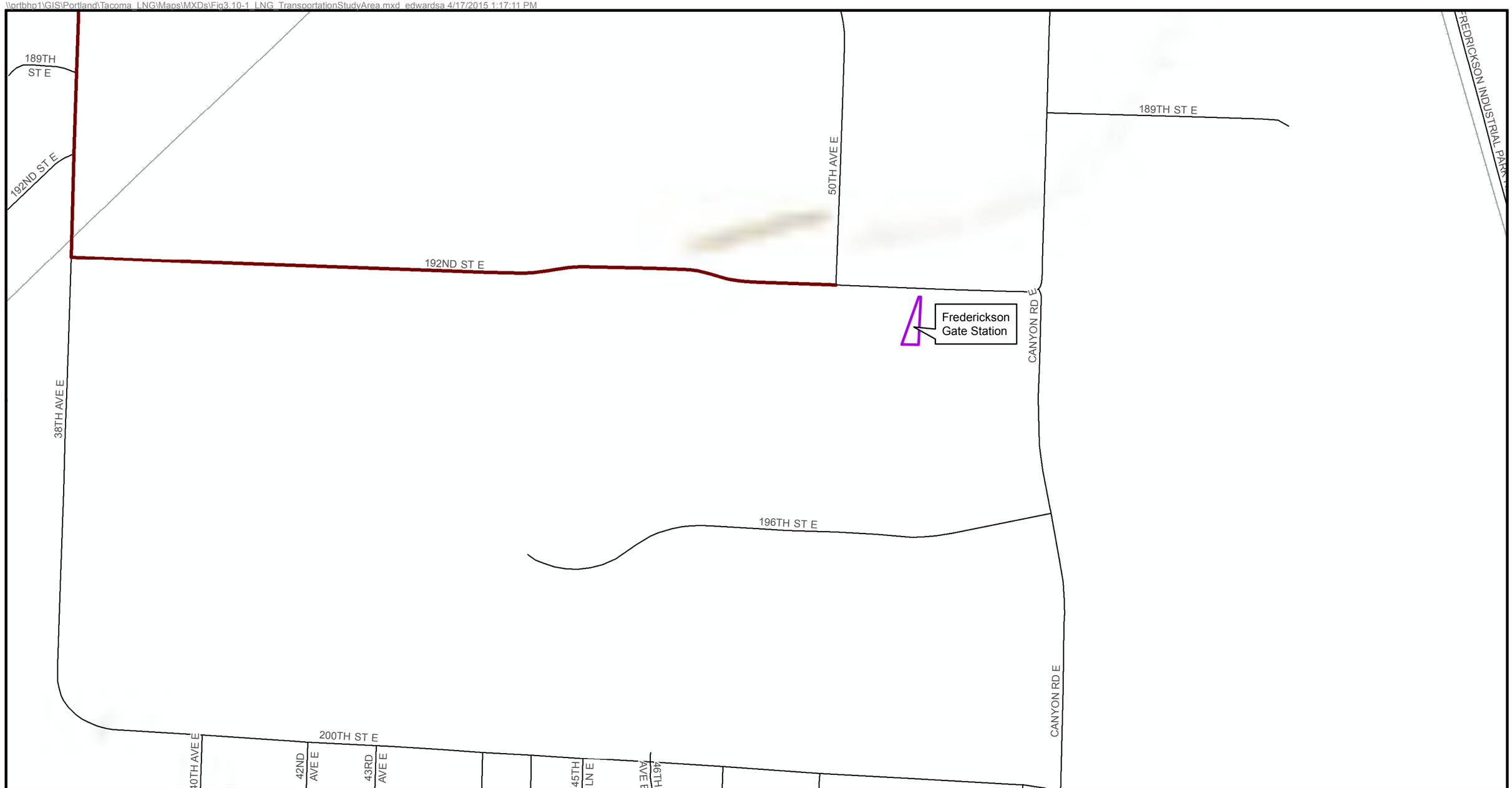

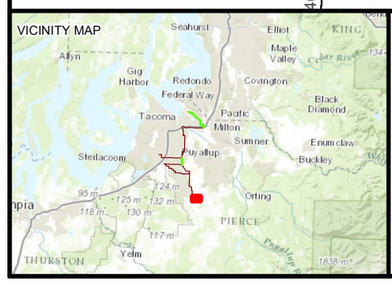

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Frederickson Gate Station
- Golden Given Limit Station
- TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary

N W E S

0 510 Feet

City of Tacoma

Figure 3.10-1C
Tacoma LNG Project
Transportation Study Area

Tacoma LNG Project

3.11 Public Services and Utilities

This section describes existing public services and utilities in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on public services and utilities that could result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). The following public services and utilities are evaluated: fire protection, law enforcement, medical services, schools, public transit, telecommunications, electricity, natural gas, sewer services, solid waste services, stormwater, and water supply services. Where appropriate, mitigation measures are identified to reduce or avoid potential impacts. The impacts of no action are discussed as an alternative to the Proposed Action.

3.11.1 Study Methodology

This section describes the methodology used to determine potential impacts to public services and utilities that may result from the Proposed Action. For descriptive purposes, the Project has been divided into three components: the Tacoma LNG Facility, the Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System, and the Puget Sound Energy (PSE) Natural Gas Distribution System (see Section 3.11.3 [Affected Environment] for more details). The components would be located across three separate jurisdictions: the City of Tacoma, the City of Fife, and unincorporated Pierce County, Washington.

The study area for each public service and utility evaluated herein is defined as the portion of the relevant provider's service area within the limits of these three jurisdictions. Thus, the study areas may differ and are dependent upon the boundaries of the service area for each public service and utility. For example, the City of Tacoma Fire Department provides fire protection services for the city of Tacoma and city of Fife, while various other fire departments and districts provide fire protection services in the remainder of Pierce County. In contrast, water supply services are provided throughout Tacoma, Fife, and portions of unincorporated Pierce County by Tacoma Water, a division of Tacoma Public Utilities. The analysis of potential impacts to fire protection therefore includes Tacoma Fire and Pierce County Fire Districts No. 6 and No. 10, while the analysis of potential impacts to water supply service includes only Tacoma Water.

City of Tacoma, City of Fife, and Pierce County public web sites and other relevant public sources were consulted to identify and quantify public services and utilities that have designated service areas or respond to public needs within the area of the Proposed Action. This information was then used to determine expected impacts of the Proposed Action.

3.11.2 Regulatory Framework

Use of public services and utilities during construction, operation, and decommissioning of the Project would comply with applicable federal, state, and local regulations, and applicable permits would be procured.

3.11.2.1 Federal

Pursuant to Navigation and Vessel Inspection Circular 01-11 (NVIC 01-11) *Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities*, dated January 24, 2011, and the *Code of Federal Regulations* (CFR) Title 33, Part 127 (33 CFR 127), new LNG waterfront projects must perform a waterway suitability assessment (WSA) in collaboration with the United States Coast Guard (Coast Guard), prior to the Coast Guard issuing a Letter of Recommendation to operate. In accordance with 33 CFR 127, the WSA must consist of a Preliminary WSA and a Follow-on WSA. (Coast Guard 2014)

PSE has developed a Preliminary WSA (PSE 2014a) that initiates the process of analyzing the safety and security risks posed by operations of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. The Preliminary WSA describes the analysis and coordination that would be undertaken to ensure the proposed LNG loading, transits, unloading, and barge-to-ship bunkering operations are appropriately safe and secure.

The Coast Guard, in coordination with PSE, would use the Preliminary WSA to develop a detailed Follow-on WSA. The Follow-on WSA would provide:

- Specific details concerning the safety and security of the transit routes and LNG vessel operations, including safety and security risk assessments at the PSE facility dock and the bunkering site as specified in NVIC 01-11;
- Safety and security risk mitigation strategies;
- Documentation of resource needs for safety, security, and response activities; and
- General conclusions and recommendations for introducing LNG vessel transits, transfers, and bunkering operations on the waterway (PSE 2014a).

The Preliminary WSA and Follow-on WSA support the Final WSA, which would describe the coordination undertaken to ensure that the proposed LNG loading, transits, unloading, and barge-to-ship bunkering operations are appropriately safe and secure (PSE 2014c). The WSA also commits PSE to providing updates to relevant Coast Guard Maritime Security and Safety Committees (PSE 2014a).

3.11.2.2 State

The laws of the State of Washington define the appropriate authorities, governance, and regulating structures for public services and utilities. Based on the affected environment for the proposed Project as described in Section 3.11.3 (Affected Environment), the following titles and chapters apply:

- **Washington State Constitution, Article 10.** Provides counties and cities with local police and sanitary authority.
- **Revised Code of Washington (RCW), Title 28A and associated notes.** Establishes the public school system. Chapter 315 (RCW 28A.315) provides for the organization of school districts.
- **RCW 35, Cities and Towns.** Provides for the establishment of and rules regarding the conduct of business by incorporated cities, including police, fire, and utilities. RCW 35.92 provides cities with authority to acquire and operate utilities, including gas, electricity, water, sewer, solid waste, stormwater, and transportation.
- **RCW 36, Counties.** Provides for the establishment of counties and various special purpose districts. RCW 36.28 establishes the office and responsibilities of the county sheriff. RCW 36.57 and 36.57A authorize the establishment of county public transportation authorities and benefit areas. RCW 36.58 and 36.58A, respectively, authorize counties to establish a system of solid waste handling for unincorporated areas and provide for the establishment of solid waste districts in unincorporated areas.
- **RCW 57, Water-Sewer Districts.** Provides for the organization of public water-sewer districts.
- **RCW 70, Public Health and Safety.** Establishes public health and safety standards, including provisions governing numerous aspects of public service and utility provision, such as laws regarding healthcare facilities, health departments, hospital districts, solid and hazardous waste management, water supply systems, and water quality.
- **RCW 80, Public Utilities.** Establishes the Washington Utilities and Transportation Commission and standards governing the provision of natural gas, electric power, water, and telecommunications services.

In general, public services and utilities that belong to a city or county are regulated by the respective City Council or County Council. Public services and utilities that are established through a special purpose district are generally governed by a separate elected board. The Washington Utilities and Transportation Commission regulates private investor-owned natural gas, electricity, water, and telecommunications utilities. (Washington Utilities and Transportation Commission 2015).

3.11.2.3 Local

Each component of the Proposed Action would comply with code provisions relevant to use and development of public services and utilities contained in the applicable jurisdiction's municipal or county code. Applicable codes are the City of Tacoma Municipal Code (City of Tacoma 2015a), the City of Fife Municipal Code (City of Fife 2015a), and the Pierce County Code (Pierce County 2015a).

3.11.3 Affected Environment

This section describes existing fire protection, law enforcement, medical services, schools, public transit, communications, electricity, natural gas, sewer, solid waste, stormwater, and water supply services within the study area for each public service and utility. The main components of the Project are the following:

- **Tacoma LNG Facility:** Would liquefy natural gas, store LNG, and include facilities to transfer LNG to the adjacent TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. Would also include facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System.
- **TOTE Marine Vessel LNG Fueling System**: Would convey LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and include transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges.
- **PSE Natural Gas Distribution System**: Would convey natural gas to and from the Tacoma LNG Facility. Would include two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), a new Golden Given Limit Station, and an upgrade to the existing Frederickson Gate Station.

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the city of Tacoma. The two new distribution pipeline segments would be located within the city of Tacoma and city of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and Frederickson Gate Station would be located within unincorporated Pierce County. A detailed description of the proposed Project components is provided in Chapter 2 (Description of Proposed Action).

3.11.3.1 Fire Protection

This section describes the existing fire protection services available within the service areas of the Proposed Action. An analysis of health and safety issues concerning the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System is provided in Section 3.5 (Health and Safety).

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The City of Tacoma Fire Department serves the city of Tacoma, including the entire Port of Tacoma where the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located, and provides contract fire services to the city of Fircrest, city of Fife, and Pierce County Fire District No. 10.

Tacoma Fire Department Stations 3 and 12 are the fire stations closest to the Project components. Station 3, located at 206 Browns Point Boulevard in the city of Tacoma, would be the closest station to the Project, at a distance of approximately 2.5 driving miles from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Station 12, located at 2015 54th Avenue East, would be approximately 3.7 driving miles from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. The next closest fire station would be Station 2, which would be located approximately 6.9 driving miles from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. (City of Tacoma 2015b)

Of these stations, Station 12 has the most extensive capabilities, including engine, ladder, medic, hazardous material and water tender units, and permanent staffing of eight response personnel. The capabilities of Stations 2 and 3 are more limited, including an engine unit, battalion unit, and four staff at Station 2, and an engine unit with three staff at Station 3. (Fehr and Peers 2015)

Overall, the City of Tacoma Fire Department has a total of 357 commissioned personnel, and approximately 69 firefighters and 16 frontline engines are on duty at any given time across its 72-square-mile service area, with the support of two on-call paramedics. Tacoma firefighters are cross-trained as emergency medical services technicians (EMTs). In addition, the Tacoma Fire Department also operates three fire boats. Boats are not staffed full time but are cross-staffed with Fire Station 14, and typically have longer response times than land-based operations (30 to 45 minutes). (Tacoma Fire Department 2013; Fehr and Peers 2015)

The closure of major manufacturing establishments in the Tideflats in the 2000s has caused the Tacoma Fire Department to significantly reduce the service provided at the Port of Tacoma by removing Fire Stations no. 6 and no. 15. The Tacoma Fire Department has expressed that the recent resurgence in manufacturing and increase in hydrocarbon-related development in the Tideflats may lead to the need to re-establish a permanent presence at the Port of Tacoma. (Fitzgerald 2015)

As a result, the response times to incidents in the Tideflats have been shown to exceed Tacoma Fire Department objectives by several minutes. For example, the 90th-percentile response time for fire incidents in the Tideflats was measured at 10.5 minutes, more than 3 minutes longer than Fire Department recommended standards. Because of the low connectivity of the local road network, the prevalence of multiple at-grade railroad crossings, poor road and railroad crossing conditions, and the relative isolation of the Blair-Hylebos peninsula from other parts of the Tideflats, response times would be even longer at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. The same study found that the historical performance of the first unit on scene at the location of the proposed Tacoma LNG Facility is actually 12.7 minutes. (Fehr and Peers 2015; TriData 2015)

Fire suppression water is provided to the Blair-Hylebos peninsula through an existing municipal firewater main by Tacoma Water, a division of Tacoma Public Utilities. An underground municipal firewater system is present along both East Alexander Avenue and East 11th Street to provide firewater to both the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Existing underground 6- and 8-inch dedicated firewater loops are present on the proposed Tacoma LNG Facility site. The Project would likely install a completely new firewater system on the site after consultation with the Tacoma Fire Department and Tacoma Public Utilities. (Tacoma Public Utilities 2015f)

PSE Natural Gas Distribution System

The City of Tacoma Fire Department provides fire protection, emergency medical services (EMS), and paramedic services in the areas of the city of Tacoma and the city of Fife where Pipeline Segment A would be located (City of Tacoma 2015c).

Pipeline Segment B, the newly proposed Golden Given Limit Station, and improvements to the Fredrickson Gate Station would be located within the service area of Pierce County Fire District No. 6 serving central Pierce County. Pierce County Fire District No. 6 provides fire protection support at 12 fire stations. Stations 61 and Station 63 would both be located within 2 driving miles of Pipeline Segment B and the Golden Given Limit Station. Station 61 operates one fire engine, one ladder truck, one paramedic unit, and one command (Battalion Chief) vehicle, and Station 63 operates one fire engine and one paramedic unit. Station 64 would be located approximately 3.4 driving miles south of the proposed improvements to the Fredrickson Gate Station. Station 64 operates one fire engine. (Central Pierce Fire and Rescue 2015a,b)

Fire suppression water is provided by Tacoma Water to areas near the PSE Natural Gas Distribution System through existing municipal firewater main. An existing underground municipal firewater system along Golden Given Road East would provide firewater to both the proposed Pipeline Segment B and Golden Given Limit Station sites. An existing underground municipal firewater system along 192nd Street East would provide firewater to the Fredrickson Gate Station. The portion of proposed Pipeline Segment A within the city of Fife would be served by the City of Fife municipal water system. The City of Fife municipal firewater system and potable water system share the same mains and the water supply is purchased from Tacoma Water. (Tacoma Public Utilities 2015f)

3.11.3.2 Law enforcement

The City of Tacoma Police Department, City of Fife Police Department, Pierce County Sheriff's Department, Port of Tacoma Port Patrol, Washington State Patrol District 1, Coast Guard, United States Customs and Border Protection, and United States Department of Homeland Security provide law enforcement services within the area of the proposed Project.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be located within the City of Tacoma Police Department Sector 1 policing area, which serves the Tideflats. Both the Central Substation and the Northeast Substation support Sector 1 service areas and would be located within approximately 7.3 miles and 3.2 miles of the Project components, respectively (City of Tacoma 2015d). The City of Tacoma Police Department's Marine Services and Dive Unit also operates a harbor patrol vessel to assist in Port of Tacoma security along Tacoma's approximately 46 miles of shoreline and throughout Commencement Bay. The Marine Services and Dive Unit works collaboratively with the Coast Guard and Port authorities to protect and provide security to Port waterways and shipping lanes within Commencement Bay. (City of Tacoma 2015e)

The Pierce County Sheriff's Department also operates a Dive Team consisting of nine Pierce County deputies who collaborate with two City of Tacoma police officers to conduct approximately 60 to 70 missions annually. The Dive Team is trained to handle Port security missions in the Puget Sound (Pierce County 2015b).

The Port of Tacoma's Port Patrol is a group of trained officers who protect the safety of Port-operated facilities and surrounding communities. The Port Patrol has the authority to access all marine terminals and cargo at the Port and works closely with the Coast Guard and United States Customs and Border Protection agencies to maintain protection of Port facilities, operations, and employees (Port of Tacoma 2015a).

The Port of Tacoma is a certified member of the United States Customs and Border Protection agency's Customs-Trade Partnership Against Terrorism coalition (Port of Tacoma 2003). This collation is an antiterrorism partnership of government and businesses that sign an agreement to work with the United States Customs and Border Protection agency to protect the trade supply chain, identify security gaps, implement security measures and best practices, and share security measures (United States Customs and Border Protection 2015a). The Port of Tacoma also requires Transportation Worker Identification Credentials (TWICs) for entry into restricted areas. The United States Department of Homeland Security oversees the TWIC identification program and ensures that people accessing secure terminals have received a thorough security background check. A TWIC is required for all Port of Tacoma employees, terminal operators, longshore workers, truckers, and others who require access to restricted areas. (Port of Tacoma 2015a)

The Coast Guard Port Security Unit 313 consists of five active duty personnel, 126 reserve personnel, and six transportable security boats that operate out of the Port of Tacoma to maintain the port's security (Coast Guard 2003). The Coast Guard is also responsible for ensuring that shipping operations are safe and secure and comply with federal marine safety regulations and Coast Guard marine safety programs (Coast Guard 2014). As explained in Section 3.11.2.1 (Federal), Coast Guard and other federal marine safety programs are described in NVIC 01-11 and in 33 CFR 127.

United States Customs and Border Protection, an agency of the United States Department of Homeland Security is responsible for monitoring cargo security operations at the Port of Tacoma through a field office in Seattle, Washington, and at the local port of entry office located at 2202 Port of Tacoma Road in Tacoma, Washington (United States Customs and Border Protection 2015b).

PSE Natural Gas Distribution System

Portions of the PSE Natural Gas Distribution System would be located in the city of Tacoma, city of Fife, and unincorporated Pierce County jurisdictions. Pipeline Segment A would be located within the city of Tacoma Police Department Sector 1 policing area and within the city of Fife Police Department service area. The City of Fife Police Department Headquarters, located at 3737 Pacific Highway East, would be located within 2 miles of all points along Pipeline Segment A (City of Fife 2015b).

The Pierce County Sheriff's Department serves all unincorporated areas of Pierce County. The Pierce County Sheriff's Department is the second-largest sheriff's agency in the state of Washington and provides law enforcement, jail, court, security, civil processing services to all areas of unincorporated Pierce County and the contract cities of Edgewood and University Place. The department consists of 300 commissioned officers that specifically serve the approximately 372,545 residents of unincorporated Pierce County. The Pierce County Sheriff also operates the county jail facility located in the city of Tacoma. Pipeline Segment B and the Golden Given Limit Station would be located approximately 3.5 miles from the Pierce County Sheriff's Parkland/Spanaway precinct. The Fredrickson Gate Station would be located approximately 5 miles from the Pierce County Sheriff's South Hill precinct. (Pierce County 2015c,d)

The Washington State Patrol serves state highways and responds to emergencies in Pierce County. The Washington State Patrol District 1 Headquarters is located in Pierce County and would be approximately 1 mile east of Pipeline Segment B. The District 1 Headquarters has a staff of approximately 200 employees assigned to traffic law enforcement, administrative support, electronic services, deputy fire marshals, communications, and traffic auto theft and narcotics investigations duties. (Washington State Patrol 2015)

3.11.3.3 Medical Services

Multiple hospitals and medical centers are located within Pierce County and provide routine and emergency medical services to greater Pierce County, including the City of Tacoma and City of Fife. Four of these facilities are or belong to Level II trauma centers that support the Harborview Hospital in Seattle, the region's closest Level I trauma center (Washington State Department of Health 2014). The City of Tacoma Fire Department and Pierce County Fire Districts provide EMS and paramedic services throughout the areas where the Proposed Action would occur. The city of Tacoma, city of Fife, and unincorporated Pierce County are served by a number of public and private ambulance and air ambulance service providers. Ambulance services follow Ambulance and Aid Service Rules and Regulations provided by the Tacoma-Pierce County Board of Health and the Pierce County Emergency Medical Services department (Pierce County 2012). These rules and regulations are designed to ensure the operation of qualified and efficient ambulance services throughout Pierce County.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Three of the four Level II trauma centers operating in Pierce County would be located in the city of Tacoma within approximately 7 to 8.5 miles driving distance of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites: Mary Bridge Children's Hospital and Health Center, St. Joseph Medical Center, and Tacoma General Hospital. The Tacoma General Hospital is the largest hospital in the city of Tacoma, with 437 beds. The St. Joseph Medical Center is a 361-bed facility that also supports the medical service needs of the city of Tacoma and Pierce County. The Allenmore Hospital, although not a Level 2 trauma center, provides additional EMS and would be located in central Tacoma within approximately 8.5 miles driving distance of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites.

The Tacoma General Hospital and St. Joseph Medical Center also partner with Madigan Army Medical Center at Fort Lewis to form the Tacoma Trauma Center partnership. This partnership has provided uninterrupted Level II trauma care to the City of Tacoma and the greater South Sound for over 14 years. The Tacoma Trauma Center provides round-the-clock trauma care throughout South Puget Sound, and each hospital has a trauma surgeon on site when the facility is on trauma duty. Cardiologists, cardiac surgeons,

neurosurgeons, and other medical specialists can respond within 20 minutes of being called. Madigan Army Medical Center is located approximately 19 miles from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. (Multicare 2014; Washington State Department of Health 2014)

As described in Section 3.11.3.1 (Fire Protection), the City of Tacoma Fire Department Stations 3 and 12 would be located within 4 miles driving distance to the proposed Tacoma LNG Facility, the TOTE Marine Vessel LNG Fueling System. All Tacoma firefighters are cross-trained as EMTs or paramedics and provide on-call paramedic support. The Tacoma Fire Department also has five dedicated paramedic units in addition to the basic EMS response provided by the rest of their units cross-trained as EMTs (City of Tacoma 2014).

PSE Natural Gas Distribution System

Saint Joseph Medical Center is located within approximately 7 miles driving distance of all points along proposed Pipeline Segment A. Tacoma General Hospital and Mary Bridge Children's Hospital would both be located within approximately 8.5 miles of all points in Pipeline Segment A. These facilities are Level II Trauma Centers, as described in Section 3.11.3.3 (Medical Services).

Three other medical centers would be located in proximity to components of the proposed PSE Natural Gas Distribution System. St. Clare Hospital, a Level IV Trauma Center, would be located within approximately 6 miles driving distance of Pipeline Segment B and Golden Given Limit Station. Multicare Good Samaritan Hospital, a Level III Trauma Center, would be located approximately 8 miles driving distance east of Pipeline Segment B in Puyallup, Washington. (Washington State Department of Health 2014)

The MultiCare Frederickson Clinic provides a comprehensive set of medical services and would be located approximately 1.2 miles north of the proposed improvements to the Fredrickson Gate Station in Pierce County.

As stated in Section 3.11.3.1 (Fire Protection), Pierce County Fire District No. 10, under contract with the Tacoma Fire Department, provides EMS and paramedic support in the city of Fife where portions of Pipeline Segment A would be located (City of Tacoma 2015c). Pierce County Fire District No. 6 provides 24-hour EMS support at 12 fire stations (Central Pierce Fire and Rescue 2015a). Both Station 61 and Station 63 operate one paramedic unit, respectively. Station 64 does not operate a paramedic unit but is available for 24-hour EMS support (Central Pierce Fire and Rescue 2015b).

3.11.3.4 Schools

Project components would be located across four school districts in Pierce County: Tacoma School District, Fife School District, Franklin Pierce School District, and Bethel School District.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be located in the Tacoma School District. The Tacoma School District serves approximately 30,000 students through the operation of 50 schools, and 14 alternative learning sites. No schools would be located within 1 mile of the Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System. The closest three schools would be located within 2 miles of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Both Meeker Middle School and Crescent Heights Elementary School would be located across the Hylebos Waterway approximately 1.5 miles north of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Northeast Tacoma Elementary School would be located approximately 1.3 miles northeast of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. (Tacoma Public Schools 2013, 2015)

PSE Natural Gas Distribution System

PSE Natural Gas Distribution System components would be located in each of the four Pierce County school districts described above. Pipeline Segment A would cross both the Tacoma School District and the Fife School District. The interconnect of Pipeline Segment A to the Tacoma LNG Facility and TOTE Marine Vessel

LNG Fueling System would be located within approximately 2 miles of the three schools in the Tacoma School District, as described in Section 3.11.3.4 (Schools).

The portion of Pipeline Segment A proposed within the city of Fife would cross the Fife School District. The Fife School District serves approximately 3,400 students at seven schools. Two schools in the Fife School District would be located within 1 mile of Pipeline Segment A. Fife High School would be located approximately 0.25 mile west of Pipeline Segment A, and Columbia Junior High School would be located approximately 0.6 mile southwest of Pipeline Segment A. (Fife School District 2015a,b)

Pipeline Segment B and the proposed Golden Given Limit Station would be located within the Franklin Pierce School District. The Franklin Pierce School District serves approximately 7,500 students at 15 schools. Four schools would be located within 1 mile of Pipeline Segment B and the proposed Golden Given Limit Station. Harvard Elementary School would be located approximately 1 mile northeast of the proposed Golden Given Limit Station. Ford Middle School and Franklin Pierce High School would be located approximately 0.3 and 0.4 mile east of Pipeline Segment B, respectively. Midland Elementary School would be located approximately 0.8 mile east of Pipeline Segment B. (Franklin Pierce School District 2015a,b)

Proposed improvements to the existing Fredrickson Gate Station would occur within the Bethel School District. The Bethel School District serves approximately 18,000 students across 30 schools. No schools in this district would be located within 1 mile of the Fredrickson Gate Station. Six schools would be located within 2 miles of the proposed Fredrickson Gate Station: Clover Creek Elementary School, Fredrickson Elementary School, Naches Trail Elementary School, Shining Mountain Elementary School, Bethel Middle School, and Bethel High School, as well as the Pierce County Skills Center. (Bethel School District 2014, 2015)

3.11.3.5 Public Transit

An evaluation of existing public transit services operating throughout the area where the Proposed Action would occur is provided in Section 3.10 (Transportation).

3.11.3.6 Communications

The communication services addressed in this section include telecommunications and Internet service in the vicinity of the proposed Project. These services are provided by multiple providers across all jurisdictions that would be crossed by the Project. Cellular service is available from a variety of carriers, including T-Mobile, Verizon, AT&T, Sprint, and Metro PCS (OpenSignal 2015). Broadband Internet service is available from many different providers in Tacoma, Fife, and Pierce County (National Broadband Map 2015). In addition, telephone service is also provided by at least seven carriers throughout the vicinity of the Project (Washington Utilities and Transportation Commission 2014). PSE has identified Comcast, CenturyLink, Frontier Communications, FHS Telecom, and Prince Telecom, Inc. as potential carriers. PSE would contract with one or more of these providers to install and maintain telecommunications services as needed. Comcast, CenturyLink, Frontier Communications, and Prince Telecom, Inc., also offer high-speed Internet services.

3.11.3.7 Electricity

Electricity in the vicinity of the Proposed Action area is provided by Tacoma Power—a division of Tacoma Public Utilities—and the Parkland Light & Water Cooperative (PL&WCo).

With the exception of a small portion of Pipeline Segment B that would be located south of State Route (SR) 512, electrical power in the vicinity of the Project is provided by Tacoma Power. Tacoma Power provides electrical power to a 180-square-mile service area, which encompasses the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites, proposed Pipeline Segment A, the majority of proposed Pipeline Segment B, the newly proposed Golden Given Limit Station, and the improvements to the Fredrickson Gate Station (Tacoma Public Utilities 2015a). Tacoma Power serves over 160,000 customers through 2,341 miles of transmission and distribution lines and 45 transmission substations (Tacoma Public

Utilities 2015b). In 2013, Tacoma Power's customers used approximately 7 million megawatt-hours of electric energy (Tacoma Public Utilities 2013).

The portion of Pipeline Segment B that would be located south of SR 512 would likely be located in the PL&WCo electrical utility service area, which serves 4,400 households and distributes 0.1 million megawatt-hours of power per year. PL&WCo currently purchases 100 percent of its power from the Bonneville Power Administration (BPA) but distributes the power through its own substation and transmission lines. (PL&WCo 2015)

The Bonneville Power Administration (BPA) also operates 23 customer substations throughout the Tacoma Power service area (Tacoma Public Utilities 2015b) and five transmission lines in the immediate vicinity of the proposed Project. Specifically, BPA operates 230-kilovolt (kV) and 500-kV transmission lines that would cross Pipeline Segment A approximately near the intersection of Taylor Way and SR 509. Pipeline Segment B would be located approximately 2.1 miles west of an existing 230-kV BPA transmission line, and the Frederickson Gate Station would be located approximately 0.9 mile southeast of an existing 230-kV BPA transmission line.

3.11.3.8 Natural Gas

Natural gas service is provided by PSE in the vicinity of the Project. PSE is Washington State's oldest energy company and provides natural gas services to approximately 770,000 natural gas customers across six counties, including Pierce County (PSE 2014b). The City of Tacoma, City of Fife, and unincorporated Pierce County are located within PSE's Pierce County service area. PSE's natural gas supply is delivered to Washington via interstate transmission pipelines owned and operated by third parties, and the natural gas is provided by suppliers in Alberta, British Columbia, and the Rocky Mountain states. The natural gas supply conveyed through to PSE is then distributed to customers through approximately 21,000 miles of PSE-owned gas distribution mains and service lines (PSE 2015).

3.11.3.9 Sewer Services

Sanitary sewer system services in the vicinity of the proposed Project are provided by the City of Tacoma's Wastewater Management division (in the Environmental Services department) and by Pierce County's Sewer Division of the Public Works and Utilities department.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Sewage in the vicinity of the proposed Tacoma LNG Facility is directed into the existing sanitary sewer system provided for the Blair-Hylebos peninsula by the City of Tacoma. Gravity sewer mains are located in Alexander Avenue (one 24-inch-diameter pipeline) and Taylor Way (two 12-inch-diameter pipelines). Wastewater is treated at wastewater treatment plants before being released to Commencement Bay. The Central Wastewater Treatment Plant is located in the Tideflats along the Puyallup River near the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. This treatment plant recycles biosolids and serves approximately 20,000 customers, which include industrial customers, from the city of Tacoma, the city of Fife, and unincorporated areas of Pierce County (City of Tacoma 2015f). Industrial customers in the City of Tacoma's Wastewater Management division service area may also be subject to the Industrial Pretreatment Program, which removes industrial wastewater pollutants before reaching the wastewater system (City of Tacoma 2015g).

PSE Natural Gas Distribution System

Sewage in the vicinity of the proposed Golden Given Limit Station and improved Fredrickson Gate Station components of the PSE Natural Gas Distribution System is directed into Pierce County's sanitary sewer system. Gravity sewer mains are located in the vicinity of the proposed PSE Natural Gas Distribution System components in Pierce County. The sewer mains collect wastewater for treatment at the Chambers Creek Regional Wastewater Treatment Plant. The Chambers Creek Regional Wastewater Treatment Plant serves central areas of unincorporated Pierce County and the Fredrickson Industrial area. (Pierce County 2015e)

3.11.3.10 Solid Waste Services

Solid waste collection services in the vicinity of the Project are provided by the City of Tacoma, Murreys Disposal Company, Inc., and Pierce County Refuse.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be located in the city of Tacoma. All businesses located in the city of Tacoma are required to set up a garbage collection account with the Solid Waste division of the Environmental Services department. The City of Tacoma also provides assistance to businesses that produce hazardous waste, including outlining disposal options, best practices, notifications to the Department of Ecology, working with private contractors to arrange for disposal, and information on avoiding excess waste. However, the City of Tacoma does not provide hazardous waste disposal services directly to commercial customers. (City of Tacoma 2015h,i,j)

PSE Natural Gas Distribution System

The portions of Pipeline Segment A that would be located in the city of Tacoma would be subject to the same solid waste regime as described above in Section 3.11.3.10 (Solid Waste Services).

For the portions of Pipeline Segment A that would be located in the city of Fife, Murreys Disposal Company, Inc. provides solid waste collection. The remainder of the PSE Natural Gas Distribution System components located in unincorporated areas of Pierce County would receive waste collection services from Pierce County Refuse, a private waste collection company operated by LeMay Transportation Services. (Pierce County 2015f)

3.11.3.11 Stormwater

Impervious surfaces, which include buildings, paved areas, and areas of compacted gravel and soil, cover approximately 99 percent of the upland portion of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Stormwater on the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites drains through Port of Tacoma conveyance systems that discharge to outfalls at the Blair and Hylebos waterways. Stormwater infrastructure (catch basins, lines, and outfalls) generally occurs under and parallel to the roadway along the proposed components of the PSE Natural Gas Distribution System. A more detailed description of existing stormwater near proposed Project components is provided in Section 3.3.3.2 (Wetlands and Waterbodies).

3.11.3.12 Water Supply Services

The Project would be located entirely within the City of Tacoma's water supply and distribution area. The City of Tacoma water supply originates from sources in the Green River watershed and from 24 groundwater wells located around Tacoma. The majority of the wells are located in the South Tacoma well field. The water system has the capacity to supply up to 292 million gallons per day. The system maintains approximately 140 million gallons in additional storage. The Tacoma Water distribution system supplies an area encompassing approximately 150 square miles in the city of Tacoma and portions of Pierce County. (Tacoma Public Utilities 2014; 2015c,d,e,f)

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potable water for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be supplied by the existing water supply and distribution system provided to the Blair-Hylebos peninsula by Tacoma Water, a division of Tacoma Public Utilities. Water mains are located directly adjacent to the site under Alexander Avenue, Taylor Way, and East 11th Street. Tacoma Water has indicated that the mains in the area have a current capacity of 11,500 gallons per minute (gpm) at 20 pounds per square inch (psi), and that a hypothetical demand of 2 million gallons per day at the proposed site would only cause a reduction of 2 psi in system water pressure. (Tacoma Public Utilities 2015f)

PSE Natural Gas Distribution System

Tacoma Water also provides potable water to the areas near the PSE Natural Gas Distribution System. Although the City of Fife serves potable water to the area in which the Pipeline Segment A would be located within the city of Fife, the entire City of Fife water supply is currently purchased from Tacoma Water (Tacoma Public Utilities 2015f; City of Fife 2015c).

3.11.4 Impacts of the Proposed Action

This section identifies public services and utilities impacts that would potentially be associated with construction, operation, and decommissioning of the Project.

3.11.4.1 Construction Impacts

This section discusses the primary construction activities and impacts that could occur to public services and utilities as a result of the Proposed Action. The construction schedule for activities required to complete each component of the proposed Project is as follows:

- 10/15 – 1/16: Building Demolition
- 11/15 – 7/16: Civil preparation (soil improvement, grading, and below grade utilities)
- 3/16 – 10/18: Plant construction
- 7/16 – 2/17: Blair waterway fueling platform construction

As described in Section 3.12.4.1 (Construction Impacts), the Proposed Action would support an average of 401 total jobs per year over the thee-year construction period. These jobs are classified as direct, indirect, or induced jobs (see Appendix J). The peak of general construction is expected to occur in 2016 and represents the combined peak of construction trucks, delivery vehicles, and workforce/personnel vehicles.

Fire Protection

This subsection addresses potential impacts to fire protection services that would result from the construction of the Project. There is an increased risk of an emergency event requiring fire protection services during the construction period, which would require the application of mitigation measures listed in Section 3.5.6 (Avoidance, Minimization, and Mitigation), as well as Section 3.11.6 (Avoidance, Minimization, and Mitigation).

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could result in an emergency event and an increase in emergency calls to fire stations in the vicinity of the Project as described in Section 3.11.3.1 (Fire Protection).

The increased level of activity on site during demolition and construction would increase the likelihood of a fire or hazardous material incident. The use of construction machinery would likely result in the increased presence and use of potentially hazardous materials on site (including diesel, fuel oil, lubricant and others), as well as an increase in potential sources of ignition. In addition, because the initial stages of construction for the Tacoma LNG Facility would involve the decommissioning and/or demolition of existing industrial facilities, there could be an additional increased risk of hazardous materials incident during this period.

Based on traffic modeling in the vicinity of the Project, temporary increases in traffic due to construction would not significantly impact the ability of fire protection services to access the Port of Tacoma.

Construction traffic is expected to arrive at the proposed sites via 54th Avenue East and Taylor Way. Tacoma Fire Department Stations 3 and 12 operate approximately 2.3 miles and 3.6 miles, respectively, from the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. The most direct route for fire protection vehicles arriving from those stations to these sites would be the 11th Avenue bridge over the Hylebos Waterway and 54th Avenue East, respectively. Construction of the Tacoma LNG Facility would

increase average daily traffic volumes on 54th Avenue East nominally by approximately 2 percent. This minor increase in traffic would not be expected to affect fire prevention services' access to the Port. Per Figure 11A of the *Transportation Discipline Report—Blair-Hylebos Peninsula Terminal Redevelopment Project*, provided as Appendix I to this draft environmental impact statement, average PM peak hour background volumes on southbound Taylor Way are approximately 470 vehicles per hour approaching SR 509. Approximately 145 peak hour outbound construction trips could be added, for a total of 615 vehicles, which represents a temporary increase of roughly 30 percent in the afternoon peak hour. Background traffic volumes on southbound 54th Avenue East range between roughly 700 and 850 vehicles per hour during the PM peak. Approximately 100 trips could be added to this total during the afternoon peak hour as construction vehicles leave the site and head towards Interstate 5. Total traffic volumes could be increased temporarily by between 10 and 15 percent. Per Section 3.10 (Transportation), this added level of traffic would not be expected to impact travel times and level of service significantly.

Nevertheless, as discussed in Section 3.11.3.1 (Fire Protection), existing response times to this area are already several minutes longer than Tacoma Fire Department recommended standards. In addition, because there are relatively few alternatives to using units from Stations 3 and 12 while maintaining acceptable response times, other portions of the Tacoma Fire Department's service area covered by those stations (such as Northeast Tacoma or other parts of the Port of Tacoma) could be left temporarily unprotected during responses to potential incidents at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System.

Finally, construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would have limited impact on fire risk to adjoining properties due to the materials present on site and the methods and materials involved in construction. Construction would begin with demolition and removal of the various existing structures, including any hazardous materials that may pose fire hazards. The existing ground surfaces within the construction footprint are either paved or covered with gravel. Existing concrete, asphalt, and gravel located outside the proposed footprint would remain in place. The primary materials used to construct the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System components would be steel and concrete, which are essentially nonflammable. These components would be installed over the requisite concrete ground improvements and associated foundations. Furthermore, the Project site is abutted by the Hylebos and Blair waterways, and the nearest structures are located south of East 11th Street at least 300 feet from the proposed development footprint of the Tacoma LNG Facility.

PSE Natural Gas Distribution System

Construction of the PSE Natural Gas Distribution System could result in an emergency event and an increase in emergency calls to fire stations in the vicinity of the PSE Natural Gas Distribution System. However, this increase would likely be temporary in nature and of limited significance.

Furthermore, construction of the PSE Natural Gas Distribution system is not expected to impact the ability of fire protection services to access areas in the vicinity of Project components. Construction of Pipeline Segment A would occur at night within portions of 54th Avenue East. This nighttime construction is not expected to affect fire prevention services' access to the Port of Tacoma because at least one travel lane would remain open at all times on 54th Avenue East. For other components, construction activities would be limited to one travel lane where the pipeline alignment coincides with an existing roadway (e.g., along Golden Given Road and 99th Avenue).

Post-construction hydrostatic testing of Pipeline Segments A and B would draw water from nearby fire hydrants. Total water demand for hydrostatic testing is expected to be 220,000 gallons for Pipeline Segment A and 31,000 gallons for Pipeline Segment B. According to Tacoma Water, existing water pressure in firewater mains along Taylor Way near Segment A is modeled at 9,000 gpm at 20 psi, and drawing water at a rate of 2 million gallons per day would cause a decrease. The minimum water pressure in firewater mains near Golden Given Road is estimated to be 4,900 gpm at 20 psi. It is therefore possible that the availability

of fire suppression water in the vicinity of Pipeline Segments A and B could be temporarily impacted, depending on the rate at which water would be drawn from the main. (Tacoma Public Utilities 2015f)

Law Enforcement

Project construction could result in increased service calls to law enforcement related to theft, vandalism, and unwanted intrusion into work areas. In addition, the number of road transportation-related accidents and calls for service in locations with traffic increases related to Project construction could increase.

Nonetheless, the increase in traffic related to construction of the Tacoma LNG Facility described above in "Fire Protection" is not expected to affect law enforcement services' access to the Port of Tacoma. The increase in traffic volume would be limited to the Project construction period and would not significantly affect existing traffic operations on local roadways. Construction-related traffic would not be expected to decrease response times for law enforcement agencies as the mitigation measures described in Section 3.10.6.1 (Construction) would be implemented to accommodate increased construction movements and emergency vehicles would be given the right-of-way required by local, state, and federal regulations.

Nighttime construction of Pipeline Segment A would occur within portions of 54th Avenue East. This nighttime construction would also not be expected to affect law enforcement services' access to the Port of Tacoma because at least one travel lane would remain open at all times on 54th Avenue East. A detailed discussion of potential impacts to traffic resulting from the Proposed Action is presented in Section 3.10 (Transportation).

During the period needed to complete construction, PSE expects that approximately 92 percent of construction workers would be hired locally or would commute from within the Puget Sound region. This workforce would not increase residential occupancy within the area surrounding the Project and therefore would not require additional police services. Accordingly, no additional police personnel, holding facilities, vehicles, or equipment would be required during Project construction.

Medical Services

Demand for EMS could increase due to construction-related accidents that could occur during Project construction. Potential hazards at construction sites that could cause injury include equipment failure, human error, and natural disasters. In addition, because the majority of construction workers would be hired locally or would commute from within the Puget Sound Region, it is not expected that an influx of construction workers would significantly increase general medical services demands in the area. Although a slight increase in demand for emergency and trauma medical services could occur, the potential increase would be within the capacity of the multiple hospitals and trauma facilities described in Section 3.11.3.3 (Medical Services). The increase would further be tempered by implementation of the mitigation measures described in Section 3.11.6.1 (Construction).

Schools

The majority of the anticipated construction labor positions would be hired locally or regionally. Workers would commute to the Project from the surrounding Pierce County and Puget Sound region on a daily or weekly basis as needed. Few construction workers from outside the region would relocate their families during the limited construction period. Project Construction would therefore not significantly increase the population in local school districts. The minimal resulting population growth would not significantly impact the school districts and schools mentioned in Section 3.11.3.4 (Schools).

Communications

Construction could impact telecommunications infrastructure located in the public right-of-way, where the proposed pipeline would also be located. This would potentially include infrastructure located along Alexander Avenue East (connecting the Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System) and along all road segments collocated with or intersecting Pipeline Segments A and B.

PSE would coordinate with the telecommunication and Internet service providers described in Section 3.11.3.6 (Communications) to locate existing facilities and limit potential construction-related impacts through the mitigation measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

Electricity

Project construction could also impact electrical infrastructure located in the public right-of-way. As for telecommunications infrastructure, this would potentially include electrical infrastructure located along Alexander Avenue East (connecting the Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System) and all road segments collocated with or intersecting proposed Pipeline Segments A and B.

In addition, Project construction would require substantial amounts of energy, potentially drawing strongly on the electrical network at times. However, the anticipated peak electrical load during construction would be small in comparison with system capacity. The majority of the construction equipment for the Project would be powered by gasoline or diesel fuels without direct need for electrical power.

In order to limit any potential impact to existing residential, commercial, or industrial customers in the Tacoma Power, PL&WCo, and BPA service areas, PSE would coordinate with those agencies and local government to minimize impacts to electrical utility lines and substations according to the mitigation measures discussed in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

Natural Gas

Construction of the Project components would not require natural gas, and PSE would be able to coordinate internally to avoid any disruption to existing natural gas lines or service over the course of construction. Therefore, construction would not limit PSE's ability to provide natural gas to existing residences or businesses in PSE's service area, and no impact is expected.

Sewer Services

Sewage would be collected in portable toilets during construction and disposed of on a regular basis to maintain sanitary conditions.

Post-construction hydrostatic testing would be required both for the tank to be constructed at the Tacoma LNG Facility and for Pipeline Segments A and B. In addition, hydrostatic test water used for Pipeline Segments A and B would be discharged to the local sanitary sewer systems. Such discharge would be metered to gradually discharge consistent with the batch discharge and wastewater discharge requirements of each jurisdiction. Accordingly, discharge of hydrostatic test water to the sanitary sewer systems would not exceed the capacity of the sanitary sewer system.

Existing sewer utilities, with the mitigation measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), would therefore not be significantly impacted by construction of the PSE Natural Gas Distribution System.

Solid Waste Services

The primary waste generated during construction would result from the demolition of existing buildings and solid construction debris such as scrap metal, concrete, creosote-treated wood and piles, cable, wire, wood pallets, plastic packing materials, and cardboard. The construction contractor would recycle useable materials and coordinate the transport of this waste to appropriate licensed disposal sites.

Creosote-treated wood and piles that would be removed during the demolition of existing in-water structures would be disposed of at an appropriate upland facility that meets the liner and leachate standards of the Minimum Functional Standards, WAC 173-304. Hazardous materials such as fuels, oils, and lubricants required to safely operate and maintain construction equipment would be disposed of in accordance with applicable state and federal regulations, including WAC 173-303. These materials would be stored in a centralized construction staging area. Excess overburden and soil would be trucked to a permitted location capable of accepting them. Furthermore, contaminated media (groundwater, subsurface

soil, or sediment) that could result from construction activities are regulated by federal, state, and local regulatory programs.

As described in Section 3.5.6.1 (Construction), a contaminated media management plan (CMMP) would be developed and implemented during construction. The CMMP would describe the proper characterization of media disturbed during construction, provide procedures for segregating contaminated media from clean fill, and outline on-site and off-site management of affected media based on the levels of contamination present. To the extent possible, recycling would be considered for applicable items.

The City of Tacoma notes that PSE has not provided estimated amounts for the different types of solid waste that may be generated over the course of construction. The information provided by PSE suggests that commercial providers of waste services will have sufficient capacity regardless of the amount of material and that no impact would therefore be expected for public service providers. However, considering the magnitude of demolition involved in the construction of the Tacoma LNG Facility, it is determined that the impact to solid waste services provided by the City of Tacoma is unknown. However, this issue does not affect construction of other Project components. Therefore, the impact on solid waste services provided in unincorporated areas by Murreys Disposal Company, Inc., or Pierce County Refuse would not be significant.

Stormwater

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

During construction, stormwater best management practices (BMPs) would be implemented to minimize potential impacts to the existing stormwater infrastructure in the form of increased runoff and erosion from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. On-site stormwater infrastructure, including catch basins, conveyance pipes, and outfalls, would be largely retained and modifications made as part of construction only where needed to improve performance of the system and comply with conditions provided in the SWPPP and BMPs described in Section 3.3.6.1 (Construction). Existing off-site stormwater infrastructure, with the mitigation measures described in Section 3.3.6 (Avoidance, Minimization, and Mitigation), would not be significantly impacted by construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System.

The 5 million gallons of water used for hydrostatic testing of the LNG storage tank would be discharged to the on-site stormwater system to the Hylebos Waterway over a specified period of time in coordination with the Port and City of Tacoma. No impact is therefore expected to adjacent municipal stormwater systems.

PSE Natural Gas Distribution System

The two new distribution pipeline segments would be constructed entirely within the paved portion of existing road rights-of-way. The Golden Given Limit Station and upgrades to the Frederickson Gate Station would both be constructed on previously developed sites. PSE would contact local public works departments and utility agencies to identify the presence of existing stormwater systems in the road rights-of-way. PSE would coordinate with the appropriate utility providers to resolve potential conflicts between proposed PSE Natural Gas Distribution System improvements and existing stormwater infrastructure. Any impacted infrastructure would be restored to preexisting conditions. During construction, BMPs would be implemented to minimize potential impacts to the existing stormwater infrastructure such as increased runoff and erosion. Therefore, existing stormwater infrastructure, with the BMPs described in Section 3.3 (Water), would not be significantly impacted by construction of the PSE Natural Gas Distribution System.

Water Supply Services

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would require approximately 9 million gallons of water. This water is most likely to be drawn from the municipal potable water supply described in Section 3.11.3.12 (Water Supply Services) for the installation of concrete ground improvements and foundations. In addition, Tacoma Water has also indicated very significant volumes of

fire suppression water in adjacent water mains (11,500 gpm at 20 psi). Water for construction purposes such as dust suppression is typically drawn from fire hydrants. (Tacoma Public Utilities 2015f)

The post-construction commissioning of the LNG storage tank would require the primary inner container of the LNG storage tank to be filled and hydrostatically tested in accordance with the requirements of American Petroleum Institute Standard 620. Approximately 5 million gallons of water would be required to perform the test. The hydrostatic test water would be supplied by the Tacoma potable water system at a proposed rate of 1,000 gpm as stated in Section 2.3.1.1 (Upland Construction). This hydrostatic test would occur only once and would be performed in accordance with approvals from Tacoma Water.

Based on available water supplies in this area as described in Section 3.11.3.12 (Water Supply Services), the water supply that would be needed to complete construction and post-construction hydrostatic testing would not significantly impact the water supply within the vicinity of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites or in the service area of Tacoma Water in general.

PSE Natural Gas Distribution System

During construction, water for dust suppression, water incorporated into concrete, and water used for fire control would be provided by the pipeline construction contractor. Typically, water is provided from a truck or via a fire hydrant through a portable meter. Based on the available supply through the firewater mains as described in this section under “Fire Protection,” above, existing water supply utilities would not be significantly impacted by construction of the PSE Natural Gas Distribution System. Further mitigation measures are described in in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

3.11.4.2 Operations Impacts

This section addresses potential impacts to public services and utilities associated with operation of the Project.

Fire Protection

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be conducted by trained personnel in accordance with the applicable requirements of 49 CFR 193 (and National Fire Protection Association [NFPA] 59A as adopted therein) and 33 CFR 127. In the event of an emergency or fire during operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, facility emergency response procedures would be acted upon, first responders from the Tacoma Fire Department would be notified, and plant fire suppression systems would be deployed, if necessary.

If the emergency were related to a release of LNG or refrigeration fluids, LNG or refrigerant would flow to a containment sump, where it would be allowed to boil off. In the case of a fire, it would be extinguished with portable dry chemical extinguisher carts or, alternatively, the fire would be allowed to burn out. Water is not used for extinguishing LNG fires and is only used to protect exposures (buildings and other equipment) on site from the heat produced by fire.

Details of the health and safety elements, emergency response procedures, and containment systems at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are provided in Section 3.5 (Public Health and Safety).

In addition, the existing underground municipal firewater system along both East Alexander Avenue and East 11th Street has a very high capacity, estimated at 11,500 gpm at 20 PSI by Tacoma Water (Tacoma Public Utilities 2015f). Any potential emergency event that demands municipal water supply and that would occur during operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would therefore be highly unlikely to exceed the capacity of the existing underground municipal firewater system. As described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), hydrant and monitor connections would be compatible with local municipal fire department equipment.

Major traffic impacts are not expected as a result of Project operation. However, when taken together with cumulative impacts from projected build-out of vacant and underdeveloped lands, it is anticipated that fire services access to the Tideflats will be significantly reduced below current levels unless a comprehensive mitigation strategy is phased in. Details regarding road conditions, speeds, response times and cumulative needs and impacts are provided in Section 3.10 (Transportation) and Section 3.13 (Cumulative Impacts).

The primary safety hazard in an LNG liquefaction facility is a release of LNG or refrigerant from process equipment or tanks. A spill could result in a potentially flammable vapor cloud that must be monitored as the spilled product evaporates, or a fire on the surface of the liquid pool that would be either extinguished or monitored as it burns out (with appropriate protection of nearby structures, if necessary, with water streams to mitigate heat damage). Training of first responders would be required as a mitigation measure described in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

Most operational incidents would likely not require direct intervention of fire protection services due to the safeguards described above. However, demand for fire protection services would nevertheless likely be increased as a result of Project operations, for the following reasons:

- Reopening of fire Station 15 is a recommended mitigation measure that places EMS responders in close proximity for a timely response.
- Facility emergency response procedures involve notification of first responders from the Tacoma Fire Department who would be obligated to respond;
- Even if no direct fire response is necessary by fire protection services, an operational incident would likely require the intervention of auxiliary services provided by the Tacoma Fire Department, such as EMS or hazardous materials response;
- Those rare incidents that would require direct intervention of fire response services are likely to be very severe and require significant amounts of Tacoma Fire Department staff and equipment for both direct fire response and auxiliary services; and
- As noted in Section 3.11.4.1 (Construction Impacts), the relative lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident.

The operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would therefore need to include mitigation measures to address these impacts, as listed in Section 3.11.6 (Avoidance, Minimization, and Mitigation) and Section 3.5 (Health and Safety).

Natural Gas Distribution System

The primary fire hazard and potential impact to fire protection services associated with operation of the PSE Natural Gas Distribution System components would be an accidental rupture of the pipeline segments caused by outside sources, such as earth moving and excavation equipment related to other activities adjacent to the location of the pipelines. However, the likelihood of an operation-related pipeline accident with current pipeline technology and adherence to existing regulation is minimal.

Traffic impacts are not expected as a result of Project operation and would not affect fire prevention services' access in the vicinity of the PSE Natural Gas Distribution System components. Furthermore, the proposed addition of approximately 5 miles of new distribution line to PSE's total system of approximately 21,000 miles of natural gas distribution mains and service lines (PSE 2014b), including many miles throughout Pierce County, does not represent a significant change to the overall system.

Operation of the PSE Natural Gas Distribution System facilities would be implemented with the mitigation measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation) and would not significantly impact fire protection services in unincorporated Pierce County.

Law Enforcement

This subsection addresses potential impacts to law enforcement services that would result from operation of the Project components. With the mitigation measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), operation of the Project components would not significantly impact law enforcement services in the vicinity of the Project sites.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Police respond to theft, vandalism, or trespassing at public and private properties. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites include security procedures for the operation and maintenance (O&M) of the facility, protective enclosures, secure communications, a security monitoring system, and warning signs. The O&M team, consisting of the plant manager, plant engineer, O&M supervisor, maintenance planner, controls technician, office administrator, and 10 represented gas operators, would be responsible for implementing the facility security procedures described in Chapter 2 (Description of Proposed Action).

The TOTE Marine Vessel LNG Fueling System's cryogenic pipeline would be located below grade and would be inaccessible to the public. The portion of the TOTE Marine Vessel LNG Fueling System located aboveground, including the LNG loading platform and access trestle, would be enclosed by a chain-link security fence as described in Section 3.11.6.2 (Operations). The facility would have limited access, and only authorized personnel would be allowed access. PSE would contract for security service as required to meet regulatory requirements and to control access and prevent unauthorized access at the Project site.

Traffic impacts are not expected as a result of Project operation and would not affect law enforcement services' access to the Port of Tacoma. Thus, operations of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would not significantly impact local law enforcement services.

Furthermore, PSE has developed a Preliminary WSA to address how operation of the marine components of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would comply with federal and Coast Guard marine safety programs described in in NVIC 01-11 and 33 CFR 127 (PSE 2014a). The Preliminary WSA, described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), shows the analysis and coordination that would be undertaken to ensure the proposed LNG loading, transits, unloading, and barge-to-ship bunkering operations are appropriately safe and secure. The Coast Guard would then use the Preliminary WSA and coordinate with PSE to develop a Follow-on WSA, as described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), to provide all details concerning the LNG transfer terminals, LNG vessel transit, and LNG bunkering information required, along with the safety and security risk assessments specified in the NVIC 01-11 (PSE 2014a). Completion of the Follow-on and Final WSA would ensure safe and secure LNG operations and would further minimize potential security risks to the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, as well as to the Port of Tacoma Manufacturing/Industrial Center generally.

PSE Natural Gas Distribution System

The new Golden Given Limit Station would be constructed entirely within one previously developed parcel and improvements to the existing Fredrickson Gate Station would occur entirely within the existing developed footprint of the site. Both stations would include security fencing.

Traffic impacts are not expected as a result of the operation of either Station, nor are they expected as a result of the operation of Pipeline Segments A and B. Therefore, there would be no impact on law enforcement services' access in the vicinity of the PSE Natural Gas Distribution System components.

Medical Services

Operation of the Project would have limited impacts to medical services. The Project's operations workforce would include approximately 16 employees at all times, and all employees would receive regular emergency response and safety training to reduce the likelihood of emergencies at the Project sites. If an emergency event were to occur and require EMS, there are adequate medical facilities in the vicinity, including multiple Level 2 trauma centers, as described in Section 3.11.3.3 (Medical Services). Furthermore, the workforce needed to construct the Project would be hired locally or would commute from within the Puget Sound region and would not significantly increase residential occupancy or associated medical service demands in the Tacoma Trauma Center service area.

Schools

New jobs for workers at Project facilities would have limited direct impacts to area schools. Workers would commute to their jobs from the surrounding Pierce County and Puget Sound region. Relocation of families to the county and region would be minimal, creating little additional demands on teachers or school facilities.

Communications

Operation of the Project would not significantly increase demand for telecommunications and Internet services in the vicinity of the Project and is very unlikely to have any adverse impact on service providers. Where appropriate, PSE would coordinate with the telecommunication and Internet service providers described in Section 3.11.3.6 (Communications) to limit operations-related impacts to these utilities.

Electricity

Electricity would be used for electrical systems within the Tacoma LNG Facility, indoor and outdoor lighting, and other support equipment. Power to serve the facility would be transmitted across lines owned and operated by Tacoma Power, a division of Tacoma Public Utilities, which has sufficient capacity to serve the facility as an added customer. The TOTE site is already served by electrical systems. There are no significant direct impacts affecting the local utility distribution system.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Electrical service would be provided to the Tacoma LNG Facility site by Tacoma Power. Transmission lines are located throughout the Blair-Hylebos peninsula. The nearest electrical substation to the site would be the Tacoma Power Arkema/Atofina Substation and switching station located on the southeastern side of East 11th Street.

The Tacoma LNG Facility would require approximately 15 megawatts while operating at peak load. The facility would be served through existing Tacoma Power transmission lines. At PSE's request, Tacoma Power conducted the *Interconnection Study – Puget Sound Energy – Liquefied Natural Gas Project*, which is a preliminary interconnection study for connecting a 15-megawatt facility to the existing 115-kV electrical system in the vicinity of the Port of Tacoma. The purpose of the interconnection is to accommodate the transmission of power to the proposed Tacoma LNG Facility (Tacoma Public Utilities 2012). The interconnection study concludes that the existing 115-kV system in the area has sufficient capacity to accommodate the power to the Tacoma LNG Facility over Tacoma Power's existing transmission system. A new substation is proposed within the Tacoma LNG Facility, which PSE would own and operate.

PSE Natural Gas Distribution System

The proposed Golden Given Limit Station would be located on a site with an existing 4,000-square-foot structure. That structure would be removed and the smaller limit station structures erected. The proposal at the Fredrickson Gate Station would be to modify existing on-site natural gas infrastructure. Operation of the proposed PSE Natural Gas Distribution System improvements would require electrical power obtained from the local distribution systems. The amount of power consumed would be similar to that currently consumed

by similar facilities and would not change regional consumption. There would be no significant impacts to the local distribution system.

Natural Gas

Project operations would provide a new natural gas peak-shaving resource, thereby strengthening the existing natural gas distribution system and providing more reliable service to existing PSE natural gas customers, especially during periods of peak winter demand. The new pipeline segments, new limit station, and improvements to the gate station would supply the Tacoma LNG Facility with the requisite quantity of natural gas, while also connecting this peak shaving resource to the local natural gas service distribution system. Therefore, the Proposed Action would improve the local natural gas service distribution system.

Sewer Services

No direct sewage-related impacts would be expected as a result of Project operations. The TOTE Marine Vessel LNG Fueling System and improvements to the PSE Natural Gas Distribution System would not generate sewage during operation. Sewage from the Tacoma LNG Facility would result from showers, toilets, and sinks in the existing Control Building. These same sources of sanitary sewage occur in existing buildings on the site and discharge to the existing sanitary sewer systems described in Section 3.11.3.9 (Sewer Services). All other liquid waste from Project operations (including process water used for gas vaporization, facility cooling, and natural gas pretreatment) would be trucked from the facility to an approved waste disposal site and disposed of in accordance with state and local regulations. Thus, operation of the Project would not significantly impact sewer services.

Solid Waste Services

Solid waste generated during operation of the Project components would be consistent with industry standards for facilities of their proposed size. The primary waste generated during operation of the Tacoma LNG Facility would be office-related waste such as plastic packing materials and cardboard and food waste from the 16 employees working on the site. PSE would coordinate with City of Tacoma Solid Waste Management to determine the type of requisite garbage service for the site. To the extent possible, recycling would be considered for applicable items.

Operation of the TOTE Marine Vessel LNG Fueling System site would not result in the generation of solid waste. Operation of the PSE Natural Gas Distribution System components, including the proposed Golden Given Limit Station and improvements to the Fredrickson Gate Station, would not require staff stationed on site and would not result in the generation of solid waste. Furthermore, solid waste pickup service is available at all Project component locations as discussed in Section 3.11.3.10 (Solid Waste Services). Accordingly, Project operations would not significantly impact solid waste services provided by the City of Tacoma, Murreys Disposal Company, Inc., or Pierce County Refuse.

Stormwater

This subsection shows that operation of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System is not anticipated to significantly impact existing stormwater infrastructure or services.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Operation of the Tacoma LNG Facility would include stormwater treatment and improve the quality of stormwater discharged from the site to the Hylebos Waterway. The Tacoma LNG Facility stormwater management system would be designed to meet the water quality requirements of the Port of Tacoma's 2014 *Stormwater Management Plan* (Port of Tacoma 2014b) and any additional applicable requirements from the Western Washington Stormwater Manual. Existing stormwater infrastructure potentially impacted during construction would benefit from changes required by code in the final stormwater design for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. Existing on-site stormwater infrastructure on the Tacoma LNG Facility site, including catch basins, conveyance pipes, and outfalls would be largely

retained and modifications made only where needed to improve performance of the system. Site conditions at the TOTE Marine Vessel LNG Fueling System site, including existing stormwater infrastructure, would be restored as closely as possible to preexisting conditions following construction. The operational effects of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System on stormwater are described in greater detail in Section 3.3.4.2 (Operations Impacts).

PSE Natural Gas Distribution System

During operations, impacts from stormwater runoff would be unchanged along Pipeline Segments A and B and at the upgraded Fredrickson Gate Station. Site conditions, including existing stormwater infrastructure, along the pipeline segments would be restored as closely as possible to preexisting conditions following construction.

Furthermore, the proposed site for the Golden Given Limit Station is at present almost entirely impervious, with a building and paved parking lot. Portions of the existing impervious surface at this location would be removed and dense native vegetation added. Low-Impact Development stormwater features would be implemented in accordance with Pierce County Code Title 17A to promote on-site infiltration and reduce stormwater runoff. Thus, any impervious surfaces used on the site as part of the limit station would, at a minimum, not differ from existing conditions, and may instead improve them. The surface at the upgraded gate station would remain gravel, which matches existing conditions.

Water Supply Services

Potential impacts to water supply services resulting from the operation of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System are described below. Potable water needs for operations of Project components would not significantly impact the ability of relevant providers to deliver water supply services.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potable water for the Tacoma LNG Facility would be supplied by the existing water distribution system provided to the Blair-Hylebos peninsula by Tacoma Water. The Tacoma LNG Facility would reuse existing potable water infrastructure on site as much as possible. The infrastructure of the proposed facility Control Building would be reused, but some reconfiguration might be necessary. Makeup water for the pretreatment system would be provided by a demineralized water system located in the Control Building. The demineralized water system would use approximately 6 gallons per minute. The only other water demand would be for sinks and toilets used by the O&M team, consisting of the plant manager, plant engineer, O&M supervisor, maintenance planner, controls technician, office administrator, and 10 represented gas operators. Furthermore, the addition of a 16-employee facility is negligible in the context of the overall Tacoma Water service area, which serves nearly 100,000 customers, including nearly 6,000 commercial/industrial customers (Tacoma Public Utilities 2015e).

PSE Natural Gas Distribution System

Water needs for operation of PSE Natural Gas Distribution System components would be minimal. Potable water would not be required for the operation of Pipeline Segments A and B. Potable water use for the newly proposed Golden Given Limit Station and improvements to the Fredrickson Gate Station would potentially be used for incidental maintenance needs.

3.11.4.3 Decommissioning Impacts

This section describes the various procedures used to address potential decommissioning impacts associated with the end of the design life of the Project. Accounting for each component of the Project, the estimated total design life of the Project is 50 years. Decommissioning of Project components would generate public services and utilities impacts similar to those discussed in Section 3.11.4.1 (Construction Impacts) with the exception of impacts to solid waste services.

Decommissioning would likely result in the removal of solid wastes. The primary waste generated during decommissioning would be solid construction debris such as scrap metal, concrete, wood, cable, wire, wood pallets, plastic packing materials, and cardboard. The construction contractor would coordinate the transport of this waste to appropriate licensed disposal sites. To the extent possible, recycling would be considered for applicable items such as steel scrap metal.

3.11.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action–related impacts to public services and utilities would not occur

3.11.6 Avoidance, Minimization, and Mitigation

This section describes avoidance, minimization, and mitigation measures proposed to address potential impacts during construction and operation of the Project.

PSE would minimize potential impacts to public services and utilities by providing police, fire, and emergency personnel with emergency response procedures for the facility in accordance with the requirements of 49 CFR 193 and NFPA *59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)* (as adopted by 49 CFR 193). Furthermore, PSE would implement measures to plan for and minimize emergencies, such as safety and emergency response training to raise the level of preparedness in the event of an emergency. As described further in Section 3.11.6.1 (Construction), impacts that could not be avoided would be minimized through implementation of specific measures.

In addition to the various mitigation measures described in this section, increased demand for public services or utilities during construction and operation of the Project would be partially mitigated by an increase in City tax revenue generated by the Proposed Action through the process described in Section 3.12.4.2 (Operations Impacts). Nonetheless, new City tax revenues generated by the Proposed Action would only offset projected impacts to public services and the cost of required mitigation to a limited extent.

3.11.6.1 Construction

The following mitigation measures would be implemented to minimize potential impacts to public services and utilities that would result from the construction.

<u>Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System</u>

Fire Protection

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to fire protection and related EMS through the following:

- PSE would provide emergency response agencies with regularly updated maps of the facilities and current access points, relevant contact information, and site procedures for fire protection and rescue operations.
- A new unit of the Tacoma Fire Department with fire response and EMS response capabilities and hazardous materials awareness would be stationed in proximity to the site of the Tacoma LNG Facility for the duration of construction. This would address the increased risk of incidents requiring fire protection and EMS, reduce response times to potential incidents and avoid impacts to fire protection in other parts of the Tacoma Fire Department if an incident occurs on site.
- The emergency preparedness, emergency access, and construction health and safety measures proposed by PSE and described in Section 3.5 (Health and Safety) would reduce potential impacts to fire protection and EMS throughout the construction period for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System.
- Construction of the Tacoma LNG Facility would meet the safety requirements of the Pipeline and Hazardous Materials Safety Administration (PHMSA) as specified in PHMSA Form 18 titled *Evaluation of*

LNG Facility Siting, Design, Construction, and Equipment (PHMSA 2014) and detailed in Section 3.5.2.1 (Siting and Design of LNG Facilities). These requirements, administered and enforced by the Washington Utilities and Transportation Commission, address Title 49 of CFR Part 193—*Liquefied Natural Gas Facilities: Federal Safety Standards* (49 CFR 193) and are primarily based on NFPA *59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)* (as adopted by 49 CFR 193).

Law Enforcement

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to law enforcement through the following:

- Security would be provided throughout the construction period for each separate component of the Project.
- Temporary security fencing would be erected around the construction sites to prevent trespassing and vandalism.

Solid Waste Services

- PSE would prepare a demolition plan and submit it to the City for review. The plan would describe the sequencing of the demolition; provide estimates of the volumes and types of expected demolition waste; describe proposed efforts to recycle as much material as possible, and describe the arrangements that have been made to dispose of material not recycled and their compliance with applicable local, state, and federal laws and regulations.

Communications, Electricity, Sewer Services, Stormwater, and Water Supply Services

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to communications, electrical, and other infrastructure potentially located in the right-of-way of East Alexander Avenue by conducting a utility location survey prior to initiating work in the right-of-way and coordinating with all relevant service providers to protect existing infrastructure.

PSE Natural Gas Distribution System

Fire Protection

Construction of the PSE Natural Gas Distribution System would minimize potential impacts to fire protection services through the following measures:

- PSE or its selected contractor would notify the relevant fire department or district prior to initiating work within that department or district's service area.
- PSE would obtain permits before hydrostatic testing of Pipeline Segment A and Segment B begins, in accordance with the provisions of local codes for the use of fire hydrants. Per Tacoma Municipal Code 12.10.305, the use of hydrants in the city of Tacoma requires a hydrant use permit through Tacoma Public Utilities. Per City of Fife Municipal Code 13.04.140, the use of hydrants in the city of Fife requires a hydrant use permit through the City of Fife Public Works Department. Hydrant use in unincorporated Pierce County must comply with the applicable provisions of the building and fire code provided in Pierce County Code 17C.60. In compliance with the requisite approvals, use of firewater from nearby hydrants for hydrostatic testing would not significantly impact pressure in the firewater system or the ability to use it as needed.
- During post-construction hydrostatic testing, the contractor would communicate with fire protection services prior to drawing water from any fire hydrant.

Communications, Electricity, Sewer Services, Stormwater and Water Supply Services

Construction of the PSE Natural Gas Distribution System would limit impacts to all types of linear public service infrastructure located in the right-of-way, by conducting a standard utility location survey prior to

initiating construction to identify existing utility lines where new pipeline segments and connections to the Golden Given Limit Station and Fredrickson Gate Station are proposed. Existing utilities would be protected in coordination with the applicable local jurisdictions and service providers.

3.11.6.2 Operations

The following mitigation measures would be implemented to minimize potential impacts to public services and utilities that would result from the operation of the Project.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Fire Protection

Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to fire protection services through the following measures:

- A new unit of the Tacoma Fire Department with fire response, EMS, and hazardous materials operations capabilities would be stationed in proximity to the site of the Tacoma LNG Facility. This would address the increased likelihood that fire protection, EMS or hazardous materials response would be called to the area, reduce response times to potential incidents and avoid impacts to fire protection in other parts of the Tacoma Fire Department's service area if an incident occurs on site.
- PSE would provide regular orientation to the site to relevant responders at the Tacoma Fire Department, and operations personnel and the Fire Department would consult to develop and implement an ongoing training regime that integrates best practices for responding to fire and emergencies at the Tacoma LNG Facility. The response methods would specifically include handling LNG fires, taking into consideration the properties of LNG.
- Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would meet the safety requirements described above in Section 3.11.4.2 (Operations Impacts) and detailed in Section 3.5 (Health and Safety).
- The Tacoma LNG Facility would contain fire and hazardous gas detectors, fire-extinguishing systems, and an extensive firewater system, as well as new pier and access trestles that would provide firetruck access to the loading platform, as described in detail in Chapter 2 (Description of the Proposed Action). Hydrant and monitor connections would be compatible with local municipal fire department equipment.

Law Enforcement

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to law enforcement services through appropriate facility security features and appropriate Project employee training, including the following:

- Procedures for the O&M of the facility would be developed to comply with 49 CFR 193 Subpart J, "Security," and NFPA 59A (2001 edition) Appendix C – Security. This would include policies for security procedures, protective enclosures, security communications, security monitoring, and warning signs. PSE would contract for security service as required to meet regulatory requirements.
- The intrusion detection system would monitor the perimeter for the facility and alarm when the perimeter is disturbed.
- Security cameras would be installed along the perimeter and other select locations for maximum viewing coverage.
- Closed-circuit television system components would be powered by an uninterruptible power system.
- The perimeter of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be enclosed by a chain-link security fence to ensure public safety, welfare, and site security. The facility would be equipped with a page/party phone and intercom system, which would also be used for the

facility emergency alarm system. Emergency party-to-party personnel communications within the facility would be by radios.

- Permanent Project personnel as well as temporary personnel would receive the following security training as appropriate to their position: 33 CFR 105.205, "Facility Security Officer (FSO)," 33 CFR 105.210, "Facility Personnel with Security Duties," and 33 CFR 105.215, "Security Training for all Other Facility Personnel."

Medical Services and Emergency Response

The workforce required to operate the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would include approximately 16 employees, and all employees would receive regular emergency response and safety training to reduce the likelihood of emergencies at the Project sites. See Section 3.5 (Public Health and Safety) for more information. The following measure would improve the flow of traffic in the vicinity of the proposed Project:

- Implementation of Phase I of the Intelligent Transportation System study.

PSE Natural Gas Distribution System

Fire Protection

The design of the PSE Natural Gas Distribution System components would incorporate specific features to reduce the risk of pipeline incidents and to provide a means to shut off the flow of natural gas, if necessary, when responding to control an emergency, including the following:

- The PSE Natural Gas Distribution System would be designed and constructed to specifications exceeding the requirements of 49 CFR Part 192 for systems in the most densely populated areas.
- The pressures at the end of the line and the flow rate of natural gas into the Tacoma LNG Facility would be constantly monitored through PSE's Supervisory Control and Data Acquisition system.
- Valves would be installed at approximately 1-mile intervals along Pipeline Segments A and B.

Law Enforcement

The perimeter of the gate and limit stations would be enclosed by a security fence to enhance public safety, welfare, and site security.

3.11.7 Conclusion

With the exception of fire protection services, the Proposed Action would result in no significant or unavoidable impacts to public services and utilities potentially associated with construction, operation, and decommissioning of the Project, so long as the appropriate measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation) are implemented.

However, the Proposed Action would result in significant impacts to fire protection services, for the following reasons:

- Proposed Action–related activities, during both the construction and operations phases, would result in increased risk of incidents requiring fire protection, EMS and hazardous materials response.
- The lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident. For example, Station 3 is the only station serving Northeast Tacoma. Station 12 serves the entire Port of Tacoma, which includes other high-risk sites.

The mitigation measures described in Section 3.11.6.1 (Tacoma LNG Facility) and Section 3.11.6.2 (Operations) would reduce these risk to a less than significant level, in particular through the addition of new firefighting, EMS and hazardous materials capacity in the vicinity of the Project, and through the

implementation of health and safety and emergency protocols detailed in Section 3.5 (Public Health and Safety).

Nonetheless, City of Tacoma management, after reviewing the preliminary analysis in the 2015 Emergency Response/Intelligent Transportation System Study has concluded that:

- The reintroduction of a staffed fire station in the Tideflats is necessary and should occur in advance of the planned opening of the Project in late 2017. New revenue from the Project may allow for initial station staffing and can be expanded as additional new projects come on-line in the Tideflats. The Project's contribution to the capital costs of reopening a Tideflats fire station is also under consideration.
- Opening of the LNG plant will also trigger the need for implementation of Phase I of the Tideflats Intelligent Transportation System structure.
- The Taylor Way road upgrades necessary for improved emergency response times has been agreed upon by PSE, the Port of Tacoma, and the City of Tacoma through an approach that results in a rebuilding of Taylor Way to "heavy haul" standards.

3.12 Socioeconomics

This section describes the existing socioeconomic environment in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on local population levels, housing, employment, and tax revenues, as well as potential regional economic impacts, that may result from construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). As described in this section, the Project would provide positive local and regional economic impacts and is not expected to result in any significant local or regional negative socioeconomic impacts. Accordingly, no socioeconomic avoidance, minimization, or mitigation measures are required and, therefore, none are included in this section.

3.12.1 Study Methodology

This section describes the methodology used to analyze potential impacts on socioeconomic resources within the Proposed Action area. The analysis assesses the Project's anticipated local impacts to population, housing, and local government tax revenues, as well as its potential impact on employment and economic conditions in the entire Puget Sound region. These two separate geographic areas form the boundary of this analysis, as follows: (1) the boundary of the local area includes Pierce County and the cities of Tacoma and Fife, as appropriate, and (2) the boundary of the regional analysis includes the entire Puget Sound region, including King, Snohomish, Pierce, Thurston, Kitsap, Mason, Skagit, and Island counties.

The analysis of potential population, housing, and local government tax impacts is limited to Pierce County and the cities of Tacoma and Fife because the majority of the Project components would be constructed and operated within this area (see Chapter 2 [Description of Proposed Action]). Statewide data for Washington and Pierce counties are provided throughout the affected environment discussion. Data for the cities of Tacoma and Fife are provided where available. The economic conditions and potential economic impacts that could result from the Proposed Action are likely to extend outside of Pierce County boundaries and affect communities on a regional level (ECONorthwest 2014a). Therefore, the study area for economic impacts encompasses the entire Puget Sound region. The data and analysis presented in this section are derived from information provided by the United States Census Bureau, the State of Washington Office of Financial Management (OFM), United States Bureau of Labor Statistics, and other relevant public sources used to assess current socioeconomic trends associated with population, housing, and employment. The regional economic impact analysis was developed by ECONorthwest using IMPLAN modeling software to estimate the direct, indirect, and induced upstream and downstream impacts of the Proposed Action on the Puget Sound regional economy. The complete ECONorthwest report, titled *Economic Impact Analysis of a Natural Gas Fuels Facility in Tacoma* (2014a), contains a description of these terms. This report is included as Appendix J-1 (ECONorthwest Economic Impact Study).

3.12.2 Regulatory Framework

No federal regulations related to socioeconomic factors (population, housing, employment, and the economy) were identified within the relevant analysis areas described above in Section 3.12.1 (Study Methodology). The following city, county, and regional documents are relevant to the Proposed Action:

- *City of Tacoma Economic Development Plan* (City of Tacoma 2001);
- *City of Tacoma Comprehensive Plan Container Port Element* (City of Tacoma 2014);
- *City of Fife Comprehensive Plan* (City of Fife 2013);
- *Pierce County Comprehensive Plan* (Pierce County 2012);
- Port of Tacoma *Strategic Plan 2012 – 2022: People. Partnership. Performance* (Port of Tacoma 2014); and

- Puget Sound Regional Council *Regional Economic Strategy for the Central Puget Sound Region: Strategy* (PSRC 2012).

The regulatory guidance provided in these documents generally supports and encourages economic development activities resulting from targeted industrial and maritime development at the Port of Tacoma, throughout Pierce County, and in the Puget Sound region. These goals and policies are consistent with the purpose of the Proposed Action.

3.12.3 Affected Environment

This section describes baseline existing conditions for population, housing, and employment within the Pierce County study area and for the economy within the Puget Sound region study area for the Proposed Action. These study areas include the three jurisdictions where the following main components of the Proposed Action would occur:

- **Tacoma LNG Facility:** Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the Puget Sound Energy (PSE) Natural Gas Distribution System. The study area for the Tacoma LNG Facility is defined by the facility site boundary (see Figure 2-1 in Chapter 2 [Description of Proposed Action]).
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities, and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The study area for the TOTE system is defined by the site boundary (see Figure 2-1 in Chapter 2).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), a new limit station (the Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. The study area for the pipeline segments is defined by the roadways on which they are centered. The limit station and gate station Areas of Potential Effect are defined by their site boundaries (see Figures 2-18 through 2-20 in Chapter 2).

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the City of Tacoma. The two new distribution pipeline segments would be located in the City of Tacoma and the City of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County. A detailed description of the Project components is provided in Chapter 2 (Description of Proposed Action).

3.12.3.1 Population

Data obtained from the Washington State OFM show that the Pierce County population was 795,225 residents in 2010. Historical, current, and projected population trends for Pierce County, the cities of Tacoma and Fife, and Washington State are summarized in Table 3.12-1. Washington State's population estimates provide a reference for comparison between Pierce County and statewide population trends. The OFM does not provide city level projected population data within Washington State. The increase in the county's population (13.5 percent) between 2000 and 2010 is consistent with statewide population growth over the same period (14.1 percent) (see Table 3.12.2). The city of Tacoma's population increase between 2000 and 2010 (2.5 percent) is smaller than the population increase that occurred in the state and county, while the City of Fife's population increase (91.7 percent) during the same period was substantially larger than the state, county, and city of Tacoma (see Table 3.12.2). Estimated county population growth between 2010 and 2014 (3.3 percent) remains consistent with statewide growth over the same period (3.4 percent), while the city of Tacoma (1.3 percent) and the city of Fife (2.5 percent) experienced a lower rate of

population growth during the same time period (see Table 3.12.2). The county and state populations are projected to increase by approximately 7 and 10 percent, respectively, over the next two decades (see Table 3.12.2).

Table 3.12-1 Historical, Current, and Projected Population

Area	2000 (actual)	2010 (actual)	2014 (estimated)	2020[a] (projected)	2030[a] (projected)
Washington State	5,894,143	6,724,540	6,951,785	7,404,391	8,153,740
Pierce County	700,818	795,225	821,300	876,565	967,601
City of Tacoma[b]	193,556	198,397	200,900	N/A	N/A
City of Fife[b]	4,784	9,173	9,405	N/A	N/A

Sources: OFM 2013,2014a,b,c
Notes:
[a] The OFM provides low, medium, and high projected population estimates for 2020 and 2030. In accordance with Section 19A.20.100 of the *Pierce County Comprehensive Plan* (Pierce County 2012). This table presents the medium population projection estimates for 2020 and 2030.
[b] The OFM does not provide population projections at the city level.
Key:
N/A = not applicable
OFM = Washington Office of Financial Management

Table 3.12-2 Population Change (in percent)

Area	2000-2010	2010-2014	2014-2020	2020-2030
Washington State	14.1%	3.4%	6.5%	10.1%
Pierce County	13.5%	3.3%	6.7%	10.4%
City of Tacoma[a]	2.5%	1.3%	N/A	N/A
City of Fife[a]	91.7%	2.5%	N/A	N/A

Sources:
Calculations are rounded and based on data provided in OFM 2013, 2014a,b,c.
Notes:
[a] The OFM does not provide population projections at the city level.
Key:
N/A = not applicable
OFM = Washington Office of Financial Management

3.12.3.2 Housing

To assess the potential impacts of temporary and permanent workforce migration to the region during the construction and operational phases of the Proposed Action, it is necessary to know the quantity and quality of existing housing in the vicinity of the Proposed Action area, particularly the availability of temporary accommodations near the site.

As described previously, the Project would be located entirely within Pierce County, with portions in the city of Tacoma and the city of Fife. According to the *2009–2013 American Community Survey*, there were approximately 326,854 existing housing units in Pierce County in 2013 (U.S. Census Bureau 2013). Approximately 86,195 of these housing units are located in the city of Tacoma, and approximately 3,954 are located in the city of Fife. The majority (61.5 percent) of Pierce County housing units are owner occupied, while the remaining 38.5 percent are renter occupied. Approximately 8.0 percent of all housing in Pierce County is vacant (26,231 units), slightly more than one quarter (7,237 units) of which would be available for rent (U.S. Census Bureau 2013). The vacancy rate of rental housing in Pierce County was 5.8 percent in 2013. The majority (51.5 percent) of city of Tacoma housing units are owner occupied, while the majority (57.9

percent) of city of Fife housing units are renter occupied (U.S. Census Bureau 2013). Approximately 8.7 percent (7,514 units) of housing in the city of Tacoma and 8.0 percent (318 units) of housing in the city of Fife is vacant (U.S. Census Bureau 2013). The vacancy rate of rental housing in the City of Tacoma (6.3 percent) is higher than the Pierce County (5.8 percent), and the city of Fife (6.2 percent) (U.S. Census Bureau 2013). In addition to the 7,237 housing units available for rent in Pierce County, there are also numerous hotels/motels that provide temporary accommodations in the Project area. A desktop analysis of current lodging resources in Pierce County revealed that more than 30 existing hotels and motels with over 300 available rooms are located within a 3-mile radius of the Port of Tacoma, mostly concentrated along the Interstate 5 and Interstate 705 corridors through the cities of Fife and Tacoma (Pierce County 2014).

3.12.3.3 Employment

Employment estimates are based on the civilian labor force, which counts employment by "place of residence" rather than "place of work" and includes the self-employed, employees on unpaid leave of absence, unpaid family workers, and household workers. Individuals with more than one job are counted only once in civilian labor force data.

The United States Bureau of Labor Statistics estimated that Pierce County's average annual civilian labor force was 383,905 workers during 2014, while the average annual unemployment rate was 7.2 percent during the time period (BLS 2015b). In 2014, Washington State's average annual civilian labor force was 3,488,183 workers, and the state's average annual unemployment rate was 6.2 percent (BLS 2015a). Table 3.12-3 summarizes 2012, 2013, and 2014 annual average civilian labor force data for the city of Tacoma, Pierce County, and Washington State. The table shows that Pierce County's unemployment rate exceeded that of the State of Washington each year over the three-year timeframe and the City of Tacoma's unemployment rate exceeded that of both the county and the state for each of the three years.

Table 3.12-3 Civilian Labor Force Data (Annual Averages from 2012, 2013, and 2014)

Area	Civilian Labor Force			Employment			Unemployment			Unemployment Rate (in percent)		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
City of Tacoma	97,595	96,286	96,519	88,351	88,076	89,320	9,244	8,210	7,199	9.5	8.5	7.5
Pierce County	386,176	382,950	383,905	351,028	351,273	356,233	35,148	31,677	27,672	9.1	8.3	7.2
Washington State	3,471,158	3,460,038	3,488,183	3,190,015	3,216,966	3,270,362	281,143	243,072	217,821	8.1	7.0	6.2

Source: BLS 2015 a,b,c.
Note:
Unemployment and labor force data are not available for the city of Fife. The United States Bureau of Labor Statistics does not collect labor force statistics for cities with less than 25,000 residents.

Three businesses currently operate at the Port of Tacoma within the proposed Tacoma LNG Facility site. These three businesses are EHW Constructors Joint Venture; Safe Boats International, LLC; and PCC Logistics. EHW Constructors Joint Venture is using the southeast corner of the proposed Tacoma LNG Facility site as a pipe laydown and welding area while building an explosives handling Wharf No. 2 at Naval Base Kitsap – Bangor near Silverdale, Washington. The company has approximately six employees working on site at any given time. Work at Naval Base Kitsap – Bangor is expected to be complete by August 30, 2015. Safe Boats International, LLC, is an aluminum boat manufacturer that uses the larger existing pier at the proposed Tacoma LNG Facility site as a staging area to test their vessels and launch new vessels. Between tests and vessel launches, there are no employees at the site; when a vessel is in the water (roughly 50 percent of the time) there are six to ten employees on site. PCC Logistics is a logistics, warehousing, trucking, distribution,

and freight services company that has approximately 15 employees and leases the existing warehouse on the proposed Tacoma LNG Facility site.

3.12.3.4 Economy

Pierce County and the cities of Tacoma and Fife are part of the Seattle-Tacoma combined statistical area (CSA). The CSA includes all of the counties in the regional economic impact area (King, Snohomish, Pierce, Thurston, Kitsap, Mason, Skagit, and Island counties), as well as Lewis County. The economy in Pierce County is best characterized as predominantly middle-income with a concentration of working-age households, including military families. It is less affluent than neighborhoods of Seattle and some of its suburbs where major, high-paying corporate office employers such as Costco, Boeing, Amazon, Genzyme, Starbucks, Weyerhaeuser, and Nordstrom are located. Per capita income in Pierce County was $28,223 in 2013, compared to $34,199 in the CSA. Likewise, 2013 median household income in Pierce County ($59,204) was less than the total median household income in the CSA ($65,596). The cities of Tacoma and Fife were less affluent than Pierce County as a whole. In 2013, per capita income in the city of Tacoma was $26,147, and $25,735 in the city of Fife. Median household income was $50,503 in the city of Tacoma and $57,275 in the City of Fife (U.S. Census n.d. (b))

The gross domestic product (GDP) of Pierce County, an indicator of overall size of the economy, was $35.2 billion in 2012, which represents roughly 19 percent of the $190 billion GDP for the entire Metropolitan Statistical Area(MSA) (ECONorthwest 2014b).

By providing approximately one-fifth of the total GDP to the MSA, Pierce County is an important contributor to the region. Primary employers in the county are the Lewis/McChord joint base (approximately 56,600 employees) and the Port of Tacoma marine/rail operations (approximately 18,900 employees). Military employment provides the county economic stability, while the Port of Tacoma provides economic diversity through its ties with Asian markets. In addition to the economic benefits of military and port employment, earnings from individuals who live in Pierce County but commute to work in neighboring counties provide a major source of overall revenue for the County. Approximately $4 billion annually is brought back to Pierce County by residents who work in Seattle and elsewhere.

3.12.4 Impacts of the Proposed Action

This section identifies potential socioeconomic impacts that could result from the construction, operation, and decommissioning of the Project. The Proposed Action is not anticipated to significantly impact population or the demand or supply of housing in Pierce County. The Proposed Action is anticipated to positively affect the local and regional economies by creating additional employment, income, and output in Pierce County and throughout the Puget Sound region.

3.12.4.1 Construction Impacts

Site preparation and construction of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System would take place over an approximately three-year construction period. Potential construction-related impacts on population, housing, employment, and the economy that would result from the Proposed Action are described in this section.

Population

As discussed in “Employment,” below, construction of the Project would create an average of 271 direct construction jobs per year during the three-year construction period (ECONorthwest 2014a). The peak construction workforce would be an estimated 150 people in the summer of 2016. The average construction workforce is estimated at approximately 75 people, including 40 to start, 150 at peak, and 30 at commissioning. The majority of the positions would be hired from within the local or regional economy. Workers are expected to commute to the Proposed Action area from the surrounding Pierce County and Puget Sound region on a daily or weekly basis as needed. No substantial in-migration is expected to occur as a result of the Project; only a minimal portion of the construction workforce with specialty skills would be

hired from outside region. Owing to the short-term and temporary nature of construction and use of local and regional labor, the Proposed Action would not result in substantial population growth, cause a concentration of population, or displace people throughout Pierce County. In addition, as described in Chapter 3.11 (Public Services and Utilities), any temporary increase in construction workforce within the city of Tacoma or surrounding area would not have a significant impact on existing public services.

Housing

Construction of the Project would not directly increase the supply of housing units, displace or remove existing housing units, or increase the demand for permanent housing in Pierce County. The Proposed Action would directly create an average of 271 construction jobs per year during the construction period. (ECONorthwest 2014a)

The majority of the skilled labor force would be hired locally or within the region and, therefore, would not require temporary short-term housing during the Project construction period. Remaining short-term housing needs for workers hired outside of the region would be met by local motel or hotel rooms or through leasing available housing stock. As described in Section 3.12.3.2 (Housing), in 2013 there were an estimated 7,237 rental housing units in Pierce County that were vacant and available for rent. The relatively small number of construction employees expected to be hired from outside of the region would not significantly impact this available housing stock. Because of the relatively short duration of construction (three years) and the availability of temporary skilled labor and temporary housing at the local and regional level, construction of the Project is not expected to increase the demand for permanent housing or adversely affect availability and cost of temporary housing.

Employment

The Proposed Action would directly support an average of 679 direct, indirect, and induced jobs during the 2015–2018 construction period (ECONorthwest 2014a). As described in Appendix J-1 (ECONorthwest Economic Impact Study), these jobs were estimated using the IMPLAN Input-Output model. Throughout this discussion, jobs are defined as the number of full-year-equivalent jobs, consistent with the official definition provided by the United States Census Bureau, which counts one job as 12 months of work. During construction (2015–2018), the Proposed Action would annually support an average of 271 jobs directly related to the construction of the Project components and approximately 200 indirect construction-related jobs resulting from business interactions with other suppliers (ECONorthwest 2014a). Construction of the Project would also annually support approximately 208 induced jobs resulting from “consumption-driven” impacts that would occur as construction employee earnings ripple through the economy (ECONorthwest 2014a). Employment and labor incomes generated through construction of the Project would benefit both the Pierce County and Puget Sound region labor markets, thus benefiting the local and regional economies.

The entire Project construction would be bid out to regional contractors. The only area that would require specialized labor is the LNG storage tank, and approximately 12 personnel from the boilermakers union would be brought in from outside the region to augment the local boilermakers and other trades constructing the tank. These 12 individuals represent about 25 percent of the boilermakers on the Project, and they work for the tank manufacturer throughout the world on these types of tanks. All other trade labor personnel (pipefitters, ironworkers, electricians, carpenters, masons, operators, and laborers) are expected to come from regional firms.

Construction of the Tacoma LNG Facility would require the demolition and removal of the various existing structures on the proposed Tacoma LNG Facility site, as shown in Figure 2-21 in Chapter 2 (Description of Proposed Action). These structures currently house two tenants, PCC Logistics and EHW Constructors Joint Venture. Safe Boats International, LLC, uses only the larger existing pier at the proposed Tacoma LNG Facility site. PCC Logistics conducts business at several Port of Tacoma locations and would likely relocate to another location within the port. No reduction of the 15-employee PCC work force is anticipated to result from the relocation. EHW Constructors Joint Venture’s approximately six employees would not be displaced

because their use of the site is expected to be complete on or before August 30, 2015, which is when construction of the Tacoma LNG Facility is scheduled to begin. The lease for the Tacoma LNG Facility site between PSE and the Port of Tacoma calls for Safe Boats International, LLC, to operate off site by July 31, 2015. No other businesses or employment would be directly affected by construction or operation of the Project. No other existing employers would be relocated or impacted by construction of the Project.

Accordingly, the overall impact on employment resulting from construction of the Project would be a net increase of approximately 679 direct, indirect, and induced jobs during the three-year construction period. Appendix J-2 presents anticipated construction costs for each calendar year. The three-year construction window would be anticipated to spread over four different calendar years. The Proposed Action would result in a beneficial impact on local and regional employment.

Economy

Construction of the Project would generate direct, indirect, and induced upstream economic impacts resulting from construction spending for services bought within the region and through worker payrolls. These impacts would continue moving upstream through supplier and employee household spending, which would trigger more spending and employment to benefit the regional economy (ECONorthwest 2014a). The total amount of output, or economic value, produced by construction of the Project would amount to an average of $120.4 million each year over the length of the construction period. Of this estimated total, $75.4 million would be generated from direct output (e.g., purchase of goods and services related to construction), and $45.0 million would be generated from a combination of indirect and induced output during each year of construction (ECONorthwest 2014a).

The labor income paid to construction workers over the three-year construction period would also generate direct, indirect, and induced upstream economic benefits to the Puget Sound region. As described in "Employment," above, the Proposed Action would support an average of 679 total jobs per year between 2015 and 2018 (ECONorthwest 2014a). Labor income paid directly to workers during construction is approximately $23.8 million during each year. When indirect and induced effects are accounted for in labor income spending ($22.6 million), the total labor income is expected to be $46.4 million per year in economic benefits to the Puget Sound region. Additional information on the effect of construction spending on the local economy is provided in Appendix J-1.

Tax Revenues and Local Governments

Construction of the Project would also result in tax revenues for the affected local jurisdictions through the collection of sales tax during the construction period. Sales tax during construction consists of taxes paid for equipment and services during the construction of both the Tacoma LNG Facility and the associated gas distribution upgrades. Some of the equipment at the facility (components related to liquefying and storing LNG) qualifies for a manufacturing sales tax exemption. The construction costs associated with the gas distribution system would occur in Tacoma, Fife, and unincorporated Pierce County, and each of those jurisdictions would benefit from sales tax related to the equipment and activities during construction. PSE has estimated these taxes, as shown in Appendix J-2 (Local Government Tax Analysis); however, the total taxes paid during construction would be tied directly to construction costs, which are not knowable at this time. In addition to sales taxes paid on construction equipment and activities, PSE has agree to pay the City of Tacoma $4.25 million over 2017–2019, which would serve as another incremental source of revenue.

Appendix J-2 provides an estimate of the sales tax to be collected by the local jurisdictions.

3.12.4.2 Operations Impacts

This section addresses potential socioeconomic impacts on population, housing, the economy, employment, and income, as well as the effects on local government tax revenue generation, associated with operation of the proposed Project.

Population

As described in greater detail in "Employment," below, operation of the Project would create a total of131 direct, indirect, and induced jobs annually (ECONorthwest 2014a). These new jobs are expected to be filled by workers who currently live in Pierce County or the Puget Sound region. No significant in-migration is anticipated into the county or the region as a result of these new jobs. Because the majority of permanent employees are expected to be hired locally, any remaining employees hired from outside Pierce County would only marginally increase the size of the local population. Therefore, no long-term impacts on population growth are anticipated to result from Project operations.

Housing

Operation of the Project would have only negligible impacts on the demand and supply of housing in Pierce County. Given the total number of vacant housing units (26,231 available units) in the county in 2013 (U.S. Census Bureau, n.d.), the existing housing supply would be more than adequate to provide housing for any permanent employees who relocate. As described previously, a total of 131 direct, indirect, and induced jobs are expected to be created during the operations phase of the Proposed Action. The majority of these staff are expected to be hired locally so would not require new permanent housing. Thus, far fewer than 131 employees would actually seek new permanent housing in the vicinity of the Proposed Action. Therefore, no long-term impacts on the Pierce County housing stock would be anticipated as a result of Project operations, and no new housing would be required.

Employment

As described in Appendix J-1 (ECONorthwest Economic Impact Study), operation of the Project would result in an increase of 131 direct, indirect, and induced permanent jobs.

During operations, PSE expects to directly hire 16 employees to work at the LNG facility. These employees would be responsible for the day-to-day operations of the Project. Approximately 72 indirect jobs would also be created as a result of business-to-business interactions associated with facility operations (ECONorthwest 2014a). Indirect jobs employed by different companies supporting the Proposed Action would also work on site or within the vicinity of the Proposed Action. Contracted businesses that employ their own workers are counted as indirect jobs, as are hires at the Port of Tacoma, municipal utilities, and companies under contract to maintain facilities and equipment. In addition, the Proposed Action would also support an estimated 43 induced jobs resulting from "consumption-driven" impacts that would occur as the salaries of operations employees' earnings move through the economy (ECONorthwest 2014a). Employment and labor incomes generated through operation of the Project would benefit the Pierce County and Puget Sound region labor markets, thus benefiting the local and regional economies by increasing employment opportunities in the area.

Economy

Similar to the economic benefits of construction described above, operation of the Project would generate beneficial direct, indirect, and induced economic impacts. The total amount of output, or economic value, produced by operation of the Proposed Action is estimated to be $78.9 million for each year of operation (ECONorthwest 2014a). Of this total, $58.0 million would be generated from direct output, and $20.9 million would be generated from a combination of indirect and induced output during each year of construction (ECONorthwest 2014a).

The annual labor income paid to operations workers would also generate direct, indirect, and induced upstream economic benefits for the Puget Sound region. As described above, the Proposed Action would directly support a total of 16 jobs annually. Labor income paid to these operations workers would amount to approximately $2.2 million (ECONorthwest 2014a). When indirect and induced effects are accounted for in operational labor income spending ($7.6 million), the total labor income for operations amounts to $9.8 million per year in economic benefits to the Puget Sound region.

This analysis also accounts for the downstream regional economic impacts associated with the Proposed Action. As described in Appendix J-1, downstream economic impacts would result from the accumulation of economic efficiencies, cost savings, and the value of social benefits gained through the reduction of emissions. For example, the Proposed Action would allow for a more efficient, cleaner-burning fuel to be purchased by marine and trucking companies, which would in turn reduce these companies' fuel costs. As a result, the Proposed Action would generate an annual net savings of $40.1 million related to fuel efficiencies associated with the marine cargo and trucking industries (ECONorthwest 2014a).

Another example of a downstream economic impact comes from the proposed peak shaving component of the Proposed Action. As a result of natural gas peak shaving, the Proposed Action would save PSE's ratepayers and LNG transportation fuel consumers approximately $43.1 million per year combined, resulting in the generation of an additional estimated $14.9 million in economic output (ECONorthwest 2014a). This additional economic output generated from peak shaving activities is estimated to support an additional $3.8 million in labor income for 74 additional jobs in the region. Furthermore, the substitution of diesel and marine fuels with cleaner-burning LNG would reduce annual carbon dioxide, nitrogen oxide, sulfur dioxide, and particulate emissions. The total estimated economic value of these reductions equates to approximately $5.7 million in social benefits for the region annually (ECONorthwest 2014a). Additional information related to the downstream economic benefits of the Proposed Action is provided in Appendix J-1.

Fixed operating costs for the Tacoma LNG Facility include maintenance, operations staff, contracted security, lease payments to the Port of Tacoma, and demand charges for electric power. In total, these operating costs are estimated to be between $6 million and $11 million (not including property tax) in 2019 and would generally grow with inflation. The variable costs at the facility would be substantially higher and include natural gas and electric power. In 2019, these costs could range between $16 million and $50 million.

Tax Revenue for Local Governments

Operation of the Project would increase tax revenues in jurisdictions crossed by the Project, i.e., the City of Tacoma, City of Fife, and unincorporated Pierce County. Local government tax revenue sources that would be affected by operation of the Project can be broadly categorized into four categories: utility and sales tax paid by PSE for operational expenses of the Project, property taxes, business and occupation tax, and increased utility tax from Tacoma ratepayers. A high-level estimate of the incremental tax revenue streams for local governments can be found in Appendix J-2 (Local Government Tax Analysis).

Taxes paid on operating costs include the tax revenues that governments would receive from the sale of goods or services during operations. The primary source of tax revenue in this category would be utility tax related to electric sales that would be collected by Tacoma Public Utilities. This tax stream would vary depending on facility output and utilization. Annual revenue from this source is estimated to range between $420,000 and $545,000 annually. In addition, PSE would pay sales tax on maintenance items and services, as well as plant consumables. Sales tax on these items are expected to generate approximately $30,000 per annum.

The Washington Department of Revenue (DOR) assesses operating property of interstate and intrastate public utilities, such as PSE, in order to assure uniformity in valuations throughout the state. PSE meets the definition of a public utility company operating in the state of Washington under Revised Code of Washington 84.12.200. When assessing property values, the total system value of the utility is determined regardless of where its property is located. Thus, PSE's operating properties are assessed en masse by the DOR and PSE's property tax bill is not determined on a per parcel basis.

As a result, each year the DOR arrives at an overall value for all of PSE's operating property. This value accounts for the historical cost of a property, incorporates an analysis of incomes and expenses of income-producing properties in estimating value, and values the debt and equity components of the company in an effort to determine the value of PSE's assets. Once the overall value has been calculated, the DOR

apportions the tax revenue to each county and tax code area based on the original, historical cost of PSE's assets. The annual property tax revenue from the Project is expected to range between $3.6 million and $4.5 million annually (including revenues generated for the state). Appendix J provides property tax estimates for Pierce County, the City of Tacoma, the City of Fife, and other local tax jurisdictions by Project component. Annual property tax receipts are projected to be approximately $319,000 in Pierce County; $732,000 in the City of Tacoma; $19,000 in the City of Fife; and $2.4 million to other local taxing jurisdictions while the Proposed Action is operational. These figures are only estimates and would be subject to the DOR's central assessment tax policy. Therefore, the funds distributed by DOR to Pierce County could be apportioned to tax code areas in the city of Tacoma, city of Fife, and unincorporated Pierce County to support public services and utility costs within these jurisdictions.

The city of Tacoma would also collect business and occupation taxes associated with the revenues generated by the Proposed Action. Tax receipts from this source are estimated to be approximately $75,000 per year. Finally, gas customers across PSE's service territory would experience a small rate increase associated with the portion of the Project that would provide peak-day gas service. This rate increase would in turn raise the utility taxes receipts associated with PSE's gas utility in the city of Tacoma by approximately $60,000 per annum.

3.12.4.3 Decommissioning Impacts

Decommissioning of Project components would generate socioeconomic impacts similar to those discussed in Section 3.12.4.1 (Construction Impacts). Potential impacts include those related to temporary job creation, labor income, and construction output, but would likely be shorter in duration than those experienced during Project construction.

3.12.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and Proposed Action–related employment, economic, and tax benefits would not occur. A new and consistent supply of cleaner fuel with fewer air emissions than traditional fuels, as would be provided by the Proposed Action for marine and land transportation, may remain unavailable in the Proposed Action area. Alternatively, supplies to meet the market need would likely come from outside of the region. Further, the peak shaving capability of the Proposed Action would be unavailable to augment natural gas service to PSE customers. Social benefits resulting from reduced air emissions within the air shed would not occur. The jurisdictions crossed by the proposed Project (including city of Tacoma, city of Fife, and unincorporated Pierce County) would not receive an increase tax revenues resulting from Project operations.

3.12.6 Avoidance, Minimization, and Mitigation

The Proposed Action would result in beneficial employment and economic impacts for Pierce County and the Puget Sound region and would not result in significant adverse impacts on population or housing. Specifically, the Proposed Action would generate a total of approximately 671 construction-related jobs and 131 annual jobs during operation, while contributing $102.4 million in construction-related economic output and $78.9 million in operations output annually. Accordingly, no avoidance, minimization, or mitigation measures are required or proposed.

3.12.7 Conclusion

The Proposed Action would result in significant beneficial impacts on employment and the economy both at a local and regional level and would likely increase property tax revenue allocations to the jurisdictions crossed by the Proposed Action. As stated above, the Proposed Action would generate construction-related economic benefits for Pierce County and the Puget Sound Region by annually supporting 671 jobs, $46.4 million in labor income, and $120.4 million in economic output over a three-year construction period. The Proposed Action would also generate operations-related economic benefits for Pierce County and the Puget

Sound region that would support 131 jobs annually and include $9.8 million in labor income and $78.9 million in economic output for each year of operation.

In addition, the Proposed Action would save PSE's ratepayers and LNG transportation fuel consumers approximately $43.1 million per year, resulting in the generation of an additional estimated $14.9 million in economic output and supporting an additional $3.8 million in labor income for 74 more jobs (ECONorthwest 2014a). The Proposed Action would have no significant or unavoidable adverse impacts on other socioeconomic factors such as population or housing.

3.13 Cumulative Impacts

3.13.1 Introduction

The Washington State Environmental Policy Act (SEPA) requires that agencies evaluate cumulative impacts, which include impacts resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in the action area (Ecology 1998). In the context of the Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project), cumulative impacts are identified on the basis of proposed and reasonably foreseeable significant future developments.

The Puget Sound Regional Council (PSRC) recently completed a study of the manufacturing industrial centers (MIC) in the central Puget Sound region. The Port of Tacoma MIC is located in the city of Tacoma, along the waterfront and on lands adjoining the waterways on Tacoma's Commencement Bay. It is one of the largest MICs in the region, with a total area of 5,160 acres, including port and marine terminals, marine cargo, on-dock intermodal rail yards, container terminals, roll-on/roll-off facilities, non-containerized cargo, automobile import facilities, shipyards, boat building, and dry docks. Overall, the Tacoma-Puyallup subarea represents 11 percent of the region's industrial land. Based on the PSRC, demand for industrial land is strong within this subarea, but adequate capacity exists in most areas to accommodate future growth given proper management strategies. (PSRC 2015)

Based on the PSRC analysis, strong demand is anticipated at the Port of Tacoma MIC. However, for the purpose of this analysis, two formally proposed projects on the Blair-Hylebos Peninsula have been identified as major, reasonably foreseeable developments near the Tacoma LNG Project (herein referred to as the Project) that could contribute to cumulative impacts: (1) the Puyallup Tribal Terminal (PTT) project, a three-berth container terminal (City of Tacoma 2012), and (2) the Northwest Innovation Works (NWIW) methanol facility, a methanol manufacturing facility announced for possible development on property owned by the Port of Tacoma (Washington Ports 2013). Construction of the Tacoma LNG Project would begin prior to the PTT and the NWIW projects, and this Draft Environmental Impact Statement contains the first comprehensive review of potential cumulative impacts of all three proposed projects.

In addition, the Tacoma Industrial Properties (TIP) and Stericycle are two other pending proposals within the Port of Tacoma. However, neither the TIP nor Stericycle projects would constitute a major development that could contribute to cumulative impacts, with the exception of increased daily truck and employee trips per day in the operations phase of the Stericycle project. A description of these proposals is provided below.

- TIP, at 1801 and 1851 Taylor Way, seeks two permits to convert an industrial site to a mooring/transload site for construction cargo. The City of Tacoma SEPA Responsible Official has issued a final, non-appealable SEPA Determination of Non-Significance for these improvements. (City of Tacoma 2014)
- Stericycle, located at 1224 Taylor Way, proposes to improve its container management area at a site used for hazardous materials management. The work would initially include approximately 20,000 cubic yards of grading activity. The second phase would include approximately 35,000 square feet of new structures (enclosed and canopies), as well as pavement, stormwater improvements, and other site improvements. The Stericycle project would add two new types of traffic to the Project Area—trucks and employee trips. Truck traffic is estimated at two inbound and two outbound trucks per day upon completion. Peak inbound truck traffic would occur between 12:00 noon and 3:00 p.m., and 7:00 a.m. to 9:00 a.m. for outbound trucks. Additionally, each new facility employee would generate two trips per day, one in the morning and one in the evening. The 20 new employees at the Stericycle expanded facility would generate 40 new employee trips per day, 20 in the morning and 20 in the evening. (City of Tacoma 2015)

Puyallup Tribal Terminal Project

In 2009, SSA Marine, Inc. proposed the development of the PTT project, a new three-berth container terminal on approximately 200 acres on the eastern shore of the Blair Waterway. The site lies to the south and west of the Tacoma LNG Project site. The PTT project would include widening the Blair Waterway by approximately 200 feet and constructing a wharf with approximately 555 pre-cast concrete piles. The widening of the Blair Waterway would removing approximately 1.75 million cubic yards of soil. The entire site would be paved and developed as a container yard with associated support and accessory facilities.

The PTT project is planned to proceed in three phases. Phase I includes dredging and widening the Blair Waterway, activating two ship berths, and constructing 100 acres of container yard. The second phase includes constructing a third berth and an additional 50-acre container yard. Finally, in the third phase, an additional berth would be built and an additional 58-acre container yard would be located in the uplands. This project has completed its environmental review and obtained various necessary project permits, but construction has not started. (City of Tacoma 2012)

3.13.1.1 Northwest Innovation Work Methanol-Manufacturing Facility

In May 2014, NWIW executed a 30-year lease with the Port of Tacoma, which included an 18-month feasibility period (renewable for up to 24 additional months) to conduct due diligence on the viability of developing and operating a methanol-manufacturing facility on an approximately 90-acre site on the eastern shore of the Blair Waterway. The goal of this facility is to manufacture and ship methanol to global markets for use in producing olefins, which is a feedstock for industrial applications. This site, like the PTT project site, also lies to the south and west of the Tacoma LNG Project site. (Port of Tacoma 2015)

NWIW has not yet submitted permit applications for the Tacoma methanol-manufacturing facility, and no environmental review has been initiated. In the absence of information that might be contained in such documents that could inform this cumulative impacts discussion, natural gas to the Tacoma methanol facility would likely be delivered to the site via a new 24-inch natural gas transmission pipeline, and methanol would be manufactured through four production lines, each capable of producing 5,000 metric tons of methanol per day. The original proposal by NWIW included two production lines, but, according to a news release by NWIW, an increase in production is made possible by the use of an innovative technology called ultra-low emissions reforming technology, which reduces both the physical footprint and the CO2 emissions of the facility, (NWIW 2015a). The methanol would be stored in non-pressurized tanks with a total capacity of approximately 200,000 metric tons within a containment area. The methanol would be transferred from storage to vessels calling on the East Blair 1 Terminal at a rate of three to six vessels per month. There is currently no information available for the NWIW project regarding the proposed construction, operations, or anticipated impacts; however, this expanded plant size will most likely increase the previous activity levels and impacts, but no details are available at this time.

3.13.2 Project Comparison

The availability of baseline environmental information for the three projects (Tacoma LNG, PTT, and NWIW) varies, as they are currently in different stages of environmental review and permitting. Programmatic environmental review of the proposed redevelopment of the entire Blair-Hylebos industrial lands was completed in 2009 (Port of Tacoma 2009). There is considerable baseline information regarding the PTT project, as SSA Marine, Inc. submitted a Shoreline Substantial Development Permit, Wetland/Stream/Fish and Wildlife Habitat Conservation Area permit, and SEPA Environmental Checklist to the City of Tacoma in 2009, and a Joint Aquatic Resource Permit Application was submitted at the same time to the United States Army Corps of Engineers in regard to Section 10/404 permitting. A Mitigated Determination of Nonsignificance (MDNS) for the PTT was issued by the City of Tacoma in May 2012 and became final the following month (City of Tacoma 2012).

As indicated above, no permit applications have been submitted for the proposed NWIW methanol facility, and environmental review has not yet begun. However, the Port of Kalama and Cowlitz County, as SEPA co-lead agencies, are presently preparing an environmental impact statement (EIS) for the KMMEF proposal. Information gathered from available sources, including the Determination of Significance and Request for Comments on the Scope of the EIS (Port of Kalama 2014) regarding the KMMEF, the Notice of Application filed with the Department of Energy's Federal Energy Regulatory Commission regarding the gas line extension (FERC 2012), and publicly available documents regarding the KMMEF, provide some baseline information for the potential NWIW methanol facility in the Port of Tacoma. The basic features of the projects that would have cumulative impacts are summarized in Table 3.13-1.

Table 3.13-1 Summary of Proposed Industrial Facilities in the Port of Tacoma/Greater Tacoma Area

Feature	Tacoma LNG	PTT	methanol facility
Air emissions (operations)	1.03 tons/year PM_{10} 1.03 tons/year $PM_{2.5}$ 13.8 tons/year NO_X 20.1 tons/year CO 5.50 tons/year SO_2 85.7 tons/year VOC 0.27 tons/year H_2SO_4 20,751 metric tons/YEAR CO_2e	5.3 metric tons/year $PM_{2.5}$	Unknown
Noise emissions	Construction – 80 to 90 dBA at 50 feet, with possibility of limited 100 dBA when pile driving. Operations – Will comply with noise rules in the WAC and TMC.	Will comply with noise rules in WAC and TMC	Unknown
Added vehicle traffic (construction)	Construction – 139 cars/small vehicles and 11 trucks/heavy duty vehicles per day at peak	Not known	Aggregate 1,000 construction workers over the two--year construction period
Anticipated Construction Dates	Q2 2015 through Q3 2017	Not known	Mid- to late 2016 through mid- to late 2018[d]
Added vehicle traffic (operations)	Up to 60 vehicles per day, including up to 6 heavy duty trucks per day	475 employee/1,030 truck trips at project open; 950 employee trips, 4,244 truck trips at buildout	Unknown; over 200 permanent employees

Sources: Tacoma LNG Project Draft Environmental Impact Statement, Sections 3.2 (Air Quality), 3.6, and 3.10; City of Tacoma 2012; NWIW 2015b

Key:

CO	carbon monoxide
CO_2e	carbon dioxide equivalent
dBA	A-weighted decibels
H_2SO_4	sulfuric acid
LNG	liquefied natural gas
NO_X	oxides of nitrogen
$PM_{2.5}$	particulate matter 2.5 microns in diameter or less
PM_{10}	particulate matter 10 microns in diameter or less
SO_2	sulfur dioxide
TMC	Tacoma Municipal Code
VOC	volatile organic compound
WAC	Washington Administrative Code

The construction schedules for the PTT and NWIW methanol facility are uncertain at this time. The PTT received a permit from the City of Tacoma in 2012, after initially submitting an application in 2009. Based on information available from the Port of Tacoma, operations for the PTT project were intended to commence in 2015; however, construction has not yet started. (City of Tacoma 2012; Port of Tacoma 2013)

The NWIW methanol facility is proposed for construction from 2016 to 2018, assuming that feasibility studies, environmental review, and all permits are completed by 2016. The lease between the Port of Tacoma and NWIW provides for an extension of the feasibility period for up to 24 months as necessary, which could delay start of construction of the NWIW methanol facility to as late as 2018. (Longview Daily News 2014; Port of Tacoma 2015)

Puget Sound Energy (PSE) proposes a construction window from the second quarter of 2015 through the third quarter of 2017 for the Tacoma LNG Project. While unlikely, it is possible that all three facilities could be under construction simultaneously. Accordingly, for the purposes of this Draft Environmental Impact Statement, it is assumed that foreseeable impacts are concurrent.

3.13.3 Earth Resources

Significant cumulative impacts on soil, topography, and geology resulting from construction and operation of the three proposed projects on the Blair-Hylebos industrial lands are not anticipated. The general character of the Tacoma LNG Project site reflects previous and ongoing industrial activity. The upland portion of the site is developed, paved, or graveled. Undeveloped areas total less than 1 percent of the entire site. The shoreline along the Blair and Hylebos waterways is developed with wharves, piers, and armored slopes containing riprap, concrete and asphalt pieces, and various debris.

The general character of the PTT site and the NWIW methanol facility similarly reflect previous or ongoing industrial activity. The upland portion of the NWIW methanol facility has been developed, paved, or graveled to varying degrees. The shoreline along the Blair Waterway is developed with wharves, piers, and armored slopes containing riprap, concrete and asphalt pieces, and various debris. Impacts on earth resources from new industrial development on these sites would be localized to the sites and would not be significant, either alone or cumulatively when combined with development of the Tacoma LNG Project on the Hylebos side of the Blair-Hylebos Peninsula.

3.13.4 Air Quality

The construction and operation of the three proposed projects would not have significant cumulative impacts on air quality in light of the nonsignificant air quality impacts of the construction, operation, and decommissioning of the proposed Project (referred to herein as the Proposed Action), the limited foreseeable emissions of all three projects, and the existing federal and state regulatory frameworks. Potential air quality impacts would further be limited because, where required, project proponents would employ mitigation measures to control air emissions. Potential impacts on air quality during Project construction and operation are discussed in greater detail below.

3.13.4.1 Construction Impacts

Construction would generate air emissions temporarily resulting in air quality degradation on a short-term basis while construction is taking place. PSE would implement emission-control measures specified by the Washington State Department of Ecology (Ecology) and Puget Sound Clean Air Authority (PSCAA) guidelines and regulations to reduce impacts associated with construction, as described in Section 3.2.2.7 (Air Quality Permitting Requirements). Anticipated emissions during each year of construction activities are well below the minimum level stated in 40 Code of Federal Regulations (CFR 93.192).

The construction of the PTT would foreseeably result in emissions from marine vessels during transit and at berths; construction, excavation, and grading equipment; haul vehicles; and container-handling equipment and vehicles. The amount of emissions that these activities would generate has not been quantified but is not deemed of concern within the MDNS or supporting documents. (City of Tacoma 2012)

No data are currently available on the likely air emissions that would result from the construction of the NWIW methanol facility. It is reasonable to anticipate that those emissions would be of similar nature and would have effects similar to the Proposed Action (combustion of fuel-burning equipment and vehicles, fugitive dust from travel on paved and unpaved roads, foundation work). To the extent that air quality could be degraded on a short-term basis while construction was taking place, emission-control measures specified by Ecology and PSCAA guidelines and regulations would be available to reduce impacts associated with construction.

3.13.4.2 Operation Impacts

As listed in Section 3.2 (Air Quality), some air pollutant emissions would result from the operation of the Project. This section lists total potential emissions and shows that emissions from the Project would be low enough that the facility would not be subject to Prevention of Significant Deterioration or Title V permitting but would require a Notice of Construction permit from PSCAA. The Proposed Action would also be subject to Ecology's greenhouse gas reporting requirements (see Washington Administrative Code 173-441).

Vessels in the vicinity of the Proposed Action are fueled at this time with bunker fuel and diesel brought in by diesel-fueled tractor trailer trucks. Beneficial impacts of the Proposed Action include a significant reduction in both vessels' use of bunker fuel, and diesel and trailer trucks' use of diesel, which would significantly reduce air pollutant emissions in the vicinity of the Proposed Action. These potential air emission benefits were not estimated or incorporated into the air emission analyses presented herein but are a driving purpose of the Proposed Action.

The operation of the PTT would foreseeably result in additional emissions from marine vessels during transit and at berths, facility operations, and vehicles transiting to and from the terminal. The amount of emissions that these activities would generate has not yet been fully quantified. Available data indicate that at full operations (projected to be in 2020), trucks used to transport containers from ships to train yards, ships berthing at the site, and on-site equipment usage may contribute 5.3 metric tons of fine particulates (particulate matter less than or equal to 2.5 micrometers in diameter; $PM_{2.5}$) to the air in the surrounding area. The PSCAA has requested that conditions be placed upon the PTT project, including annual emission reports and an emissions cap for $PM_{2.5}$. (City of Tacoma 2012)

The PTT project proposes to implement the following mitigation measures to reduce or control air emissions during operations:

- Use of ultra-low sulfur fuel in land-based equipment;
- Use of lower-than-average sulfur fuel in vessel hotelling ship engines;
- Use of new cargo handling equipment (CHE) with engines that comply with the lowest applicable emission requirements;
- Use of electricity to power refrigerated container units while they are being filled; and
- Use of zero-emissions electrical equipment for both the ship-to-shore cranes and the rubber-tired gantries used to stack shipping containers.

No data are currently available on the likely air emissions that would result from the operation of the NWIW methanol facility. In its lease with the Port of Tacoma, NWIW agreed to assist the Port of Tacoma in meeting the goals and objectives of the Northwest Ports Clean Air Strategy by implementing programs, policies, plans, or procedures to meet action and performance targets. NWIW also agreed, "at reasonable request," to participate in small-scale emission-reduction pilot projects and to provide equipment data, terminal activity data, and air testing results. NWIW also agreed to post anti-idling signs, develop an anti-idle policy, and mutually explore technical idle-reduction technology.

Impacts on air resources from development of the Tacoma LNG, PTT, and NWIW projects would include temporary emissions during construction and ongoing emissions during the facilities' operations. Each facility will be subject to mitigation measures to reduce the impacts during construction and operations and to ongoing regulatory requirements, including procurement of air permits as necessary to further reduce and mitigate emissions. With the application of mitigation measures, and the ongoing oversight of the facilities by regulatory agencies with jurisdiction, the cumulative effect of all three projects on air resources is not anticipated to be significant.

3.13.5 Water Resources

As discussed in detail in the following section, the construction and operation of the Tacoma LNG Project, the PTT, and the NWIW methanol facility would not have significant cumulative impacts on water resources.

3.13.5.1 Construction Impacts on Water Resources

Creosote-treated Piling Removal. As described in Section 3.3.4.1 (Construction Impacts), approximately 508 creosote-treated timber piles would be removed from the Hylebos and Blair waterways Project-wide (the majority from the Hylebos) as part of the Proposed Action. This removal would temporarily disturb sediment on the seafloor and has the potential to re-suspend background concentrations of polyaromatic hydrocarbons (PAHs). However, any increase is expected to be short term, and elevated concentrations are likely to be greatly diminished within one or two tide cycles after the completion of the removal and installation activities. Moreover, the long-term consequence of this action would be qualitatively beneficial, improving sediment and water quality, by removing the creosote source from the environment.

PTT construction would require dredging 1.75 million cubic yards of soil and installing a wharf with approximately 555 pre-cast concrete piles (City of Tacoma 2012). These activities have the potential to re-suspend sediment containing pre-existing PAHs, but that re-suspension would likely be generally localized to the Blair Waterway and so would have limited cumulative effects combined with the Proposed Action's piling removal/installation activities, as they would primarily occur in the Hylebos waterway. If any re-suspension of PAHs from the Tacoma LNG and PTT projects were to occur at the same time, increased concentrations would be expected to be short term and to greatly diminish within one or two tide cycles. Any cumulative impacts associated with this re-suspension would not be significant.

Publicly available documents do not confirm the nature of in-water work at the proposed NWIW methanol facility. However, were the NWIW methanol facility's activities to include in-water work similar to the Tacoma LNG and PTT projects, cumulative impacts relating to the re-suspension of background contaminant concentrations would be short term and would rapidly decrease following the conclusion of in-water work. Accordingly, cumulative impacts associated with this re-suspension are not anticipated to be significant.

Turbidity. Cumulative turbidity impacts are not expected to be significant with the implementation of best management practices (BMPs) and tidal exchanges and potential timing of the projects. During Project construction, impacts from temporary increases in turbidity would be relatively minor and would last only a matter of hours or a few days because tidal exchange quickly disperses turbid water.

Construction of the PTT would require dredging 1.75 million cubic yards of soil, which has the potential to impact water turbidity. Additionally, and closer to PSE's in-water work, the PTT project plans to beneficially reuse dredge spoils to build juvenile salmon habitat in the Hylebos Waterway. Such activities, even if concurrent with the Tacoma LNG Project's in-water work, are reasonably expected to cumulatively increase turbidity, but such impacts would not be significant as they are short term due to regular tidal exchanges. (City of Tacoma 2012)

Publicly available documents do not analyze the nature and extent of NWIW's in-water activities for the construction of the methanol facility. It is reasonable, however, to assume that cumulative impacts on turbidity would not be significant, as they would be short term and would rapidly decrease following the conclusion of in-water work.

Spills. Water quality impacts from spills of materials such as oil, gasoline, and hydraulic fluids may occur during construction. Impacts would be limited by the implementation of spill-containment plans and BMPs. Specifically, PSE, the PTT, and NWIW would be required to maintain spill response plans in accordance with federal, state, and local laws and permits.

Construction Water Use. Approximately 9 million gallons of water would be required during the entire construction phase of the Proposed Action and would be supplied by Tacoma Public Utilities. Construction water inadvertently discharged could temporarily impact water quality in the Hylebos and Blair waterways by fluctuating water temperature and pH. Given their respective primary construction locations, inadvertent discharges associated with the Tacoma LNG Project would likely pass into the Hylebos Waterway, and inadvertent releases from the PTT and NWIW methanol facility would likely pass into the Blair Waterway. As such, significant cumulative impacts are not reasonably foreseeable at this time.

Available documents do not indicate the quantity of water required for the construction of the PTT and NWIW methanol facility. Reasonably assuming that any water required would be obtained from Tacoma Public Utilities, it is unlikely that there would be significant cumulative impacts even if all of the construction activities associated with all three projects were to occur simultaneously, in light of the relatively negligible amount of water required for the Proposed Action (peak use of 1.25 million gallons per day expected immediately prior to post-construction hydrostatic testing) as compared with Tacoma Public Utilities' water delivery capacity (up to 11,500 gallons per minute in the vicinity of the Tacoma LNG Project and 292 million gallons per day total system capacity).

Stormwater. During construction, temporary introductions of pollutants to the Hylebos or Blair waterways could occur from rainstorm runoff at all three project sites. The Project would implement code-required temporary erosion and sedimentation control measures or BMPs to mitigate or prevent such events from occurring.

Data on potential stormwater impacts during construction for the PTT and NWIW methanol facility are limited. However, it is reasonable to assume that, as required by the National Pollutant Discharge Elimination System (NPDES) Stormwater General Permit, BMPs would be implemented prior to the construction of all three proposed projects to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. Additionally, it is reasonable to assume that demolition and construction activities occurring in the Hylebos and Blair waterways would occur during the in-water work window for Commencement Bay. Based on these factors, significant cumulative impacts are unlikely.

Groundwater. With respect to the Project, shallow groundwater could experience a minor disturbance from changes in overland flow and/ or changes caused by grading and trenching on the proposed site. Degradation of water quality would be unlikely and, but in the event that any temporary degradation were to occur, it would be limited to the immediate vicinity of the construction activity or borehole; thus, no significant impact on groundwater resources would occur during construction activities.

The environmental checklist for the PTT project indicates that groundwater would not be withdrawn and water would not be discharged to groundwater. As noted above, there is no publicly available information regarding the NWIW methanol facility. As the PTT and NWIW methanol facility would not reasonably be expected to impact groundwater differently than the Proposed Action, any localized and limited impacts potentially caused by the construction of the Tacoma LNG Project would not be cumulatively significant.

Wetlands. The Project was sited specifically to avoid construction in wetlands. See Section 3.3.3.2 (Water). The PTT project would permanently fill approximately 0.8 acres of wetlands and 5.7 acres of wetland buffer areas but would provide compensatory mitigation through the creation 1.48 acres of new category II wetland area in the city of Fife (City of Tacoma 2012). The former Kaiser Aluminum site where the proposed NWIW methanol facility would be constructed if approved contains no jurisdictional wetlands, although there are wetlands on adjacent sites, so some mitigation may be required to avoid impact to neighboring

areas (Port of Tacoma 2011). Based on this information, the construction of the Project in conjunction with the construction of the PTT and NWIW methanol facility would not be expected to have any cumulative impacts on wetlands.

3.13.5.2 Operation Impacts on Water Resources

Surface Waters. During the processing and transmission of LNG, the potential exists for spills. The Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System would include secondary containment for LNG and various other chemicals on site as required by federal and state law and described in Chapter 2 (Description of Proposed Action). Although highly unlikely, any LNG spill would be directed to spill containments consisting of below-grade open top concrete sumps.

Vessel operations as part of the Proposed Action could include vessels being fueled twice per week via the Project's bunkering barge, as is currently done to fuel these vessels with bunker oil and/or diesel or via a direct pipeline. If the direct LNG pipeline is not available, only one LNG bunkering barge is expected to be in use, which would make the trip back and forth to TOTE twice per week, for approximately eight to ten trips per month. The trips would not add to the current maritime traffic on the two waterways (because the vessels are currently fueled by barge); the vessels would not require ballast discharges and would present minimal risk of fuel spills. Tugs would be fueled at other locations and would be subject to spill-prevention plans at those facilities. In the unlikely event of leakage of LNG from a barge, the LNG would vaporize and not affect water quality. When exposed to ambient heat sources such as water or soil, LNG vaporizes rapidly.

The Mitigated Determination of Nonsignificance for the PTT does not assess the potential that vessels calling on the marine container terminal could have in-water fluid spills that could negatively impact surface waters (City of Tacoma 2012). It is unclear whether the added vessel traffic in the Blair Waterway from the PTT would pose a significant increase relative to current risks.

Based on information for similar facilities, the NWIW methanol facility would be called on by vessels between three and six times per month (Port of Kalama 2014). While no data are available regarding whether and to what extent the operation of these vessels would increase spill risks associated with facility operations, the additional trips would be minor in comparison with existing maritime traffic and are not likely to constitute a significant change to the risk of spills in the Blair and Hylebos waterways or in Commencement Bay more generally.

Stormwater. The Proposed Action would not require an Industrial NPDES stormwater permit, but it would bring the site into compliance with current stormwater management requirements, including, but not limited to, the Port of Tacoma's 2015 Stormwater Management Plan, City of Tacoma Stormwater Management Manual, and applicable Ecology Secondary Permittee requirements. This would result in improved stormwater quality in the Hylebos Waterway because the stormwater discharge from the Tacoma LNG Project site would be properly treated according to the most current standards, as compared with no treatment under existing conditions.

One hundred percent of the proposed PTT would be covered in impervious surfaces, which would drain into a new stormwater treatment system; the stormwater would be treated for probable contamination from vehicle traffic prior to release. This would constitute an improvement over current conditions, in which stormwater from the proposed site is discharged directly into the City of Tacoma's stormwater system (City of Tacoma 2012). As both the Tacoma LNG and PTT projects would likely have beneficial stormwater impacts, no significant adverse cumulative impacts are anticipated.

In its lease, NWIW agrees to use the Port of Tacoma's stormwater system and to satisfy all requirements of Ecology's NPDES General Municipal Stormwater Permit to the extent applicable and to obtain (and comply with) an Industrial Stormwater General Permit. In light of these concurrent permitting processes, the NWIW methanol facility's stormwater management is not anticipated to have a cumulative adverse impact on

stormwater when considered in combination with the positive net effects of the Tacoma LNG Project and PTT.

Groundwater. During operation of the Tacoma LNG Project, the likelihood for spills to reach groundwater and affect groundwater quality is very low due to the planned spill impoundments and the volatile nature of LNG as it warms from its cryogenic state. In addition, it is reasonable to assume that the PTT and NWIW methanol facility would also operate in compliance with local, state, and federal water quality laws and would also have spill prevention control and countermeasure plans in place to address any accidental spill. Cumulative impacts would, therefore, be anticipated to be insignificant.

Although unlikely, assuming concurrent construction, foreseeable cumulative impacts on water resources from the three proposed projects (e.g., increase in water use, potential increases in turbidity, and re-suspension of contaminants during in-water work) are likely to be temporary, localized, and insignificant. Cumulative impacts associated with Project operations are limited to increases in stormwater collection and treatment and an unquantifiable, but qualitatively low risk associated with potential spills of petroleum or hazardous substances to surface or groundwater. As potential cumulative impacts are either remote or limited in scale and duration, the Proposed Action would have no significant cumulative impacts on water resources.

3.13.6 Plants and Animals

The Tacoma LNG Project, PTT, and the NWIW methanol facility would be sited primarily on existing industrial sites that are largely paved or graveled. Accordingly, the current upland sites offer little, if any, habitat that would support significant plant or animal populations. Potential impacts on aquatic and marine plant and animal life would be localized to the shoreline adjacent to the proposed project areas and would be associated with temporary impacts from construction and long-term impacts from additional piers over the nearshore habitat. Given appropriate mitigation, cumulative impacts from the three projects are unlikely to be significant.

3.13.6.1 Plants

There are no anticipated cumulative impacts on plants because construction and operation of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and Natural Gas Distribution System would take place on industrial sites that were previously paved or graveled.

PTT includes the proposed filling of 0.80 acres of wetlands, which could have adverse impacts on vegetation. PTT has committed to complying with the landscaping and buffering requirements found in Tacoma Municipal Code 13.06.502 and would mitigate any loss through habitat enhancement and plantings that ensure habitat function, soil stabilization, and the successful creation of new wetland areas at an identified location in Fife.

The potential impact of the NWIW methanol facility on plants is unknown. However, in its lease, NWIW has committed to “prevent or control invasive species,” which ostensibly could include measures relating to Scotch broom and Himalayan blackberries.

3.13.6.2 Animals

Impacts on terrestrial and avian wildlife from the Proposed Action would be mostly avoided or minimized because construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would take place on existing paved industrial sites and because no habitat of value has been identified.

There is no information currently available on the potential impacts of the PTT and NWIW methanol facility on terrestrial and avian species. However, the PTT MDNS has determined that it is not likely to adversely affect any listed species (City of Tacoma 2012). Because the Project’s potential impacts on terrestrial and avian wildlife would be negligible and consistent with current uses, it is unlikely that there would be

significant adverse cumulative impacts when construction and operation of the Project is considered cumulatively with the potential impacts of the PTT and NWIW methanol facility.

Aquatic Species. In-water work for pile-driving would take place as part of the Proposed Action during a period when the numbers of juvenile Chinook salmon, steelhead, and bull trout are low. Assessment of pile-driving impacts on fish and wildlife and proposed mitigation is provided in Chapter 3.4 (Plants and Animals). To minimize the potential for harm, the Proposed Action would incorporate mitigation specified and required by the applicable permitting agency (i.e., National Marine Fisheries Service and Washington Department of Fish and Wildlife). Temporary turbidity would occur during pile removal and pile-driving activities, as well as during re-grading of 600 feet of shoreline in the Hylebos waterway. Increased suspended sediment loads would be minimal and expected to be well below levels associated with direct mortality and sublethal effects on salmonids and other fish. Turbidity impacts would be relatively minor and would last only a matter of hours or a few days because tidal exchange quickly disperses turbid water. Potential construction-related impacts on designated critical habitat for the Chinook salmon and bull trout would be short term and limited to temporary effects on water quality from piling removal, pile driving, accidental spills, and general construction-related turbidity.

The PTT would permanently impact the entire 50-foot fish and wildlife habitat marine buffer area adjacent to the PTT project site and 0.80 acres of on-site wetlands. As a result, PTT's mitigation plan includes off-site planting, habitat restoration, and creation of new category II wetlands. PTT would also mitigate for unavoidable shading impacts on nearshore environments through restoration and enhancement of habitat for juvenile salmon in the Inner Hylebos.

While there are no publicly available data on the potential construction impacts of the NWIW methanol facility on aquatic species, it is reasonable to assume that NWIW's construction activities will comply with federal, state, and local regulations concerning fish and wildlife. In addition, the proposed site for the NWIW plant is located inland from shore and would not include any on-site wetlands (Port of Tacoma 2011; NWIW 2015b). As a result, no significant impacts on this resource is expected.

While there is a potential for impacts on aquatic species during the construction and operation of the three proposed projects, any cumulative impacts would occur when the risk of an adverse impact is lowest (e.g., during salmon work windows), temporary (e.g., increases in turbidity during construction), and would be mitigated. Commensurate with federal and state law, limited permanent impacts (here only PTT's filling of 0.80 acres of wetlands) would be fully mitigated. Accordingly, the concurrent build-out and operation of the Tacoma LNG Project, the PTT, and the NWIW methanol facility would not have significant adverse impacts on aquatic species.

Impacts on Marine/Aquatic Habitat. The Proposed Action and PTT would likely result in some shading impacts over the Hylebos and Blair waterways. Shading is associated with reduced productivity and habitat for predatory fish. Although there are foreseeable cumulative impacts arising from increases in shading, impacts could be mitigated by using grating on catwalks or removing decrepit creosote pilings and overwater structures.

The construction of the Tacoma LNG Project would also result in the loss of a 33-foot-wide strip of federally listed rockfish habitat. However, the Project's installation of concrete and steel piers would increase fish productivity because it encourages encrusting organisms more than the existing wood piers. No data are available as to the potential impacts of the PTT on rock fish habitat. Any potential impact would be subject to the federal Endangered Species Act and, where determined necessary by federal wildlife agencies, fully mitigated. Accordingly, concurrent build-out and operation of the Tacoma LNG Project, PTT, and NWIW methanol facility would not likely cause significant cumulative impacts on rock fish habitat.

No cumulative impacts are associated with the increase in artificial lighting in aquatic areas adjacent to the Tacoma LNG Project and PTT. Tacoma LNG Facility lighting that affects water surfaces would be at lower intensities than those associated with impacts on migrating juvenile salmon. No data are available on the

potential lighting impacts of the PTT. However, it is reasonable to assume that any such impact would be subject to required mitigation consistent with that implemented for the Tacoma LNG Project.

Increases in vessel traffic resulting from the Proposed Action would be minimal in light of existing vessel traffic in Commencement Bay. No data on vessel traffic associated with the build-out of the PTT are available. However, based on a comparable project at the Port of Kalama, vessel traffic associated with the NWIW methanol facility is likely to be limited to three to six vessels per month (Port of Kalama 2015). Given the existing levels of vessel traffic, cumulative impacts on wildlife (aquatic, avian or terrestrial) and prey species are not likely to be significant.

As the three proposed projects are consistent with the industrial, maritime facilities in and around Commencement Bay, potential impacts on plants and animals associated with project build-out would be anticipated to be temporary, localized, and not significant in light of existing uses and required mitigation.

3.13.7 Health and Safety

The construction and operation of the Project, PTT, and NWIW methanol facility could have significant cumulative impacts on health and safety. Although available information as to the construction and operational plans of the PTT and NWIW methanol facility is limited, it is reasonable to assume that these facilities, as well as the Project, would comply with applicable local, state, and federal safety regulations and implement plans and measures to limit safety risks. However, the addition of both the Project and the NWIW methanol facility does present a cumulative higher risk of fire and explosion.

3.13.7.1 Construction Impacts

During construction of the Project, environmental health measures would be taken to ensure that certified hazardous materials contractors would remove asbestos-containing material or lead-based paints in the buildings that would be demolished as part of the Proposed Action. Any contaminated material found during construction would be handled in a manner consistent with the terms of the work plan in Section 3.1.3.4 (Existing Contaminated Sites and Remedial Actions). This plan would address necessary characterization of impacted media, protection of worker health and the environment, temporary storage of impacted media, and proper reuse or off-site disposal of contaminated soil in accordance with local, state, and federal regulations. An additional layer of safety measures would be implemented during construction of the Project, as all PSE contractors and subcontractors are required to develop and implement safety plans prior to being contracted.

Environmental hazards associated with the construction of the PTT include general risks associated with the use of heavy machinery during construction and operation and site contamination from prior uses, including a contaminated groundwater plume. PTT would use “appropriate controls” to ensure that remediation is ongoing and that human exposure to any site contamination is minimized. PTT reports that the site will be “clean for industrial uses” prior to the start of construction. (City of Tacoma 2012)

Data on the potential health and safety impacts of the construction of the NWIW methanol facility are limited to statements in their lease that NWIW will not use, store, treat, generate, sell, or dispose of any hazardous substances in violation of any local, state, or federal law.

Adherence to local, state, and federal laws concerning health and safety during construction by all three proposed project proponents would prevent significant cumulative impacts.

3.13.7.2 Operation Impacts

Potential safety hazards at the Tacoma LNG Project relate to the specific characteristics of LNG and the conditions under which it would be handled and stored and to associated operations that involve the use of other hazardous materials. Operation of the proposed facility would not pose a potential public hazard because PSE would adopt and implement strict design and operational measures to control potential accidents. Stringent requirements would be put into place for the design, construction, operation, and

maintenance of the facility as well as extensive safety systems to detect and control potential hazards. More specifically, design, construction, and operation of the Tacoma LNG Project would meet the safety requirements of the Pipeline and Hazardous Materials Safety Administration, the United States Coast Guard (USCG), and the Washington Utilities and Transportation Commission. (See, e.g., 33 CFR 127 [Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas]; 49 CFR 193 Subpart F [Liquefied Natural Gas Facilities: Federal Safety Standards]; and National Fire Protection Association 59A. Additionally, PSE would adopt and implement strict emergency protocols and health and safety mitigation measures as set forth in Section 3.5.(Human Health and Safety)

No data on the potential health and safety impacts associated with the operation of the PTT are available. It is reasonable to assume that the PTT project would adhere to all applicable local, state, and federal health and safety laws. Nonetheless, certain health and safety risks can reasonably anticipated. For example:

- Risks typically associated with container operations (e.g., cranes) can be anticipated on site;
- Significant increases in truck traffic volume on the Blair-Hylebos peninsula associated with the PTT may increase potential for road incidents in the vicinity of PTT; and
- If sufficient to cause road congestion, these increases in truck traffic could hamper emergency vehicles' access to incidents on the peninsula, particularly if congestion affects Taylor Way.

Similarly, no data on the health and safety impacts of the operation of the NWIW methanol facility are available. It is reasonable to assume that the NWIW would adhere to all applicable local, state, and federal health and safety laws in the operation of its methanol facility. However, methanol is known to be highly flammable harmful if ingested, and easily dissolvable in water (Caltech 2009; EPA 2000). In addition, there is likely to be a constant inventory of methanol stored on site. As such, there will be an ongoing environmental health and safety risk from the presence of methanol, particularly related to its potential for combustion.

As all three of the proposed projects will be required to meet the strict health and safety protocols of local, state, and federal laws, the construction and operation of the proposed projects should not have significant adverse cumulative impacts. However, the presence of these facilities (particularly the Tacoma LNG Facility and NWIW methanol facility) does significantly raise the risk of fire and explosion on the Blair-Hylebos peninsula. In addition, the added truck traffic caused by the operation of the PTT may impede the ability of the Tacoma Fire Department to respond to incidents on the Blair-Hylebos peninsula.

3.13.8 Noise

The construction and operation of the Tacoma LNG Project, the PTT project, and the NWIW methanol facility would not have significant cumulative noise impacts during because cumulative impacts are limited by the physics of sound.

As discussed in Section 3.6.1 (Fundamentals of Acoustics), the physics of sound level addition dictates that the maximum cumulative sound level increase over the Tacoma LNG Project would be 3 A-weighted decibels (dBA). That is, when adding the sound level of the Tacoma LNG Facility to a baseline sound level that includes, for example, both the PTT and the NWIW methanol facility, the maximum increase resulting from adding the Tacoma LNG Facility to the existing environment would be 3 dBA. If the Tacoma LNG Facility's sound level differs from the baseline level by 2 dBA or more (either louder or quieter), the resulting increase would be less than 2 dBA. Therefore, the Tacoma LNG Project would not present probable significant adverse cumulative noise impacts when considered with the other reasonably foreseeable projects known in the area.

3.13.9 Land Use and Recreational Resources

The three proposed projects are consistent with the historical use of industrial parcels in the Port of Tacoma and current land use designations and the City of Tacoma Comprehensive Plan. Recreational resources in the area may be temporarily impacted during construction of the proposed projects, but impacts would be

less likely during project operation. Foreseeable impacts during construction would be temporary and would not impede vessel traffic in the waterways. Any waterway access impacts are most likely to be caused by the PTT, and not by the facilities associated with the Proposed Action. Accordingly, no cumulative impacts on land use or recreational resources are anticipated from the construction and operation of the three proposed projects.

3.13.9.1 Land Use

The Tacoma LNG Project site would be in an area zoned as Port Maritime Industrial (PMI). The site is primarily developed for industrial maritime use and has been in industrial use for at least 75 years. The Project would not change the land use or character of existing industrial lands, and impacts would not exceed the extent of the site boundaries. The Proposed Action would also be consistent with comprehensive plan designations, zoning districts, and critical areas criteria.

Although available data on the PTT and NWIW methanol facility are limited, both projects reflect previous or ongoing industrial activity, and it is reasonable to assume that proposed uses would be consistent with both PMI zoning and the “high intensity” designation in the City of Tacoma’s Comprehensive Plan.

The PTT facility would not comply with shoreline access requirements (City of Tacoma 2012). However, this impact would occur independently of any impact associated with the Project, and no associated cumulative impacts would be expected as a result.

3.13.9.2 Recreational Resources

Temporary impacts to recreational boating may be experienced in the Blair and Hylebos waterways during the in-water construction activities associated with the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and the Puyallup Tribal Terminal. Because in-water construction activities are likely to take place at similar times (to avoid impacts to migrating fish as described in Section 3.13.6, above), there would potentially be a temporary cumulative impact from simultaneous in-water construction at the TOTE Marine Vessel LNG Fueling System and the PTT.

Future increased marine vessel traffic volume and increased marine vessel size serving the PTT may also have a permanent impact on recreational boating in the Blair Waterway. However, the relatively limited amount of traffic generated at the Tacoma LNG Facility and TOTE Fueling System sites is unlikely to generate additional cumulative impacts.

The NWIW methanol facility would most likely rely on breakbulk operations at the currently operating East Blair One terminal for shipping (Port of Tacoma 2014). Associated marine vessel traffic is expected to be limited to three to six vessels per month, based on similar projects (Port of Kalama 2015). Therefore, cumulative impacts from the Tacoma LNG Project and NWIW Methanol facility are unlikely.

In addition, the PTT and NWIW methanol facility would be located on the Blair-Hylebos facility, and neither construction nor operation of these projects would be expected to take place in other locations. Therefore, it is unlikely that there would be any cumulative impacts on any other recreational resources in the vicinity of the Tacoma LNG Project.

3.13.10 Aesthetics/Light and Glare

The construction and operation of the Tacoma LNG Project, PTT, and NWIW methanol facility are likely to cumulatively impact aesthetics, light, and glare, but would still be within the existing industrial character of the port of Tacoma and minimized by appropriate mitigation.

The existing site of the proposed Tacoma LNG Project contains a variety of industrial structures. The Proposed Action would replace those structures with fewer, taller, and narrower structures. The site would remain industrial in use and character, as would the surrounding areas. Considering the size and scale of the LNG tank compared with other surrounding facilities, the visual impact would be significant and unavoidable. However, incorporating the mitigation measures contained in Sections 3.8.6.1 (Aesthetics) and

3.8.6.2 (Light and Glare) would reduce the aesthetic impacts. The Proposed Action would have no significant or unavoidable adverse impacts on impacts from light and glare.

The lighting and structural aesthetics of the proposed PTT would likely be consistent with existing uses and character of the existing industrial portions of the site. There are no foreseeable significant adverse impacts based on currently available information, and thus no cumulative impacts with the Tacoma LNG Project are currently anticipated. (City of Tacoma 2012)

No information is currently available as to how the NWIW methanol facility will (or will not) impact aesthetics and light/glare. However, it is reasonable to assume that, as an industrial facility, the methanol facility's appearance would remain industrial in character and be consistent with the surrounding industrial uses. Based on a highly preliminary and schematic conceptual rendering of the site, it is possible that certain tall structures may pose a significant and unavoidable impact. However, it is not possible at this time to determine whether this impact would be adverse to any sensitive receptors (NWIW 2015b).

3.13.11 Cultural Resources

The construction and operation of the Tacoma LNG Project, the PTT, and the NWIW methanol facility are not anticipated to cumulatively impact cultural resources in light of the sites' existing industrial character, limited foreseeable impacts, proposed mitigation, or adherence to state and federal laws protecting cultural resources.

Because no historic-era resources of the built environment are present within the area of potential effects of the Proposed Action, no significant unavoidable adverse impacts are expected. Additionally, there are no archaeological resources known or likely present within the area of potential effect of the Proposed Action, and no significant unavoidable impacts on archaeological resources are expected.

A cultural resource study of the PTT project area in 2008 reported no findings. Historic debris was found at the Inner Hylebos Site, but it was determined to be ineligible for listing on the National Register of Historic Places. Accordingly, no significant adverse impacts are anticipated, and so no adverse cumulative impacts on cultural resources are anticipated.

No information is available about the impacts of the NWIW methanol facility on cultural resources. However, it is reasonable to assume that the site's historic use was as an operational port. In light of the nature of the site and adherence to state and federal laws protecting cultural resources, it is unlikely that there would be significant adverse unavoidable impacts on such resources.

3.13.12 Transportation and Traffic

Construction of the Tacoma LNG Project, the PTT, and NWIW may cause cumulative impacts to road traffic and roadway surface damage due to construction vehicles traveling along Taylor Way. In addition, operation of the PTT would cause significant adverse impacts to the City's street system and would result in increased congestion at key intersections providing access to the Blair-Hylebos peninsula. Cumulative impacts to marine vessel traffic are unclear: the Tacoma LNG Project and NWIW methanol facility would not generate significant traffic, but no information is available regarding the potential generation of marine traffic by the PTT.

3.13.12.1 Vehicle and Rail Traffic

Construction of the Project would result in a temporary increase in daily and peak hour traffic volumes. In addition, up to two lanes of specific roadway segments may be closed at times due to pipeline construction. As a result, the Proposed Action may cause temporary increases in traffic delays and changes in traffic patterns. However, these temporary increases would have limited impacts and would not be expected to significantly increase roadway congestion or decrease the level of service at key intersections near the Blair-Hylebos peninsula.

Nonetheless, the use of heavy and oversized vehicles during construction may cause some damage to the road surface along Taylor Way. The poor quality of roadway surface along Taylor Way has been identified as an issue by the City of Tacoma (Fehr and Peers 2015). Construction may also cause temporary rail traffic disruptions, particularly at the intersection of proposed Pipeline Segment A and rail spurs along Taylor Way. This impact would be mitigated by the use or horizontal drill or bore construction to limit the length of traffic disruption and avoid damage to rail spurs.

Operation of the Tacoma LNG Project would generate very limited vehicle traffic, and would typically only minimal rail traffic. No impact on road or rail facilities, congestion, or level of service is expected as a result.

Table 3.13-2 Anticipated Trips Associated with Construction of the Tacoma LNG Project

	PM Peak Hour Trips (directional)		Daily Traffic Volumes	
	Cars/Small Vehicles	**Trucks/Heavy Vehicles**	**Cars/Small Vehicles**	**Trucks/Heavy Vehicles**
Tacoma LNG Facility	0 inbound, 139 outbound	5 inbound, 5 outbound	139 vehicles	11 vehicles
Pipeline Segment A[a]	0 inbound, 0 outbound	0 inbound, 0 outbound	15 vehicles	20 vehicles
Total	**0 inbound, 139 outbound**	**5 inbound, 5 outbound**	**154 vehicles per day**	**31 vehicles per day**

Note:
[a] Construction of the pipeline could occur at night; therefore, no vehicle trips are expected during the PM peak hour.

The available documents do not forecast the traffic impacts of the construction phase of the PTT. Based on the large scale of the Project and considerable grading activities, it is likely that construction of the PTT would generate daily truck traffic in a comparable or larger amount than what would be expected for the Tacoma LNG Project. Thus, it is possible that concurrent construction of the Tacoma LNG Project and PTT would have a cumulative impact on damage to the road surface along Taylor Way. This impact would likely be further exacerbated by concurrent construction of the proposed NWIW methanol facility.

It is projected that PTT operations will generate 475 employee and 1,030 truck total trips daily upon opening and 950 employee and 4,244 truck trips daily by full project build-out. The City of Tacoma has determined that this would cause significant adverse impacts to the City's street system, and traffic impacts at key intersections. A combination of applicant commitments and mitigation requirements imposed by the city would include:

- Optimization of signal timing, cycle length, and phasing at the four most impacted intersections (Taylor Way/State Route [SR]-509; SR-509/Alexander Avenue; Pacific Highway East/Port of Tacoma Road; and Lincoln Avenue/Portland Avenue); and
- Geometric improvements at the intersection of Taylor Way and SR-509.

More specifically, when the building permit to construct the ship berth on PTT is granted, the PTT would implement the following traffic mitigation measures:

- Contribute $300,000 to the City of Tacoma for an Interchange justification report to study the SR 509 D Street ramp project;
- Provide the City of Tacoma with a copy of the short-term and long-term rail operations agreement that defines where intermodal cargo would be handled. This agreement would define whether intermodal cargo will be drayed to a new off-dock Burlington Northern Santa Fe intermodal rail yard near D Street or to a new on-dock intermodal transfer facility;
- Improvements to the SR-509/Taylor Road intersection, including widening eastbound SR-509 to provide dual left-turn lanes; widening of westbound Marine View Drive (SR-509) to provide dual left turn lanes;

the widening of Taylor Way north of SR-509 to extend the two land northbound section by an additional 300 feet, and the re-timing of the signal at the intersection of SR-509/Taylor Road to optimize cycle lengths and phase splits;

- Retime the traffic signal at Lincoln Avenue/Portland Avenue to optimize cycle length and phase splits; and
- Retime signals on Port of Tacoma Road between Interstate 5 and SR-509 to optimize cycle lengths and phase splits.

The implementation and timing of such mitigation should be coordinated to ensure that there is no interference between activities associated with the Tacoma LNG Project and activities associated with PTT traffic mitigation. In addition, the mitigation measures proposed should be reviewed for consistency with the medium- and long-term road and traffic management improvements prescribed in the current Emergency Response/Intelligent Transportation System commissioned by the City of Tacoma (Fehr and Peers 2015).

No specific information is available on the traffic impacts of the NWIW methanol facility. In its lease with the Port of Tacoma, NWIW agreed to develop, maintain, and comply with a traffic control plan reviewed by the Port of Tacoma and Washington State Department of Transportation if an approved traffic plan is required. I

3.13.12.2 Vessel Traffic

During construction of the Tacoma LNG Project, temporary vessel navigation impacts could occur in both the Hylebos and Blair waterways as construction barges, equipment, and supplies are being transported to and from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. These impacts would be short term and limited to the duration of construction. Once the construction barges, equipment, and supplies arrive at either site, they would largely remain stationary and would not restrict vessel movement up and down the remainder of the waterways. Any restricted vessel navigation during construction would be communicated through a notice to mariners by the USCG and posted by the Harbor Master at marinas in the vicinity of the Tacoma LNG Project.

In-water construction in both the Hylebos and Blair waterways is anticipated to require the use of barge-mounted cranes, a support barge, a diesel or hydraulic impact hammer, and various small workboats. A tugboat may also be needed to position the barges. Construction activities would be localized in the vicinity of the existing TOTE facilities and would not impede vessel traffic in the rest of the Blair waterway.

Construction in both waterways is estimated to result in two tug/barge roundtrips (in and out) of the waterway every day, and up to four small workboats would be working 10 to 12 hours per day. These additional trips would increase the combined monthly average of the approximately 69.7-foot deep-draft vessels, barges, and tugboat arrivals that occurred on the Hylebos Waterway during 2014 (see Tables I-2 and I-4 in Appendix I-2 (Supporting Transportation Tables), but these trips would be temporary and would not occur outside the construction period. These additional trips would also increase the combined monthly average of the approximately 257.2-foot deep-draft vessels, barges, and tugboat arrivals that occurred on the Blair Waterway during 2014 (see Tables I-3 and I-5 in Appendix I-2). Again, these trips would be temporary and would not occur outside the construction period.

The new LNG barge and tugboat trips introduced to the Hylebos and Blair waterways during operation of the Project would not significantly impact commercial shipping. The new maritime activity resulting from Project operation would be limited to LNG barge and tugboat assists in the Hylebos and Blair waterways. Operation of the barge and tugboat assists to and from the Tacoma LNG Facility and TOTE sites would be consistent with federal marine safety regulations and USCG marine safety programs provided in the waterway suitability assessment described in Chapter 3.11 (Public Services and Utilities). As discussed in detail in Section 3.10 (Transportation), TOTE vessels would be fueled twice per week via the Project's bunkering barge; these vessels are currently fueled by barges carrying bunker diesel.

The PTT project would use water transportation as an essential component of the operation of the shipping terminal. Water transportation would consist of container vessels docking at the completed project's berths to collect and deliver containers. No data are available within the environmental permits and MDNS for the PTT describing anticipated volumes of marine vessel traffic (City of Tacoma 2012).

Based on the similar project proposed at the Port of Kalama, the NWIW methanol facility would likely generate three to six vessel trip per month in the Blair Waterway when operating (Port of Kalama 2015). These three to six trips per month in the Blair Waterway would be an insignificant contribution to the 257.2 foot vessel arrivals currently on the waterway. No cumulative impacts would be expected as a result.

3.13.13 Public Services

Although available information is limited, the construction and operation of the Tacoma LNG Project, PTT, and NWIW methanol facility would likely have a cumulative impact on fire protection and law enforcement services. Impacts on other public services and utilities would be limited, and would likely be specific to each project and not cumulative.

As described in detail in Section 3.11 (Public Services and Utilities), construction of the Project would increase demand for fire protection and law enforcement services in the vicinity of the Tacoma LNG Project, due to construction hazards and increased activity in the area. Furthermore, operation of the Tacoma LNG Project would place an increased burden on the Tacoma Fire Department, for the following reasons:

- Facility emergency response procedures involve notification of first responders from the Tacoma Fire Department, who would be obligated to respond;
- Even if no direct fire response by fire protection services is necessary, an operational incident would likely require the intervention of auxiliary services provided by the Tacoma Fire Department, such as emergency medical services or hazardous materials response;
- Incidents that would require direct intervention of fire response services are likely to be very severe and require significant amounts of Tacoma Fire Department staff and equipment for both direct fire response and auxiliary services; and
- As noted in Section 3.11.4.1 (Construction Impacts), the relative lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident.

No direct data on the potential impacts of the construction and operation of the PTT on public services are available. Data on the potential impacts of the PTT on fire services is limited to stating that build-out of the facility would not increase demands on public services and would comply with emergency vehicle circulation requirements. However, because operation of the PTT would cause significant increases in road traffic, it is likely that increased road congestion would result in increased delays in emergency vehicle access to the Blair-Hylebos Peninsula (City of Tacoma 2012). This would result in a cumulative impact on fire protection and law enforcement services, when combined with the increased demand for these services caused by all the proposed projects.

There are no publically available data on the potential impact of the NWIW methanol facility on fire services. However, due to the volatile and highly flammable nature of methanol, it is reasonable to anticipate that the presence of such a facility would increase the risk of incidents requiring the intervention of the Tacoma Fire Department.

In addition, the combined added presence of a new container terminal, LNG facility, and methanol facility would pose significant cumulative security risks likely to require additional law enforcement presence on the Blair-Hylebos peninsula. Certain security risks directly attributable to the Tacoma LNG Facility would be addressed within the waterway suitability assessment detailed in Section 3.11.2.1 (Federal), but a

cumulative analysis of security risk is required in order to ascertain the full extent of additional law enforcement presence required by the presence of all three proposed projects.

3.13.14 Socioeconomics

The construction and operation of the Tacoma LNG Project, the PTT, and the NWIW methanol facility are not anticipated to have adverse cumulative impacts on socioeconomic resources in Tacoma. Rather, any cumulative impact would likely be beneficial in terms of job growth and direct, indirect, and induced economic growth impacts.

3.13.14.1 Construction Impacts

Construction of the Project would create an average of 401 jobs per year during the three-year construction period, with the majority of skilled labor positions hired locally or regionally. In light of the short-term (three-year) construction window, the Proposed Action would not result in substantial population growth, cause an increase or concentration of population or new housing, nor displace people throughout Pierce County.

Employment and labor incomes generated through construction of the Project would result in an overwhelming benefit to the Pierce County and Puget Sound region labor markets, thus benefiting the local and regional economies. Of the 401 jobs created, approximately 159 would be directly created by the construction activities, 118 would be indirectly created via business interactions with suppliers, and 124 jobs would be induced through consumption-driven impacts. Additionally, no jobs would be displaced or eliminated as a result of the construction of the Project because existing Port of Tacoma tenants would either relocate (PCC Logistics and Safe Boats, International, LLC) or are planning to leave the site (EHW Constructors Joint Ventures) before the proposed start of construction.

Construction of the Project would generate direct, indirect, and induced upstream economic impacts resulting from construction spending for services brought within the region and through worker payrolls. The total amount of output, or economic value, produced by construction of the Tacoma LNG Project would amount to an average of $71.1 million during each year of construction. Of this, an estimated $44.5 million would be generated from direct output and $26.6 million would be generated from a combination of indirect and induced output. Additionally, labor income during construction is estimated to be $14.1 million annually. When direct and induced effects are accounted for in labor income spending, the total labor income amounts to approximately $27.5 million per year in economic benefits to the Puget Sound region.

No data on the socioeconomic impacts of the construction of the PTT and the NWIW methanol facility are available. However, in light of current unemployment rates and the high population of Pierce County and the wider Puget Sound region, it is reasonable to assume that the vast majority of non-specialized construction jobs would be locally sourced and thus beneficially impact the local economy.

3.13.14.2 Operation Impacts

Operation of the Project would create approximately 16 jobs annually and would support 115 indirect or induced jobs. These jobs would most likely be filled by persons already living in Pierce County, and so it is not reasonably foreseeable that the Proposed Action would only marginally increase local population and housing demand (see Section 3.12 [Socioeconomics]).

Similar to the economic benefits of construction, operation of the Project would generate beneficial direct, indirect, and induced upstream economic impacts. The total amount of economic value produced by operation of the Project would average $78.9 million annually. This analysis also accounts for downstream regional impacts (accumulation of economic efficiencies, cost savings, and value of social benefit gained through reduction of emissions) associated with the Proposed Action. A particularly significant downstream impact of the Tacoma LNG Project is a result of natural gas peak shaving, which would save PSE ratepayers and LNG transportation fuel consumers approximately $43.1 million per year combined, resulting in the generation of an additional $14.9 million in economic output. Furthermore, the substitution of diesel and

marine fuels with cleaner-burning LNG could reduce annual greenhouse emissions (including carbon dioxide, nitrogen oxide, sulfur oxide, and particulate emissions), which annually generates approximately $5.7 million in social benefits. Finally, PSE estimates that the annual property taxes assessed on the Tacoma LNG Facility would be approximately $4.2 million to $4.9 million. These tax revenues would support public services and utility costs within the City of Tacoma, City of Fife, and unincorporated Pierce County.

No detailed data on the potential socioeconomic impacts of the PTT project are available at this time. However, as stated in Section 3.13.12 (Transportation and Traffic), the Project would be expected to generate up to 950 employee trips daily. In addition, construction would proceed in three phases and would involve large amounts of grading, paving, dredging, restoration, and other work. It is therefore likely that the PTT project would have significant positive socioeconomic impacts during both the construction and operations phases.

Similarly, no data exist on the potential socioeconomic impacts of the NWIW Methanol facility project. However, NWIW expects that the project could generate up to 1,000 jobs during construction and 200 permanent jobs (NWIW 2015b). It is therefore equally likely that the NWIW methanol facility project would have significant positive socioeconomic effects.

4 Comments and Responses

The City of Tacoma initiated environmental review of the Tacoma Liquefied Natural Gas (LNG) Project in September 2014. Following a scoping period and several months of detailed review, the City issued a Notice of Availability for the draft Environmental Impact Statement (DEIS) on July 7, 2015. This was followed by a 30-day public comment period ending on August 6, 2015.

During this period, the following meetings were held:

- An agency meeting was held on July 9, 2015, at 2:00 PM to explain the nature of the Project and the contents of the DEIS. Eleven persons attended this meeting, including representatives of City, state, and federal permitting authorities.
- A public meeting was held on July 16, 2015, 5:30 p.m., at the Port of Tacoma's Fabulich Center, for community members to learn more about the Project and the DEIS, and to provide comments. This meeting was attended by 28 people, including community members as well as representatives of the City and Puget Sound Energy (PSE).

In all, the City received 27 written comments from a variety of stakeholders, including neighboring residents, local businesses and business groups, union members, current and former City of Tacoma and Pierce County officials, the Washington State Department of Ecology (Ecology), the United States Environmental Protection Agency (EPA), PSE, the Port of Tacoma, and the Puyallup Tribe of Indians.

The majority of comments were in favor of the Project, with particular emphasis on the perceived economic benefits associated with the development of the Tacoma LNG Facility. Nonetheless, certain concerns were expressed regarding the Project and the content of the DEIS, for example:

- The Puyallup Tribe of Indians expressed concern regarding potential health and safety hazards related to an LNG facility and potential impacts on the Tribe and wider communities.
- Ecology and EPA expressed concern regarding certain construction methods and environmental monitoring protocols, particularly in sensitive areas along the Blair and Hylebos Waterways.
- PSE and the Port of Tacoma expressed concern that certain proposed mitigation requirements were unwarranted or disproportional to the Project’s stated impacts.

A full summary of all comments, as well as the City’s detailed responses, is included in the following pages. As indicated in the response, a number of areas of the final Environmental Impact Statement (EIS) were edited to take into account the received comments.

Shirley:

Thank you for our conversation this week about the proposed LNG project and associated Draft Environmental Impact Statement. EPA has been working with U.S. Army Corps of Engineers Project Manager Olivia Romano to complete CERCLA coordinations for three permits currently being considered at the site to support the proposed upland LNG facility. The three Corps permits are:

1) NWS-2014-1128 Port of Tacoma and Puget Sound Energy (for LNG structures and mitigation in the Hylebos and Blair Waterways)
2) NWS-2015-0114 Port of Tacoma and TOTE (for dolphins in the Blair and mitigation in the Hylebos Waterway)
3) NWS-2015-0550 Port of Tacoma and Puget Sound Energy (stormwater outfalls to Hylebos Waterway)

As context, the applicants are correct that the Blair Waterway was deleted from the NPL list, and with notable exceptions (like the ongoing TBT cleanup at Blair Waterway Pier 4), it has been assumed that Blair Waterway sediment is cleaner than within the Hylebos Waterway. EPA's main concerns with the project proposals described in the permit applications above are components in the Hylebos Waterway.

In the Hylebos Waterway, some areas have been dredged as part of the CERCLA cleanup to remove all contaminated sediment. Other areas were not dredged and instead selected as "no action" or "monitored natural recovery" areas based upon the quality of surface sediment (0-10 cm deep). The quality of sediment deeper than 10 cm below the mudline has not been well characterized in many "no action" and "monitored natural recovery" areas. These areas were expected to remain relatively undisturbed so that clean sediment could settle on them long-term and contaminated subsurface sediment remain isolated in place. Relatively new (since 2013) sediment quality data have found dioxin/furan compounds, for which Hylebos Waterway sediments have not historically been tested, within areas which were not dredged as part of the CERCLA remedial action.

As part of EPA's CERCLA coordination with the Corps, the project applicants have been asked to provide a summary of the existing Hylebos Waterway sediment characterization data in the project vicinity, identify data gaps, and develop a draft Sampling and Analysis Plan (SAP) needed to characterize sediment quality. A teleconference about this was held between EPA, the Corps, PSE, and the Port of Tacoma June 25, 2015. As of today, EPA and the Corps has not received the information requested.

The final DEIS should describe the uncertainty about embankment soil and sediment quality in the project area, and the need for site characterization to occur prior to project design. The DEIS should also state that the construction sequencing and design of the replacement dock, bulkhead, and other structures proposed along the Hylebos Waterway will depend upon the soil and sediment quality characterization within the project area. In some places, soil and/or sediment removal may need to precede construction. 0004-1 0004-2

EPA and the Corps are also concerned that, as part of the project, the applicants have proposed parts of the Blair Waterway be shaded by docks in exchange for removing an equivalent amount of dock shading 0004-3

on the Hylebos Waterway. It should be acknowledged that the two waterways have different levels of sediment contamination, and the difference in habitat mitigation value between them discussed.

0004-4

EPA's understanding from discussion with the Corps project manager is that the permit applicants are pulling together a new mitigation strategy for the various interconnected elements of the project(s). This may involve changes in the sequencing of the different elements of the project – perhaps moving ahead with Blair Waterway components while allowing more time to gather/collect information on sediment quality in the Hylebos, and plan construction there accordingly. The final EIS should describe this updated approach.

0004-5

Thanks again for the discussion yesterday. In summary, EPA is supportive of the proposed project if environmental characterization work, including that described above, is conducted as needed to inform all aspects of project design and subsequent construction.

Justine Barton
Office of Environmental Assessment
U.S. Environmental Protection Agency
Seattle, WA

Number	Issue	Response
0004-1	Earth	The commenter states that the final EIS "should describe the uncertainty about embankment soil and sediment quality in the project area, and the need for site characterization to occur prior to project design." **Response: The final EIS will include a statement about the uncertainity of embankment soil and sediment quality and the need for further site charaterization.**.
0004-2	Earth	The commenter states that the EIS should "state that the construction sequencing and design of the replacement dock, bulkhead, and other structures proposed along the Hylebos Waterway will depend upon the soil and sediment quality characterization within the project area." **Response: The EIS will include a statement that final construction sequencing and design of structures along the Hybelos Waterway will depend on further sediment characterization.**
0004-3	Water Resources	The commenter notes that the applicant has proposed mitigating new dock shading on the the Blair Waterway in exchange by removing docks on the Hylebos Waterway. The commenter states that the Blair and Hylebos Waterways have different levels of sediment contamination and that the difference in habitat mitigation value between the two waterways should be discussed in the EIS. **Response: It is noted that because there are different levels of sediment contamination between the Hybelos and Blair Waterways, there may also be a difference in habitat mitigation value between the two waterways. However, the actual difference in mitigation, if any, will be determined through the U.S. Army Corps of Engineers permitting process.**
0004-3 cont'd	Water Resources	See previous response.
0004-4	Mitigation	The commenter understands that the Applicant is "pulling together a new mitigation strategy for the various interconnected elements of the project" and that "the final EIS should reflect this approach". **Response: The EIS will include a statement that as the project moves closer to construction mitigation may involve changes in the sequencing of the different elements of the project – such as moving ahead with Blair Waterway components while allowing more time to gather/collect information on sediment quality in the Hylebos, and plan construction there accordingly.**
0004-5	General	The commenter is supportive of the Proposed Action "if environmental characterization work, including that described above, is conducted as needed to inform all aspects of project design and subsequent construction." **Response: Comment noted.**

August 4, 2015

Ms. Shirley Schultz, Principal Planner
Planning and Development Services Dept.
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Dear Ms. Shultz:

As the former director of Citizens for a Healthy Bay, I have had the opportunity in recent years to be actively involved in the cleanup, restoration and protection of Commencement Bay, surrounding waters and our natural habitat. It is from this perspective that I'm writing to express my personal support for the Draft Environmental Impact Statement (DEIS) for the liquefied natural gas (LNG) facility proposed by Puget Sound Energy in the Port of Tacoma. 0005-1

We are fortunate to have a very environmentally responsible shipping company in the Port of Tacoma, Totem Ocean Trailer Express (TOTE). This company has worked hard for years to reduce the environmental impact of its facilities and its operations through its ongoing efforts to reduce greenhouse gas emissions, recycle and eliminate waste, conserve energy and water and protect against storm water pollution. TOTE's decision to seek a cleaner fuel alternative, liquid natural gas, to power its large vessels that travel to and from Anchorage Alaska represents a remarkably positive opportunity to improve our community's environment. The completion of PSE's liquid natural gas facility is crucial to TOTE's ability to follow through in its commitment to switch to much cleaner fuel.

I believe that the proposed PSE facility not only represents a very significant benefit to the environment health of Tacoma and the entire South Sound area, but also a substantial economic development benefit through the creation of numerous, permanent family wage jobs. TOTE's successful conversion to LNG will also set a very positive example for other shipping companies.

I fully support the thorough review this project is receiving and I urge you to move forward and approve the DEIS for this project. Thank you for your consideration.

Yours truly,

Bill Anderson
3803 N. 22nd Street
Tacoma, WA 98406

Number	Issue	Response
0005-1	General	Commenter supports project. Comment noted.

City of Tacoma
Planning and Development Services

Comment Sheet: Public DEIS Meeting

July 16, 2015

Proponent: Puget Sound Energy, Inc.
Project Name: Tacoma LNG Project
SEPA Lead Agency: City of Tacoma – File No. SEP2014-40000230810

Comments regarding Draft Environmental Impact Statement: I am very much in support of this project. It will create needed jobs and is a good fit for the port. I really hope this project can be built as soon as possible 0006-1

Contact information:

Name: Clint Bryson
Address: 3049 S 36th St 101 Tacoma
Email: clintb@ibew76.org

Please return this sheet to staff at tonight's meeting. Comments may also be mailed to: Shirley Schultz, Planning and Development Services, City of Tacoma, 747 Market Street Rm 345, Tacoma, WA 98402-3701 or emailed to shirley.schultz@cityoftacoma.org.

Number	Issue	Response
0006-1	General	Comment noted

City of Tacoma
Planning and Development Services

Comment Sheet: Public DEIS Meeting

July 16, 2015

Proponent: Puget Sound Energy, Inc.
Project Name: Tacoma LNG Project
SEPA Lead Agency: City of Tacoma – File No. SEP2014-40000230810

Comments regarding Draft Environmental Impact Statement:

0007-1

GREAT PROJECT, LOOKING FOWARD TO HELPING AND PROVIDE MANPOWER TO CONSTRUCT THIS PROJECT.
DENNIS CALLIES

Contact information:

Name: DENNIS R. CALLIES / BUSINESS MANAGER / FINANCIAL SECRETARY
Address: 3049 SO 36TH ST IBEW LOCAL 76
Email: TACOMA, WA 98409 dennisc@ibew76.ORG

Please return this sheet to staff at tonight's meeting. Comments may also be mailed to: Shirley Schultz, Planning and Development Services, City of Tacoma, 747 Market Street Rm 345, Tacoma, WA 98402-3701 or emailed to shirley.schultz@cityoftacoma.org.

Number	Issue	Response
0007-1	General	Commenter supports project. Comment noted.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

August 6, 2015

Peter Huffman, Director
City of Tacoma Planning and Development
747 Market Street, Room 345
Tacoma, WA 98402

RE: Tacoma LNG DEIS

Dear Mr. Huffman:

Thank you for the opportunity to provide comments on the Draft Environmental Impact Statement (DEIS) for the Tacoma Liquefied Natural Gas (LNG) Project located at the Port of Tacoma, north of East 11th Street, east of Alexander Avenue, south of Commencement Bay, and on the west shoreline of the Hylebos Waterway as proposed by Tacoma LNG, Puget Sound Energy. The Department of Ecology (Ecology) reviewed the information provided and submits the following comments for the Draft Environmental Impact Statement (DEIS).

Toxic Cleanup

2.2.1.3, Liquefaction: This describes underground storage tanks. PSE has since informed us that the tanks will not be underground. This section should be corrected, and include a description of spill controls and containment for the tanks. The tanks should be identified on the map of site facilities. 0008-1

2.2.1.7, Heavy Hydrocarbon Collection and Storage System: The section on heavy hydrocarbon collection and storage should include a discussion of spill controls and containment measures. 0008-2

2.2.1.7, Buildings: The storage building overlies groundwater containing benzene above levels considered safe for potentially causing vapors at harmful levels. This building should not contain office space or other locations where people will regularly present, without first testing air quality. 0008-3

2.3.1.1, Site Preparation: This section describes that contamination from neighboring sites may extend to locations within the construction footprint of the LNG facility and pipelines. The final EIS should include maps showing the location of the contaminant plumes compared to the construction footprints. This information will be needed by permitting agencies as the project plans are further developed. To my knowledge the construction footprint itself does not contain significant contaminated soils, and the petroleum-affected groundwater plumes in the vicinity largely do not encroach onto the subject property (however there were some exceedances of metals in groundwater from the 2014 investigation report). Ecology can assist PSE with contacts to get the most up to date information about the Occidental and Alexander Avenue Petroleum Tank Facilities plumes, and can assist with identifying the potential for contaminated sites to be in the path of the proposed pipelines. There are a multitude of cleanup sites and potential for contaminated soil and groundwater to be present in the pipeline pathway along Taylor Way and through Fife. 0008-4

2.3.1.1, Demolition of in-water structures: This states that piles that break off during removal with the vibratory hammer would be cut off two feet below the mudline. PSE should consult with DNR and EPA about the best approach in this situation. Disturbing sediments 2 feet deep could potentially release buried contaminated sediments. In general, EPA should be consulted about all in-water construction in the Hylebos Waterway problem area. 0008-5

2.3.1.1, Shoreline Improvements: Care must be taken when removing materials above existing timber bulkhead, and work should occur during low tides. It is not uncommon for debris and industrial fill to be present within and beneath historic shoreline rip-rap, so PSE should be prepared to remove such materials before placing the new backfill below the sheet pile wall. 0008-6

The EIS should state how deep the sheet pile is planned and whether or not it will extend along the entire shoreline of the site.

2.3.3.1, General Pipeline Construction Techniques: Because of the potential for the pipeline to intersect with contaminated groundwater plumes on Taylor Way and in Fife, it may be necessary to consider special practices regarding how the trench is backfilled (to prevent creating a preferential pathway for groundwater pollution), worker training and certification to work in contaminated areas, and stormwater management. 0008-7

3.1.1, Study Methodology: This section mentions a document titled "Geotechnical Engineering Services, Tacoma LNG Project (GeoEngineers 2015)." Ecology requests a copy of that report. 0008-8

3.1.2, Model Toxics Control Act: A mechanism must be in place as part of the LNG facility development to be sure that cleanup considerations are included in site planning and that cleanup (if needed) would be conducted as a part of the site development. Furthermore, if any visual or 0008-9

olfactory signs of contamination are detected during construction, Ecology must be notified, and measures taken to prevent releases to the environment and to clean up contamination. 0008-9 Continued

3.1.3.2, Sea Level Rise: This section describes potential sea level rise in the vicinity of the LNG facility, but it does not indicate what the effects of sea level rise might be on the facility. 0008-10

3.1.3.3, Groundwater: Refer to site investigation documents for the Occidental and Alexander Avenue Petroleum Tank facilities sites for more information on tidal influence on groundwater in this area. 0008-11

3.1.3.4, Existing Contaminated Sites and Remedial Actions: It is not clear how, in the fourth paragraph, the Port's cleanup actions in the vicinity of Blair Hylebos peninsula specifically relates to this site. 0008-12

3.1.3.4, Tacoma LNG Facility: It is recommended that the sites be referred to by the Ecology site names in addition to Port parcel numbers, and Include the facility-site ID (FSID) numbers for the contaminated properties, so that the reader could find them on Ecology's database (Naval Reserve Center, FSID 93581722; Tacoma Port Parcel 4, FSID 3831; Port Parcel 2 (aka Alexander Avenue Petroleum Tank Facilities –FSID 1377); Occidental Chemical Corp. FSID 1212; PRi (aka Glenn Springs Holdings – FSID 1246). 0008-13

3.1.3.4, Ongoing Investigation and Cleanup Actions: To be more useful for the purposes of the EIS and future permitting/planning, specific information about contamination on neighboring properties, *as it affects the subject site,* should be included. The general discussion of what is occurring on neighboring cleanup sites is not that helpful in terms of understanding potential environmental issues at the development site. Throughout these sections, please refer to the bulk petroleum facilities at the former PRI site and within Port Parcel 2 as the "Alexander Avenue Petroleum Tank Facilities" site. 0008-14

3.1.3.4, Completed Cleanup Actions: This section should be more specific about what was done to clean up the releases for the USTs, whether confirmation sampling indicated the site was clean, and status of the site on Ecology's list of contaminated sites. For clarity, the discussion about the Hylebos Waterway cleanup in the vicinity of the site should be separate. Ecology is not aware of any 'ongoing' groundwater sampling for the Occidental site taking place in this area. 0008-15

Also, there are several incorrect statements throughout section 3.1.3.4. It is recommended that the writers of the EIS contact Joyce Mercuri at 360-407-6260 to ensure correct references are made in the final EIS. 0008-16

Water Quality

SEPA Fact Sheet, Required Approval and/or Permits: Indicate how many Construction Stormwater General Permits (CSWGP) will be applied for? Based on review, there are pipeline distribution systems that go beyond the Port of Tacoma. Will these be separate CSWGPs? 0008-17

2.3.1.1, Stormwater Management: It is important to clearly identify areas where construction activities will overlap potential contamination. The EIS should include a map that shows the contaminated areas within the footprint of all ground disturbing activities, including staging areas, wheel washes, equipment storage, parking for construction workers, internal haul roads, etc. The EIS should also include a map that shows contaminated areas within the footprint of the excavation. A map should show contamination, concentrations of contaminants, any boring locations, and an overlay of the excavation proposed. 0008-18

3.1.6.1, Erosion and Sediment Control: This section does not provide enough detail to understand how the stormwater will be managed. If there are both clean and contaminated soils onsite, will they segregate the clean from the contaminated stormwater? A map should show which Best Management Practices (BMPs) will be utilized on site to create this stormwater segregation (including flow paths to baker tanks for contaminated stormwater and/or dewatering water). Indicate whether or not any catch basins will be plugged during construction? 0008-19

3.1.4.1, Groundwater: Discuss the potential effects on pH in groundwater with the installation of 4-6,000 grout columns. 0008-20

3.3.4.1, Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, Groundwater: In the third paragraph, this section talks about the use of a vibratory hammer during installation of the grout columns and that it wouldn't have any negligible effect on groundwater. Using a vibratory hammer on the shoreline could potentially displace sediments in waters. Address the potential effects of causing turbidity in nearby waters from using a vibratory hammer on and close to the shoreline. 0008-21

3.3.6.1, Turbidity Minimization: This section is not consistent with table 3.3-1, turbidity. Figure out the appropriate waterbody classification and be consistent throughout the document. 0008-22

Ecology's comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various issues that may still need to be addressed in order to carry out the proposed action.

If you have any questions, please contact me at 360-407-7503 or kerry.carroll@ecy.wa.gov.

Sincerely,

Kerry Carroll

Kerry Carroll
Environmental Review and Transportation Section

ecc: Joyce Mercuri, Ecology
Carol Serdar, Ecology
Sonia Mendoza, Ecology
Brenden McFarland, Ecology
Shirley Schultz, City of Tacoma

Number	Issue	Response
0008-1	Description of Proposed Action	The commenter notes that underground storage tanks are described in draft EIS section 2.2.1.3, but that the Applicant has since indicated the tanks will not be underground. Commenter states that the location of the tanks should be corrected in the final EIS and that spill controls and containment systems should be described. **Response: There are no underground tanks proposed. The tanks in question would be above ground in a concrete containment area (a “bathtub”), which would subsequently be filled with sand for fire protection purposes. The proposed tanks are shown in Figure 2-3 in the purple rectangle to the west of the LNG storage tank. There would be three refrigerant storage tanks for propane, isopentane, and ethylene.** **In addition to the three tanks listed above, there would be two additional tanks. – a “heavies” tank and a refrigerant storage tank. The “heavies” tank would be used to store heavy hydrocarbons that are removed during the liquefaction process. The tank would be emptied as needed and the hydrocarbons hauled off site and recycled. The storage tank would not normally contain product; it would be used for temporary storage of refrigerant when sections of the refrigeration system are drained for maintenance.** **This information is described in Chapter 2 of the draft EIS in subsection 2.2.1.2 (Natural Gas Delivery and Pretreatment Systems) and 2.2.1.3 (Liquefaction). The latter subsection will be edited in the FEIS in response to the comment.**
0008-2	Description of Proposed Action	With regard to draft EIS section 2.2.1.7, the commenter notes that "the discussion on heavy hydrocarbon collection and storage should include information on spill controls and containment measures." **Response: Design includes secondary containment for the heavy hydrocarbon storage tank. Specific spill controls and containment measures will be addressed in the facility spill control plan to be implemented for operations. No edits will be made to the final EIS in reference to this comment.**
0008-3	Description of Proposed Action	With regard to draft EIS section 2.2.1.7, the commenter notes that "the storage building overlies groundwater containing benzene above levels considered safe for potentially causing harmful vapor levels. This building should not contain office space or other locations where people will regularly be present, without first testing air quality." **Response: Noted. PSE will not use the storage building for office space or a regular meeting place. The structure would be used for temporary storage during construction and for longer-term storage post-construction.**

Number	Issue	Response
0008-4	Description of Proposed Action	With regard to draft EIS section 2.3.1.1, the commenter requests that the final EIS contain maps showing the locations of contaminant plumes originating from neighboring sites compared to the construction footprint of the LNG facility and pipeline. **Response: Available information from the Occidental and Alexander Avenue Petroleum Tank Facilities has been reviewed. Construction activities, including ground improvement, are located near and southeast of the southeastern fringe of the groundwater contamination. Discussions with the Port of Tacoma indicate that the planned construction activities are not expected to interfere with future remedial actions for the Alexander Avenue Petroleum Tank Facilities Site because nearly all of the facility development is located southeast of the contamination.** **PSE completed due diligence review to identify locations of potential environmental concern along the LNG pipeline alignment, including the Fife and Taylor Way segments. Based on this review, PSE is currently conducting sampling along the pipeline alignment and will prepare an environmental summary and a waste media management plan for the pipeline installation.**
0008-5	Description of Proposed Action	With regard to section 2.3.1.1, commenter requests that the Proponent consult with Washington DNR and U.S. EPA prior to cutting piles 2 feet below the mudline. The commenter notes that the Proponent should consult with U.S. EPA regarding all in-water work in the "Hylebos Waterway problem area." **Response: PSE will consult with the EPA and the Port of Tacoma to confirm appropriate steps addressing potential pile demolition and management. This section has been clarified in response to the comment.**
0008-6	Description of Proposed Action	With regard to draft EIS section 2.3.1.1, the commenter states that removal of materials above existing timber bulkhead sould be undertaken with care and during low tide. PSE should also "be prepared to remove [debris and industrial fill] before placing the new backfill below the sheet pile wall." The commenter also writes that "the EIS should state how deep the sheet pile is planned and whether or not it will extend along the entire shoreline of the site." **Response: Noted. Care will be taken when removing materials above the existing timber bulkhead, and work will occur during low tides. PSE will be prepared to remove debris and industrial fill before placing new backfill below the sheet pile wall. A minor addition will clarifies this section in the final EIS in response to the comment.** **Further design considerations indicate that there is only a need for the sheet pile wall at the location of the access point to the new Hylebos Pier. More detailed design will be required to evaluate the depth and related engineering elements. No change will be made in the final EIS regarding these specific elements.**

Number	Issue	Response
0008-7	Description of Proposed Action	With regard to draft EIS section 2.3.3.1, the commenter notes that the potential for the pipeline to intersect with contaminated groundwater may require consideration of special construction practices, including special backfilling methods, worker training and certification, and stormwater management. **Response: The results of the forthcoming pipeline alignment sampling and testing will inform the approach re: trench backfill, worker training, and stormwater management. Based on this information, PSE will consider special practices as needed to address environmental issues. No change will be made to this section in the final EIS in response to the comment.**
0008-8	Earth	With regard to draft EIS section 3.1.1, the commenter (WA State Dept. of Ecology) requests a copy of the "Geotechnical Engineering Services, Tacoma LNG Project (GeoEngineers 2015)" report. **Response: A copy of this report will be provided to Ecology.**
0008-9	Earth	With regard to draft EIS section 3.1.2, Commenter notes that cleanup considerations must be included in site planning, including the potential for cleanup to be conducted as a part of site development. Commenter further notes that "any visual or olfactory signs of contamination [...] detected during construction" must be reported to the WA State Dept. of Ecology, and measures must be taken "to prevent releases to the environment and to clean up contamination." **Response: Noted. Discussions with the Port of Tacoma indicate that the planned construction activities are not expected to interfere with future remedial actions at the Alexander Avenue Petroleum Tank Facilities Site (Alexander Site). As a result, if contaminated soil is encountered during facility construction, it will not be necessary to address contamination beyond the construction footprint to achieve cleanup of the Alexander Site.** **Contaminated materials encountered during facility construction will, however, be appropriately managed. A Materials Management Plan (MMP) and Stormwater Pollution Prevention Plan (SWPPP) will be developed that describe procedures for handling materials with visual or olfactory signs of potential contamination encountered within the construction footprint. These plans will also address reporting of construction-related releases and measures to prevent such releases. No change will be made to this section in the final EIS in response to the comment.**
0008-9 cont'd	Earth	See previous response.
0008-10	Earth	With regard to draft EIS section 3.1.3.2, commenter notes that the section "does not indicate what the effects of sea level rise might be on the facility." **Response: The LNG process area would be located at an elevation 15 to 20 feet above mean sea level. The 2012 Ecology and University of Washington study referenced in this section suggests an average global sea level rise ranging from 3 to 55 inches by 2050 as a result of rising temperatures and melting glaciers. There would be no impact to the project facilities as designed. Minor changes will be made to clarify this section in the final EIS in response to the comment.**

Number	Issue	Response
0008-11	Earth	With regard to draft EIS section 3.1.3.3, the commenter recommends refering to existing "site investigation documents for the Occidental and Alexander Avenue Petroleum Tank facilities sites for more information on groundwater in this area." **Response: the tidal influence within the 15-foot groundwater zone diminishes with distance from the shoreline, and there does not appear to be tidal influence within this zone at distances greater than approximately 100 feet from the shoreline. Groundwater within the 25-foot zone was observed to be moderately to strongly tidally influenced, and groundwater within the 50-foot zone was moderately tidally influenced. The greatest tidal influence on groundwater within the 25-foot zone was observed in monitoring wells located within approximately 60 feet of the shoreline.** **The influence of Hylebos Waterway tidal fluctuations on groundwater in the 15-foot, 25-foot, and 50-foot groundwater zones was evaluated during a 2004 hydraulic investigation at the Alexander Avenue Petroleum Tank Facilities Site (CRA 2008). The results of the evaluation indicated a minor tidal influence within the 15-foot groundwater zone near the shoreline. A moderate tidal influence was observed within the 25-foot and 50-foot groundwater zones as much as 400 feet west of the Hylebos Waterway shoreline.** **The information above was obtained from the following reference. The citation will be added to the final EIS.** **Reference: Conestoga-Rovers & Associates (CRA). Preliminary Draft Site Characterization Report, Groundwater and Sediment Remediation, Occidental Chemical Corporation, Tacoma, Washington. March 2008.**
0008-12	Earth	With regard to draft EIS section 3.1.3.4, the commenter notes that "it is not clear how, in the fourth paragraph, the Port's cleanup actions in the vicinity of the Blair Hylebos peninsula specifically relates to the site." **Response: the Port of Tacoma's cleanup actions described in the fourth paragraph do not specifically relate to the LNG Facility site. This paragraph will be deleted from the final EIS.**
0008-13	Earth	With regard to draft EIS section 3.1.3.4, the commenter notes that the sites for the Tacoma LNG Facility should "be referred to by the Ecology site names in addition to Port parcel numbers, and include the facility-side ID (FSID) numbers for the contaminated properties, so that the reader could find them on Ecology's database." **Response: This text will be revised accordingly in the final EIS.**

Number	Issue	Response
0008-14	Earth	With regard to draft EIS section 3.1.3.5, the commenter notes that it would be more useful for the EIS to include "specific information about contamination on neighboring properties, as it affects the subject site," rather than "general discussion of what is occurring on neighboring cleanup sites." In addition, the commenter requests that "the bulk petroleum facilities at the former PRI site and within Port Parcel 2" be referred to "as the 'Alexander Avenue Petroleum Tank Facilities' site." **Response: As indicated in our response to the comment for Section 2.3.1.1, construction is not expected to preclude or interfere with remedial actions associated with the Alexander Avenue Petroleum Tank Facilities Site and Occidental groundwater plumes. This is because the LNG facility/ construction footprint is outside of, or on the fringes of, the impacted areas of these sites. Text references to the bulk petroleum facilities at the former PRI site and within Port Parcel 2 will be changed to the "Alexander Avenue Petroleum Tank Facilities" site in the final EIS.**
0008-15	Earth	With regard to draft section 3.1.3.4, the commenter notes that the section on completed cleanup actions, "should be more specific about what was done to clean up the releases for the USTs, whether confirmation sampling indicated the site was clean, and status of the site on Ecology's list of contaminated sites." The commenter also recommends that "the discussion about the Hylebos Waterway cleanup [...] be separate" and that "Ecology is not aware of any 'ongoing' groundwater sampling for the Occidental site taking place in this area." **Response: Revisions will be added to this section in the final EIS to clarify UST removal and cleanup status.**
0008-16	Earth	The commenter states that there are several incorrect statements within draft EIS section 3.1.3.4, and recommends contacting Joyce Mercuri (360-407-6260) to ensure correct references in the final EIS. **Response: Ms. Mercuri provided clarification regarding the current status of previously contaminated sites in the vicinity of the Project. The final EIS will include updates to reflect her input.**
0008-17	SEPA Fact Sheet	With regard to the SEPA Fact Sheet, Required Approvals and/or Permits section of the draft EIS, the commenter asks how many Construction Stormwater General Permits (CSWGPs) will be applied for and whether pipeline systems that go beyond the Port of Tacoma will apply for separate CSGWPs. **Response: Separate CSWGPs will be completed for the LNG facility and the pipeline distribution system. PSE submitted a Notice of Intent (NOI) for the Tacoma LNG facility CSWGP on June 9, 2015, and Ecology granted coverage on July 29, 2015 (WAR303232). PSE plans to submit the NOI for the pipeline distribution project CSWGP in 2016. The two separate CWSGPs will be added to the final EIS Fact Sheet.**

Number	Issue	Response
0008-18	Description of Proposed Action	With regard to draft EIS section 2.3.1.1, the commenter notes that "the EIS should include a map that shows the contaminated areas within the footprint of all ground disturbing activities" and "a map that shows contaminated areas within the footprint of the excavation," and that "a map should show contamination, concentrations of contaminants, any boring locations, and an overlay of the excavation proposed." **Response: Please see response to the comment for Section 2.3.1.1 regarding the extent of contamination from the Alexander Avenue Petroleum Tank Facilities Site and Occidental plume. Additional information specific to construction work areas, staging, stockpiling, parking, and access is currently being developed for City of Tacoma permit applications and contract planning documents. That information will also be included in the Stormwater Pollution Prevention Plan (SWPPP), currently in progress. No changes have been made to this section in the final EIS in response to the comment.**
0008-19	Earth	With regard to section 3.1.6.1, the commenter notes that "this section does not provide enough detail to understand how the stormwater will be managed." The commenter requests that "a map should show which Best Management Practices (BMPs) will be utilized on site to create [...] stormwater segregation" between stormwater originating from clean and from contaminated soils. Commenter asks whether "any catch basins will be plugged during construction?" **Response: Stormwater management details will be addressed in the forthcoming Stormwater Pollution Prevention Plan (SWPPP) prepared pursuant to the CSWGP. The SWPPP will include a temporary erosion and sediment control plan figure, as required by the CSWGP to identify planned BMP locations. Catch basins and storm drain lines that are not needed will be removed. A key guiding concept for stormwater management is the segregation of potentially contaminated media to avoid contact with stormwater. Stormwater that inadvertently becomes contaminated will be treated as needed and stored for sanitary sewer disposal or other appropriate off-site disposal at a permitted facility. No change will be made to this section in the final EIS in response to this comment.**
0008-20	Earth	With regard to draft EIS section 3.1.4.1, the commenter requests that the EIS discuss the potential effect of installing 4-6,000 grout columns on groundwater pH. **Response: The cement grout to be used for auger cast piles will set up quickly during installation, limiting contact with groundwater and minimizing potential pH halo effects. No change will be made in the final EIS in response to this comment.**

Number	Issue	Response
0008-21	Water Resources	With regard to draft EIS section 3.3.4.1, third paragraph, the commenter notes that the EIS indicates that "the use of a virbatory hammer during installation of the grout columns [...] wouldn't have any negligible effect on groundwater." Commenter disputes this assertion, indicating that "using a vibratory hammer on the shoreline could potentially displace sediments in waters" and requesting that the EIS "address the potential effects of causing turbidity in nearby waters." **Response: Current ground improvement plans do not include the use of vibratory hammer methods during auger cast pile installation, including the planned ground improvement area near the Blair Waterway shoreline. Upland auger drilling and grout placement will not result in in-water turbidity impacts. No change will be made to this section in the final EIS in response to the comment.**
0008-22	Water Resources	With regard to draft EIS section 3.3.6.1, the commenter notes that the text in this section is not consistent with Table 3.3-1 and that waterbody classification should be corrected and consistent throughout the EIS. **Response: The turbidity minimization text in question in the EIS Section 3.3.6.1 applies to the construction activities associated with upland and in-water activities for the LNG facility and TOTE marine vessel fueling system. Table 3.3-1 will be revised to note that turbidity monitoring requirements and mixing zones will be established in the Clean Water Act Section 401 certification conditions for in-water work, as suitable for the waterbody classification. Turbidity monitoring requirements will also be described in the SWPPP monitoring plan addressing CSWGP requirements.**

City of Tacoma
Planning and Development Services

Comment Sheet: Public DEIS Meeting

July 16, 2015

Proponent: Puget Sound Energy, Inc.
Project Name: Tacoma LNG Project
SEPA Lead Agency: City of Tacoma – File No. SEP2014-40000230810

Comments regarding Draft Environmental Impact Statement: Please Do not delay this project! We need sustainable living wage jobs! 0009-1

Contact information:

Name: TIM DOWNES BA PLUMBERS & PIPEFITTERS UA LOCAL 26 & WA ST. BUILDING TRDS.
Address: 8501 ZENITH CT NE
Email: LACEY WA 98516

Please return this sheet to staff at tonight's meeting. Comments may also be mailed to: Shirley Schultz, Planning and Development Services, City of Tacoma, 747 Market Street Rm 345, Tacoma, WA 98402-3701 or emailed to shirley.schultz@cityoftacoma.org.

Number	Issue	Response
0009-1	General	Commenter supports project. Comment noted.

TARGA SOUND TERMINAL

TARGA SOUND TERMINAL LLC
4130 E 11th, Tacoma, WA 98421
(253) 272-9348 1-800-426-9799

July 30, 2015

Shirley Schultz
City of Tacoma, Planning and Development Services Department
747 Market Street, Room 345
Tacoma, WA 98402

RE: LNG Project at the Port of Tacoma

I wish to express my personal support of Puget Sound Energy's liquefied natural gas project proposed to be located at the Port of Tacoma. As a long-time Tacoma businessperson and a Board Member for the Economic Development Board for Pierce County, it is encouraging to see a project that so clearly provides important economic and environmental benefits for our area. 10-1

The Tacoma LNG project will generate important economic benefits for all South Sound residents. In addition to helping local employers like TOTE remain competitive and helping to maintain hundreds of family-wage jobs, the LNG facility itself will support nearly 500 jobs during its construction and more than 120 permanent jobs during its operations. Pierce County needs new family-wage jobs and this project will help increase our County's economic base. It is likely this facility will provide a cleaner energy source for additional transportation modes, and this will also contribute to the economic health of our greater Tacoma community.

In addition to the direct and indirect job creation, the Tacoma LNG project will also generate additional tax revenues for state and local governments, helping to fund needed public services like schools, roads and Tacoma and Pierce County public safety departments.

Importantly, both the commercial and residential segments of the community will benefit from this project as it also will help ensure continued dependable natural gas service to existing PSE customers even on the coldest days of the year.

Thank you for the opportunity to provide public comment on the economic and environmental benefits of this important project.

Sincerely,

Troy Goodman
President
Targa Sound Terminal

Number	Issue	Response
0010-1	General	Commenter supports project. Comment noted.

ECONOMIC DEVELOPMENT BOARD
FOR TACOMA–PIERCE COUNTY

August 4, 2015

Shirley Schultz, City of Tacoma Planning and Development Services Department
Email: Shirley.schultz@cityoftacoma.org

Re: Draft EIS Comments on PSE Proposed Tideflats LNG Facility

Dear Ms. Schultz:

0011-1

The Economic Development Board for Tacoma-Pierce County strongly supports Puget Sound Energy's proposed liquefied natural gas (LNG) facility at the Port of Tacoma. The project is consistent with the EDB's mission of growing our economy by helping existing businesses expand and grow here. It certainly supports on-going efforts by the City of Tacoma to encourage a healthy local business climate, retaining and growing companies who already call Tacoma home.

The building and operation of the LNG facility represents hundreds of millions of dollars of private investment in a state-of-the-art facility. It will help TOTE remain competitive and provide LNG for its newly-configured marine vessels to comply with lower sulfur emission standards.

The Tacoma LNG facility will create at least 150 construction jobs and 18 permanent jobs with the economic activity from the project creating another 125 permanent jobs in the region. It will contribute millions of dollars in new tax revenues to benefit local schools, city services, and other state and local government services by making more public funds available to meet roads and public safety needs. In addition to these direct revenues, the DEIS Section 3.12.4 - **Economy**, indicates that the project's indirect effects will result in $120.4 million in added economic activity. This increased economic activity will result in further tax revenues to our local governments for the public's benefit, a figure not expressly stated in the Draft Environmental Impact Statement.

The Port of Tacoma is the right place for this facility. The Port is an established industrial area, and this project is consistent with the types of uses and aesthetic appearance of other marine-related industrial activities in the area.

The Economic Development Board for Tacoma-Pierce County fully supports the approval of the project based on an FEIS consistent with our comments, as we are confident the facility will provide great benefits to the residents and businesses of Pierce County and the Puget Sound region for years to come.

Regards,

Bruce W. Kendall

Bruce Kendall, President & CEO

Post Office Box 1555, Tacoma, Washington 98401-1555

Phone: (253) 383-4726 Fax: (253) 383-4676 Website: www.gopierce.org

Number	Issue	Response
0011-1		Commenter supports project. Comment noted.

SADLER LADENBURG
Personal Injury Attorneys

Jeffrey H. Sadler ■ Erik F. Ladenburg ■ John W. Ladenburg, Jr. ■ John W. Ladenburg, Sr.* ■ R. Randall Harrison*

July 23, 2015

Shirley Schultz, Principal Planner
City of Tacoma Planning Department
747 Market Street
Tacoma, WA 98402

RE: PSE LNG Project at Port of Tacoma

Dear Ms. Schultz:

0012-1

As a former Pierce County Executive and former chair of the Pierce Transit Board and former chair of the Sound Transit Board, I worked on many issues related to transportation, energy, conservation and the environment. In those capacities, I found great satisfaction in identifying and advancing those unique projects that provided both economic and environmental benefits to the residents of Tacoma and Pierce County.

Having reviewed the Puget Sound Energy proposal to develop a Liquefied Natural Gas (LNG) project at the Port of Tacoma, it is clear to me that this is a project that offers numerous benefits to our region. I strongly believe that LNG is going to serve an important role in our transportation systems here and across the country in the future, due to its unique physical characteristics and transport advantages, cost-benefit advantages, and environmental benefits compared to other fuels. I believe LNG will have broad applications for fueling various segments of the maritime industry, including the possibility of our state ferries in the future, as well as the trucking industry.

We are fortunate to have Totem Ocean Trailer Express (TOTE) located at the Port of Tacoma providing jobs to hundreds of local employees and paying good family wages. TOTE's decision to seek a cleaner fuel alternative for their large Alaska-bound vessels is truly a positive action that benefits Tacoma residents. In addition, the partnership that has emerged with Puget Sound Energy to build and manage the LNG facility at the Port of Tacoma should provide our region a top-quality facility for years to come. It is hard to ignore the significant environmental benefit this LNG facility will bring from fueling TOTE ships and thus reducing greenhouse gas emissions and virtually eliminating visible particulate emissions. Improved air quality and reduced health risks can be expected if this project is approved.

In addition to the environmental benefits, I fully applaud the efforts of the Port of Tacoma to facilitate a healthy local business climate to retain and grow companies who call Tacoma home.

Atrium Court 705 S 9th Street, Suite 305 Tacoma, Washington 98405 Phone: (253) 573-1700 Fax: (253)573-2848 *Of Counsel
www.SadlerLadenburg.com

In addition to helping TOTE remain competitive and helping to maintain its hundreds of family-wage jobs, the LNG facility itself will directly and indirectly support nearly 500 jobs during its construction and more than 120 permanent jobs during its operations.

Finally, as a former local elected official, I know all too well that the need exists for more tax revenues to meet our citizen's service demands across many issues. Good projects that generate additional tax revenues for state and local governments are important to support.

I wish to convey my personal support of this project and urge the City to convey their support by approving all necessary permits expeditiously to assure that all of the benefits of this project accrue to the citizens of Tacoma and Pierce County for years to come. As a community, we should applaud this large investment by both Tote and PSE in our community and in no way create obstacles that could jeopardize this project.

Sincerely,

John W. Ladenburg Sr.

Atrium Court 705 S 9th Street, Suite 305 Tacoma, Washington 98405 Phone: (253) 573-1700 Fax: (253)573-2848 *Of Counsel
www.SadlerLadenburg.com

Number	Issue	Response
0012-1	General	Commenter supports project. Comment noted.
0012-1 cont'd	General	See previous response.

July 13, 2015

Shirley Schultz - Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

0013-1

Ms. Schultz,

Having lived in Brown's Point for 22 years, and owning the "Salon at the Point" in Browns Point, I have the opportunity to interact with a number of people in the northeast Tacoma community. I've had a chance to discuss Puget Sound Energy's proposed liquefied natural gas facility with a number of individuals. To me, LNG development on the Port can prove to be nothing but beneficial, thus my willingness to support PSE's Draft Environmental Impact Statement for the proposed LNG facility on the Port of Tacoma.

As a small business owner just up the hill from the proposed LNG site, I think it's great that the City and the Port are supporting a healthy business climate for local companies. PSE and TOTE have been active businesses for many years, and the community definitely benefits from the family wage jobs they provide.

It is also my understanding that the use of LNG as a transportation fuel significantly reduces greenhouse gas emissions. This is not only good for the local community, but good for the greater Puget Sound region.

As an area resident and business owner, I support approval of PSE's Draft Environmental Impact Statement for the proposed LNG facility on the Port. Any alternatives that can be pursued to reduce global warming must be pursued.

Thank-You for your consideration on this matter.

Sincerely,
Jeanine Lee
5205 Harborview Drive NE
Browns Point, WA 98422
Owner: Salon at the Point

Number	Issue	Response
0013-1	General	Commenter supports project. Comment noted.

August 4, 2015

City of Tacoma
Planning and Development Services Department
ATTN: Shirley Schultz, Principal Planner
747 Market Street, Room 345
Tacoma, WA 98402

0014-1

Dear Ms. Schultz,

As 22 year Brown's Point resident, and owner of two Brown's Point businesses (The Brown's Point Diner and The Sandbar) I am very much attuned with what is happening in the northeast Tacoma community. From both my home and work locations, I am lucky enough to have a front row seat for maritime traffic serving the Port of Tacoma. While I enjoy the ship traffic, I've always been interested in making sure that the Port waterways and shorelines remain clean and safe. It is from this perspective that I wish to express my support for Puget Sound Energy's proposed liquefied natural gas (LNG) facility on the Port of Tacoma.

The LNG facility will help to improve our local environment by providing a cleaner fuel alternative for TOTE (Totem Ocean Trailer Express) ships serving Alaska (berthed at the Port of Tacoma). LNG-based ships will also help to improve air quality in the Commencement Bay area by reducing greenhouse gas emissions and virtually eliminating visible particulate emissions. This is a benefit for the citizens of Tacoma and the entire South Sound region, namely better air quality with accompanying reduction in health risks and reduced risk of a potentially damaging fuel spill.

As a small business owner located in reasonable proximity to the proposed LNG site, I strongly support the Port's and City's efforts to create a healthy business climate for local companies who choose to do business in Tacoma. Both TOTE and PSE are respected, long-time area businesses, and the community definitely benefits from the family wage jobs they provide.

Additionally, I understand that PSE will be contributing millions of dollars in tax revenue for local schools, city services, and other state and local government services. I appreciate and value seeing projects that will lead to increased tax revenues to help our local schools and public safety departments.

I fully support the thorough review this project will receive and urge you to move forward with approval of PSE's proposed LNG facility, a project that will provide great benefits to the citizens of Tacoma, Pierce County, and the South Sound region for years to come.

Sincerely,
Tanja Leek
6623 Eastside Drive NE

Browns Point, WA 98422
Owner: The Browns Point Diner/The Sandbar

Number	Issue	Response
0014-1	General	Commenter supports project. Comment noted.

City of Tacoma
Planning and Development Services

Comment Sheet: Public DEIS Meeting

July 16, 2015

Proponent: Puget Sound Energy, Inc.
Project Name: Tacoma LNG Project
SEPA Lead Agency: City of Tacoma – File No. SEP2014-40000230810

Comments regarding Draft Environmental Impact Statement: I Believe Due To extreme strict regulations That Construction Should Be At High quality 0015-1

Contact information:

Name:

Address:

Email:

Please return this sheet to staff at tonight's meeting. Comments may also be mailed to: Shirley Schultz, Planning and Development Services, City of Tacoma, 747 Market Street Rm 345, Tacoma, WA 98402-3701 or emailed to shirley.schultz@cityoftacoma.org.

Number	Issue	Response
0015-1		The commenter requests that the project be built to high quality standards. **Response: Comment noted.**

Pierce County Building & Construction Trades Council AFL-CIO
3049 South 36th Street Room #220
Tacoma, Washington 98409
piercebctc@earthlink.net

August 4, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Dear Ms. Schultz,

0016-1

The Pierce County Building & Construction Trades Council, representing the interests of 16 construction craft unions and over 8,000 union construction workers living and working in Pierce County, strongly supports the Puget Sound Energy liquefied natural gas (LNG) facility proposed at the Port of Tacoma. We encourage the City of Tacoma publish an FEIS that reasonably addresses the effects of this project and reflects the interests expressed herein so that the Tacoma LNG facility may be permitted and built.

On July 16, over 20 union workers attended the public DEIS meeting who all supported this project. It will create an estimated 200 jobs during construction and 16 operations jobs at the facility. In addition, the economic activity from the project will create another 125 jobs in the region.

To quote an IBEW Local 76 official at the meeting, "I am very much in support of this project. It will create needed jobs and is a good fit for the Port." As a reminder, no opposition testimony was given at the meeting.

We strongly support the Port's efforts to create a healthy business climate for local companies who choose to do business in Tacoma. Both TOTE and PSE are respected, long-time area businesses, and the entire community benefits from both the family wage jobs they provide and the fact both are committed to utilizing the best available environmental technology to remain competitive in the world economy.

This marine fueling facility will also put the City of Tacoma at the forefront of the movement for cleaner fuels, greenhouse gas emission reductions, and elimination of visible particulate emissions.

Representing the opinions of the many working men and women in the South Sound, we fully support the timely publishing of a reasonable project FEIS for Tacoma LNG. This facility will provide great benefits to the businesses and residents of Pierce County and the Puget Sound region for years to come.

Sincerely,

Mark P. Martinez
Executive Secretary of the Pierce County Building & Construction Trades Council, AFL-CIO

Number	Issue	Response
0016-1		Commenter supports project. Comment noted.

Pierce County

Office of the County Executive

930 Tacoma Avenue South, Room 737
Tacoma, Washington 98402-2100
FAX (253) 798-6628
www.piercecountywa.org

PAT McCARTHY
Executive
(253) 798-7477
pmccart@co.pierce.wa.us

KEVIN R. PHELPS
Deputy Executive
(253) 798-7477
kphelps@co.pierce.wa.us

August 3, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

0017-1

Dear Ms. Schultz:

I wish to express my support for Puget Sound Energy's liquefied natural gas (LNG) facility proposed at the Port of Tacoma. This is a great opportunity for Pierce County to have a major new project that will provide substantial benefits to county residents. This letter reflects my comments on the Draft Environmental Impact Statement (DEIS).

This LNG facility brings together two respected local employers, each with a strong commitment to environmental responsibility and a distinguished history of positive engagement with the community. Both TOTE and PSE are long-time area businesses, and we benefit from both the family wage jobs they provide and the fact that both companies are committed to utilizing the best available environmental technology to remain competitive in the world economy.

The building and operation of the LNG facility represents hundreds of millions of dollars of private investment for a state-of-the-art facility. It will help TOTE remain competitive by providing a needed supply of LNG for its newly-configured marine vessels.

The ready availability of LNG also helps ensure continued dependable service on the coldest days of the year and additional benefits to all PSE natural gas customers in the county. Having a stock of available LNG will also allow PSE to reduce its gas purchases at time of peak demand, reducing costs that could otherwise be passed on to customers. Limiting the use of marine diesel fuel in the Port of Tacoma will also improve air quality in our area which is a priority as we work to stay in attainment for particulate matter 2.5. PSE and TOTE's efforts could significantly improve air quality in the Port of Tacoma and make it a more viable option for other shipping lines to consider in the future.

The benefits of the LNG facility reach far beyond TOTE and PSE. One of my top priorities as County Executive is to ensure we have a strong local economy that offers good job opportunities for local residents. The project will create an estimated 125 permanent jobs in the county and will also contribute millions of dollars in new tax revenues that will benefit the City, local schools, the county, and other state and local government services. Further, it is imperative that we retain good firms in our County and I thank the City for doing all it can to help retain TOTE -- a valuable local employer and customer of the Port of Tacoma. This project is a significant economic development opportunity and we appreciate you helping this project in any way that you can.

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I encourage the City to adopt a Final EIS that reflects the very significant contributions Puget Sound Energy is making in our community – not just in the payment of significant sales tax on construction, and ongoing property tax, but as a valuable member of our business community.

I fully support timely publishing of a reasonable project FEIS for the Tacoma LNG facility.

Sincerely,

Pat McCarthy
Pierce County Executive

cc: Kevin Phelps, Deputy Director
Denise Dyer, Economic Development Director
Ryan Dicks, Sustainability Manager

Number	Issue	Response
0017-1	General	Commenter supports project. Comment noted.
0017-1 cont'd	General	See previous response.

MOSS-ADAMS LLP
Certified Public Accountants | Business Consultants

WWW.MOSSADAMS.COM
1301 A Street, Suite 600
Tacoma, WA 98402
T (253) 572-4100 F (253) 383-8085

July 16, 2015

Shirley Schultz
Project Manager
City of Tacoma, Planning Department

RE: LNG Project at the Port of Tacoma

0018-1

Dear Shirley,
I wish to express my personal support of Puget Sound Energy's liquefied natural gas (LNG) project proposed to be located at the Port of Tacoma subject. As a long-time Pierce County businessperson, resident, and former chair and board member of both the Tacoma Pierce County Chamber of Commerce and the Foss Waterway Development Authority, it is encouraging to see a project that so clearly provides important economic and environmental benefits for our area.

The Tacoma LNG project will generate important economic benefits for all South Sound residents. In addition to helping local employers like Totem Ocean Trailer Express (TOTE) remain competitive and helping to maintain hundreds of family-wage jobs, the LNG facility will also help assure that TOTE continues to be a viable part of our local businesses for the distant future. It is encouraging to see TOTE taking a leadership role in converting its vessels to LNG, a conversion that depends on this facility to be successful. It is likely this facility will provide a cleaner energy source for additional transportation modes, and this will also contribute to the economic health of our greater Tacoma community.

Pierce County needs new family-wage jobs and this project will help increase our County's economic base. In addition to the direct and indirect job creation, the Tacoma LNG project will also generate additional tax revenues for state and local governments and the Tacoma school district, helping to fund needed public services and Tacoma and Pierce County public safety departments. The City should be offering economic development support like they would to any other company they are trying to recruit.

Importantly, both the commercial and residential segments of the community will benefit from this project as it also will help ensure continued dependable natural gas service to existing PSE customers even on the coldest days of the year.

Clearly, the project will provide important environmental and economic benefits for the people of Tacoma and Pierce County as a whole.

Sincerely,

Barbara N. Mead

Barbara N. Mead CPA

Praxity
MEMBER
GLOBAL ALLIANCE OF INDEPENDENT FIRMS

Number	Issue	Response
0018-1		Commenter supports project. Comment noted.

Totem Ocean Trailer Express

August 6, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Dear Ms. Schultz,

As a representative for Totem Ocean Trailer Express (Totem Ocean), I wish to express Totem Ocean's support for Puget Sound Energy's liquefied natural gas (LNG) facility proposed at the Port of Tacoma. This letter reflects Totem Ocean's comments on the Draft Environmental Impact Statement (DEIS). 0019-1

As you know, Totem Ocean supports hundreds of local family wage jobs to South Sound residents. Our decision to seek a cleaner fuel alternative for our large Alaska-bound vessels is truly a positive action benefiting the region's residents. We are committed to LNG as a fuel source due to its unique physical characteristics, transport and safety advantages, and environmental benefits compared to other fuels. We have found an excellent local partner in Puget Sound Energy to build and maintain the LNG facility.

The Tacoma LNG facility also represents private investment of hundreds of millions of dollars on a state-of-the-art facility that is choosing to locate in Tacoma. **If the facility were not approved in Tacoma, Totem Ocean would need to find another location to fuel our vessels and the hundreds of millions of capital investment would go elsewhere.** 0019-2

In addition, the LNG facility will contribute millions of dollars in new tax revenues that will benefit local schools, city services, and other state and local government services by making more public funds available to meet road and public safety needs. Through the process of construction, the project will also pay a proportionate share of mitigation costs for improved infrastructure. We encourage the City to adopt a Final EIS that reflects this.

The Port of Tacoma is the right place for a facility such as Tacoma LNG. The Port is an established industrial area, and this project is consistent with the types of uses and aesthetic appearance of other marine-related industrial activities in the area.

Totem Ocean fully supports the LNG facility and urges the City to finalize environmental review consistent with the foregoing, doing everything possible to make this project financially viable.

32001 32nd Avenue South, Suite 200, Federal Way, WA 98001 | P: 253-449-8100 | F: 253-449-8225 | www.totemocean.com

Totem Ocean Trailer Express

Sincerely,

John Parrott
President
Totem Ocean Trailer Express

32001 32nd Avenue South, Suite 200, Federal Way, WA 98001 | P: 253-449-8100 | F: 253-449-8225 | www.totemocean.com

Number	Issue	Response
0019-1	General	Commenter supports project. Comment noted.
0019-2	General	The commenter notes that if this project is not constructed in Tacoma, the corresponding investment would be diverted elsewhere. **Response: Comment noted.**

Tacoma-Pierce County CHAMBER Business in Motion

August 3, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Via email: shirley.schultz@ci.tacoma.wa.us

RE: Tacoma LNG SEPA DEIS

Dear Ms. Schultz,

On behalf of the Chamber, thank you for accepting these comments in regard to the Draft Environmental Impact Statement (DEIS) for Puget Sound Energy's liquefied natural gas (LNG) facility proposed at the Port of Tacoma, a facility for which we express our support. 0020-1

The Tacoma LNG facility represents private investment of hundreds of millions of dollars on a state-of-the-art facility choosing to locate in Tacoma rather than other locations. It will help TOTE, a major shipping concern, remain competitive by providing a needed supply of LNG for its newly-configured marine vessels. If the facility were not approved, TOTE will find another location to fuel its vessels and the hundreds of millions of capital investment will go elsewhere.

The Tacoma LNG facility will create at least 150 construction jobs and 18 permanent jobs. The economic activity from the project will create another 125 permanent jobs in the region and will also contribute millions of dollars in new tax revenues to the City of Tacoma's budget. The new dollars flowing into the area as a result of the project will benefit local schools, city services, and other state and local government services by making more public funds available to meet needed roads and increased public safety.

The facility is consistent with the on-going efforts by the City of Tacoma to encourage a healthy local business climate, helping retain and grow companies who call Tacoma home. It engages the Port of Tacoma as a facilitator of economic growth in Pierce County, working with two well-known and respected local companies, to find the best available environmental technology to remain competitive.

As such, the LNG facility is a win-win for the citizens, local governments and businesses of Tacoma. The Chamber appreciates your consideration of our position in support of a Final EIS that is reflective of the significant direct and indirect economic contributions of the project and will also fund local services, and encourages the City of Tacoma to approve the project supported by such an FEIS.

Regards,

Tom Pierson
President & CEO

950 Pacific Ave; Ste. 300
P.O. Box 1933
Tacoma, Washington 98401
P 253.627.2175
F 253.597.7305
TACOMACHAMBER.ORG

Number	Issue	Response
0020-1	General	Commenter supports project. Comment noted.

Puyallup Tribe of Indians

August 6, 2015

VIA ELECTRONIC MAIL

Ms. Shirley Schultz, Principal Planner
City of Tacoma, Planning and Development Services Department
747 Market Street, Room 345
Tacoma, WA 98402

RE: Preliminary Comments on the Draft EIS for the Puget Sound Energy Tideflats LNG Facility

Dear Ms. Schultz:

The Tribe is writing to provide a summary of more technical comments we have on the Draft EIS for the Proposed LNG Facility on the Tacoma Tideflats. Our staff will forward more detailed comments next week. Review of the proposed project as described in the EIS and then subsequent research into the complexities and dangers of LNG facilities in general has taken an extensive effort of several Tribal Departments. Due to the extensive nature of our review, our detailed comments will be forthcoming next week. The City Staff however requested we provide a more general list of our comments in advance of the details. In addition, the Tribe has requested a government to government consultation with the City of Tacoma to discuss our comments and grave concerns as to the impacts this project will have on the Tribe and its members.

The Tribe is very concerned regarding the impacts this facility will have on the Tribe, its members, the community as a whole, and the environment. Several Tribal members reside within sight distance of this facility. The Tribe also owns and is developing several properties across the waterway from this facility. The Tribe maintains two mitigation sights in the vicinity, one of which is directly across the waterway. The marine waters surrounding the project are also home to many marine organisms including listed salmon species.

The following are the general areas where we have comments and concerns:

1. The Tribe is very concerned the City continues to vigorously support the siting of a LNG facility of this size in an urban and heavily populated area highly susceptible to catastrophic seismic activity without any discussion as to the safety zones nationally 0021-1

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preferred to avoid significant harm to residents, workers, and the environment in an urban heavily populated area. From our research of materials and subjects not addressed in detail in the EIS, these facilities are usually located miles from heavily populated areas due to the danger associated with failures at such facilities. The Port of Tacoma area is heavily populated, and home to many of our members. Tribal members live within sight distance of this facility on the tideflats. A significant and real potential for substantial loss of human life and property in the event of an incident at this plant is not appropriately addressed in the EIS. 0021-1 Continued

2. Adequacy of emergency response to incidents at the facility is wholly inadequate, and the EIS does not fully address the needs brought about by this facility. The EIS briefly discusses a need to increase public safety in the area to respond to incidents at this facility. It is well known that current response times at the Port are abysmal. As documented in the draft Tacoma Tideflats Emergency Response Study 2015, response times exceed 8 minutes. This facility will dramatically increase risk and must include not only reopening of the currently unmanned fire station, but additional resources must be provided to local responding agencies, including the Tribe, to train, prepare, and respond to incidents at the facility where response is even possible if the incident doesn't give rise to major destruction. In addition, road design should be evaluated and modified so that roads leading to and around the facility are designed to accommodate emergency vehicle clearance in areas already burdened with excessive traffic congestion. This is particularly critical along Taylor Way as the 11th Street Bridge could be inaccessible when boats are traveling through the Hylebos Waterway. 0021-2
3. Security required to protect this facility is not adequately addressed in the EIS. Due to the inherent dangers of LNG facilities, our research has shown that there are significant terrorism concerns with LNG facilities. The EIS does not adequately address the security required to ensure the facility remains safe from terrorist activities. 0021-3
4. The zones of risk have not been adequately addressed, modeled, or designed to minimize risk for this facility. 0021-4
5. Traffic studies have not yet been conducted and such studies are usually an integral part of evaluating impacts to many of the areas of the environment required to be analyzed. Without the Traffic Study the EIS is not taking into account the long term effects of the project as far as operations and impacts to existing routes of travel to get to the facility, nor has it appropriately analyzed impacts to air quality. While the employee level might be categorized by the applicant as minimal, construction traffic and required road closures, and additional traffic to service the facility also must be considered. An EIS cannot appropriately evaluate many of the impacts without a traffic study. The mention 0021-5

of encouraging carpooling is nothing more than a band aid, an unenforceable band aid. Appropriate mitigation for traffic impacts cannot be determined absent more detailed information. 0021-5 Continued

6. The EIS fails to address impacts to roads or needs for roads to be upgraded to allow for current heavy haul traffic (and anticipated additional traffic due to other known future development by the Port or the Port's lessees) to travel on roads safely over a natural gas pipeline. Examples include, but are not limited to, Taylor Way, 12th Street, and 62nd Avenue East. Taylor Way's condition has declined to the point where it will require total replacement the length of the pipeline to withstand, safely, the loads on the trucks that travel from the Port of Tacoma. Additional roads should also be evaluated where heavy Port truck traffic will be traveling over the pipeline. The utility corridors of the pipeline should be designed to specifications concerning liquefaction of soils to avoid systemic catastrophe after an earthquake. Furthermore, in areas wither the pipeline will be constructed on the shoulder of the road, curb should be installed to help avoid vehicular accidents from compromising the pipeline. 0021-6 0021-7
7. In addition to the mitigation to ensure the roads are in a condition to accommodate the pipeline, the railroad crossings should also be reconstructed to current specifications to accommodate freight travel in a safe and orderly manner to avoid accidents and derailments that could also impact the integrity of the pipeline. 0021-8
8. The EIS describes part of the project to include barge or boat facilities, after removal of pilings and reconstruction of new facilities, on the waterway directly across from a Tribal mitigation site and Tribal properties. The EIS does not provide final plans for how the removal of existing pilings or new construction will take place and, therefore, it is impossible to fully analyze the environmental impacts to the water, fish, or Tribal properties. Furthermore, use of the site for barges, along with the tug boats required to move those barges, could cause prop outwash to impact the waterway and Tribal properties, including a sensitive mitigation site. The EIS fails to recognize these activities or discuss the contaminated sediments of the waterways and impacts these activities and sediments will have on the environment or surrounding properties. Mitigation will be required for the environmental impacts. Such mitigation can only be determined once the plans are identified and all impacts analyzed. 0021-9
9. The EIS fails to recognize the significant and known existence that contamination of the earth and groundwater will need to be addressed at the site. The Occidental Chemical site has created a substantial groundwater plume in the area. The EIS continues to discuss "if" contamination is found, certain measures will be taken. In reality, contamination WILL be found, and appropriate testing to characterize the entire site of 0021-10

the project along with a cleanup plan should be in place prior to any construction activities. The Tribe is also very concerned with any work involving the shoreline area and potential releases to marine waters. All such activity should be delayed until characterization and cleanup plans are more firm. Furthermore, the contamination existing in sediments of the waterway have not been identified or impacts from disturbing those sediments analyzed. The EIS must include an analysis of the contaminated sediments and resulting impacts and set forth appropriate mitigation for those impacts. 0021-10 Continued 0021-11

10. The EIS fails to disclose where waste products from the processes of the plant, e.g. impurities removed to bring the natural gas to liquid, will be discharged and any impacts from such discharges. 0021-12
11. The EIS fails to identify and discuss the amount of cooling water required, the source of that water, and how such water will be disposed of. It is impossible to identify or evaluate impacts to waters based upon the lack of such information. 0021-13
12. The EIS fails to call out mitigation measures for cultural resources. The use of an inadvertent discovery plan only in some of these areas is wholly inadequate. A monitor supplied by the applicant is required for all ground disturbing activities, and the Tribe requests notification of all ground moving activities in order to assess whether the Tribe will send its own monitor, in addition to the Applicant's on site monitor. Most if not all of the locations identified for the project occur in an area of high likelihood for cultural resources. Even where the area was filled, such as on the peninsula, there is an extremely high likelihood of cultural resources as the fill was from local sources that also had very high likelihood of artifacts. These items are of great value to the Tribe and are protected cultural resources. 0021-14

Tribal Staff will provide more detailed technical comments next week and we look forward to discussing these issues with the City during a government to government consultation.

Sincerely,

Bill Sterud

Bill Sterud, Chairman
Puyallup Tribal Council

Number	Issue	Response
0021-1	Public Health and Safety	The commenter is concerned about the siting of an LNG facility in a densely populated urban area and that such a facility poses a significant potential for substantial loss of life and property, including many tribal members. The commenter states that such facilties are usually located in remote areas. **Response: Comment noted. The proposed Tacoma LNG facility is appropriately sited on a brownfield site in an existing industrial area zoned for industrial activities. To ensure public safety and comply with applicable regulations, vapor dispersion and thermal radiation analyses have been conducted for credible spill scenarios, using the methodologies and computational models prescribed by the Pipeline and Hazardous Materials Safety Administration (PHMSA) and approved on similar facilities. The modeling conclusively demonstrates that exclusion zones defined by federal regulation 49 CFR. § 193.2059 and, by reference, National Fire Protection Association (NFPA) 59A (2001), remain within the property lines of the proposed site. The EIS describes the modeling and includes mitigation measures to ensure that vapor dispersion and thermal radiation does not extend beyond the property lines of the Tacoma LNG project.**
0021-1 cont'd	Public Health and Safety	See previous response.
0021-2	Public Health and Safety	Portions of this comment apply to Public Health and Safety, and to Transportation. The commenter is concerned that emergency response at the LNG facility is "wholly inadequate" and that response times at the Port are "abysmal," exceeding 8 minutes. The commenter states that "the EIS does not fully address the needs brought about by this facilitiy". Commenter states that the facility "will dramatically increase risk" and recommends a number of measures in addition to reopening the fire station. Recommended measures include "additional resources [...] to local responding agencies, including the Tribe, to train, prepare, and respond to incidents," as well as evaluation and modification of road designs leading to and around the facility "to accommodate emergency vehicle clearance in areas already burdened with excessive traffic congestion." The commenter questions whether emergency response is even possible in certain circumstances, including events causing "major destruction" and when the 11th Street bridge is inaccessible due to boat traffic. **Response: Comment noted. To account for the ability of emergency responders to access the site and surrounding vicinity in a timely matter, mitigation measures agreed to by PSE, Port of Tacoma, and the City include reopening of Fire Station 15, implementing Phase 1 of the Emergency Response/Intelligent Transportation System, and an approach for rebuilding of Taylor Way to heavy haul standards.**

Number	Issue	Response
0021-3	General	The commenter notes that the EIS does not adequately address security at the LNG facility. Specifically, the commenter states that "the EIS does not adequately address the security required to ensure the facility remains safe from terrorist activities." **Response: Comment noted: Section 3.11 Public Services and Utilities addresses security issues, including LNG fueled vessels, the refueling facility and the liquefaction facility. The U.S. Coast Guard conducts a Waterways Suitability Assessment which assesses security concerns and as Captain of the Port can impose additional security measures such as exclusion zones. Specific security measures are confidential.**
0021-4	Public Health and Safety	Commenter states that "the zones of risk have not been adequately addressed, modeled, or designed to minimize risk for this facility." **Response: To define the extent of thermal vapor dispersion and thermal radiation exclusion zones to ensure the public’s safety requires quantitative modeling. When LNG is released from a container and comes in contact with air, it vaporizes and produces methane vapor. For any methane vapor to ignite (not only LNG, but any fuel containing methane), two conditions must simultaneously occur: (1) the methane vapor must be at a concentration of 5 to 15 percent in air and (2) an ignition source must be present. If such a methane vapor-air mixture from an LNG spill ignites, the LNG flame front will either burn back to the release location (if the vapor concentration along this path is sufficiently high to support the combustion process) or, if the vapors dissipate quickly enough, the flame burns out for lack of fuel.** **For Tacoma LNG, vapor dispersion analyses have been conducted for credible spill scenarios, using the methodologies and computational models prescribed by the Pipeline and Hazardous Materials Safety Administration (PHMSA) and approved on similar facilities. The modeling conclusively demonstrates that exclusion zones defined by federal regulation 49 CFR § 193.2059 and, by reference National Fire Protection Association (NFPA) 59A (2001), remain within the property lines of the proposed site. Keeping all spilled LNG (and any potential resulting flammable vapor clouds) within the property boundary eliminates the risk of off-site ignition.**

Number	Issue	Response
0021-5	Transportation	Portions of this comment apply to Air Quality as well as Transportation. The commenter states that traffic studies have not yet been conducted, and that without such study the EIS is not taking account the long-term effects of the project with respect to "operations and impacts to existing routes of travel", and is not appropriately analyzing air quality impacts. Commenter states that "an EIS cannot appropriately evaluate many of the impacts" without a traffic study, and that certain types of traffic and traffic impacts need to be taken into account, such as heavy construction traffic, construction-related road closures, and service trips to the facility. Commenter states that "encouraging carpooling is nothing more than an [unenforceable] band aid." and that "appropriate mitigation for traffic impacts cannot be determined absent more detailed information." **Response: The EIS incorporates information from the Blair-Hybelos Terminal Redevelopment Project (BHTRP) Final Environmental Impact Statement and information from the Transportation Discipline Report prepared for the BHTRP. In addition, traffic data were updated and included in the Tacoma LNG Draft Environmental Impact Statement. The operational project will employ approximately 18 personnel. During the afternoon commute peak hour, up to 42 vehicle trips would be added to the traffic network during operations (18 inbound and 18 outbound personnel trips, two inbound and two outbound delivery/maintenance truck trips, and one inbound and one outbound tanker truck trips).** **Per day, up to 60 vehicles would be added to the traffic network during operations, representing less than 1 percent of existing traffic volumes. Compared to daily traffic volumes on roadways in the vicinity of the Project (see Table 3.10-1), the addition of 60 vehicles per day would be insignificant relative to existing traffic.**
0021-5 cont'd	Transportation	See previous response.
0021-6	Transportation	The commenter states that "the EIS fails to address impacts to roads or needs for roads to be upgraded to allow for current heavy haul traffic (and anticipated additional traffic," referring without limitation to Taylor Way, 12th Street, and 62nd Avenue East. The commenter states that Taylor Way will require total reconstruction along the length of the pipeline. **Response: the EIS recognizes potential impacts to Taylor Way, and PSE, the Port of Tacoma, and the City have agreed to an approach in rebuilding of Taylor Way to heavy haul standards.**
0021-7	Public Health and Safety	The commenter recommends evaluation of additional roads "where heavy Port truck traffic will be traveling over the pipeline." The commenter also points out that "the utility corridors of the pipeline should be designed to specifications concerning the liquefaction of soils" and that, where "the pipeline will be constructed on the shoulder of the road, [a] curb should be installed." **Response: Comment noted. The purpose of building roads to heavy haul standards is to withstand continuous use by trucks carrying heavy loads, not because there are natural gas pipelines and other utilities buried under the road. As for liquefaction, pipelines carrying natural gas are bouyant and would tend to float in liquefaction conditions; moreover, being buried under a road surface it is unlikely they would be exposed.**

Number	Issue	Response
0021-8	Transportation	The commenter states that "railroad crossings should also be reconstructed to current specifications [...] to avoid accidents and derailments that could also impact the integrity of the pipeline." **Response: Comment noted. Railroad crossings would be taken into consideration during the rebuilding of Taylor Way to heavy haul standards.**
0021-9	Description of Proposed Action	Portions of this comment apply to Earth and to Water Resources, as well as to the Description of the Proposed Action. The commenter states that, for barge or boat facilities described on the Hylebos Waterway, "the EIS does not provide final plans for [...] the removal of exisitng pilings [and] new construction [...] and, therefore, it is impossible to fully analyze the impact to the water, fish, or Tribal properties" and to a Tribal mitigation site. The commenter further states that use of barges and tugboats "could cause prop outwash to impact the waterway and Tribal properties, including a sensitive mitigation site." The commenter states that "the EIS fails to recognize these activities" or discuss the impacts these activities and contaminated sediments would have on the environment or surrounding properties. Commenter states that mitigation for such activities "can only be determined once the plans are identified and all impacts analyzed."> **Response: Preliminary drawings for both construction on Hybelos and Blair waterways will be included as an appendix. Additional information can be found in the JARPA submitted to the Seattle District Corps of Engineers, The City of Tacoma, and the Washington Departments of Ecology and Fish and Wildlife. The EIS indicates that additional sediment testing will be required and incorporated as conditions of Federal, State, and local permits.**
0021-10	Water Resources	Portions of this comment apply to Earth as well as to Water Resources. The commenter states that "the EIS fails to recognize the significant and known existence [of] contamination of the earth and groundwater that will need to be addressed," and that it is not a question of "if" contamination will be found. Rather, commenter states that "a cleanup plan should be in place prior to any construction activities" because contamination "will" be found. **Response: The project site has been the subject of extensive testing of both the soils and groundwater. Section 3.1 Earth provides an overview of the site contamination, clean-up, and existing conditions. Additional information provided by the Department of Ecology and the Port of Tacoma hwill be included in the final EIS.**
0021-10 cont'd	Water Resources	See previous response.

Number	Issue	Response
0021-11	Water Resources	Portions of this comment may apply to Earth as well as to Water Resources. The commenter is concerned with any work involving the shoreline area and states that "all such activity should be delayed until characterization and cleanup plans are more firm." In particular, the commenter is concerned that "the contamination existing in sediments" has not been identified nor have "the impacts from disturbing those sediments." The commenter states that "the EIS must include an analysis of the contaminated sediments and resulting impacts and set forth appropriate mitigation." **Response: The Department of Ecology and the Environmental Protection Agency have also raised concerns about adequate charaterization of the sediments, specifically in the Hybelos Waterway. The final EIS will include mitigation measures including requiring that further characterization of the sediments be conducted prior to any construction.**
0021-12	Public Services and Utilities	This comment may apply to Earth, Water Resources and Public Health and Safety as well as to Public Services and Utilities. The commenter states that "the EIS fails to disclose where waste products from the processes of the plant [...] will be discharged and any impacts from such discharges." **Response: Section 3.3 Water describes how stormwater from the site will be collected and discharged, and Section 3.11 describes how sanitary and other wastes from the faciliity produced by the facility will be handled.**
0021-13	Description of Proposed Action	This comment applies to Water Resources and Public Services and Utilities as well as to the Description of Proposed Action. The commenter states that the EIS fails to discuss the amount, source, and disposal methods for cooling water, and that "it is impossible to identify or evaluate impacts to waters based upon the lack of such information." **Response: No cooling water will be produced by the Tacoma LNG project.**

Number	Issue	Response
0021-14	Cultural Resources	The commenter states that "the EIS fails to call out mitigation measures for cultural resources" and that "the use of an inadvertent discovery plan only in some of these areas is wholly inadequate." The commenter states that "most if not all of the locations identified in the project occur in an area for high likelihood for cultural resources," even areas that were filled as "the fill was from local sources that also had very high likelihood of artifacts." As a result, the commenter states, "a monitor supplied by the applicant is required for all ground disturbing activities, and the Tribe requests notification of all ground moving [...] to assess whether the Tribe will send its own monitor, in addition". Commenter states that "[artifacts] are of great value to the Tribe and are protected cultural resources." **Response: PSE has indicated that they will provide a monitor in areas near the base of the Blair-Hylebos peninsula at or near the natural shoreline that are deemed likely to have cultural importance would be monitored by a trained and experienced cultural resource expert. In addition, the final EIS will indicate that PSE would provide training in identifying cultural artifacts according to a training protocol developed by PSE and approved by the City after consultation with the Tribe. In addition, PSE will ensure that crews involved in ground-disturbing activities be familiar with the Unanticipated Discovery Plan.** **If suspected cultural artifacts are found, construction will be halted in the vicinity of the find until the status of the artifact can be determined. In addition, the final EIS will indicate that PSE would notify a contact person provided by the Tribe prior to commencement of ground breaking and for the expected duration of any excavation.**

From: Suafoa, Rumina <SuafoaR@wsdot.wa.gov>
Sent: Tuesday, July 21, 2015 8:49 AM
To: shirley.schultz@cityoftacoma.org
Cc: Davies, David (SR167)
Subject: FW: SR 167-Tacoma to Puyallup-New Freeway
Attachments: ALIGNMENT COMPARISON.PDF

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Green Category

Shirley,

I was contacted by Pete Townsend, Olympic Region Utilities Engineer. He forwarded the web address for the PSE Liquid Natural Gas plant currently in the Draft EIS review/comment stage. I have an update to Section 3.10.3.10 Potential Future Transportation Improvement Projects.

SR 167 Extension Project-Tacoma to Puyallup-New Freeway received funding recently when the Governor signed the new-law Connecting Washington transportation bill. Design of the SR 167 extension, six lane facility (two general purpose, one HOV lane each direction) in Puyallup from SR 161 to I-5, and four lane facility (two general purpose lanes each direction) from I-5 to SR 509 is about 15 percent complete, to include new interchanges at SR509/54th, SR 167/Valley Avenue and I-5/SR 167. There is a new 70th Ave structure crossing over I-5. Currently the project is preparing a NEPA Re-Evaluation for FHWA approval. Design Documentation and Plans for Approval will be the next milestone document for this project. Our Record of Decision was signed in October 2007. There have been a few a more parcels acquired, however the alignment has been refined (changed) from the FEIS to reduce right of way (ROW) costs, reduce environmental impacts, and reduce construction costs (see attached pdf). We are in beginning efforts of scheduling an access hearing for Spring 2016, which will result in new ROW plans for continued acquisition by September 2016. We have been allocated funds over the next four biennia (2015-2023). The key piece being completion of ROW acquisition throughout the corridor. Relocation of businesses once ROW is acquired will take approximately 3 years to complete. Construction of portions of the overall project (e.g. wetland mitigation or riparian restoration or stream relocation project) could starts at early as 2017. 0022-1

Please feel free to contact me if you have any questions or comments or if you need anything further.

Rumina Suafoa, P.E.
Olympic Region Project Development
SR 167 Extension Project Office
360.357.2623 Desk
253.223.2215 Mobile

Number	Issue	Response
0022-1	Transportation	The commenter proposes an update to the text in draft EIS section 3.10.3.10, concerning the SR167 Extension project. **Response: The updated information will be reflected in the final EIS.**

DRAFT

PRELIMINARY

Subject to Revision

Number	Issue	Response
0023-1	Transportation	This document (0023) is a map providing a graphic representation of the changes to the SR 167 Extension Project described in an e-mail comment (0022). The map was submitted as an attachment to the e-mail. **See response 0022-1.**

From: Rick Talbert <rtalber@co.pierce.wa.us>
Sent: Thursday, August 06, 2015 4:28 PM
To: shirley.schultz@cityoftacoma.org
Subject: Puget Sound Energy's liquefied natural gas (LNG) facility

August 4, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Dear Ms. Schultz,

0024-1

I wish to express my support for Puget Sound Energy's liquefied natural gas (LNG) facility proposed at the Port of Tacoma. I applaud the on-going efforts by the City to encourage a healthy local business climate to help retain and grow companies who call the South Sound home. This letter reflects my comments on the Draft Environmental Impact Statement (DEIS).

The LNG facility will generate important economic benefits for all South Sound residents. In addition to helping local employers like TOTE remain competitive, it will create at least 150 construction jobs and 18 permanent jobs. The economic activity from the project will create another 125 permanent jobs in the region.

The facility will also contribute millions of dollars in new tax revenues to benefit local schools and other state and local government services by making more public funds available to meet road and public safety needs.

In addition to these direct revenues, the DEIS, at Section 3.12.4 - **Economy**, provides that the project's indirect effects will result in $120.4 million in added economic activity. Not noted in the DEIS is that this increased economic activity will result in further tax revenues to our local governments for the public's benefit.

The environmental and health benefits of LNG are also very important. LNG is a cleaner alternative to conventional fuels such as diesel. Switching to LNG reduces greenhouse gas emissions by up to 30 percent and eliminates visible particulate emissions. This helps improve air quality and reduce health risks, while helping local employers like TOTE comply with new stricter low-sulfur emission standards.

I fully support the approval of the project based on a Final Environmental Impact Statement that reflects the full direct and indirect economic contributions of the project to fund local services.

Sincerely,

Rick Talbert
Pierce County Councilmember

Number	Issue	Response
0024-1	General	Commenter supports project. Comment noted.

From: John Thurlow <johnthurlow@harbornet.com>
Sent: Thursday, August 06, 2015 3:44 PM
To: Schultz, Shirley
Cc: Ian Munce; Thoms, Robert; Mason, Evette; 'Andrew Strobel'; Arill Berg; Bill Thompson; James Philp; Hayes Alexander; Jim DeJung; Dick Hayek; Sue Baldwin; Lois Cooper; Don Halabisky; Carolyn Edmonds; Jon Higley; Karen Pischel; Patti Warwick; Yvonne McCarty; Faye Teel; Leek, Sandy A; Leek, Sandy A
Subject: NETNC: Comments on Draft EIS for the PSE Tideflats LNG plant proposal
Attachments: NETNC ltr on LNG DEIS 6Aug15.pdf

August 6, 2015

Re: PSE Tideflats LNG plant DEIS

Shirley Schultz
Principal Planner
Planning and Development Services
City of Tacoma

By e-mail

Dear Ms. Schultz

The Northeast Tacoma Neighborhood Council Executive Committee has reviewed the Draft EIS for the proposed LNG plant on E Alexander Ave. in the Tideflats. We have concerns in the areas listed below and request careful attention to comprehensive and successful implementation of the mitigations cited in the DEIS. NETNC will update this letter when the full Board has had the opportunity to approve it.

1. Fire protection and emergency response

Given the introduction of additional significant fire risk, and the proximity of residences on the bluffs above the plant's site, we believe the proposed re-provisioning of fire-fighting capability on the Blair-Hylebos peninsula to be paramount. A fire station with resident crew and equipment can respond in a timelier manner to various types of industrial incidents than response from Station 12 in Fife or Station 3 in NE Tacoma. It could also provide more-effective backup when Station 3's engine is not available.

2. Traffic impact

The intersection of Taylor Way with SR509 is already over-taxed with trucks entering and leaving the Tideflats. Additional daily traffic will compound the situation. Implementing the Intelligent Transportation System under study and prioritizing the eventual improvements contemplated in the SR167 completion in this area are key to alleviating the congestion.

3. Light pollution and noise

Although we acknowledge that homes on the bluffs above the Tideflats are subject to the effects of being near legitimate business activities in the zoned Port Maritime and

Industrial area, we believe that those effects should be managed to achieve minimum practical levels. Implementing the mitigations discussed in the DEIS, for example, will help reduce the effect of increased industrial lighting and noise on the properties along the NE Tacoma bluffs in the vicinity.

We have been assured that there will be only a small increase in noise from the plant, and that it will be a steady drone, not the clanking sorts of noises generated by other industries in the neighborhood. The noise levels should be monitored at startup and following to ensure that predicted levels are being achieved.

4. Emergency Response / Intelligent Transportation System study

We await the opportunity to review the findings and recommendations from this ER/ITS study, which will likely drive related mitigation projects and priorities that affect quality of life for NE Tacoma residents. Please include the Northeast Tacoma Neighborhood Council among early reviewers of this study's results.

We appreciate the opportunity to work with PSE and City planners on this project, and look forward to comprehensive and successful implementation of the mitigations cited in the DEIS.

Sincerely,

/s/ Carolyn Edmonds
/s/ John Thurlow
Co-Chairs, Northeast Tacoma Neighborhood Council

cc: Ian Munce, PDS
Robert Thoms, Distr. 2 Councilmember
Evette Mason, Port of Tacoma
Andrew Strobel, Puyallup Tribe of Indians
Jim Hogan, PSE
NETNC Board

Number	Issue	Response
0025-1	General	The document in question (0025) is an e-mail containing identical text to a letter (0026) provided as an attachment to the same email, submitted by the same commenter. **Response: See reponses 0026-1 through 0026-5.**

Northeast Tacoma Neighborhood Council
www.netacoma.org
1000 Browns Point Town Center #180, PMB 222
Tacoma, WA 98422

August 6, 2015
Re: PSE Tideflats LNG plant DEIS

Shirley Schultz
Principal Planner
Planning and Development Services
City of Tacoma

By e-mail

Dear Ms. Schultz

The Northeast Tacoma Neighborhood Council Executive Committee has reviewed the Draft EIS for the proposed LNG plant on E Alexander Ave. in the Tideflats. We have concerns in the areas listed below and request careful attention to comprehensive and successful implementation of the mitigations cited in the DEIS. NETNC will update this letter when the full Board has had the opportunity to approve it.

1. Fire protection and emergency response 0026-1

Given the introduction of additional significant fire risk, and the proximity of residences on the bluffs above the plant's site, we believe the proposed re-provisioning of fire-fighting capability on the Blair-Hylebos peninsula to be paramount. A fire station with resident crew and equipment can respond in a timelier manner to various types of industrial incidents than response from Station 12 in Fife or Station 3 in NE Tacoma. It could also provide more-effective backup when Station 3's engine is not available.

2. Traffic impact 0026-2

The intersection of Taylor Way with SR509 is already over-taxed with trucks entering and leaving the Tideflats. Additional daily traffic will compound the situation. Implementing the Intelligent Transportation System under study and prioritizing the eventual improvements contemplated in the SR167 completion in this area are key to alleviating the congestion.

3. Light pollution and noise 0026-3

Although we acknowledge that homes on the bluffs above the Tideflats are subject to the effects of being near legitimate business activities in the zoned Port Maritime and Industrial area, we believe that those effects should be managed to achieve minimum practical levels. Implementing the mitigations discussed in the DEIS, for example, will help reduce the effect of increased industrial lighting and noise on the properties along the NE Tacoma bluffs in the vicinity.

We have been assured that there will be only a small increase in noise from the plant, and that it will be a steady drone, not the clanking sorts of noises generated by other industries in the neighborhood. The noise levels should be monitored at startup and following to ensure that predicted levels are being achieved.

Northeast Tacoma Neighborhood Council Comments on Tideflats LNG DEIS

0026-4

4. Emergency Response / Intelligent Transportation System study

We await the opportunity to review the findings and recommendations from this ER/ITS study, which will likely drive related mitigation projects and priorities that affect quality of life for NE Tacoma residents. Please include the Northeast Tacoma Neighborhood Council among early reviewers of this study's results.

We appreciate the opportunity to work with PSE and City planners on this project, and look forward to comprehensive and successful implementation of the mitigations cited in the DEIS.

Sincerely,

/s/ Carolyn Edmonds
/s/ John Thurlow
Co-Chairs, Northeast Tacoma Neighborhood Council

cc: Ian Munce, PDS
Robert Thoms, Distr. 2 Councilmember
Evette Mason, Port of Tacoma
Andrew Strobel, Puyallup Tribe of Indians
Jim Hogan, PSE
NETNC Board

* Reference to 1999-2000 Northeast Tacoma Neighborhood Strategic Action Plan items

Number	Issue	Response
0026-1	Public Services and Utilities	The commenter states that the reintroduction of firefighting capability on the Blair-Hylebos peninsula is critically important given the significant additional fire risk posed by the Proposed Action. The commenter recommends a fire station "with resident crew and equipment" on the peninsula. **Response: Comment noted. Recommended mitigation in the draft EIS includes re-opening Fire Station no. 15 on the Blair-Hylebos peninsula.**
0026-2	Transportation	The commenter states that the SR-509/Taylor Way intersection is "already overtaxed" and that additional traffic will "compound the situation." The commtenter recommends implementing the Intelligent Transportation System and prioritizing improvements to SR 167 to alleviate congestion. **Response: the final EIS will include implementing Phase I of the Emergency Response/Intelligent Transportation Systems (ER/ITS) as mitigation.**
0026-3	Noise	The commenter notes that homes above the Tideflats are subject to light and noise impacts from industrial uses but that proposed mitigation in the draft EIS will help reduce the effects of increased industrial lighting. The commenter nonetheless requests that "noise levels should be monitored at startup and following to ensure that predicted levels are being achieved." **Response: It is anticipated that with implementation of noise minimization measures, operation of the facility will not exceed the statutory noise levels. However, the final EIS will state that if noise complaints are received, PSE will take noise measurement (24 hours) at the project fence line and at the fence line of sensitive receptors.**
0026-4	General	The commenter requests that the NE Tacoma Neighborhood Council be included among early reviewers of the Emergency Response/Intelligent Transportation Systems (ER/ITS) study, as the results of this study will drive projects and priorities that affect quality of life for NE Tacoma residents. **Response: Comment noted.**

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Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

RE: Tacoma LNG Draft Environmental Impact Statement

Dear Ms. Schultz:

Please find below the comments of Puget Sound Energy (PSE) in regard to the Draft Environmental Impact Statement (DEIS) published by the City on July 7, 2015.

As you know, the proposed Tacoma LNG project to be developed on the Blair-Hylebos Peninsula represents the efforts of two respected private local employers, TOTE and PSE, each with a strong commitment to environmental responsibility and a distinguished history of positive engagement with the Tacoma community. Both TOTE and PSE are long-time area businesses providing family-wage jobs to area residents and significant tax revenues to local and state agencies for public services such as roads, schools, and other public amenities. The Tacoma LNG proposal for development of a small-scale liquefied natural gas facility for use as a marine fuel to TOTE vessels and also as a peak shaving facility for PSE's natural gas customers represents the private sector's investment of several hundred millions into new facilities.

In addition, LNG offers many environmental benefits over conventional fuels, like diesel. Switching from diesel to LNG reduces greenhouse gas emissions by up to 30% and eliminates visible, particulate emissions. This helps improve air quality and reduce health risks. Use of LNG also reduces the potential for harmful fuel spills that could damage the waters of Puget Sound.

Over the past year, PSE has reached out to diverse stakeholders including federal wildlife and natural resource agencies, the U.S. Environmental Protection Agency, the Washington Department of Ecology, the Puyallup and Muckleshoot nations, the Northeast Tacoma Neighborhood Council, labor organizations, neighboring Port businesses, and multiple other interested people and entities to inform them about the Project and hear their questions. Several common themes have emerged from that outreach.

First and foremost, safety is in everyone's interest and PSE appreciates the feedback it has received in this aspect of the Project. PSE shares and supports the community's interest in ensuring there is a reopened fire station near the facility, the benefits of which will flow to the entire area. The actual properties and behavior of LNG have been the subject of many conversations. Natural gas is used in millions of homes and vehicles. When cooled, natural gas

becomes a liquid (LNG) that is one six-hundredth the volume. In its liquid state LNG is easier to store and transport. LNG is neither explosive nor flammable in its liquid state. When it returns to its gaseous state, it behaves as any natural gas found in the pipelines throughout neighborhoods, communities, commercial and industrial areas across the county and is handled accordingly. The DEIS does an excellent, exhaustive job of discussing and analyzing the behaviors of natural gas and LNG and the comprehensive regime of rules, regulations and measures that are applied to ensure facility safety.

Tacoma LNG will be a state-of-the-art facility served with utilities (water, electricity, and sanitary wastewater) provided by Tacoma Public Utilities. It will comply with new, stringent regulatory and development standards such as modern lighting ordinances that maximize the reduction of light pollution, and an enhanced stormwater treatment system.

Questions about the Project's effects on local and area traffic often arise. Although facility operations will actually generate less traffic from the site than the businesses that are there now, the Legislature has determined independently to fund the completion of new interchanges at SR 509/54th Street and SR 167, providing a contemporaneous improvement to area traffic congestion.

These stakeholder interests and many others were brought forth during the scoping of environmental review for Tacoma LNG. To that end, PSE is appreciative of the opportunity to comment and the extent and efficiency with which the City of Tacoma has engaged in the SEPA process. We are hopeful that the Final EIS will fully reflect the Project's benefits and impacts to the City, inclusive of new revenues and additional proportionate mitigation as necessary to ameliorate the Project's own impacts to the City, so that the facility can be developed in Tacoma.

PSE stipulated to the preparation of an EIS under the Washington State Environmental Policy Act (SEPA), which is intended to ensure that environmental values are considered during decision-making by state and local agencies. An EIS describes the existing environment that will be affected by the proposal, analyzes significant adverse environmental impacts of each alternative, and discusses reasonable mitigation measures. Where mitigation is imposed without the applicant's consent, SEPA's limitations on the exercise of substantive authority must be satisfied. Actions can only be conditioned to mitigate specific adverse environmental impacts that are identified in the environmental documents.

Any mitigating conditions must be based on policies, plans, rules, or regulations that the agency has formally designated as a basis for exercising its substantive authority, and must be "reasonable and capable of being accomplished." The responsibility for implementing mitigation measures may be imposed upon an applicant "only to the extent attributable to the identified adverse impacts of its proposal."[1]

SEPA substantive mitigation requirements are limited by the constitutional nexus and proportionality requirements established by the United States Supreme Court in *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987), and *Dolan v. City of Tigard*, 512 U.S. 374

[1] WAC 197-11-660(d) (emphasis added).

(1994). While *Nollan* and *Dolan* involved the exactions of land, the United States Supreme Court in *Koontz v. St. Johns River Water Management District*, 133 S. Ct. 2586 (2013) extended those holdings to financial expenditures imposed on an applicant by ruling that the government cannot condition the issuance of a land use permit on the applicant giving up a portion of his property, including financial property, unless there is a "nexus" and "rough proportionality" between the government's mitigation request and the proposed land use's specific impacts.

Washington courts similarly are clear in their instruction that any mitigation measures imposed on a project, regardless of the source of authority for the imposition, must be in rough proportion to the project's impacts. This is true even when a plan, policy or regulation exists that would obligate a developer to undertake mitigation in a proportion that is well beyond the impacts that its project contributes to the improvement.[2]

Insofar as the effects this project will have on the City of Tacoma, including impacts to services and infrastructure it provides, mitigation must be viewed relatively. The cost of new infrastructure and services must be evaluated relative to positive fiscal effects the Project will have on the City. The DEIS contains a robust discussion of the direct new revenues that would flow into the City of Tacoma's coffers (as well as those of Fife and Pierce County) as a result of the project being developed.

The DEIS correctly calculates that if Tacoma LNG is built, the City of Tacoma will receive **$5.17 million** in direct new revenue to the City's budget between 2015 and 2018 from construction. This figure is comprised of $793,980 from LNG construction-related sale taxes

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[2] This issue was squarely before the Washington Supreme Court in *Benchmark Land Co. v. City of Battle Ground*, 146 Wn.2d 685, 49 P.3d 860 (2002). As a condition of project approval, the City of Battle Ground required the Benchmark Land Company to improve an existing street adjacent to Benchmark's proposed development. The City based its condition upon a city ordinance that required developers to construct half-width road improvements to adjoining access streets as a prerequisite to permit approval. The required expenditure for street improvements was not directly or proportionately related to the traffic generated by the development. Notably, the road that the City sought to have improved by application of its pavement policy did not meet City roadway standards even before the development was proposed. Rather, the required improvements would relieve a preexisting deficiency. Studies relevant to the project indicated that Benchmark's development would cause little or no impact upon the street at issue: "[t]he increase in traffic volumes on North Parkway due to [the proposed project] "are far less than the typical day to fluctuation of traffic and would be virtually indistinguishable to the average driver in the area."" *Benchmark* at 695. Nevertheless, the City argued that its requirement was supported by substantial evidence. Division II of the Washington Court of Appeals invalidated the street improvement requirement as unconstitutionally disproportionate to the proposed subdivision's community impact. The Washington Supreme Court affirmed the lower court's conclusion regarding the invalidity of the City's development condition without even reaching the constitutional question. Instead, the *Benchmark* Court applied the "substantial evidence" test applicable to land use challenges under RCW 36.70C.130(c), and found that no evidence demonstrated that Benchmark's subdivision would measurably impact the adjacent street. The *Benchmark* decision reiterates the Washington principle of law that development conditions must be predicated on substantial evidence of the development's probable impacts. To the extent that mitigation measures for a project's own impacts are imposed under SEPA, they may not be exacted to remedy existing deficiencies. Regardless of a degraded existing condition, the addition of a new project does not render that project entirely responsible for the improvements as mitigation under SEPA, but instead, it is only responsible for its proportionate share. Were this otherwise, it would be virtually impossible for any prospective developer to know if its project was going to be the one that 'breaks the camel's back' so to speak. Imposing the entire burden for an improvement or mitigation measure on the entity that finally meets a triggering event constitutes a denial of due process and is an unconstitutional taking under the U.S. Constitution and state law.

collected in Tacoma;[3] $126,210 from gas-related construction upgrades within Tacoma;[4] and an additional $4.25 million payable in three installments triggered by construction dates under agreement with the City.[5] During operations the City will receive an additional $1.374 million per year in on-going tax collections, i.e., **an additional $13.74 million** in direct new revenue over ten years' time.[6]

In addition to these direct revenues, the DEIS, at Section 3.12.4 - Economy, provides that the Project's indirect effects will result in $120.4 million in added economic activity. This increased economic activity will result in further tax revenues to our local governments for the public's benefit, including roads, schools and other public service, in an amount not quantified in the Draft Environmental Impact Statement.

In this context, we have reviewed the DEIS. Our comments focus on five specific areas of the DEIS: Section 3.4 – Plants and Animals; Section 3.5 - Health and Safety; Section 3.8 - Aesthetics/Light and Glare; Section 3.10 - Transportation; and Section 3.11 - Public Services and Utilities. These comments will also reflect the analysis and conclusions in DEIS Section 3.12 - Socioeconomics, consideration of which should accompany the mitigation measures proposed throughout the FEIS.

0027-1

Table ES-1, Section 3.4 - Plants and Animals

The DEIS at p. 3.4-10 concludes that there is no likelihood of impacts to marbled murrelets. Consistent with the DEIS, the U.S. Fish and Wildlife Service (Service), which is responsible for Endangered Species Act evaluation regarding this species, has concluded that observers are not necessary for this project. A copy of the Service's July 6, 2015 electronic correspondence confirming this is attached hereto as Exhibit A.

Based on the foregoing, the last bulleted item in Table ES-1, Section 4 - Plants and Animals is not necessary and should be removed.

Section 3.5 - Public Health and Safety

PSE concurs with the thorough discussion in the DEIS regarding safety history of the LNG industry both in the U.S. and the world. There are over 110 functioning LNG facilities in the U.S. today.[7] In the 75-year history of their operations, there have only been two LNG safety-related incidents - in 1944 and 1979 - that have resulted in adverse effects to the public or environment.[8] Both incidents resulted in changes to the national codes under which the facilities

[3] See Attachment J-2 to DEIS: of the $2,381,940 in construction-related taxes collected from the LNG processing facility and the pipeline segments located in the City of Tacoma, one-third ($793,980) is allocated to Tacoma.

[4] Id.

[5] Id.

[6] Id.

[7] DEIS at 3.5.3.1, p. 3.5-5.

[8] Id.

are designed, built and operated.[9] PSE will design, build and operate the proposed Project facilities in compliance with all applicable codes, including adopted fire codes, a requirement formalized in the DEIS.[10]

0027-2

The LNG facility itself will not be accessible to the public, and PSE will be providing for mitigation related to this loss of the public's access to the shoreline pursuant to the City of Tacoma's Shorelines Master Program. Additionally, strict siting requirements that keep any facility fire contained to the confines of the site and the safety measures incorporated into the design of an LNG plant further minimize the likelihood of any incident jeopardizing the environment, including the public's health and safety. Specifically, the DEIS at 3.5-1 notes that "[w]ith regard to health and safety, these regulations and their referenced codes ensure that the facility would be (1) sited to minimize risk to the general public, (2) designed, operated, and maintained to minimize the risk of inadvertent release and to implement safety mechanisms for protecting worker and public safety, and (3) secured against threats of intentional acts of destruction." The City's preliminary engineering review performed during preparation of the DEIS yielded the same conclusion: "Codes for new LNG facilities are held to a very high standard to avoid unsafe conditions within the facility and to the public. The permitting and review process is rigorous and thorough, and the stipulated requirements can be relied upon."[11]

The DEIS's thorough discussion of the health and safety implications of Tacoma LNG, along with the mitigation measures contained in Section 3.5 (as suggested for revision below), supports the conclusion that Tacoma LNG, built and operated in accordance with applicable laws, regulations and development standards, does not present a significant adverse impact to the environment, including the public health and safety. PSE concurs with the conclusion at Section 3.5 - Public Health and Safety, at p. 3.5-10:

> Operation, Maintenance, and Emergency Procedures
> Operation of the Tacoma LNG Facility would not pose a potential public hazard if strict design and operational measures to control potential accidents were applied. The primary concerns regarding public safety are events that could lead to an LNG spill of sufficient magnitude to create an off-site hazard. Stringent requirements are in place for the design, construction, operation, and maintenance of the facility, as well as the extensive safety systems to detect and control potential hazards. In addition to the operation and maintenance procedures that are required by both 49 CFR 193 Subpart F and NFPA 59A, emergency procedures are also required. All of the procedures (operation, maintenance, emergency) would be developed and documented prior to commissioning. With specific reference to the emergency procedures, elements that would be addressed include recognizing an emergency situation, responding to an emergency, and issuing the appropriate notifications to emergency responders. The overarching goal of all of these procedures would be to ensure the safety of personnel through sound operation and maintenance procedures and monitoring of the various safety systems located throughout the facility.

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[9] Id.
[10] Id.
[11] DEIS at p. 3.5-18.

> Subpart F provides prescriptive requirements for operating procedures, emergency procedures, personnel safety, operating records, and other requirements for the ongoing operation of the facility. PSE would prepare all procedures in advance of plant operation. Each procedure would be reviewed and approved by the WUTC Pipeline Safety Office as the duly-appointed delegate of PHMSA. These procedures and records would be subject to ongoing audits by the WUTC for the life of the Project.

Changes for accuracy in Section 3.5 - Public Health and Safety should include the following;

At p. 3.5-3, the citations to 40 CFR 68 - Chemical Accident Prevention Provisions and 52 NFPA should be removed as incorrect. The federal Department of Transportation has jurisdiction over this facility's accident prevention provisions, and the correct citations to the applicable regulations are shown in the DEIS as 49 CFR 193 and 59A NFPA. 0027-3

At p. 3.5-13, first bulleted mitigation measure, please revise the nomenclature to reflect the correct requirement, as follows: 0027-4

> A Fire ~~Risk Assessment (NFPA 59A)~~Protection Evaluation would be completed ~~prior to construction that evaluates the level of risk present and identifies measures to reduce risk to an acceptable level.~~per the requirements of NFPA 59A 9.1.2.

This measure has already been complied with. On July 9, 2015, PSE provided the City of Tacoma's Fire Department with the requested Fire Protection Evaluation (FPE), which is incorporated into this comment letter in its entirety by this reference. The FPE comprehensively describes the potential types of fire and emergency incidents that could arise, describes the magnitude of the potential hazard, and scrupulously details the measures and resources implemented in siting, design and operations to ensure the safety risk is less than significant. 0027-5

At 3.5-13, second bulleted mitigation measure, please correct to reflect additional risk mitigation for vapor cloud explosion, as follows: 0027-6

> To ensure evacuation routes (including Alexander ~~Way~~Avenue, 11th Street and Taylor Way) in the vicinity of the project will remain open in the event of an LNG release, the facility design will incorporate mitigation measures to ensure that thermal radiation, ~~and~~ vapor dispersion, or the effects of a vapor cloud do~~es~~ not extend ~~beyond the land portions of the PSE and TOTE property lines.~~onto any of those streets.

At 3.5-17, this section should be revised to accurately reflect each entity's respective legal rights and duties as follows: 0027-7

> As a jurisdictional state, the WUTC Office of Pipeline Safety (OPS) has been delegated PHMSA authority for siting and technical assessment of the design, construction, and operation for compliance. The Coast Guard has responsibility for a design review of the ship to shore interface, ~~and~~ marine transportation, and maritime facility security. ~~However, the process and requirements to approve and accept the terminal design are less specific and the "Authority Having Jurisdiction" (AHJ) approval steps are not~~

0027-7
Continued

~~specifically defined in the LNG code.~~

The City of Tacoma is the authority for elements of the Project not under the purview of 49 CFR 192 and 49 CFR 193 as delegated to the WUTC OPS~~ffice of Pipeline Safety~~. These elements will include fire prevention, detection, and extinguishing systems (joint with WUTC), and regulations compliant with structures, ~~building design,~~ foundations, ~~design, site~~ civil and utility construction. ~~design, and structural design~~.

The City of Tacoma may request to participate in periodic site inspections with the WUTC OPS~~ffice of Pipeline Safety~~ staff in the~~ir~~ OPS responsibilities ~~review~~ per the PHMSA-prescribed review and approval process.

~~For the Project, the WUTC and the City of Tacoma are the AHJ for evaluating the balance of plant design and operations for compliance. At this time, the design of the Tacoma LNG facility is a "work in progress" and incomplete, and therefore should receive further review and validation prior to final authorization by the AHJ for construction of LNG facilities to begin. It is recommended that further validation be performed at major milestone points as a condition for approval, as follows:~~

~~a. A FERC style "Cryogenic Review" is conducted by an independent LNG expert(s) on behalf of the AHJ as a condition of approval for the Project. A "Cryogenic Review" is the same requirement for FERC jurisdictional projects performed after the engineering design and project hazard assessment review are completed, as a condition of approval. During the review, the final design documents and drawings are reviewed to validate the final design for code compliance, operability, maintenance, and fire prevention.~~

~~b. A report of findings is prepared by an independent LNG expert(s) from the Cryogenic Review and issued with recommendations to be incorporated in the design as a condition of approval.~~

~~c. After completion of the Cryogenic Review and incorporation of recommendations, status of engineering documents and drawings can be changed to "issued for construction."~~

~~d. After the Cryogenic Review, the LNG facility design is "frozen" where material changes to the LNG facility design requires a review of the change by an independent LNG expert(s) to confirm the design change is acceptable and approved.~~

~~e. As an option, the AHJ may request periodic site inspections during construction.~~

~~f. After mechanical completion of the LNG facility, and before the start of commissioning, an independent LNG expert(s) performs a walk-down of the site. Start of commissioning is signified by the introduction of hydrocarbons to the process for the first time, known as "first gas." The walk- down is performed to confirm that the completed plant design conforms to the design, and that safety, fire protection, and fire detection systems are in place and active as a condition for approval of commissioning to begin.~~

Section 3.7 - Aesthetics/Light and Glare

0027-8

PSE takes issue with the DEIS's conclusion that the LNG storage tank constitutes an adverse environmental impact, even if insignificant. The physical infrastructure will change with the removal of several large and small sprawling structures and replacement by a smaller processing facility and large storage tank, all compliant with current applicable lighting requirements. As proposed, the project is consistent with the applicable Container Port element of the City's comprehensive plan and the industrial zoning in the area. The new facilities are entirely consistent with the industrial viewshed and maritime activities in the Port of Tacoma. The impact is entirely consistent with other tall, wide, round, square, lighted, stationary, moving, dark, reflective and non-reflective elements of the viewscape, including multiple oil storage tanks varying in size, location and siting configurations. As such, PSE does not think that the cluttered industrial maritime viewscape will experience an adverse impact with the addition of this project. New infrastructure, otherwise consistent with all other facilities in a busy industrial maritime viewshed that is planned and zoned for such uses, does not constitute an adverse environmental impact. The conclusion should be revised to conclude the Project aesthetics do not constitute an adverse environmental impact.

Section 3.10 - Transportation

Tacoma LNG's impacts to transportation, traffic and road conditions are insignificant, and any mitigation required by SEPA[12] must be proportionate to that small impact.

- Insignificant traffic impacts: PSE concurs with the DEIS's conclusion that Tacoma LNG's traffic volumes are insignificant: "[a]s compared to daily traffic volumes on roadways in the vicinity of the project (see Table 3.10-1) including the addition of 60 vehicles would be insignificant."[13] This conclusion is supported by the assessment of existing traffic volumes generated from operations at the site now as compared to the site's redevelopment and operation as an LNG facility. Specifically, the DEIS notes that there are presently businesses operating at the proposed Tacoma LNG site that are currently contributing to traffic volumes and wear and tear to the roadways in the area, including Taylor Way.[14] With displacement by this project, during construction "all roadways would experience less than a 3% increase in daily traffic volumes."[15] In fact, Table 3.10-4 demonstrates that the levels of impact during construction on area roads only range between 0.3% and 2.5%. This impact declines during operations to a less than 1% impact on area roads: "[p]er day, up to 60 vehicles would be added to the traffic network during operations, representing less than 1 percent of existing traffic volumes."[16] 0027-9

- Preexisting Condition of Taylor Way: PSE agrees with the DEIS that Taylor Way currently shows significant wear and tear. The DEIS, at p. 3.10-13, states that "[p]oor roadway surface has been identified as an issue along Taylor Way, and it is possible that 0027-10

[12] This discussion is limited to mitigation under SEPA; road restoration policies that impose obligations under a non-SEPA authority, while still subject to the nexus and rough proportionality tests of *Nollan/Dolan/Koontz*, are separate obligations.

[13] DEIS at 3.10-15.

[14] DEIS at 3.10-12.

[15] Id.

[16] DEIS at 3.10-15 to 3.10-16.

0027-10 Continued

traffic oversize and overweight construction trucks could cause additional damage to roadway surface conditions."

PSE agrees with the first clause of this DEIS statement: Taylor Way is already a poor roadway surface. Its condition is a preexisting condition meriting an upgrade, reflected by the fact that the City of Tacoma has already placed Taylor Way on its 2015-2020 Capital Facilities Program.[17]

Nonetheless, PSE does not agree with the statement, in which the DEIS provides that it is 'possible' that Tacoma LNG-related traffic from oversize and overweight construction trucks could cause additional damage to roadway surface conditions. Road wear is primarily determined by the weight on each axel, not the presence of an overly wide or tall load. As far as loads that are 'overweight', the Project description does not provide for a need for any overweight vehicles requiring special permits, evaluation of every bridge and road crossing for sufficiency, etc. Instead, PSE anticipates that it and its contractors will size all loads or pieces of equipment into standard size and weights that can be transported by a normal semi-trailer.

To the extent that Tacoma LNG construction trucks contribute to added wear and tear on any identified construction route roads, mitigation for these impacts must be proportionate to the Project's impact to the roads as they existed immediately prior to construction. The simplest and most accurate way of documenting the condition of each road prior to construction is by videotaping it before construction. This allows for assessment of the project's actual impacts via a "before and after" review. The DEIS already requires videotaping as a mitigation measure, via the sixth bulleted in 3.10.6.1.

- Safety and Reduction of Emergency Vehicle Response Times:[18] As discussed in the DEIS itself, and further addressed by the comments regarding Section 3.5 above, Tacoma LNG does not present significant adverse environmental impacts regarding safety, regardless of the condition of Taylor Way. 0027-11

  A hazard is the potential for a certain harm, damage, or adverse effect on something under certain conditions. Risk is the likelihood that the harm, damage or adverse effect will occur. LNG facilities have an exceptional safety record. The Tacoma LNG Project as proposed presents neither a significant hazard nor is there significant risk of these hazards occurring as a result of the Project's siting, design, construction or operations. The Project will be compliant with all applicable federal, state and local law, rules and regulations.

  The assessment of the hazards presented by this proposal are already included in the DEIS (Section 3.5) and supplemented by the FPE. A review of previous incidents,

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[17] http://cms.cityoftacoma.org/finance/budget/2015-2016/cfp_2015-2020/Final_CFP_2015-2020.pdf at Chapter 2, pp. II-128, 197.

[18] This discussion should also be considered a part of PSE's comments regarding Section 3.11, Public Services and Utilities

0027-11 Continued

regulatory requirements, and chemical hazards pertaining to plant operational safety and the storage and manufacture of flammable and combustible chemicals is covered by the DEIS Section 3.5, and the FPE. This includes a review of the design and safety features of the planned operations.

Management of these hazards to ensure the risk of an incident affecting public health and safety is less than significant is thoroughly discussed in the DEIS, as supplemented by the FPE. The FPE includes a consequence and impact analysis to assess potential significant impacts from development and operations of this particular facility. A professional review of the facility siting analysis conducted by the City's consultant in the course of preparing the DEIS concluded that the preliminary LNG design, construction, and integrity testing are compliant to 49 CFR Part 193, NFPA 59A, and USCG regulations. Further WUTC OPS (and PHMSA as requested by the WUTC) and TFD review of the facility, its operations and emergency management measures suitable for the facility is already accounted for by operation of law and pursuant to discussions between the City of Tacoma and the WUTC. Pursuant to recent discussions between the WUTC and the City, including the TFD, the WUTC will be confirming the framework of the parties' roles for incorporation into the FEIS. The WUTC OPS will apply all PHMSA regulations and compliance criteria to its review and approval of the final facility. The City of Tacoma, including its fire department, construction plans, operational safety and emergency response plans, and regular operations of the Tacoma LNG Facility. Both have enforcement authority over their respective areas of jurisdiction. Review of operational worker safety at the facility, including safety and emergency operations plans to mitigate potential impacts to environmental health to workers from construction and operations of the facility are required by DEIS Section 3.5. The public is specifically excluded from the site to minimize or eliminate any public health and safety risks. Special emergency response needs at the plant, including equipment and training needed to support U.S. Coast Guard and Tacoma LNG's in-house emergency responders will also be required by the DEIS. All of these requirements and mitigation measures are what reduce the risk of a significant incident to a de minimis level.

Based on the analysis described above, we do not think the analysis contained in the DEIS supports the statement at 3.10-16,[19] "the operation of a major LNG processing facility would pose increased health and safety risks in the vicinity of the Project, as described in Section 3.5 (Public Health and Safety)."

Similarly, we do not agree with the further conclusion in Chapter 3.5 that the very small risk of any hazards to the position that the Project is now a "major new risk factor" that

[19] *See, also*, DEIS at 3.10-19 ("[t]he project does add a new and significant risk…"; DEIS ES at p. 3, ES-5: "The Project does introduce a major new risk factor into an area with one of the City's lowest emergency response times."

requires reopening of closed Fire Station 15 close to Tacoma LNG[20] and in paving all lanes of Taylor Way to cut 40 seconds off of a 12-minute emergency response time.[21]

- Fire Station Reopening: PSE supports the mitigation measure of reopening Fire Station 15. PSE also concurs with the DEIS's acknowledgment that there is no fire station currently manned within the Port to serve any of the facilities already there or those reasonably foreseeable in the future. This pre-existing situation is the culmination of a variety of financial factors, even as the industrial activity in the Port has grown unmitigated as to fire protection within the last 10 years, including more fuels facilities (e.g., new oil tanks at the Targa site) and other proposed industrial operations such as the PTT terminal. The desirability of a fire station to serve all activities in the Port of Tacoma is acknowledged. The existing deficiency detailed in the DEIS, as well as the Emergency Response/Intelligent Transportation Systems (ER/ITS) draft reports published to date and incorporated herein by this reference is similarly undisputed. 0027-12

  PSE asks that the FEIS acknowledge the new revenues to the City as a result of construction of the facility and, to the extent such funds are inadequate to offset Tacoma LNG's proportionate mitigation obligations, provide that fire station reopening mitigation be required in proportion to the impact that Tacoma LNG will have on the Port's current and reasonably foreseeable fire protection needs.

- Reducing Emergency Response Time by 40 Seconds: The DEIS does an adequate review of the existing response times for emergency response in the Port. The current situation is an existing deficiency that could conceivably affect residential fire response elsewhere if a multi-station response in the Port occurred simultaneously with a call outside the Port area. The DEIS makes it abundantly clear that the fire protection problem that needs solving is not just that of Tacoma LNG - it is that of the entire Port and beyond.

  The DEIS indicates that the 12.7 minute response time could be ameliorated by paving of Taylor Way to reduce the current 12.7 minute response time by 40 seconds, but there is no significant public health and safety risk to support this need. 0027-13

  - This state-of-the-art facility does not present an unmitigated significant risk of an adverse impact to public health and safety in the first instance. The DEIS cannot discount its own exhaustive analysis in Section 3.5 regarding the safety of LNG generally, the lengthy safety measures built into every phase of this Project and the additional mitigation measures that will continue throughout the lifetime of the project to all but eliminate risk of any identified hazard of any significant magnitude.

[20] FEIS at Section 3.10 - Transportation, last paragraph of Section 3.10.6.2 - Operations, at p. 3.10-19
[21] FEIS at Section 3.10 - Transportation, first bullet in Section 3.10.6.2 - Operations, at p. 3.10-19

0027-13
Continued

- In the unlikely instance of a catastrophic event, there is no significant hazard to the public health and safety. The public is excluded from the site by the siting, design, construction and operations measures required by federal, state and local laws and regulations, regulatory oversight and enforcement.

- The 12.7-minute response reduction argument has no nexus to the development of Tacoma LNG. The response times are not the result of roadway conditions being degraded by construction or operations of Tacoma LNG, as those impacts are only a maximum of 2.5% and less than 1% respectively. Instead, response times are the result of a variety of factors, including without limit, rail crossings that impede traffic, existing and future traffic, the elimination of fire houses manned for structural fires or emergency response within the Port, lack of other new and reasonably foreseeable industrial developments' contribution to fire response, and the conditions of roads within the Port.[22]

- The 12.7-minute response time does not account for the proposed mitigation measure of a reopened and manned fire station on Taylor Way near the facility.

- A 40-second reduction in a 12.7-minute (762 second) event is a 5.2% improvement. Conversely, the estimated cost to repave all lanes of Taylor Way ranges between $12 and $15 million per the updated June, 2015 ER/ITS report.

- The DEIS's 40-second reduction in response time through the paving of Taylor Way was based on an early 2015 version of the ER portion of the ER/ITS. In the updated ER study (dated June, 2015 and before the issuance of the DEIS) this number is refined to "*between* "15 and 40 second".[23] (Italic added).

- In regard to improved response times if all road improvements including the Taylor Way repave are completed by 2020, the City's own consultant concluded that even the "slight improvements in travel [response] time due to new roadway connections are somewhat offset by increases in general traffic congestion."[24]

- The June ER/ITS, in its Recommendations, acknowledged that *"[r]esponse times are not significantly affected in 2020 or 2035 with the planned roadway projects."*[25]

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[22] June 2015 ER/ITS.
[23] June, 2015 ER/ITS at p. 32.
[24] June, 2015 ER/ITS at p. 24.
[25] June, 2015 ER/ITS at p. 36. (Italic added).

0027-13 Continued

- The new ER/ITS report itself acknowledges that although the increase in manufacturing on the Blair/Hylebos Peninsula may present operations that potentially add to the demand for fire services, "these developments will help restore the economic and tax-generating base within the Tideflats."[26] Those benefits would already be realized upon construction of Tacoma LNG, as the positive fiscal impacts to the City as a result of the project construction phase alone total $5.17 million.

The nexus and proportionality requirements are not met for an exercise of substantive SEPA authority to impose mitigation to pave a road in order to improve fire response for this project.[27].

0027-14

ITS Funding: PSE has contributed $75,000 to the City toward the cost of the ER/ITS study. We understand that grant funding for 50% of the remaining costs may have been identified already. Contribution to the remaining unfunded need for Phase I ITS may be an appropriate mitigation measure taking into account the amount already contributed and the $5.17 in new revenues to the City as a result of the Project's construction.

0027-15

Changes consistent with the foregoing should be made to Section 3.10 of the FEIS as follows: At 3.10.3.10 - Potential Future Transportation Improvement Projects, the following should be added as a result of the recent 2016-2017 budget passed by the Washington Legislature and signed by Gov. Inslee in July, 2015 after the release of the DEIS:

> Tacoma to Puyallup-New Freeway received funding recently when the Governor signed the new-law Connecting Washington transportation bill. Design of the SR 167 extension, six lane facility (two general purpose, one HOV lane each direction) in Puyallup from SR 161 to I-5, and four lane facility (two general purpose lanes each direction) from I-5 to SR 509 is about 15 percent complete, to include new interchanges at SR509/54th, SR 167/Valley Avenue and I-5/SR 167. There is a new 70th Ave structure crossing over I-5. Currently the project is preparing a NEPA Re-Evaluation for FHWA approval. Design Documentation and Plans for Approval will be the next milestone document for this project. Our Record of Decision was signed in October 2007. There have been a few a more parcels acquired, however the alignment has been refined (changed) from the FEIS to reduce right of way (ROW) costs, reduce environmental impacts, and reduce construction costs (see attached pdf). We are in beginning efforts of scheduling an access hearing for Spring 2016, which will result in new ROW plans for continued acquisition by September 2016. We have been allocated funds over the next four biennia (2015-2023). The key piece being completion of ROW acquisition throughout the corridor. Relocation of businesses once ROW is acquired will take approximately 3 years to complete. Construction of portions of the overall project (e.g. wetland mitigation or riparian restoration or stream relocation project) could starts at early as 2017.

[26] June, 2015 ER/ITS at p. 4.
[27] Based on constitutional law from *Nollan* to *Dolan* to *Koontz*.

On p. 3.10-16, at Safety, the following revisions should be made consistent with the DEIS and the foregoing: 0027-16

> The number of vehicle collisions and the type of collisions within the Tacoma LNG Facility site are not expected to change as a result of the Proposed Action. The nominal increase in traffic volume would not be expected to cause increased traffic incidents, and no changes in traffic patterns are anticipated.
>
> Introduction of LNG tank trucks on the roadways near the Tacoma LNG Facility site would not significantly affect safety. The Port of Tacoma currently experiences heavy truck traffic, and any new LNG tank trucks associated with the Proposed Action would be fewer than the number currently generated at the Tacoma LNG Facility site by PCC Logistics.
>
> ~~However, the operation of a major LNG processing facility would pose increased health and safety risks in the vicinity of the Project, as described in Section 3.5 (Public Health and Safety). These increased risks would result in a greater need for transportation improvements to ensure emergency services' access to the area.~~

At 3.10.6.1 - Avoidance, Minimization, and Mitigation - Construction, the second to last bullet should be revised as follows: 0027-17

- Following installation of the pipeline~~ with the exception of Taylor Way~~, roads would be restored by repaving the travel lane impacted by the pipeline construction pursuant to ~~the~~appropriate plans and specifications adopted by~~of~~ Tacoma Public Works, City of Fife Public Works, and Pierce County Public Works.

At 3.10.6.1 - Avoidance, Minimization, and Mitigation - Construction, the last bullet should be revised as follows: 0027-18

> For the 2 miles of Taylor Way from SR 509 to the Project site, restoration requirements for areas disturbed by placement of the new gas line will be based on the City Right-of-Way Restoration Policy requirements, which will be determined by the design and construction methodology of the Project's new gas line design. ~~Utility conflicts, utility separation requirements, and subsurface soils conditions will determine the alignment of the gas main within the Taylor Way roadway. Standard Plan SU-15A requires the full trench to be repaired, including a 2-foot-wide cut back zone on both sides of the trench. Transverse joints cannot fall within the wheel path; therefore, the pavement restoration may include up to two full lanes. Standard Plan PD-01 requires that the pavement design section satisfy the specifications for a Heavy Haul Industrial Corridor. The method of construction will also impact restoration requirements. If bore pits are being proposed, Section 2.3 of the Restoration Policy requires the consolidation of roadway excavations that are within 75 feet of each other. This is typically accomplished with a grind and overlay.~~

In regard to Section 3.10.6.2, the following revisions should be made consistent with the foregoing. Parenthetically, discussion of any mitigation measures for 3.5 - Public Health and Safety and 3.11 -Public Services and Utilities does not belong in 3.10 - Transportation. 0027-19

> 3.10.6.2 Operations
> Project operations are not likely to have an adverse impact on vehicle delay times, vehicle queues, or congestion during the afternoon peak hour. Impacts on traffic outside the peak hour are not expected based on the Project operation's nominal effect on traffic volumes. However, the Project is in ~~does add a new and significant risk to~~ an area of the City that currently does not meet the City's standard for emergency services' response time. The following mitigation measure~~s~~ would help improve emergency services' ability to respond to emergencies at ~~on the Blair/Hybelos peninsula and~~ the Project site. ~~Section 3.5 (Public Health and Safety) also addresses the increased public health and safety risks.~~
> ~~• The ER/ITS Study indicates that improving Taylor Way to meet current City standards will improve emergency response travel time by approximately 40 seconds. Establishment of a Local Improvement District with participation by PSE to rebuild Taylor Way to Heavy Haul Industrial Corridor standards should be considered.~~
> • Construction of Phase I of the planned ITS Infrastructure needed for basic information sharing among stakeholders, as defined in the ER/ITS study.
>
> ~~In addition, as described in Section 3.11 (Public Services and Utilities), it is recommended a new unit of the Tacoma Fire Department with fire response, emergency medical services, and hazardous materials operations capabilities be stationed in proximity to the Tacoma LNG Facility.~~

At 3.10.7, the following revision should be made consistent with the foregoing: 0027-20

> Unavoidable adverse impacts on traffic and transportation are also not expected as a result of operating the Project. ~~The need for additional access for emergency services to a site with increased public health and safety needs during operation of the Tacoma LNG Facility would be addressed by the mitigation measures defined in Section 3.10.6.2.~~

Chapter 3.11 - Public Services and Utilities

The discussion regarding Chapter 3.10 - Transportation is reincorporated by this reference regarding Public Services and Utilities.

At Section 3.11.4.1 - Fire Protection, the construction of Tacoma LNG does not present an increased risk of an emergency event requiring the mitigation measures described and discussed above. The construction methodologies are similar to other major construction projects. The presence of "potentially hazardous materials on site (including diesel, fuel oil, lubricant and others)…" occurs on other major construction projects, including construction project equipment, demolishing structures and the like. 0027-21

The following revision to p. 3.11-11 is recommended accordingly:

0027-21 Continued

Fire Protection

This subsection addresses potential impacts to fire protection services that would result from the construction of the Project. ~~There is an increased risk of an emergency event requiring fire protection services during the construction period, which would require the application of mitigation measures listed in Section 3.5.6 (Avoidance, Minimization, and Mitigation), as well as Section 3.11.6 (Avoidance, Minimization, and Mitigation).~~

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Construction methods, materials, Labor and Industries safety regulations and other applicable construction safety measures are conventional to project demolition and construction in the City of Tacoma, and present no probability of a significant adverse environmental impact. ~~Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could result in an emergency event and an increase in emergency calls to fire stations in the vicinity of the Project as described in Section 3.11.3.1 (Fire Protection).~~

~~The increased level of activity on site during demolition and construction would increase the likelihood of a fire or hazardous material incident. The use of construction machinery would likely result in the increased presence and use of potentially hazardous materials on site (including diesel, fuel oil, lubricant and others), as well as an increase in potential sources of ignition. In addition, because the initial stages of construction for the Tacoma LNG Facility would involve the decommissioning and/or demolition of existing industrial facilities, there could be an additional increased risk of hazardous materials incident during this period.~~

Based on traffic modeling in the vicinity of the Project, temporary increases in traffic due to construction would not significantly impact the ability of fire protection services to access the Port of Tacoma.

0027-22

Consistent with the discussion throughout this letter, and further consistent with the verbatim but italicized introductory language below, the DEIS concludes that most operational incidents would not likely require fire protection services. The plant will be designed, constructed and operated in accordance with the most modern and exacting applicable laws and regulations. The DEIS is replete with discussion, analysis and support for this conclusion. The text on p. 3.11-17 should be revised as follows:

Most operational incidents would likely not require direct intervention of fire protection services due to the safeguards described above. However, demand for fire protection services would nevertheless likely be increased as a result of Project operations, for the following reasons:

- Facility emergency response procedures involve notification of first responders from the Tacoma Fire Department who would be obligated to respond;
- Even if no direct fire response is necessary by fire protection services, an operational incident would likely require the intervention of auxiliary services

provided by the Tacoma Fire Department, such as EMS or hazardous materials response; 0027-22 Continued

- Reopening of Fire Station 15 is a recommend mitigation measures that places EMS responders in close proximity for a timely response.
- ~~Those rare incidents that would require direct intervention of fire response services are likely to be very severe and require significant amounts of Tacoma Fire Department staff and equipment for both direct fire response and auxiliary services; and~~
- ~~As noted in Section 3.11.4.1 (Construction Impacts), the relative lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident.~~

~~The operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would therefore need to include mitigation measures to address these impacts, as listed in Section 3.11.6 (Avoidance, Minimization, and Mitigation) and Section 3.5 (Health and Safety).~~

At 3.11.6 - Avoidance, Minimization, and Mitigation, page 3.11-22, the last sentence italicized in the paragraph excerpted below is unclear as to intent or propriety under SEPA. If the intent is to indicate that revenues derived from the construction of Tacoma LNG will be distributed in a fashion determined by the City that is appropriate. However, to suggest that mitigation for impacts occasioned by Tacoma LNG falls short because those new revenues were already distributed elsewhere and are simply unavailable is not appropriate under SEPA because it potentially skews the analysis of nexus and proportionality. PSE is confident that this is not the intent of such statement. However, please correct to conform to SEPA and clarify the intent of the statement. 0027-23

> In addition to the various mitigation measures described in this section, increased demand for public services or utilities during construction and operation of the Project would be partially mitigated by an increase in City tax revenue generated by the Proposed Action through the process described in Section 3.12.4.2 (Operations Impacts). *Nonetheless, new City tax revenues generated by the Proposed Action would only offset projected impacts to public services and the cost of required mitigation to a limited extent, and would likely need to be redistributed to benefit the full range of City services.*

In regard to the first bulleted mitigation measure in 3.11.6.1, at p. 3.11-22 and its identical counterpart in 3.11.6.2, at p. 3.11-24, PSE suggests the following revisions in accordance with the most recent ER report dated June 2015: 0027-24

- A new unit of the Tacoma Fire Department ~~with fire response and EMS response capabilities and hazardous materials awareness~~ appropriately staffed in accordance with the needs analyzed in the ER report of June, 2015 would be stationed at Fire Station 15, in proximity to the site of the Tacoma LNG Facility at the time operations are commenced at Tacoma LNG. Mitigation for the costs of reopening Fire Station 15 should be accurately evaluated and proportionate

mitigation for unmet need considered. ~~for the duration of construction. This would address the increased risk of incidents requiring fire protection and EMS, reduce response times to potential incidents and avoid impacts to fire protection in other parts of the Tacoma Fire Department if an incident occurs on site.~~ 0027-24 Continued

0027-25

Insofar as there would be a new need to fund the on-going operations of Fire Station 15, we appreciate that the DEIS recognizes that this project will generate $1.374 million per year in direct new tax revenues, not to mention the other reasonably foreseeable tax-revenue generating projects proposed for the Blair-Hylebos Peninsula or the significant but uncalculated indirect economic activity that flows from Tacoma LNG. Determining proportionate shares for an on-going expense in the face of a variety of new revenues accruing in the future is particularly difficult. Nevertheless, PSE recognizes that those costs (e.g., staffing) are an on-going expense. PSE acknowledges that the determination of how the City allocates new, on-going tax revenues from the operations of Tacoma LNG is soundly within the City's discretion. Nevertheless, PSE strongly encourages the City to consider dedicating on-going tax revenues from the operations of Tacoma LNG to the staffing of Fire Station 15.

0027-26

In regard to 3.11.7 Conclusion, the following revisions are suggested as consistent with the entirety of the DEIS and the foregoing comments:

3.11.7 Conclusion

~~With the exception of fire protection services, t~~ The mitigation measures contained in this Final EIS and the design, construction, and operations and safety measures, standards and regulations applicable to Tacoma LNG, as periodically inspected for continuing compliance by the appropriate jurisdictions with authority, enable this Facility to be sited, built and operated safely in the city of Tacoma. As appropriately mitigated, the Proposed Action would result in no significant or unavoidable impacts to public services and utilities potentially associated with construction, operation, and decommissioning of the Project~~, so long as the appropriate measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation) are implemented.~~

~~However, the Proposed Action would result in significant impacts to fire protection services, for the following reasons:~~

- ~~Proposed Action- related activities, during both the construction and operations phases, wouldresult in increased risk of incidents requiring fire protection, EMS and hazardous materials response.~~
- ~~The lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident. For example, Station 3 is the only station serving Northeast Tacoma. Station 12 serves the entire Port of Tacoma, which includes other high risk sites.~~

~~The mitigation measures described in Section 3.11.6.1 (Tacoma LNG Facility) and Section (Operations) would reduce these risk to a less than significant level, in particular through the addition of new firefighting, EMS and hazardous materials capacity in the~~

0027-26 Continued

~~vicinity of the Project, and through the implementation of health and safety and emergency protocols detailed in Section 3.5 (Public Health and Safety).~~

Last, as much a parenthetical comment as anything, the last paragraph on p. 3.11-26, inclusive of its 3 bullets, seem inconsistent with the fundamental purpose of SEPA, which is to reasonably and thoroughly discuss a proposal's probable significant adverse environmental impacts and explore their potential mitigation in order to ensure decision-makers are fully informed.

CONCLUSION

Tacoma LNG would bring significant private investment by TOTE and PSE were it to develop in the City of Tacoma. The facility would be state-of-the-art, and subject to an exacting and exhaustive list of federal, state and local laws and regulations. New taxes revenues of $5.17 million would be generated for Tacoma from construction-related activities, and an additional ~$1.5 million +/- per year from on-going operations. Indirect economic activity resulting from the project in the way of new jobs, additional spending and new indirect tax revenues is over $170 million in the Tacoma-Fife-Pierce County area. To the extent the project results in impacts that are unmitigated by the generation of the new revenues to the City of Tacoma, as discussed above, mitigation measures that are proportionate to these impacts should be required as stated above. Accordingly, the FEIS should incorporate these changes and be published to inform decision-makers' actions to permit and otherwise authorize Tacoma LNG.

We appreciate the City of Tacoma's engagement and dedication to this process.

Very truly yours,

Puget Sound Energy, Inc.

Larry Tornberg

Larry Tornberg
Senior Siting Project Manager

Cc: Roger Garratt
Lorna Luebbe
Jim Hogan

Number	Issue	Response
0027-1	Plants and Animals	With regard to Table ES-1, in Section 3.4, the commenter notes that the U.S. Fish and Wildlife Service has concluded that observers are not necessary for Marbled Murrelets in the context of this project. The commenter requests that the Marbled Murrelet (last bulleted item) be removed from the table. **Response: The final EIS will reflect this requested change.**
0027-2	Public Health and Safety	The commenter notes that the LNG Facility will not be accessible to the public but that PSE will be providing mitigation related to this loss pursuant to the City of Tacoma's Shoreline Master Program. **Response: Comment noted.**
0027-3	Public Health and Safety	With regard to page 3.5-3, the commenter requests that citations to 40 CFR 68 and 52 NFPA be corrected to 49 CFR 193 and 59A NFPA, respectively. **Response: The final EIS will reflect this request.**
0027-4	Public Health and Safety	With regard to draft EIS page 3.5-13, the commenter requests revision of nomenclature to reflect current requirements, and the following correction: A Fire Risk Assessment (NFPA 59A)Protection Evaluation would be completed prior to construction that evaluates the level of risk present and identified measures to reduce risk to an acceptable level per the requirements of NFPA 59A 9.1.2. **Response: The final EIS will reflect this request.**
0027-5	Public Health and Safety	The commenter notes that PSE provided the City of Tacoma with a Fire Protection Evaluation (FPE) on July 9, 2015, complying with the requirement cited in the prior response. **Response: The City of Tacoma is currently reviewing the FPE. The final EIS will note that an FPE has been submitted.**
0027-6	Public Health and Safety	With regard to draft EIS page 3.5-13, second bulleted mitigation measure, the commenter requests the following modification: To ensure evacuation routes (including Alexander WayAvenue, 11th Street and Taylor Way) in the vicinity of the project will remain open in the event of an LNG release, the facility design will incorporate mitigation measures to ensure that thermal radiation, and vapor dispersion, or the effects of a vapor clous does not extend onto any of those streets. **Response: The intent of this paragraph was to limit thermal radiation and vapor dispersion to within the property lines of the Tacoma LNG site and the TOTE property in the vicinity of the LNG fueling operation, not limited to the streets. The final EIS will keep the original reference to within the property lines.**
0027-7	Public Health and Safety	With regard to the text on page 3.5-17, Commenter requests that the text regarding each entity's rights and responsibilities be revised. Commenter proposes a number of changes. **Response: This section will be revised in the final EIS. The commenter's specific proposed changes will be taken into consideration.**
0027-7 cont'd	Public Health and Safety	See previous response.

Number	Issue	Response
0027-8	Aesthetics, Light and Glare	The commenter "takes issue with the draft EIS's conclusion that the LNG storage tank constitutes an adverse environmental impact, even if insignificant." The commenter believes that the storage tank is fully consistent with other elements of the surrounding industrial landscape. The commenter recommends that "the conclusion should be revised to conclude the Project aesthetics do not constitute an adverse environmental impact." **Response: The City of Tacoma recognizes that the storage tank may be consistent with the surrounding industrial landscape, but it still introduces a significant and dominant new feature to senstive viewers overlooking the project site. The draft EIS describes this by stating that the "...asethetic impact of the LNG storage tank would be adverse for views from this area." The final EIS will retain this characterization, but some editorial changes will be made to the mitigation section.**
0027-9	Transportation	With regard to Section 3.10, the commenter concurs with the draft EIS conclusion that the traffic volumes associated with Tacoma LNG are insignificant. **Response: Comment noted.**
0027-10	Transportation	With regard to Section 3.10, the commenter "agrees with the draft EIS that Taylor Way currently shows significant wear and tear" and "is already a poor roadway surface." The commenter disagrees with the assertion in the draft EIS that "it is 'possible' that Tacoma LNG-related traffic [...] could cause additional damage to roadway surface conditions." **Response: Comment noted. The City of Tacoma does not agree and notes that in the Transportation Section it is stated "Approximately 11 large or heavy-duty vehicles associated with construction could be used during a typical day of peak construction," which could cause additional damage to roadway surface conditions.**
0027-10 cont'd	Transportation	See previous comment.
0027-11	Transportation	The commenter notes that draft EIS section 3.5 (Public Health and Safety) establishes that the operation of the Tacoma LNG facility would not "present significant adverse environmental impacts regarding safety, regardless of the condition of Taylor Way." Therefore, the commenter disagrees with the statement on draft EIS page 3.10-16, whereby "the operation of a major LNG processing facility would pose increased health and safety risks in the vicinity of the Project, as described in Section 3.5". **Response: Comment noted. A word search for "significant, adverse, and environmental" did not reveal any reference to Taylor Way. However, section 3.5 does describe numerous LNG hazards such as cryogenic burns, flammability, and aphyxiation; moreover, there are other industrial accidents that could occur on site that would require emergency responders to be on site as quickly as possible.**
0027-11 cont'd	Transportation	See previous response.

Number	Issue	Response
0027-12	Transportation	This comment applies to the Public Services and Utilities section as well as Transportation. The commenter (PSE) supports the Fire Station 15 reopening, reflecting existing deficiencies and the increased need from foreseeable facilities in the area. The commenter asks that the final EIS acknowledge new revenue from the Proposed Action and set forth that PSE's share of cost for reopening Fire Station 15 be proportionate to mitigation obligations imposed by Tacoma LNG's impacts. **Response: Comment noted. The final EIS will reflect the agreed upon mitigation measure of reopening Fire Station 15.**
0027-13	Transportation	The commenter states that there is no public health and safety risk to support reducing the current 12.7-minute response time to the proposed Tacoma LNG Facility site, and therefore no nexus or proportionality in requiring the repaving of Taylor Way as mitigation for the Proposed Action. The commenter offers a variety of reasons, including: The proposed facility would not present an unmitigated significant risk of adverse impact to public health and safety. There would be no significant hazard to public health and safey in a catastrophic event. The 12.7-minute response time has no nexus to the development of Tacoma LNG and is the result of a variety of pre-existing factors. The 12.7 minute response time does not account for the proposed mitigation measure of reopening Fire Station no. 15. A 40-second improvement in a 12.7 minute event is a 5.2% improvement. The improvement has been estimated at 15 to 40 seconds by the updated ER study rather than 40 seconds. This improvement in travel time is expected to be lost by increases in roadway congestion by 2020. Developments such as Tacoma LNG on the Tideflats, although they may potentially add to the demand for fire services, generate significant positive fiscal impacts. **Response: The City of Tacoma disagrees with the contentions regarding the absence of significant risk in general, and in a catastrophic event in particular. The City of Tacoma further disagrees with the assertion that the current emergency bears no nexus to Tacoma LNG. Both construction and operation of the Tacoma LNG facility will increase the need for emergency services in the area, for the reasons cited in the draft EIS. The City of Tacoma further notes that the reopening of Fire Station no. 15 will not be immediate and will require refurbishing of the building, meaning that emergency response services will continue to be provided from Fire Stations no. 3 and 12 in the intervening period.** **For these reasons, the City of Tacoma in general disagrees with the comment, but nonetheless does recognize the significant cost to the Project to implement the proposed mitigation for Taylor Way. For this reason, the City of Tacoma, the Port of Tacoma, and PSE have reached and agreement for rebuilding Taylor Way to Heavy Haul Standards.**
0027-13 cont'd	Transportation	See previous response.
0027-13 cont'd	Transportation	See previous response.

Number	Issue	Response
0027-14	Transportation	The commenter notes that PSE has contributed $75,000 toward the cost of the Emergency Response/Intelligent Transportation Systems (ER/ITS) study and proposes that contribution to the remaining unfunded need for Phase I ITS may be an appropriate mitigation measure taking into account the $5.17 million in new revenues to the City as a result of the Proposed Action. **Response: Comment noted, but new revenue resulting from the Proposed Action will be needed to re-establish and maintain operations of the re-opened fire station.**
0027-15	Transportation	The commenter notes upcoming updates regarding SR 167 and proposes changes to the text in draft EIS section 3.10.3.10. **Response: Comment noted. The final EIS will reflect changes to the text proposed by the Washington State Department of Transportation (see response 0022-1).**
0027-16	Transportation	With regard to text on page 3.10-16, the commenter requests that the following paragraph concerning Safety be removed: However, the operation of a major LNG processing facility would pose increased health and safety risks in the vicinity of the Project, as described in Section 3.5 (Public Health and Safety). These increased risks would result in a greater need for transportation improvements to ensure emergency services' access to the area. **Response: Comment noted, no changes will be made in the final EIS.**
0027-17	Transportation	With regard to section 3.10.6.1, the commenter requests minor modifications to a mitigation measure, specifically: Following installation of the pipeline with the exception of Taylor Way, roads would be restored by repaving the travel lane impacted by the pipeline construction pursuant to theappropriate plans and specifications adopted byof Tacoma Public Works, City of Fife Public Works, and Pierce County Public Works. **Response: The proposed changes will be made in the final EIS.**
0027-18	Transportation	With regard to draft EIS section 3.10.6.1, the commenter requests that the technical specificity in the text regarding road reconstruction plans be removed. **Response: The final EIS will reflect the requested changes. However, the specifics to be deleted from the final EIS will be reflected in permit conditions.**

Number	Issue	Response
0027-19	Transportation	With regard to draft EIS section 3.10.6.2, the commenter requests edits to the text as follows: Project operations are not likely to have an adverse impact on vehicle delay times, vehicle queues, or congestion during the afternoon peak hour. Impacts on traffi outside the peak hour are not expected based on the Project operation's nominal effect on trffic volumes. However, the Project is in does add a new and significant risk to an area of the City that currently does not meet the City's standard for emergency services' response time. The following mitigation measures would help improve emergency services' ability to respond to emergencies at on the Blair/Hylebos peninsula and the Project site. Section 3.5 (Public Health and Safety) also addresses the increased public health and safety risks. The ER/ITS study indicates that improving Taylor Way to meet current City standards will improve emergency response travel time by approximately 40 seconds. Establishment of a Local Improvement District with participation by PSE to rebuild Taylor Way to Heavy Haul Industrial Corridor standards should be considered. Construction of the Phase I of the planned ITS infrastructure needed for basic information sharing among stakeholders, as defined in the ER/ITS study. In addition, as described in Section 3.11 (Public Services and Utilities), it is recommended a new unit of the Tacoma Fire Department with fire response, emergency medical services, and hazardous materials operations capabilities be stations in proximity to the Tacoma LNG Facility. **Response: Comment noted, some of the recommended changes will be incorporated into the final EIS.**
0027-20	Transportation	With regard to draft EIS section 3.10.7, the commenter asks that the reference to access for emergency services be removed and the text revised as follows: Unavoidable adverse impacts on traffic and transportation are also not expected as a result of operating the Project. The need for additional access for emergency services to a site with increased public health and safety needs during operation of the Tacoma LNG Facility would be addressed by the mitigation measures defined in Section 3.10.6.2. **Response: The City of Tacoma disagrees with this deletion. No changes will be made to this section in the final EIS in response to this comment.**

Number	Issue	Response
0027-21	Public Services and Utilities	With regard to Section 3.11.4.1, the commenter asserts that "the construction of Tacoma LNG does not present an increased risk of an emergency event." Accordingly, the commenter requests edits to the text at page 3.11-11 reflecting this position, justified by the fact that construction of Tacoma LNG will follow safety and other standards typical of major construction projects: Fire Protection This subsection addresses potential impacts to fire protection services that would result from the construction of the Project. There is an increased risk of an emergency event requiring fire protection services during the construction period, which would require the application of mitigation measures listed in Section 3.5.6 (Avoidance, Minimization and Mitigation), as well as Section 3.11.6 (Avoidance, Minimization and Mitigation). *Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System* Construction methods, materials, Labor and Industries safety regulations and other applicable construction safety measures are conventional to project demolition and construction in the City of Tacoma, and present no probability of a significant adverse environmental impact. Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could result in an emergency event and an invrease in emergency calls to fire stations in the vicinity of the Project as described in Section 3.11.3.1 (Fire Protection). The increaswed level of activity on site during demolition and construction would increase the likelihood of a fire or hazardous material incident. The use of construction machinery would likely result in the increased presence and use of potentially hazardous materials on site (including diesel, fuel oil, lubricant and others), as well as an increase in potential sources of ignition. In addition, because the initial stages of construction for the Tacoma LNG Facility would involve the decommissioning and/or demolition of existing industrial facilities, there could be an additional increased risk of hazardous materials incident during this period. **Response: The City of Tacoma disagrees with the proposed deletions. Construction of the project, even following applicable safety protocols, does increase risk of an emergency event compared to the current situation (no construction), due to the hazardous nature of construction in general. No changes will be made to this section in the final EIS in response to this comment.**
0027-21 cont'd	Public Services and Utilities	See previous response.

Number	Issue	Response
0027-22	Public Services and Utilities	With regard to draft EIS page 3.11-17, the commenter requests edits regarding the need for fire protection services reflecting the fact that "most operational incidents would likely not require direct intervention of fire protection services." Edits include adding the following bullet: Reopening of Fire Station 15 is a recommended mitigation measure that places EMS responders in close proximity for a timely response. Those rare incidents that would require direct intervention of fire response services are likely to be very sever and require significant amounts of Tacoma Fire Department staff and equipment for both direct fire response and auxiliary services. As noted in Section 3.11.4.1 (Construction Impacts), the relative lack of alternatives to Stations 3 and 12 for rapid response ad the Tacoma LNG Facility and TOTE Maine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident. The operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would therefore need to include mitigation measures to address these impacts, as listed in Section 3.11.6 (Avoidance, Minimization and Mitigation) and Section 3.5 (Health and Safety). **Response: The City of Tacoma disagrees with the extent of the deletions. Some edits will be made to the text in the final EIS, but not the proposed deletions.**
0027-22 cont'd	Public Services and Utilities	See previous response.
0027-23		The commenter requests that the intent of the following statement be clarified to conform to SEPA: *In addition to the various mitigation measures described in this section, increased demand for public services or utilities during construction and operation of the Project would be partially mititated by an increase in City tax revenue generated by the Proposed Action through the process described in Section 3.12.4.2 (Operations Impacts). Nonetheless, new City tax revenues generated by the Proposed Action would only offset projected impacts to public services and the cost of required mitigation to a limited extent, and would likely need to be redistributed to benefit the full range of City services.* **Response: Comment noted. The underlined sentece will be edited to the following in the final EIS:** ***"Nonetheless, new City tax revenues generated by the Proposed Action would only offset projected impacts to public services and the cost of required mitigation to a limited extent."***

Number	Issue	Response
0027-24	Transportation	The commenter suggests edits to the first bulleted mitigation mesure in draft EIS section 3.11.6.1, and its identical counterpart in section 3.11.6.2, as follows: A new unit of the Tacoma Fire Department with fire response and EMS response capabilities and hazardous materials awareness appropriately staffed in accordance with the needs analyzed in the ER report of June, 2015 would be stationed at Fire Station 15, in proximity to the site of the Tacoma LNG Facility at the time operations are commenced at Tacoma LNG. Mitigation for the costs of reopening Fire Station 15 should be accurately evaluated and proportionate mitigation for unmet need considered. for the duration of construction. This would address the increased risk of invidents requiring fire protection and EMS, reduce response times to potential incidents and avoid impacts to fire protection in other parts of the Tacoma Fire Department if an incidient occurs on site. **Response: Comment noted. Some of the recommended edits will be incorporated into the final EIS.**
0027-24 cont'd		See previous response.
0027-25	Public Services and Utilities	The commenter encourages the City of Tacoma to consider dedicating ongoing tax revenues from the operation of Tacoma LNG to the staffing of Fire Station 15. **Response: Comment noted.**
0027-26	Public Services and Utilities	The commenter (PSE) proposes significant edits to Section 3.11.7, the conclusion of the Transportation section, reflecting commenter's positon that the Proposed Action would result in no significant or unavoidable impacts to public services and utilities, including fire response services. **Response: The City of Tacoma disagrees with this position and the proposed edits. No changes will be made in response to this comment.**
0027-26 cont'd	Public Services and Utilities	See previous response.

July 23, 2015

Shirley Schultz
Project Manager
City of Tacoma Planning Department

Re: LNG project at the Port of Tacoma

Dear Ms. Schultz:

0028-1

As a former Mayor and current resident of the City of Tacoma, I have both a strong interest and a unique perspective on what is best for our community and our citizenry. It is from this perspective that I wish to provide my support for the LNG project Puget Sound Energy has proposed to be located at the Port of Tacoma.

The environmental benefits of this project are clear. It is being driven by the need to provide a cleaner fuel alternative for maritime vessels owned by Totem Ocean Trailer Express (TOTE), and berthed at the Port of Tacoma. The bottom line is that the LNG facility fueling TOTE ships will help reduce greenhouse gas emissions and virtually eliminate visible particulate emissions. This is a very favorable outcome for the citizens of Tacoma and the entire South Sound region, namely better air quality and an accompanying reduction in health risks. As Tacoma just received news of its removal from non-attainment status, this type of environmentally responsible project can continue our momentum in improving our local air quality.

In addition to these environmental benefits, the project also is consistent with the on-going efforts by the City of Tacoma to encourage a healthy local business climate to help retain and grow companies who call Tacoma home. It will reaffirm that the Port of Tacoma is a leader of economic growth in Pierce County, supporting two well-known and respected local companies using the best available environmental technology to remain competitive in a world economy.

As such, the PSE LNG proposal is a win-win for the citizens of Tacoma to improve our environment and help local companies succeed and remain robust employers in our community.

Another important benefit is that the LNG project will generate additional tax revenues for our city government, including property taxes, sales taxes and utility taxes. As a current Tacoma school board member, I appreciate and value seeing projects that will lead to increased tax revenues to help our local schools.

As Mayor, I believed that it was the City's job to offer incentives as an encouragement to grow local businesses. This is a project that would give the City visibility as a leader in the nation in supporting clean businesses and growing our Port potential. The City should be encouraging the success of this project.

Finally and importantly, our local citizens and businesses will also benefit from the enhanced natural gas infrastructure provided by the LNG project. It is the most cost-effective way to ensure continued dependable service to all PSE natural gas customers on the coldest days of the year, when natural gas is in highest demand.

0028-1
Continued

I fully support the thorough review this project is receiving from federal, state and local government agencies. I am confident that this review and approval process will reach the conclusion that this project is good for our community. I am hopeful that the City will do all it can to assure the success of PSE's proposed LNG facility understanding that it will provide great benefits to the citizens of Tacoma, Pierce County and the Puget Sound region for years to come.

Sincerely,

Karen Vialle

Karen Vialle

Number	Issue	Response
0028-1	General	Commenter supports project. Comment noted.
0028-1 cont'd	General	See previous response.

Port of Tacoma
People. Partnership. Performance.
P.O. Box 1837
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www.portoftacoma.com

August 6, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

RE: Tacoma LNG Draft Environmental Impact Statement

Dear Ms. Schultz:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for Puget Sound Energy's (PSE) proposed Tacoma Liquefied Natural Gas (LNG) facility.

The Port of Tacoma (Port) strongly supports this project. The plant will provide Totem Ocean Trailer Express (TOTE) clean alternative fuel for its domestic service (primarily between Tacoma and Alaska). Changes in federal air quality requirements have necessitated significant emissions reductions from most commercial vessels within 200 miles of North American shores. While marine cargo related sources only account for 3% of fine particulate emissions in Pierce County, we believe these emission reduction initiatives demonstrate the leadership of the maritime industry in maintaining and improving our region's quality of life. The Port further supports PSE's goal of providing a peek shaving source allowing them to maintain expected levels of natural gas service throughout Pierce County during times of high gas demand on exceptionally cold winter days.

PSE's proposed plant will place Tacoma at the forefront of providing clean fuel to the maritime, as well as other sectors of the transportation industry. It is very exciting to watch the transition to cleaner fuels at our very doorstep.

In general the Port finds the DEIS to be thorough and well-reasoned. The Port also appreciates the speed at which the City of Tacoma (City) produced the document and engaged the SEPA process. Below is a compilation of comments from Port staff. Please note these comments are Port positions as the lessor of the Tacoma plant site and as a major land owner and developer of the Tideflats area.

Comment 1 ES-1; Section 3.1: The Port has two minor, but important, technical corrections regarding subsurface conditions at the proposed plant site.

Section 3.1.3.4 (pg. 3.1-10).

0029-1

Please consider replacing the last sentence with the bold text to the following paragraph.

Port Parcel 2 (adjacent to the northwest of the Tacoma LNG Facility site): The northwest portion of this property is located adjacent to the former PRI site. The property historically was used for bulk petroleum storage. It is impacted by migration of groundwater-containing solvents and elevated pH from the Occidental Chemical site, and potentially by migration of petroleum

contamination from the adjacent former PRI site (Port of Tacoma 2009). Petroleum contamination has been documented in soil and groundwater on the Port Parcel 2 property. **Parcel 2 and the former PRI site are being investigated under an Agreed Order between Ecology, Mariana Properties (Occidental Chemical Corporation) and the Port.** 0029-1 Continued

Section 3.1.3.4 (pg. 3.1-11) 0029-2

In the second paragraph to further clarify, please consider deleting "a narrow plume of"… and replacing it with "identified a **delineated** plume of **dissolved** benzene in groundwater that extends onto the TOTE Marine Vessel LNG Fueling System site, approximately 300 feet northwest of the proposed cryogenic pipeline."

Comment 2 ES-1; Section 3.4: States that a bubble curtain and one other noise attenuation device would be used for impact driving of all steel pile. The Port disagrees with the need to use bubble curtains in this area. The species for which this type of attenuation device is intended to protect are not present during the in-water construction season. There are not forage fish beds in this area. The National Marine Fisheries Service (US NMFS) did not request bubble curtains at all for this project as part of their Endangered Species Act (ESA) Section 7 Consultation. The US Fish and Wildlife Service has requested bubble curtains as part of Section 7 Consultation for pile 30" in diameter and larger. And while the Port remains confused as to the science behind that request, PSE has agreed to use bubble curtains for 30" pile. Given the outcome of the Consultation process, the City should not impose more stringent requirements than the USFWS. There is no need for bubble curtains for pile under 30". 0029-3

Further, the Port disagrees with the need to have observers for marbled murrelets. They are not present in this (or likely any) part of Commencement Bay. Murrelets do not frequent industrial areas. The USFWS, which regulates impacts to marbled murrelets, specifically stated murrelet monitoring during pile driving is not required for this project. 0029-4

Comment 3 ES.5; Section 3.8: The Port disagrees with the conclusion that replacing an old warehouse on a currently hard-scape site in a heavily industrialized area with a large gray tank constitutes a significant negative aesthetic impact. This is not a view sensitive area like the Columbia Gorge. It is an industrial area that pre-dates all "sensitive receptors". While the Port understands and appreciates the desire for right-of-way trees and some on-site landscaping, painting a structure like the tank is unreasonable. 0029-5

Comment 4; ES-1, Section 3.10: The Port is confused by the Taylor Way discussion. As written, this implies the applicant (PSE) is liable for the rebuilding of Taylor Way from SR 509 to East 11th to heavy haul standards. Certainly, that cannot be the case. While the City has its restoration policy (which in this case would address trenching or direction bore installation of the Taylor Way pipeline) to saddle the last applicant for these costs is not legal under SEPA[1], nor appropriate for the long-term viability of Tacoma. Areas of 0029-6

[1] Under SEPA all mitigation must be proportionate to the impact caused by the proposal. The Tacoma plant does not create impacts to Taylor Way worthy of a $10 million-$11 million dollar rebuild.

the City that have fallow properties, be they industrial, commercial or residential that suffer deficits in infrastructure investment will continue to lie fallow as developers cannot make up for historic lack of public investment. Attempting to impose those costs on the "last applicant through the door" will create a significant chilling effect on investment in Tacoma. The rebuilding of Port of Tacoma Road should serve as a model for this case. The Port requests this section be clarified to note multiple funding partners, including agencies providing transportation grants, will be included in cost sharing.

0029-6 Continued

Further, the Port disagrees that the reconstruction of Taylor Way, which might improve fire response times by 15-40 seconds (according to City data), constitutes a significant positive impact. While 40 seconds could be critical in a medical emergency, given the design and fire suppression methods at LNG facilities 40 seconds will not improve fire safety. A fire at an LNG facility is either extinguished with on-site dry chemicals, or allowed to burn itself out. The reopening of the 11th Street fire station, directly across the road from the proposed plant site, would provide excellent medical response for any emergencies at the proposed Tacoma Plant, and elsewhere on the Blair Peninsula. The DEIS does an excellent job of discussing the safety and health hazards and risks of LNG facilities in Section 3.5. However, there is a disconnect between the analysis presented in Section 3.5 and the conclusions drawn in Section 3.10.

The Port recommends that the EIS distinguish between the need for improved investment in fire and medical services in this area from the desire to rebuild Taylor Way to heavy haul standards.

The Port notes that the City stands to collect over $5 million in fees and taxes just from the construction of the plant. This sum does not include any fees paid as mitigation. It also stands to collect approximately $1.3 million each year in taxes from the facility. And while the Port certainly will not tell the City how to allocate its funds, the Port does believe a portion of that money should be reinvested in the Blair peninsula. Not only will that help make this project work, it will help set that peninsula up for much needed future investment.

Again, thank you for your timely and good hard work on this project. Your efforts are greatly appreciated. If you have any questions regarding our comments please direct them to Tony Warfield at 253-428-8632.

Sincerely,

John Wolfe
CEO, Port of Tacoma and Northwest Seaport Alliance

Number	Issue	Response
0029-1	Earth	With regard to Section 3.1.3.4, Commenter recommends replacing portions of the text with the bold text indicated as follows: ***Port Parcel 2*** *(adjacent to the northwest of the Tacoma LNG Facility site): The northwest portion of this property is located adjacent to the former PRI site. The property historically was used for bulk petroleum storage. It is impacted by migration of groundwater-containing solvents and elevated pH from the Occidental Chemical site, and potentially by migration of petroleum contamination from the adjacent former PRI site (Port of Tacoma 2009). Petroleum contamination has been documented in soil and groundwater on the Port Parcel 2 property.* ***Parcel 2 and the former PRI site are being investigated under an Agreed Order between Ecology, Marianna Properties (Occidental Chemical Corporation) and the Port.*** **Response: The final EIS will reflect this recommended change.**
0029-1 cont'd	Earth	See previous response.
0029-2	Earth	With regard to draft EIS section 3.1.3.4, page 3.10-11, the commenter recommends deleting the text "a narrow plume of" and replacing it with "identified a delineated plume of dissolved benzene [...]" **Response: The final EIS will reflect the recommended change.**
0029-3	Plants and Animals	With regard to section 3.4, the commenter disagrees with the need to use a bubble curtain for driving pile under 30 inches, following the recommendations of the U.S. Fish and Wildlife Service. **Response: The final EIS will be edited to reflect that a bubble curtain may not be required per recommendations of the U.S. Fish and Wildlife Service.**
0029-4	Plants and Animals	The commenter disagrees with the need for observers for marbled murrelets, noting that the U.S. Fish and Wildlife Service, has "specifically stated murrelet monitoring during pile driving is not required for this project." **Response: The final EIS will not include a requirement to have observers for marbled murrelets.**
0029-5	Aesthetics, Light and Glare	The commenter disagrees with the conclusion that replacing current structures with a large grey tank "constitutes a significant negative aesthetic impact" and states that requiring "painting a structure like the tank is unreasonable." **Response: The City of Tacoma recognizes that the proposed LNG storage tank is located in an industrial area, but it is also a new dominant structure in the viewscape. The final EIS will not include a requirement to paint the LNG storage tank. However, it is recommended that the concrete be tinted a dark gray color to lessen the contrast with surrounding asphalt and buildings.**
0029-6	Transportation	The commenter disagrees that the full reconstruction of Taylor Way to heavy haul industrial standards would constitute appropriate and proportional mitigation to the impacts of the Project and recommends a model that was used in rebuilding of Port of Tacoma Road be considered. **Response: The final EIS will include mitigation that has been changed to be more proportional to the impacts of the Proposed Action.**
0029-6 cont'd	Transportation	See previous response.

Puyallup Tribe of Indians

August 17, 2015

VIA ELECTRONIC MAIL AND U.S. MAIL

Ms. Shirley Schultz, Principal Planner
City of Tacoma, Planning and Development Services Department
747 Market Street, Room 345
Tacoma, WA 98402

RE: Comments on the Draft EIS for the Tacoma LNG Facility proposed by Puget Sound Energy

Dear Ms. Schultz:

We want to thank City of Tacoma staff for sitting down with us on August 12th in Council chambers on a government-to-government basis to begin our discussions on the proposed Tacoma LNG facility. We appreciate the candor and openness of the conversation. It is essential we continue a transparent dialogue given the concerns both of our governments have regarding ensuring the safety of the Tribal membership and surrounding community, as well as preventing irrevocable damage to Tribal and community assets and properties.

The intent of this letter is to provide you preliminary comments on the draft EIS for the Tacoma LNG. The preponderance of our comments focus on safety and security issues associated with the proposed facility. The key issues with the draft EIS are two-fold. The EIS lacks quantitative analysis, most importantly with regard to defining the extent of the maximum thermal and radiation vapor zones (exclusion zone) that would be needed in the event of a catastrophic release. Secondly, the project continues to be modified, after the publication of the 0030-1 0030-2

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0030-2
Continued

draft EIS. For these reasons, we reserve the right to provide additional comments on this project in its "final configuration" as warranted.

Background

The Proposed Action as summarized in the Draft EIS is outlined below. The proposed action includes:

• receiving natural gas from PSE's distribution system, chilling natural gas to produce approximately 250,000 to 500,000 gallons of LNG daily, and storing up to 8 million gallons of LNG on site;

• re-gasifying the LNG for re-injection and diversion of approximately 85,000 decatherms (Dth) per day (995,000 gallons of LNG) of peak day gas supply into PSE's distribution pipeline system; and

• dispensing LNG for the following uses: maritime transportation fuel to be used by Totem Ocean Trailer Express (TOTE) at their Port of Tacoma facility (approximately 39 million gallons per year) and other future regional LNG marine vessel fuel customers, and loading to trucks or barges for other regional markets seeking a cleaner fuel. LNG would be stored in the Tacoma LNG facility storage tank before being transferred to TOTE's ships via cryogenic pipeline as part of the TOTE Marine Vessel LNG fueling system or bunkering barge originating at the Hylebos Pier. We have learned that the cryogenic pipeline option is the preferred approach.

Puyallup Tribe Comments

Our gravest concern about the proposed facility is the imminent endangerment to human life and property of an uncontrolled release from the facility. Given that the energy content of the 8 million storage tank has an equivalency of 11 hiroshima nuclear bombs, it is to us an untenable position to consider putting the safety and security of theTribal membership and community at risk by locating the proposed facility in a densely populated area. For this reason alone, we oppose the siting of the LNG facility on the Puyallup Reservation. 0030-3

The construction and operation of the proposed LNG facility disproportionately shifts the consequence of an uncontrolled release to the Tribe, potentially killing, injuring many Tribal members who live and work on the Reservation as well as damage to our properties. As we 0030-4

0030-4 Continued

discussed in our consultation on August 12th, over ¾ of the 5,000 members live on or near the Reservation. The Tribe is not peripetetic like most other populations, so members typically don't leave the Reservation. Such an action by PSE would place most of the entire Tribe in jeopardy of harm. This is a risk we are not willing to accept. We recognize the importance of cleaner fuels as well as our dependence on imports to meet U.S. energy demands, just don't take this action here.

We have several nearby properties that would be severely impacted if a catastrophic event were to occur at the facility. Our Chinook Landing Marina, Ole & Charlie's Marina, our Blair Waterway and Back-up properties as well as our Inner Hylebos Mitigation Site and Outer Hylebos Mitigation site and a host of other mitigation sites could be irrevocably damaged. We are very concerned the location of this facility would put the safety and welfare of employees associated with our marina and planned port development at risk. Attached maps show Tribal properties and surrounding land uses.

0030-5

In the event of a catastrophic event, the safety and security of the surrounding community would also be in jeopardy. There are over 30,000 workers in the tideflats during peak operations; 20,000 NE Tacoma residents; and over 200,000 people in Tacoma that would be placed at risk from a chain reaction of explosions or an ensuing vapor cloud that would disperse quickly off the site.

0030-6

James Fay, now deceased and a former professor emeritus at MIT, worked on LNG for over 35 years. Fay's exlusion zones extend well beyond the boundary of the facility site, regardless of the facility size. This makes sense given the thermal dynamics of cryogenic liquefied gas (at -260 degrees F) when it hits a relatively warmer medium, whether it be water or land. The liquid vaporizes rapidly. If the vapor cloud subsequently encounters an ignition source, those portions of the cloud with a combustible gas-air concentration will burn. The vapor cloud would gradually burn its way back to the location of the LNG spill and would continue to burn as a pool fire until all of the LNG that was spilled was consumed. An LNG pool fire is the evaporating gas in a combustible gas-air concentration that will burn above an LNG spill if ignited. The resulting pool fire would spread as the LNG pool expanded away from its source and continued evaporating. These pool fires are intensely hot, and they cannot be extinguished – all of the LNG must be consumed before it goes out. These fires burn much hotter and more rapidly than oil or gasoline fires, which renders emergency response in a very diminished capacity. Evacuation becomes necessary.

0030-6
Continued

The 2004 Sandia Report by the Sandia National Laboratory, a division of the Department of Energy, suggested that an expanding pool fire from a leak in a storage vessel could cause a fire that would be hot enough to melt steel at distances of 1,200 feet and could result in second degree burns on exposed skin a mile away. Of course, this is one scenario from a leak from a tanker barge. What makes LNG dangerous? Natural gas is 90% methane, which is highly combustible. Though in the liquid state, natural gas is not explosive, spilled LNG will quickly evaporate, forming a highly combustible vapor cloud, which if ignited, can be exceedingly dangerous. Fay says that "there's no way to put out that kind (pool) of fire". The fire would burn until all of its fuel is gone, which would take five to eight minutes, and it could ignite a rash of secondary fires on such a large scale that the secondary fires could cause more damage than the initial blaze. The risk of a chain reaction due to the open flames and flammable materials in the vicinity of the facility would be high.

Fay modeled several facility exclusion zones, and of course, their size is contingent on the extent of the spill, location, wind, and several other variables, but not one, was limited to the site boundaries. In some cases, like in the case of the Pleasant Point terminal on Sipayaik tribal land, the thermal and flammable radiation zones encompassed a swath of land about 20-square miles! Just last year, emergency personnel evacuated a 2-mile zone around the LNG storage facility near Plymouth WA on the Columbia when there was an explosion and ensuing fire.

For illustration purposes, we prepared a map that showed a one mile and two-mile "exclusion zone" around the proposed facility. The exclusion zones cover most of the industrial tideflats and a big portion of the residential neighborhood of NE Tacoma (see attached map). No quantification of the thermal and vapor zone is forthcoming in the draft EIS, but for a statement that the exclusion zone will not extend beyond site borders. There is no basis to support this statement. Concrete sumps are not going to contain a vapor cloud. At what distance does thermal radiation fall below the safe threshold of 1.6 kilowatts per square meter? A safe radiation distance for fires would be that for which the thermal radiation level does not exceed 1.6 kilowatts per square meter. Federal regulations govern thermal radiation protection (49 C.F.R. § 193.2057) and flammable vapor-gas dispersion protection (49 C.F.R. § 193.2059). Generally, each LNG container and LNG transfer system must have a dispersion exclusion zone in accordance with sections 2.2.3.3 and 2.2.3.4 of NFPA 59A-2001.

The draft EIS's failure to examine the extent of the risks identified above as added to the already existing facilities, including other fuel facilities that maintain open flames or also pose a significant fire and explosion risk renders the EIS deficient. An EIS should provide information to allow for a reasoned decision by identifying primary, secondary, and cumulative impacts. The cumulative impact analysis in the EIS fails to analyze the impacts the project will have as a result of its own risks ADDED to those risks already present from existing facilities. 0030-7

Furthermore, PSE has very little experience owning and operating an LNG storage facility. The LNG facility in Gig Harbor is a very, very small operation. Their experience re-gasifying LNG in order to meet peaking demand isn't extensive either. They simply have nowhere near the expertise of owning and operating a facility with complexities like the one currently proposed. Furthermore, we are dismayed by the fact that this facility wouldn't be under the regulatory oversight of FERC. We have borne the consequences of the lack of FERC oversight in other arenas with Puget Sound Energy as the Operator to the Tribe's detriment. In many ways, this is an age old story – of efforts to locate facilities that pose significant safety or environmental consequences on tribal lands or other's lands deemed to be of less value. There are other LNG facilities in the United States that were proposed on Indian lands, such as the Pleasant Point terminal on Sipayik tribal land near Eastport, ME. But unlike most Indian lands, the Puyallup Reservation is densely populated. We don't oppose cleaner energy – what we oppose is siting this facility here on the Puyallup Reservation in a densely populated urban environment. 0030-8 0030-9 0030-10

The EIS must evaluate reasonable alternatives that could feasibly attain the proposal's objective. While it is true that not every conceivable alternative need be considered, the entire purpose of the EIS is to lead to a reasoned choice among alternatives. The draft EIS does not provide an analysis of alternatives other than the no-action and proposed alternative, in spite of several alternative sites or even capacity for the facility to carry out its primary objective exist. It is presumed that any of the location alternatives that were considered were dismissed on cost. The key criteria for consideration prior to cost should have been public safety. In fact, federal law prescribes minimum safety standards for making decisions on the location of a new liquefied natural gas pipeline. 49 U.S.C. §60103, Standards for Liquified Natural Gas Pipeline Facilities. In prescribing safety standards for deciding on the location of a new liquefied natural gas pipeline facility, the Secretary of Transportation is required to, among other things, consider: 0030-11 0030-12 0030-13

0030-13
Continued

existing and projected population and demographic characteristics of the location; existing and proposed land use near the location; and the need to encourage remote siting. 49 U.S.C. §60103(2)(3)(6). There was not one rural location considered or evaluated in the draft EIS, for the new cryogenic pipeline and larger facility. Every facility in the country we have researched, whether it be a storage facility in Plymouth, WA or an LNG terminal in Cameron Parish, Louisiana (shown below), look similar to the one below – it is located in a rural area with an exclusion zone that extends far and wide, way beyond the limits of the property boundary.

Sabine Pass LNG - Cameron Parish, Louisiana

0030-14

As we understand it, the primary objective of this facility is to provide a cleaner fuel to the TOTE ships. The opportunity to meet peaking-demand would be a secondary consideration. Based on the primary objective, alternative routes for the pipeline, alternative locations for the fueling facility, and alternative locations for the storage tank should be considered in combination and alone. At the very least, varying sizes for the facility to meet the primary goal should have also been considered to reduce the imminent danger in the urban environment. There is no indication that in order to meet the secondary objective of the peaking-demand the facility MUST be sited on the Port of Tacoma Tideflats amidst a densely populated urban environment and within the Reservation. It is the Tribe's understanding that to fuel TOTE, which is identified as the primary reason to locate the facility at the Tacoma Tideflats and is cited as the reason alternative sites listed in the EIS would not be cost efficient, the facility would not require an 8 million gallon storage capacity but rather roughly 25% of the storage capacity

proposed. Each of these alternatives should be fully evaluated and discussed in the draft EIS to meet the requirements under SEPA. The criteria for consideration should include first and foremost public safety and welfare.The overall seismicity of the Pacific Northwest region is high because of the presence

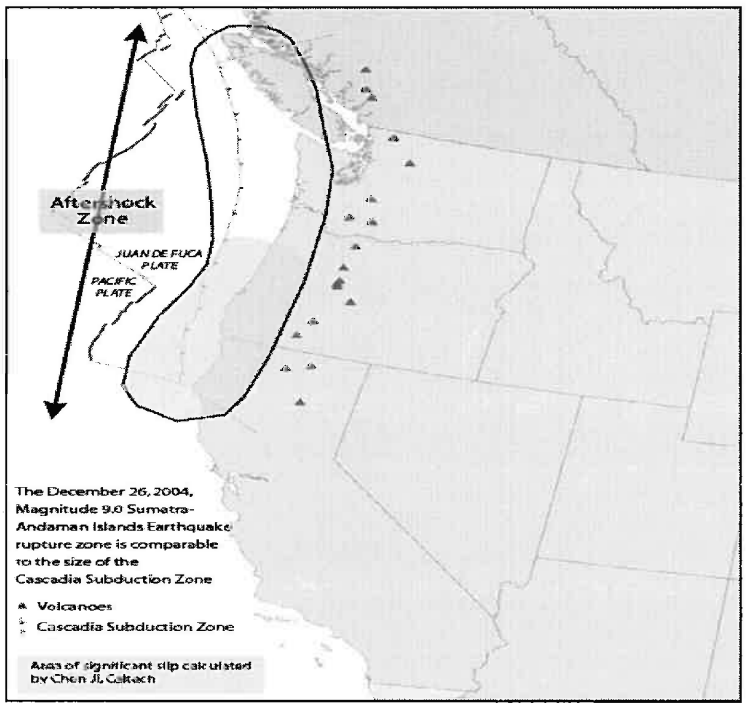
0030-14 Continued

0030-15

of the Cascadia Subduction Zone off the coast. The Cascadia subduction zone (also referred to as the Cascadia fault) is a convergent plate boundary that stretches from northern Vancouver Island to northern California. It is a very long sloping subduction zone fault that separates the Juan de Fuca and North America tectonic plates.

Due to the high seismic activity along the coast and high potentiality of liquifaction in the event of a large earthquake, again siting the facility on the Puyallup Reservation poses unacceptable risks to to the Tribe and the community as a whole.

The cascadia subduction zone, where two oceanic and continental plates meet, are shown below. The proximity to the proposed facility is evident in the picture below.



Source: http://earthquake.usgs.gov/eqinthenews/2004/usslav/rupture_area-nw.gif

Given the proximity of the subduction zone to the proposed facility location and the fact that our last large earthquake was in 2001, the siting for this facility in the tideflats does not make sense. The facility site would have a high risk of soil liquefaction during a large

0030-16

earthquake. Obviously, in the case of liquefaction, the consequences, once again, could very well be catastrophic in an uncontrolled release. In fact, a figure prepared by Department of Natural Resources, and attached to this letter shows high liquefaction susceptibility for the entire Hylebos-Blair Waterway peninsula exactly where the proposed facility would be located. The area in red indicates a high susceptibility to liquefaction – precisely where the proposed facility would be located. The facility would also be located within the 100-year floodplain as well as the inundation boundary for a tsunami associated with a large CSZ earthquake. There is no sufficient mitigation that would be sufficient to allay our concerns.

0030-17

Richard A. Clarke, a former senior adviser to both the Bush and Clinton administrations, indicated that defenders probably can't prevent a determined terrorist strike on a liquefied natural gas terminal (or any LNG facility). Clarke's consultant group concluded that terrorists could "relatively easily" secure weapons needed for an effective attack on a LNG tanker (or tank facility), and said an attack runs "a high risk of generating catastrophic damage." The Institute for the Analysis of Global Security (IAGS) has said that LNG would fit well with al-Qaeda's tactics and techniques. Recent events have borne this out. Al-Qaeda militants fired two rockets at the Balhaf liquefied natural gas (LNG) terminal in Shabwah province in December of 2014. An 8 million gallon tank is a highly visible, potential target on the Puyallup Reservation.

0030-18

We don't question the need for additional energy supplies, our opposition against this LNG facility is about siting it in an alternative location that is sufficiently remote to prevent harm to innocent people.

Thank you for consideration of our comments. If you have any questions or would like to discuss this letter further with me or my staff, you can reach me at (253) 573-7838, or our Natural Resources Director, Bill Sullivan at (253) 573-7850 or Char Naylor at (253) 680-5520.

Sincerely,

Bill Sterud

Bill Sterud, Chairman
Puyallup Tribe of Indians

Puyallup Tribe

Proposed Location for Liquified Natural Gas (LNG) Facility

- Proposed LNG Facility Site
- 1873 Survey Area
- Pierce County Parcels (Pierce Co)

Puyallup Tribal Lands

Trust Status

- In Fee
- Tribal Trust
- Member Trust

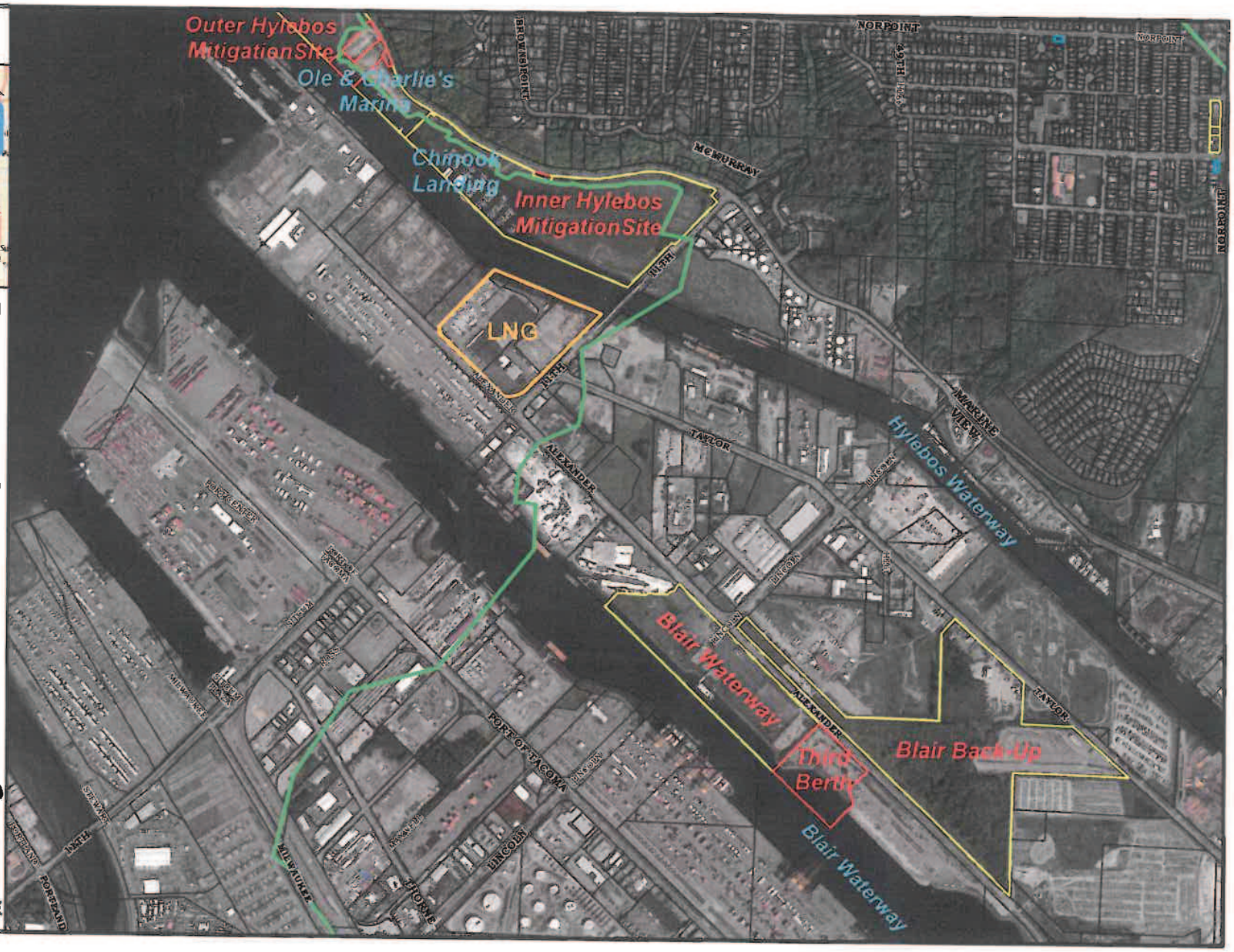
Note: The boundary of the Puyallup Indian Reservation is similar, but not identical, to the 1873 Survey.

Map Author: Puyallup Tribe GIS Dept
10 August 2015

Puyallup Tribe GIS

Feet
0 500 1,000 1,500 2,000

Disclaimer: The information (maps, reports, and analysis) included here has been compiled for reference use only. It represents an approximation of reality. It is neither a legally recorded map nor survey. Puyallup Tribe GIS makes no guarantees or warranties, expressed or implied, as to the accuracy, completeness or timeliness of this information, but instead encourages users of this information independently determine its accuracy, currency and suitability for their purposes.



Puyallup Tribe

Proposed Location for Liquified Natural Gas (LNG) Facility

- Proposed LNG Facility Site
- 1873 Survey Area
- Pierce County Parcels (Pierce Co)

Puyallup Tribal Lands

Trust Status

- In Fee
- Tribal Trust
- Member Trust

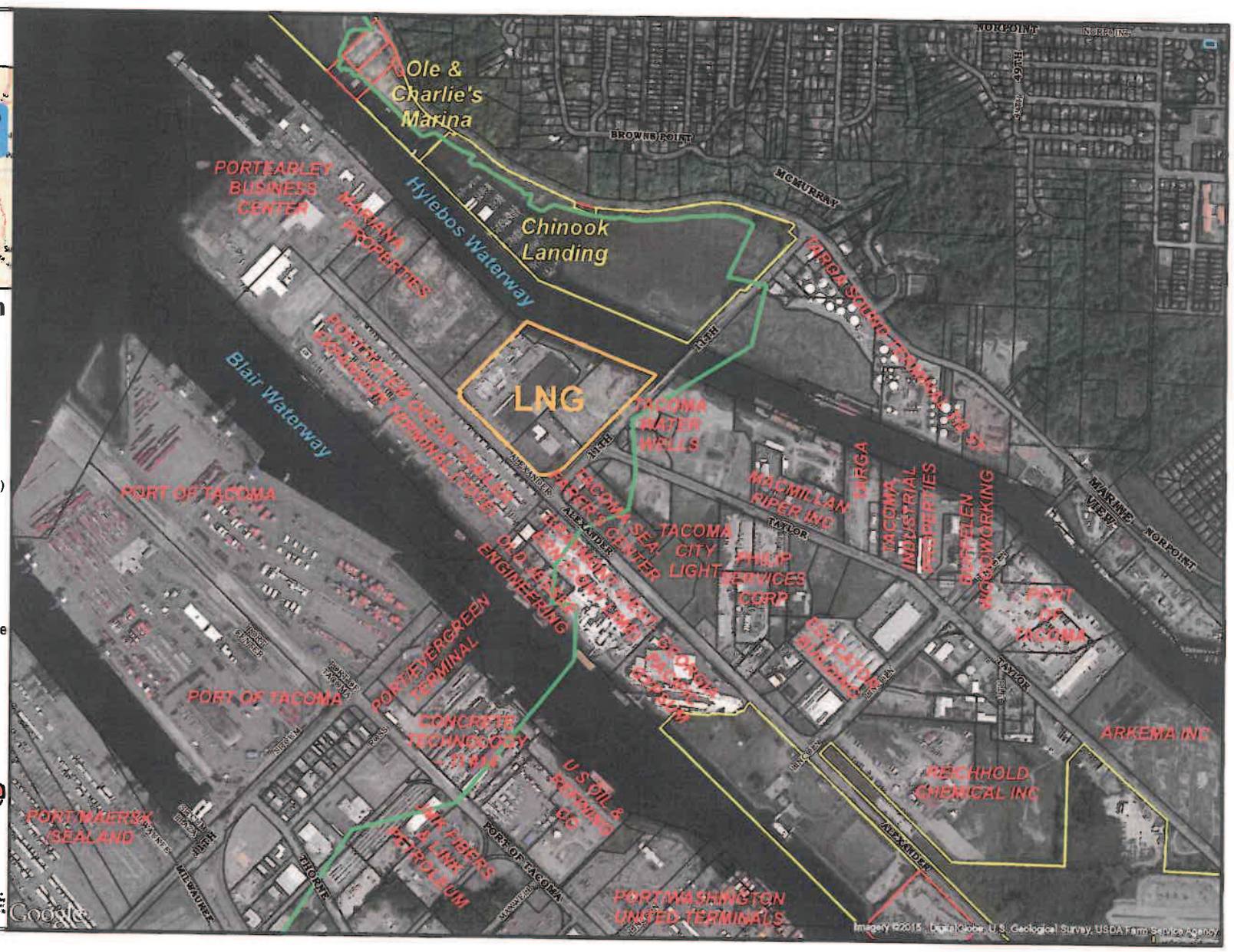
Business names are taken from the Pierce County parcel data. Not all parcels immediately near the proposed LNG facility (which itself consists of several parcels) are labeled.

Note: The boundary of the Puyallup Indian Reservation is similar, but not identical, to the 1873 Survey.

Map Author: Puyallup Tribe GIS Dept
11 August 2015

Puyallup Tribe GIS

Feet
0 500 1,000



Puyallup Tribe

Proposed Location for Liquified Natural Gas (LNG) Facility

- Proposed LNG Facility Site
- Buffers Around Proposed LNG Site
- 1873 Survey Area

Puyallup Tribal Lands

Trust Status

- In Fee
- Tribal Trust
- Member Trust

Note: The boundary of the Puyallup Indian Reservation is similar, but not identical, to the 1873 Survey.

Map Author: Puyallup Tribe GIS Dept
11 August 2015

Puyallup Tribe GIS

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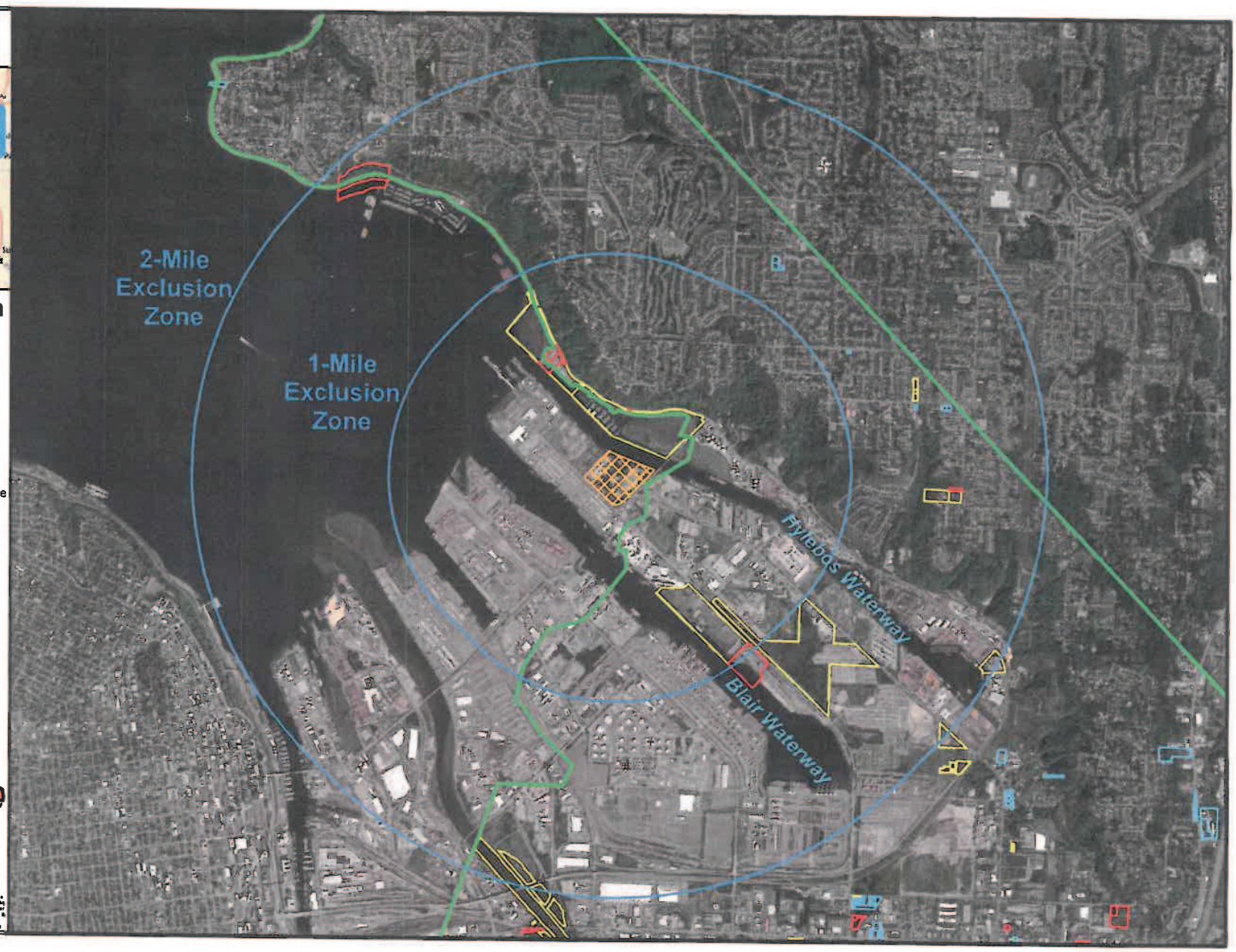
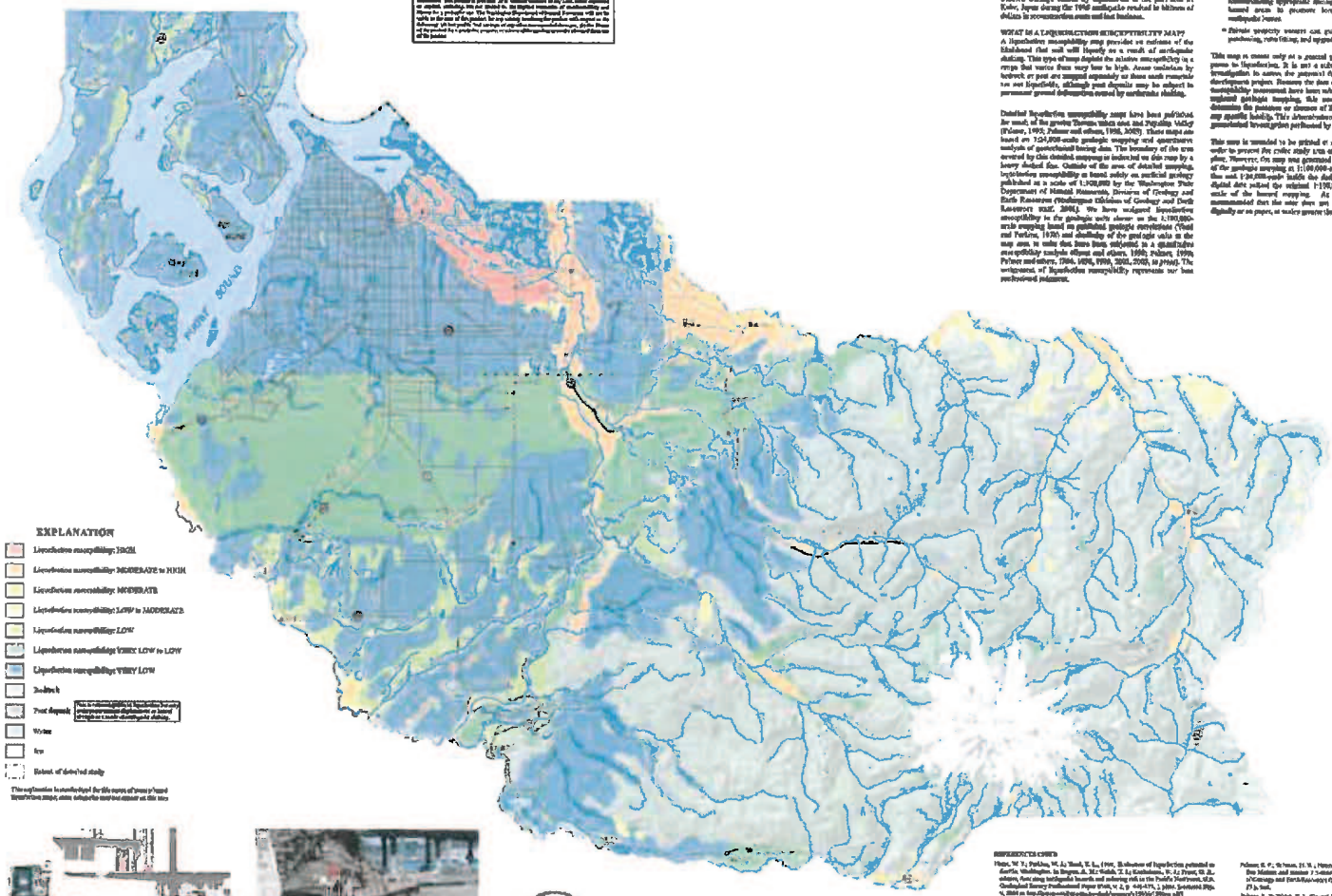
Miles 0 0.5 1



Liquefaction Susceptibility Map of Pierce County, Washington

by Stephen P. Palmer, Sammantha L. Magsino, Eric L. Bilderback, James L. Poelstra, Derek S. Folger, and Rebecca A. Niggemann

September 2004



Stephen P. Palmer
9/1/04

WHAT IS LIQUEFACTION?

Liquefaction is a phenomenon in which strong earthquake shaking causes a soil to rapidly lose its strength and behave like quicksand. Liquefaction typically occurs in saturated fills and in areas of loose sandy soils that are saturated with water, such as low-lying coastal areas, lakebeds, and river valleys. When soil strength is lost during liquefaction, the consequences can be catastrophic. Movement of liquefied soils can rupture pipelines, move bridge abutments and send and railway alignments, and pull apart the foundations and walls of buildings. Ground movement resulting from liquefaction caused most of the damage to highways and railroads throughout southern Alaska during the 1964 Good Friday earthquake. During the 1989 Loma Prieta earthquake, liquefaction was a contributing factor to severe building damage in the Marina District of San Francisco. Liquefaction-induced movements also broke water lines, severely hampering control of the resulting fires in the Marina District. Damage caused by liquefaction in the port area of Kobe, Japan during the 1995 earthquake resulted in billions of dollars in reconstruction costs and lost business.

WHAT IS A LIQUEFACTION SUSCEPTIBILITY MAP?

A liquefaction susceptibility map provides an estimate of the likelihood that soil will liquefy as a result of earthquake shaking. This type of map depicts the relative susceptibility in a range that varies from very low to high. Areas underlain by bedrock or peat are mapped separately as these much materials are not liquefiable, although peat deposits may be subject to permanent ground deformation caused by earthquake shaking.

Detailed liquefaction susceptibility maps have been published for much of the greater Tacoma, which cites and Puyallup Valley (Palmer, 1995; Palmer and others, 1998, 2003). These maps are based on 1:24,000-scale geologic mapping and quantitative analysis of geotechnical boring data. The boundary of the area covered by this detailed mapping is indicated on this map by a heavy dashed line. Outside of the area of detailed mapping, liquefaction susceptibility is based solely on surficial geology published at a scale of 1:100,000 by the Washington State Department of Natural Resources, Division of Geology and Earth Resources (Washington Division of Geology and Earth Resources staff, 2004). We have assigned liquefaction susceptibility to the geologic units shown on the 1:100,000-scale mapping based on published geologic correlations (Noll and Perkins, 1978) and similarity of the geologic units in the map area to units that have been subjected to a quantitative susceptibility analysis (Palmer and others, 1998; Palmer, 1999; Palmer and others, 1994, 1998, 1999, 2001, 2002, in press). The assignment of liquefaction susceptibility represents our best professional judgment.

HOW CAN THIS MAP BE USED?

Liquefaction susceptibility maps such as this can be used for many different purposes by a variety of users. For example:

- Emergency managers and decision makers which provide direction and lifelines are located in hazardous areas.
- Building officials and engineers can select areas where detailed geotechnical studies should be performed before new construction or rehabilitation of older structures.
- Facilities managers can assess the vulnerability of corporate and public facilities, including schools, and recommend actions required to maintain public safety and minimize earthquake damage and loss.
- Insurance companies can determine relative actuarial risk in adjusting rates of insurance coverage and premiums.
- Land-use planners can reduce vulnerability by recommending appropriate zoning and land use in high hazard areas to promote long-term mitigation of earthquake losses.
- Private property owners can guide their decisions on purchasing, rehabilitating, and upgrading their properties.

This map is meant only as a general guide to delineate areas prone to liquefaction. It is not a substitute for site-specific investigations to assess the potential for liquefaction for any development project. Because the data used for the liquefaction susceptibility assessment have been established on the basis of regional geologic mapping, this map cannot be used to determine the presence or absence of liquefiable soils beneath any specific building. This determination requires a site-specific geotechnical investigation performed by a qualified professional.

This map is intended to be printed at a scale of 1:72,000 or smaller to present the entire study area on a single standard sheet. However, the map was generated using digital coverages of the geologic mapping at 1:100,000-scale inside the dashed line; outside the dashed line extension, the digital data retained the original 1:100,000-scale or 1:24,000-scale of the source mapping. As with all maps, it is recommended that the user does not apply this map, either digitally or on paper, at smaller generalized than the source data.

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Number	Issue	Response
0030-1	General	The commenter asserts that the EIS lacks quantitative analysis, particularly with regard to the thermal and radiation vapor exclusion zone in a catastrophic event. **Response: With respect to exclusion zones, the federal regulations establish hard and non-discretionary criteria for demonstrating that a proposed facility will satisfy all applicable exclusion zones under National Fire Protection Association (NFPA) 59A-2001 Paragraph 2.1.1(d), which is incorporated by reference in 49 CFR Part 193. All hazards that can affect the safety of the public or plant personnel are to be considered by the siting and regulatory agencies during project design review.** **The hazards evaluated in an LNG hazard and safety review include vapor dispersion from liquid pools, vapor dispersion from jetting and flashing phenomena, thermal radiation from pool fires, thermal radiation from fires involving jetting and flashing phenomena (jet fires), overpressure from vapor cloud ignitions, toxic gas dispersion, and boiling liquid expanding vapor explosions (“BLEVEs”) when pressurized storage vessels are present. These assessments ensure that, among many other safety measures and criteria, the thermal radiation exclusion zone and vapor dispersion exclusion zones are accurately calculated so that facilities may be sited entirely within those zones where the public is not present.** **Insofar as defining the extent of thermal vapor dispersion and thermal radiation exclusion zones to ensure the public’s safety, including the safety of Tribal members, the City of Tacoma agrees with the Tribe’s comments that such effort requires quantitative modeling and this modeling has been completed. The exclusion zone modeling cited in the Tribe’s letter as done by Dr. Richard Fay is not applicable to the Tacoma LNG facility and is not a substitute for the actual modeling per federal regulations that has been done for Tacoma LNG. Notably, the work done by Dr. Fay (comment letter at p. 3-4) in regard to LNG facilities does not account for the absence of oxygen in an LNG tank or the LNG itself. Without that oxygen, LNG energy cannot be released by explosion and combustion.** **The effects of a release of LNG into the air, are discussed in the draft EIS at pp. 3.5-9 through 3.9-12. The draft EIS, at p. 3.5-11, makes clear that LNG is not explosive in its normal manner of transport or storage.**
0030-2	General	The commenter states that the project continues to be modified after publication of the draft EIS. **Response: The Project remains essentially the same as described in the draft EIS. However, initiation of environmental review before the completion of final engineering design is very common. Most infrastructure and major facility proposals (e.g., highways, convention centers, manufacturing facilities, and wastewater treatment plants) obtain initial use authorization, including completion of Wasthington State Environmental Policy Act (SEPA) review, before final project design is complete. Nevertheless, significant changes to the project engineering and design could warrant further review under SEPA through a Supplemental EIS.**
0030-2 cont'd		See previous response.

Number	Issue	Response
0030-3	General	The commenter states that they are opposed to the Proposed Action, due to imminent endangerment to life and property. For this reason alone, the commenter opposes the siting of the LNG facility on the Puyallup Reservation. **Response: The City of Tacoma does believe that the proposed Tacoma LNG project presents a new health and safety risk, but that risk is confined to a relative small area, primarily the project site. The draft EIS and the final EIS include mitigation that requires PSE to design the facility to contain vapor dispersion and thermal radiation within the fenceline of the project site. The City has also included mitigation measures that re-establish Fire Station 15; reached an agreement with PSE and the Port for rebuilding Taylor Way, which will reduce emergency responder transit time to the Hybelos/ Blair Peninsula; and agreed to implement Phase I of the Emergency Response/Intelligent Transportation System (ER/ITS) plan.**
0030-4	General	The commenter states that the proposed LNG Facility poses a disproportionate risk to the members, community, and properties of the Puyallup Tribe of Indians. **Response: The City of Tacoma understands the concerns that the Puyallup Tribe has for its people, reservation, and other properties in the vicinity of the proposed project. The City also has concerns for industries, businesses, and neighborhoods that are in the vicinity of the Project. That is why the City has hired environmental and LNG experts to evaluate in detail the potential environmental and health and safety risks of the Project. In addition, the U.S. Coast Guard, the Pipeline and Hazardous Materials Safety Administration (PHMSA), the Washington Utilities and Transportation Commission, and the Tacoma Fire Department are also evaluating the health and safety risks of the Project. Oversight of the Project by these agencies will extend throughout construction and operation of the Project to ensure it is constructed and operated in safe manner.**
0030-4 cont'd	General	See previous response.
0030-5	General	The commenter states that the Proposed Action also puts in jeopardy the safety of the surrounding community, including over 30,000 workers and over 200,000 residents. **See responses to 0030-1, -3, and -4.**
0030-6	Public Health and Safety	The exclusion zone surrounding the LNG facility should extend significantly beyond the facility site boundary, in accordance with scientific research findings and applicable federal regulations. **Response: 2-D and 3-D PHAST quantitative modeling has been completed for the Project in accordance with federal regulation. The modeling results have been reviewed by the LNG engineering consultant for the City, who determined that the modeling was done according the federal requirements and the guidelines of 59A of the National Fire Protection Association. The modeling shows that exclusions zones that extend significantly beyond the facility site are not warranted.**
0030-6 cont'd	Public Health and Safety	See previous response.

Number	Issue	Response
0030-7	Cumulative Impacts	The commenter states that the draft EIS fails to examine the extent of primary and secondary project risks and that the cumulative impacts analysis fails to anayalse the impacts the project will have when added to risks already present from existing facilities. **Response: It is correct that there are other facilities in the industrial area that also present a risk for vapor expansion, fire, or explosion, and the addition of the Project does present a new risk. However, the existing facilities and the proposed Project are standalone risks, and an incident at one facility does not have any bearing on other such facilities in the area. To mitigate for adding an additional risk in the Tideflats industrial area, Fire Station 15 will be refurbished and staffed. Other mitigation measures include improvements to Taylor Way and implementing Phase I of the Emergency Response/Intelligent Transportation Systems (ER/ITS). As for future facilities that would pose an additional risk of vapor expansion, fire, or explosion, it would be anticipated that additional mitigation measures would be required.**
0030-8	General	The commenter states that the Proponent has very limited experience owning and operating LNG facilities. **Response: PSE will be responsible for staffing and operating the facility. PSE has extensive experience and capabilities in operating large energy infrastructure. In addition to its natural gas and electric distribution systems, PSE also operates an LNG facility in Gig Harbor, WA; a large underground storage facility in Chehalis, WA; nine natural gas fired power plants; three wind farms; and two hydroelectric facilities. In total, PSE is responsible for over $10.5 billion of assets that are either directly or indirectly related to operating energy infrastructure.** **PSE took delivery of its mobile LNG tanker and vaporizer in 2000 and has been operating the Gig Harbor LNG facility since 2004.** **Further, the Tacoma LNG Project will be operated by trained and qualified staff 24 hours per day, seven days per week. Operation of the facilities will comply with prescriptive federal and state regulations for LNG facilities. Worker and public safety are paramount in the operation of the Tacoma LNG facilities. Training of staff and requalification will continue during the lifetime operation of these facilities.**
0030-9	General	The commenter objects to the lack of FERC oversight over the Proposed Action. **Response: The Federal Energy Regulatory Commission (FERC) is responsible for authorizing the siting and construction of onshore and near-shore LNG facilities engaged in import/export activities. As required by the National Environmental Policy Act (NEPA), FERC prepares environmental analyses for proposed LNG facilities under its jurisdiction. The Tacoma LNG Facility would not engage in import/export facilities, and therefore does not fall under the jurisdiction of FERC. Futher, PHMSA has authority to establish and enforce safety standards for onshore LNG facilities, and has issued its regulations in 49 CFR 193. The Tacoma LNG Facility is obligated to follow regulations pursuant ro 49 CFR 193.**

Number	Issue	Response
0030-10	General	The commenter states that the Proposed Action continues a history of locating hazardous facilities on tribal lands and other devalued lands, with the added risk that the Puyallup Indian Reservation is densely populated. **Response: The Project site is zoned Port Maritime Industrial (PMI). A variety of uses are permitted in the PMI District, including Industry, heavy; Port, terminal and industrial (water-dependent or water-related uses); and Utilities. The PMI District is intended to allow all industrial uses and uses that are not permitted in other districts. In addition, the City of Tacoma Comprehensive Plan designations for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System component sites include Manufacturing/Industrial Center, High-Intensity Industrial Development, and Shoreline High-Intensity Environment.**
0030-11	Purpose, Need, and Alternatives Considered	The commenter argues that the analysis of alternatives to the Proposed Action did not include sufficient analysis of alternative sites or project capacity. **Response: As indicated in Chapter 1 of the EIS, PSE did evaluate alternative sites to assess whether they could meet each Proposed Action objective. Key attributes in this evaluative process included sufficient setbacks to comply with federal code 49 CFR 193, proper industrial zoning, access to markets, access to PSE’s distribution system, and waterfront siting to accommodate deliveries to TOTE and potential marine markets. All of these factors contribute to the determining the site of the Proposed Action.**
0030-12	General	The commenter argues that safety should be a primary consideration in project siting and design, superseding cost. **Response: A primary requirement for sites considered is meeting the vapor dispersion and thermal radiation requirements of the federal regulations (49 CFR 193) and requirements of the National Fire Protection Association (59A). If the siting requirements cannot be met the project cannot be constructed.**
0030-13	Purpose, Need, and Alternatives Considered	The commenter states that federal regulations require LNG facility siting to take into account considerations that essentially require LNG facilities to be located in remote and/or rural areas, and that such siting is the usual practice. **Response: Federal regulations for siting of LNG facilities do not have criteria that would essentially require LNG facilities to be constructed in remote or rural areas. There are numerous examples of LNG facilities located in urban areas that have operated without incidents for decades. Two examples include the Yankee LNG facility built in a residential area in Waterbury, Connecticut and the Everett LNG marine terminal in Boston Harbor. See https://primis.phmsa.dot.gov/comm/LNG_Map.htm?nocache=7428 for a map showing LNG facilities in the United States.**
0030-13 cont'd	General	See previous response.

Number	Issue	Response
0030-14	Purpose, Need, and Alternatives Considered	The commenter argues that alternative routes, locations, and sizes of Proposed Action components that meet the objectives of the Proposed Action should have been considered and evaluated in the draft EIS, per SEPA requirements. **Response: Per Washington Administrative Code 197-11-440(5)(d) regarding private projects proposed at specific site, the lead agency must evaluate the proposed action, the no action alternative, and only other reasonable alternatives for achieving the proposals objective on the same site.**
0030-14 cont'd	Purpose, Need, and Alternatives Considered	See previous response.
0030-15	Public Health and Safety	The commenter states that risks emanating from natural hazards, such as earthquake-induced soil liquefaction, tsunamis, and flooding pose a significant risk in the presence of an LNG facility, including the possibility of accidental catastrophic releases. Commenter states that no possible mitigation of these risks would be sufficient to allay Tribal concerns. **Response: the seismicity of the Pacific Northwest, including the Cascadia Subduction Zone, is fully acknowledged and analyzed in the DEIS. At Section 3.1.3.1 - Geologic Hazards, the DEIS contains a thorough description and discussion of all geologic hazards associated with the Blair-Hylebos Peninsula and surrounding communities, including seismic and landslide hazards, liquefaction and lateral spreading, and tsunamis. As discussed therein, there are applicable federal regulations that apply to the modeling of an LNG facility in such an area. The draft EIS, at pp. 3.1-3, carefully describes the magnitude of events for which the Tacoma LNG must be modeled.** **Tacoma LNG’s ground improvements must meet the seismic design criteria in 49 CFR Part 193 to withstand liquefaction, lateral spreading and tsunami inundation events. To achieve this, ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading. The LNG tank, which is the largest project component, would be underlain by a seismic base isolation system to absorb potential seismic events. Other portions of Tacoma LNG will similarly be subject to stringent ground improvement standards. With these in place, the draft EIS concludes that the ground improvements would serve to decrease potential seismic hazards at the site.**
0030-16	Public Health and Safety	See previous response.

Number	Issue	Response
0030-17	Public Health and Safety	The commenter argues that LNG facilities are vulnerable to terrorist attack and difficult to effectively defend. **Response: The Sandia Report of 2004, referenced in the comment letter, specifically includes discussion of intentional LNG breach, spill and hazard analyses. The Sandia Report studied significantly larger LNG facilities; however, it concludes that “the risk analysis performed as part of this study indicates that the potential for a large vapor dispersion from an intentional breach is highly unlikely." The Sandia Report, at Key Conclusion 5 (p. 14) includes a general analysis of a range of intentional attacks. While noting that the consequences from an intentional breach of an LNG containment structure can be more severe than those from accidental breaches, multiple techniques exist to enhance LNG spill safety and security management and to reduce the potential of a large LNG spill due to intentional threats. Effectively implemented, these techniques significantly reduce the potential for an intentional spill.** **The design of the facility includes a state-of-the-art integrated control and safety system that includes automated shutdowns upon detection of abnormal and hazardous occurrences. Security measures are included in the design of the facility including access control, intrusion detection and CCTV camera monitoring.**
0030-18	General	The commenter states that the Puyallup Tribe of Indians is opposed to the proposed LNG facility and would prefer that such a facility be located in an alternative and remote location to prevent harm to innocent people. **Response: Comment noted**

5 References

CHAPTER 1—PURPOSE, NEED, AND ALTERNATIVES CONSIDERED

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APPENDIX A

List of Preparers

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Ryan Erickson, P.E. Tacoma Fire Department	Tacoma Fire Department , Fire Code Official	B.S Civil Engineering	18 yrs
Ecology and Environment, Inc.			
Jim Thornton	Project Manager	B.A., Psychology	40 yrs
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Pasquale Franzese, Ph.D	Air Quality	Ph.D., Aerospace Engineering M.S., Mechanical Engineering	20 yrs
Jonathan Reeves	Earth	M.S., Geology B.A., Geology	11 yrs
Janice Gardner	Plants & Animals	M.S., Ecology and Environmental Science B.S., Wildlife Management	7 yrs
Louise Flynn	Health & Safety	M.P.H., Public Health M.E.S., Environmental Studies B.A., Biology and Society	28 yrs
Tom Siener	Noise	B.S., Biology	42 yrs
Dan Costantino	Land Use & Recreation	M.U.R.P., Urban and Regional Planning Grad Cert., Urban Design Diploma, Arabic B.A., Geography	6 yrs
Joseph Donaldson, AICP	Aesthetics, Light and Glare	M.L.A., Landscape Architecture B.A., Architecture	38 yrs
Jim Thornton	Cultural Resources	B.A., Psychology	40 yrs
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Dan Costantino	Public Services & Utilities	M.U.R.P., Urban and Regional Planning Grad Cert., Urban Design Diploma, Arabic B.A., Geography	6 yrs
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Jim Thornton	Cumulative Impacts	B.A., Psychology	40 yrs

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Alan Hatfield, P.E.	LNG Engineering/Risk Analysis	B.S. Engineering, P.E. License Georgia, North Carolina, Texas, Oregon	35 yrs

APPENDIX B

Distribution List

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2006 KIST LLC
2014-1 IH BORROWER LP
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BAKIANO TERESA G
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APPENDIX C

Soil and Groundwater Data Summary

GeoEngineers

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Memorandum

To:	Greg Andrina and John Rork – Puget Sound Energy
From:	Rob Leet and Steve Woodward
Date:	September 5, 2014
File:	0186-914-02-0400
Subject:	Soil and Groundwater Data Summary – Limited Environmental Site Assessment PSE Tacoma LNG Project

INTRODUCTION

This memorandum presents soil and groundwater analytical results obtained as part of a limited environmental site assessment (ESA) conducted for Puget Sound Energy's Tacoma Liquefied Natural Gas (LNG) Project. The soil and groundwater sampling was completed between May 20 and June 2, 2014 in general accordance with the April 24, 2014 sampling and analysis plan (SAP). The SAP provides details about the project background, field methods, and the analytical testing program.

In this document and the SAP, project-specific cardinal directions are used when describing locations of site features and sampling locations. Consistent with past projects conducted on the Blair-Hylebos Peninsula by the Port of Tacoma (Port) and others, "project north" corresponds approximately to true northwest (Figure 1).

DEVIATIONS FROM THE SAMPLING AND ANALYSIS PLAN

Borings logs for the ESA soil borings are attached. The following deviations from the SAP occurred during the ESA soil and groundwater sampling:

- A sonic drilling rig was used to complete six of the nine borings inside the warehouse (Building 50; borings B-9 and B-12 through B-16) and one boring outside the warehouse (boring B-19). Initial attempts to complete the subject borings in the warehouse with a direct-push rig were unsuccessful due to repeated drilling refusals encountered within the structural fill beneath the building.
- For the borings completed inside the warehouse, "ground surface" was defined as the warehouse floor. In these borings, the soil samples that were originally planned to be collected at depths of 2 feet below ground surface (bgs) and 8 feet bgs were instead collected at depths between 6 and 8 feet bgs and 11 and 13 feet bgs to account for the warehouse floor being elevated approximately 5 feet above the surrounding site grade. The warehouse floor appeared to be constructed on structural fill. A similar adjustment was not made to groundwater sampling depths.
- Four samples of the apparent structural fill pad beneath the warehouse were collected for analytical testing. These samples were not originally scoped in the SAP.
- A groundwater sample was not obtained from 25 feet bgs in boring B-15 (Figure 1) due to low groundwater yield.

- Groundwater was not purged from the temporary well casing and water quality field parameters were not measured prior to collecting the 25-foot bgs groundwater sample in boring B-12 and the 50-foot bgs groundwater sample in boring B-16 due to low groundwater yield at the target depth interval. Consequently, these groundwater samples may not be representative of the targeted intervals.
- Soil and groundwater samples originally planned to be analyzed for total petroleum hydrocarbons as gasoline (TPH-G) and benzene, toluene, ethylbenzene, and xylenes (BTEX) by Methods NWTPH-Gx and 8021 (per SAP Table 2) were analyzed for BTEX by Method 8021 only if the samples were not analyzed by Method 8260 (BTEX compounds are included on the Method 8260 target analyte list).

ANALYTICAL RESULTS

The analytical results for the soil and groundwater samples are presented in Tables 1 and 2. The results are compared to potentially applicable risk-based screening levels developed for the Alexander Avenue Petroleum Tank Facilities Site Remedial Investigation/Feasibility Study Work Plan (Port Work Plan; Aspect Consulting, 2014). These screening levels consider protection of marine surface water, Model Toxics Control Act (MTCA) cleanup levels for industrial sites, and MTCA Method C groundwater screening levels published in the Washington Department of Ecology's current vapor intrusion guidance (Ecology Publication no. 09-09-047; October 2009), and reflect current toxicological information provided in Ecology's Cleanup Levels and Risk Calculations (CLARC) database. The soil screening levels for lead and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) published in the Port Work Plan have been adjusted in Table 1, based on discussions with the Port, to account for an empirical demonstration (based on existing groundwater data) that concentrations of these constituents in soil are protective of the soil-to-groundwater-to-surface water pathway. Additionally, the Federal drinking water Maximum Contaminant Level (MCL) for arsenic is included in Table 2 for comparison; the arsenic MCL has been proposed as a potential surface water cleanup level (Ecology, 2014).

Further evaluation of the data may be completed as necessary, including comparison of the soil analytical results to appropriate criteria for determining reuse and/or disposal options for soil that may be excavated during future construction activities.

The quality of the laboratory analytical data was reviewed in accordance with United States Environmental Protection Agency guidelines for Stage 2A data validation. The laboratory data quality review is summarized in the attached data validation report. The results of the data quality review indicate that the analytical data are useable for their intended purpose. However, based on a review of sampling procedures and field observations, some of the analytical data may not be representative of site conditions. These suspect data are identified below in the discussion of analytical results.

Soil Analytical Results

The soil analytical results are presented in Table 1. The following analytes were detected in soil at concentrations exceeding Port screening levels:

- Total petroleum hydrocarbons as diesel (TPH-D)
- Bis(2-ethylhexyl)phthalate (BEHP)

BEHP slightly exceeded the associated screening level in a soil sample obtained from 8 feet bgs in boring B-18, and TPH-D exceeded the associated screening level in a sample obtained from 8 feet bgs in boring B-20 (Table 1, Figure 1). The BEHP detection in boring B-18 was the only detection of BEHP reported in soil. This detection may reflect laboratory contamination of the sample, as BEHP is a common laboratory contaminant.

The estimated southerly extent of soil contamination (screening level exceedances) inferred to be related to the former petroleum bulk storage facility based on the ESA results is shown in Figure 1.

Groundwater Analytical Results

The groundwater analytical results are presented in Table 2. The following analytes were detected in groundwater at concentrations exceeding Port screening levels:

- TPH-D
- Total petroleum hydrocarbons as lube oil (TPH-LO)
- Benzene
- Metals (arsenic, chromium, copper, and lead)
- BEHP
- pH

Concentrations of one or more of these analytes exceeded screening levels in groundwater samples obtained from six borings completed in the warehouse (B-10, B-12, B-13, B-14, B-15, and B-16), two borings completed north of the warehouse (B-21 and B-24), and two borings completed near the Hylebos Waterway embankment (B-17 and B-19) (Table 2, Figure 1). The samples with exceedances were collected at depths ranging from approximately 11 feet to 51 feet bgs. Chlorinated volatile organic compounds, which are the primary constituents of concern in groundwater beneath the Occidental Chemical Corporation (OCC) Site north of Parcel 2, were not detected in the ESA groundwater samples.

The results for constituents detected above screening levels are summarized as follows:

- Metals (arsenic, chromium, copper, and lead) were the most prevalent analytes that exceeded screening levels. The groundwater samples submitted for metals analysis were filtered in the field (using a disposable 0.45-micron filter) to reduce potential high bias of results from suspended particulates. The highest metal concentrations were detected in the samples obtained from approximately 23 feet and 50 feet bgs in boring B-16. However, some of the metals data may not be representative of groundwater conditions, as discussed below.
    - Solids were observed at the bottom of the 23- and 50-foot bgs filtered samples obtained from boring B-16, suggesting that filter breakthrough occurred. Consequently, the metals results for these samples may be biased high.
    - As previously noted, the 25-foot bgs sample from B-12 and the 50-foot bgs sample from B-16 may not be representative of the targeted depth interval because groundwater was not purged from the temporary well casing prior to collecting these samples (due to low groundwater yield).

- Elevated electrical conductivity (greater than 0.750 millisiemens per centimeter [mS/cm]) was observed in all but one of the samples in which metals exceeded screening levels. High conductivity can indicate elevated salinity, which can cause analytical interferences and high bias of metals analyses (Port, personal communication). Four of the samples (B-10 at 50 feet, B-13 at 15 feet, B-15 at 15 feet, and B-17 at 25 feet) exceeded the Port Work Plan criterion of 1.0 mS/cm for triggering laboratory sample preparation using the reductive precipitation procedure, which can reduce salinity-related interferences. Reductive precipitation was not used in this limited ESA. Consequently, based on discussions with the Port, the metals results for the subject samples obtained from borings B-10, B-13, B-15, and B-17 may be biased high due to elevated salinity in these samples.

- BEHP was detected slightly above the screening level in a groundwater sample obtained from boring B-17. Like the single BEHP detection in soil, this single BEHP detection in groundwater may reflect laboratory contamination.
- Groundwater exceedances of TPH-D and/or TPH-LO were detected at borings B-12 (27 feet bgs: TPH-LO only), B-14 (26 feet bgs: TPH-D and TPH-LO), and B-24 (11 feet bgs: TPH-LO only). These detections are not contiguous with previously reported detections of TPH-D or TPH-LO in soil or groundwater beneath the former petroleum bulk storage facility in the northern portion of Parcel 2 (Port, personal communication). TPH-D and TPH-LO are subject to high bias in unfiltered groundwater grab samples. Additionally, due to low groundwater yield at 27 feet bgs in boring B-12, this sample was collected without first purging the temporary well casing. Therefore, the TPH-D and TPH-LO data may not be representative of groundwater conditions.
- Groundwater exceedances of benzene were detected at borings B-12 (27 feet bgs), B-13 (25 feet bgs), B-21 (26 feet bgs), and B-24 (11 feet and 28 feet bgs). These exceedances are consistent with previously reported detections of petroleum constituents in groundwater beneath the former petroleum bulk storage facility in the northern portion of Parcel 2.
- Three pH exceedances (values greater than 8.5) were detected, at borings B-16, B-19, and B-24. These exceedances range between 8.60 and 8.90, which is only slightly higher than the typical pH range of marine waters, and are not contiguous with exceedances of pH in groundwater beneath the OCC Site (Port, personal communication).

The previously estimated (in the SAP) southerly extent of groundwater contamination (screening level exceedances) inferred to be related to the OCC Site and/or the former petroleum bulk storage facility has been revised based on the ESA results; the revised extent is shown in Figure 1.

References

Aspect Consulting, 2014. Work Plan For Remedial Investigation/Feasibility Study, Alexander Avenue Petroleum Tank Facilities Site, Tacoma, Washington, Ecology Facility Site No. 1377/Cleanup Site No. 743. Prepared for Port of Tacoma and Mariana Properties Inc.

Washington Department of Ecology, 2009. Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Review Draft). Publication No. 09-09-047. October 2009.

Washington Department of Ecology, 2014. Washington Human Health Criteria Review Documents (Draft). Revised August 8, 2014.

Attachments:

- Figure 1 – Site Plan Showing Constituents Exceeding Screening Levels in ESA Samples
- Table 1 – Soil Analytical Data Summary
- Table 2 – Groundwater Analytical Data Summary
- Data Validation Report
- Boring Logs

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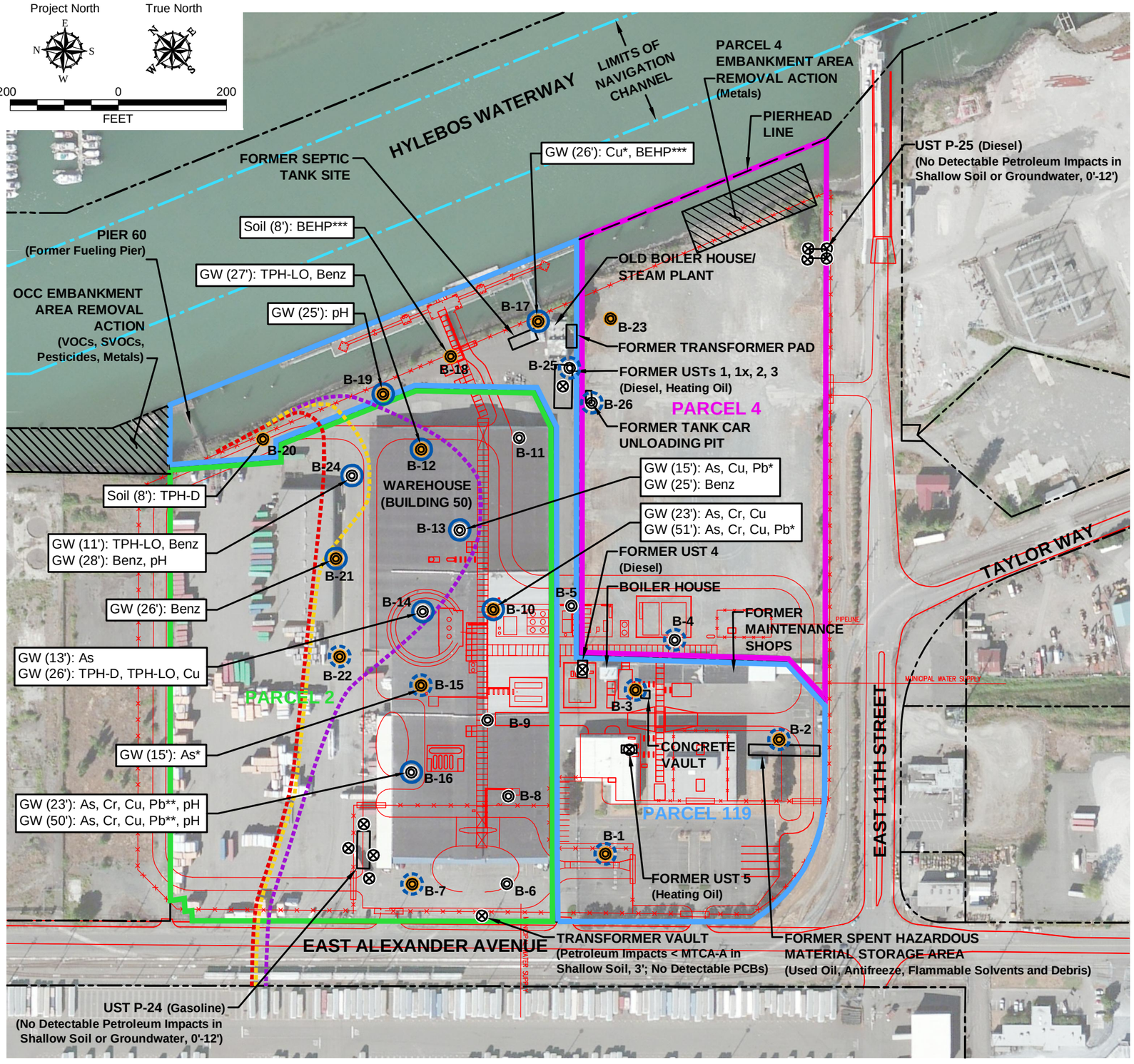

Legend

Previous Sampling Locations

- Previous Soil and/or Groundwater Grab Sample Locations (represents one or more samples collected at locations shown)

May-June 2014 ESA Sampling Locations

- Soil Boring
- Soil Boring with Soil Samples Tested for Full Analytical Suite
- Shallow (11') Groundwater Sample
- Shallow (11') and Deep (25' and/or 50') Groundwater Samples
- Estimated Extent of Soil Contamination Inferred to be Related to Former Petroleum Bulk Storage Facility
- Estimated Extent of Groundwater Contamination Inferred to be Related to OCC Site and/or Former Petroleum Bulk Storage Facility - 10-15 Foot Depth Zone (May-June 2014; Metals and pH Data Not Used in Delineating Extent)
- Estimated Extent of Groundwater Contamination Inferred to be Related to OCC Site and/or Former Petroleum Bulk Storage Facility - 20-30 Foot Depth Zone (May-June 2014; Metals and pH Data Not Used in Delineating Extent)

GW = Groundwater
(28') = 28 Feet Below Ground Surface (example)
UST = Underground Storage Tank
OCC = Occidental Chemical Corporation
VOCs = Volatile Organic Compounds
SVOCs = Semivolatile Organic Compounds
PCBs = Polychlorinated Biphenyls
MTCA-A = Model Toxics Control Act Method A Cleanup Levels
As = Arsenic
Cr = Chromium
Cu = Copper
Pb = Lead
Benz = Benzene
TPH-D = Total Petroleum Hydrocarbons as Diesel
TPH-LO = Total Petroleum Hydrocarbons as Lube Oil
BEHP = Bis(2-ethylhexyl)phthalate
* = Metals results for this sample may be biased high due to elevated salinity.
** = Metals results for this sample may be biased high due to the presence of solids in the filtered sample.
*** = Possible laboratory contaminant

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Preliminary Plot Plan by CH-IV International dated 1/29/14.

Site Plan Showing Constituents Exceeding Screening Levels in ESA Samples

Puget Sound Energy
Tacoma LNG Project
Tacoma, Washington

GeoEngineers

Figure 1

P:\0\0186914\02\CAD\Task 400 Soil GW Evaluation\0186914-02 Fig 1 Site Plan w_May-June 2014 Sampling Results.dwg\TAB:LANDSCAPE (2) modified by thichaud on Sep 04, 2014 - 13:53

TABLE C-1

SOIL ANALYTICAL DATA SUMMARY

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	B-1-2.0 2-3 ft	B-1-8.0 7-8 ft	B-2-2.0 1.5-2.5 ft	B-2-8.0 8-9 ft	B-3-2.0 1.5-2.5 ft	B-3-8.0 7-8.5 ft	B-4-2.0 1.5-2.5 ft	B-4-8.0 7-8 ft	B-5-2.0 2-3 ft	B-5-8.0 7.5-8.5 ft	B-6-2.0 2-3 ft	B-6-8.0 7-8 ft	B-7-2.0 1.5-2.5 ft	B-7-8.0 8-9 ft	B-8-6.0 5.5-6.5 ft	B-8-11.0 10.5-11.5 ft	B-9-7.0 6-7.5 ft	B-9-13.0 13-14 ft	B-10-2.0 1.5-2.5 ft (fill)	B-10-7.0 6.5-7.5 ft	B-10-13.0 12-13.5 ft	B-11-8.0 8-9 ft	B-11-12.0 11.5-13 ft	B-12-2.0 2 ft (fill)	B-12-7.0 7 ft	B-12-13.0 13 ft	B-13-7.0 7-8 ft
BTEX	5035A/8021	Benzene	mg/Kg	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	5035A/8021	Ethylbenzene	mg/Kg	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	5035A/8021	Toluene	mg/Kg	6.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	5035A/8021	Xylene, m-,p-	mg/Kg	9.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	5035A/8021	Xylene, o-	mg/Kg	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fuels	NWTPH-Gx	Total petroleum hydrocarbons as gasoline	mg/Kg	30	6.6 U	8.7 U	6.8 U	7.3 U	5.4 U	6.8 U	7.9 U	8.2 U	--	--	--	--	6.7 U	8.2 U	--	--	--	--	5.6 U	5.3 U	6.6 U	--	--	6.7 U	7.3 U	6.9 U	--
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as diesel**	mg/Kg	2000	150 U	35 U	29 U	32 U	27 U	32 U	34 U	37 U	27 U	32 U	27 U	30 U	27 U	32 U	26 U	34 U	27 U	34 U	27 U	26 U	36 U	40 U	35 U	30 U	31 U	31 U	26 U
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as lube oil**	mg/Kg	2000	**1800**	71 U	59 U	63 U	54 U	65 U	67 U	73 U	55 U	64 U	53 U	59 U	54 U	65 U	53 U	68 U	54 U	67 U	54 U	52 U	72 U	79 U	70 U	61 U	62 U	61 U	52 U
Metals	6010/6020	Arsenic	mg/Kg	20	12 U	14 U	12 U	13 U	11 U	13 U	13 U	15 U	11 U	13 U	11 U	12 U	11 U	13 U	11 U	14 U	11 U	13 U	11 U	10 U	14 U	16 U	14 U	12 U	12 U	12 U	10 U
Metals	6010/6020	Cadmium	mg/Kg	--	0.60 U	0.71 U	0.59 U	0.63 U	0.54 U	0.64 U	0.67 U	0.73 U	0.55 U	0.64 U	0.53 U	0.59 U	0.54 U	0.65 U	0.53 U	0.68 U	0.54 U	0.67 U	0.54 U	0.52 U	0.72 U	0.79 U	0.70 U	0.61 U	0.62 U	0.61 U	0.52 U
Metals	6010/6020	**Chromium**	mg/Kg	1000	**11**	**8.5**	**14**	**11**	**18**	**11**	**7.9**	**20**	**9.5**	**9.5**	**8.2**	**7.5**	**14**	**9.5**	**7.8**	**12**	**8.6**	**13**	**33**	**7.6**	**18**	**16**	**8.1**	**30**	**7.6**	**9.7**	**11**
Metals	6010/6020	**Copper**	mg/Kg	36	**12**	**7.9**	**9.5**	**7.3**	**14**	**11**	**12**	**30**	**12**	**11**	**8.6**	**6.7**	**10**	**9.6**	**8.1**	**20**	**9.4**	**13**	**11**	**9.1**	**33**	**20**	**11**	**11**	**7.7**	**8.4**	**13**
Metals	6010/6020	**Lead**	mg/Kg	1000 (a)	6.0 U	7.1 U	5.9 U	6.3 U	**69**	**7.4**	6.7 U	7.3 U	5.5 U	6.4 U	5.3 U	5.9 U	5.4 U	6.5 U	5.3 U	6.8 U	5.4 U	6.7 U	5.4 U	5.2 U	7.2 U	7.9 U	7.0 U	6.1 U	6.2 U	6.1 U	5.2 U
Metals	7471	Mercury	mg/Kg	--	0.30 U	0.35 U	0.29 U	0.32 U	0.27 U	0.32 U	0.34 U	0.37 U	0.27 U	0.32 U	0.27 U	0.30 U	0.27 U	0.32 U	0.26 U	0.34 U	0.27 U	0.34 U	0.27 U	0.26 U	0.36 U	0.40 U	0.35 U	0.30 U	0.31 U	0.31 U	0.26 U
PCBs	8082	PCB-aroclor 1016	mg/Kg	--	0.0030 U	0.0035 U	0.0029 U	0.0032 U	0.0027 U	0.0032 U	0.0034 U	0.0037 U	--	--	--	--	0.0027 U	0.0032 U	--	--	--	--	0.0025 U	0.0026 U	0.0036 U	--	--	0.0030 U	0.0031 U	0.0031 U	--
PCBs	8082	PCB-aroclor 1221	mg/Kg	--	0.0030 U	0.0035 U	0.0029 U	0.0032 U	0.0027 U	0.0032 U	0.0034 U	0.0037 U	--	--	--	--	0.0027 U	0.0032 U	--	--	--	--	0.0025 U	0.0026 U	0.0036 U	--	--	0.0030 U	0.0031 U	0.0031 U	--
PCBs	8082	PCB-aroclor 1232	mg/Kg	--	0.0030 U	0.0035 U	0.0029 U	0.0032 U	0.0027 U	0.0032 U	0.0034 U	0.0037 U	--	--	--	--	0.0027 U	0.0032 U	--	--	--	--	0.0025 U	0.0026 U	0.0036 U	--	--	0.0030 U	0.0031 U	0.0031 U	--
PCBs	8082	PCB-aroclor 1242	mg/Kg	--	0.0030 U	0.0035 U	0.0029 U	0.0032 U	0.0027 U	0.0032 U	0.0034 U	0.0037 U	--	--	--	--	0.0027 U	0.0032 U	--	--	--	--	0.0025 U	0.0026 U	0.0036 U	--	--	0.0030 U	0.0031 U	0.0031 U	--
PCBs	8082	PCB-aroclor 1248	mg/Kg	--	0.0030 U	0.0035 U	0.0029 U	0.0032 U	0.0027 U	0.0032 U	0.0034 U	0.0037 U	--	--	--	--	0.0027 U	0.0032 U	--	--	--	--	0.0025 U	0.0026 U	0.0036 U	--	--	0.0030 U	0.0031 U	0.0031 U	--
PCBs	8082	PCB-aroclor 1254	mg/Kg	--	0.0030 U	0.0035 U	0.0029 U	0.0032 U	0.0027 U	0.0032 U	0.0034 U	0.0037 U	--	--	--	--	0.0027 U	0.0032 U	--	--	--	--	0.0025 U	0.0026 U	0.0036 U	--	--	0.0030 U	0.0031 U	0.0031 U	--
PCBs	8082	**PCB-aroclor 1260**	mg/Kg	--	0.0030 U	0.0035 U	0.0029 U	0.0032 U	0.0027 U	0.0032 U	0.0034 U	0.0037 U	--	--	--	--	0.0027 U	0.0032 U	--	--	--	--	0.0025 U	0.0026 U	0.0036 U	--	--	0.0030 U	0.0031 U	0.0031 U	--
PAHs	8270	**1-Methylnaphthalene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**2-Methylnaphthalene**	mg/Kg	320	0.040 U	0.0094 U	0.0078 U	0.0084 U	**0.0074**	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**Acenaphthene**	mg/Kg	0.5	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**Acenaphthylene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**Anthracene**	mg/Kg	1	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**Benzo(g,h,i)perylene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**Fluoranthene**	mg/Kg	2.5	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**Fluorene**	mg/Kg	0.6	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**Naphthalene**	mg/Kg	2.6	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**Phenanthrene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
PAHs	8270	**Pyrene**	mg/Kg	3.3	0.040 U	0.0094 U	0.0078 U	0.0084 U	**0.0089**	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
cPAHs	8270-SIM	**Benzo(a)anthracene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
cPAHs	8270-SIM	**Benzo(a)pyrene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
cPAHs	8270-SIM	**Benzo(b)fluoranthene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
cPAHs	8270-SIM	**Benzo(j,k)fluoranthene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
cPAHs	8270-SIM	**Chrysene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
cPAHs	8270-SIM	Dibenzo(a,h)anthracene	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
cPAHs	8270-SIM	**Indeno(1,2,3-cd)pyrene**	mg/Kg	--	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
cPAHs	8270-SIM	**Total cPAHs TEC (ND=0.5MRL)**	mg/Kg	18 (a)	0.030 U	0.0071 U	0.0059 U	0.0063 U	0.0054 U	0.0065 U	0.0068 U	0.0073 U	--	--	--	--	0.0054 U	0.0065 U	--	--	--	--	0.0054 U	0.0052 U	0.0072 U	--	--	0.0061 U	0.0063 U	0.0062 U	--
SVOCs	8270	1,2,4-Trichlorobenzene	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	1,2-Diphenylhydrazine	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	1,3-Dinitrobenzene	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2,3,4,6-Tetrachlorophenol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2,3,5,6-Tetrachlorophenol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2,3-DICHLOROANILINE	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2,4,5-Trichlorophenol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2,4,6-Trichlorophenol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2,4-Dichlorophenol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2,4-Dimethylphenol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2,4-Dinitrophenol	mg/Kg	--	1.0 U	0.24 U	0.20 U	0.21 U	0.18 U	0.21 U	0.22 U	0.24 U	--	--	--	--	0.18 U	0.22 U	--	--	--	--	0.18 U	0.17 U	0.24 U	--	--	0.20 U	0.21 U	0.20 U	--
SVOCs	8270	2,4-Dinitrotoluene	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2,6-Dinitrotoluene	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2-Chloronaphthalene	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2-Chlorophenol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2-Nitroaniline	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	2-Nitrophenol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	3,3'-Dichlorobenzidine	mg/Kg	--	1.0 U	0.24 U	0.20 U	0.21 U	0.18 U	0.21 U	0.22 U	0.24 U	--	--	--	--	0.18 U	0.22 U	--	--	--	--	0.18 U	0.17 U	0.24 U	--	--	0.20 U	0.21 U	0.20 U	--
SVOCs	8270	3-Nitroaniline	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	4,6-Dinitro-2-Methylphenol	mg/Kg	--	1.0 U	0.24 U	0.20 U	0.21 U	0.18 U	0.21 U	0.22 U	0.24 U	--	--	--	--	0.18 U	0.22 U	--	--	--	--	0.18 U	0.17 U	0.24 U	--	--	0.20 U	0.21 U	0.20 U	--
SVOCs	8270	4-Bromophenyl phenyl ether	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	4-Chloro-3-Methylphenol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	4-Chloroaniline	mg/Kg	--	1.0 U	0.24 U	0.20 U	0.21 U	0.18 U	0.21 U	0.22 U	0.24 U	--	--	--	--	0.18 U	0.22 U	--	--	--	--	0.18 U	0.17 U	0.24 U	--	--	0.20 U	0.21 U	0.20 U	--
SVOCs	8270	4-Chlorophenyl-Phenylether	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	4-Nitroaniline	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	4-Nitrophenol (p-Nitrophenol)	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Aniline	mg/Kg	--	1.0 U	0.24 U	0.20 U	0.21 U	0.18 U	0.21 U	0.22 U	0.24 U	--	--	--	--	0.18 U	0.22 U	--	--	--	--	0.18 U	0.17 U	0.24 U	--	--	0.20 U	0.21 U	0.20 U	--

TABLE C-1

SOIL ANALYTICAL DATA SUMMARY

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	B-1-2.0 2-3 ft	B-1-8.0 7-8 ft	B-2-2.0 1.5-2.5 ft	B-2-8.0 8-9 ft	B-3-2.0 1.5-2.5 ft	B-3-8.0 7-8.5 ft	B-4-2.0 1.5-2.5 ft	B-4-8.0 7-8 ft	B-5-2.0 2-3 ft	B-5-8.0 7.5-8.5 ft	B-6-2.0 2-3 ft	B-6-8.0 7-8 ft	B-7-2.0 1.5-2.5 ft	B-7-8.0 8-9 ft	B-8-6.0 5.5-6.5 ft	B-8-11.0 10.5-11.5 ft	B-9-7.0 6-7.5 ft	B-9-13.0 13-14 ft	B-10-2.0 1.5-2.5 ft (fill)	B-10-7.0 6.5-7.5 ft	B-10-13.0 12-13.5 ft	B-11-8.0 8-9 ft	B-11-12.0 11.5-13 ft	B-12-2.0 2 ft (fill)	B-12-7.0 7 ft	B-12-13.0 13 ft	B-13-7.0 7-8 ft
SVOCs	8270	Benzene, 1,4-Dinitro-	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Benzidine	mg/Kg	--	2.0 U	0.47 U	0.39 U	0.42 U	0.36 U	0.43 U	0.45 U	0.49 U	--	--	--	--	0.36 U	0.43 U	--	--	--	--	0.36 U	0.35 U	0.48 U	--	--	0.40 U	0.41 U	0.41 U	--
SVOCs	8270	Benzyl Alcohol	mg/Kg	--	1.0 U	0.24 U	0.20 U	0.21 U	0.18 U	0.21 U	0.22 U	0.24 U	--	--	--	--	0.18 U	0.22 U	--	--	--	--	0.18 U	0.17 U	0.24 U	--	--	0.20 U	0.21 U	0.20 U	--
SVOCs	8270	Bis(2-chloroethoxy)methane	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Bis(2-chloroethyl)ether	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Bis(2-chloroisopropyl)ether	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	**Bis(2-ethylhexyl)phthalate (BEHP)**	mg/Kg	0.13	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Butyl benzyl phthalate	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Carbazole	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Di-N-Octyl Phthalate	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Dibenzofuran	mg/Kg	160	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Dibutyl phthalate	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Diethyl phthalate	mg/Kg	0.9	1.0 U	0.24 U	0.20 U	0.21 U	0.18 U	0.21 U	0.22 U	0.24 U	--	--	--	--	0.18 U	0.22 U	--	--	--	--	0.18 U	0.17 U	0.24 U	--	--	0.20 U	0.21 U	0.20 U	--
SVOCs	8270	Dimethyl phthalate	mg/Kg	80000	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Hexachlorobenzene	mg/Kg	0.01	0.040 U	0.0094 U	0.0078 U	0.0084 U	0.0072 U	0.0086 U	0.0090 U	0.0097 U	--	--	--	--	0.0072 U	0.0086 U	--	--	--	--	0.0071 U	0.0069 U	0.0096 U	--	--	0.0081 U	0.0083 U	0.0082 U	--
SVOCs	8270	Hexachlorobutadiene	mg/Kg	0.01	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Hexachlorocyclopentadiene	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Hexachloroethane	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Isophorone	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	m,p-Cresol	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	N-Nitrosodi-n-propylamine	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	N-Nitrosodimethylamine	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	N-Nitrosodiphenylamine (as diphenylamine)	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Nitrobenzene	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	o-Cresol (2-methylphenol)	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	O-DINITROBENZENE	mg/Kg	--	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Pentachlorophenol	mg/Kg	0.1	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Phenol	mg/Kg	4.6	0.20 U	0.047 U	0.039 U	0.042 U	0.036 U	0.043 U	0.045 U	0.049 U	--	--	--	--	0.036 U	0.043 U	--	--	--	--	0.036 U	0.035 U	0.048 U	--	--	0.040 U	0.041 U	0.041 U	--
SVOCs	8270	Pyridine	mg/Kg	--	2.0 U	0.47 U	0.39 U	0.42 U	0.36 U	0.43 U	0.45 U	0.49 U	--	--	--	--	0.36 U	0.43 U	--	--	--	--	0.36 U	0.35 U	0.48 U	--	--	0.40 U	0.41 U	0.41 U	--
VOCs	5035A/8260	1,1,1,2-Tetrachloroethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,1,1-Trichloroethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,1,2,2-Tetrachloroethane	mg/Kg	0.005	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,1,2-Trichloroethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,1-Dichloroethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,1-Dichloroethene	mg/Kg	0.005	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,1-Dichloropropene	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,2,3-Trichlorobenzene	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,2,3-Trichloropropane	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,2,4-Trichlorobenzene	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**1,2,4-Trimethylbenzene**	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	**0.027**	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,2-Dibromo-3-Chloropropane	mg/Kg	--	0.34 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	1,2-dibromoethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,2-Dichloroethane	mg/Kg	0.012	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,2-Dichloropropane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**1,3,5-Trimethylbenzene**	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	**0.0082**	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,3-Dichloropropane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	2,2-Dichloropropane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**2-Butanone (MEK)**	mg/Kg	--	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	**0.0088**	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	**0.0093**	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	2-Chloroethyl vinyl ether	mg/Kg	--	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	2-Chlorotoluene	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	2-Hexanone	mg/Kg	--	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	4-Chlorotoluene	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	4-Methyl-2-Pentanone (Methyl isobutyl ketone)	mg/Kg	--	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	**Acetone**	mg/Kg	72000	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	**0.038**	0.0079 U	**0.020**	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	**0.036**	--	--	0.0050 U	0.0064 U	**0.015**	--
VOCs	5035A/8260	**Benzene**	mg/Kg	0.02	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Bromobenzene	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Bromochloromethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Bromodichloromethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Bromoform (Tribromomethane)	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Bromomethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**Carbon Disulfide**	mg/Kg	--	0.0016 U	**0.0015**	0.0016 U	**0.0030**	0.0012 U	**0.011**	0.0016 U	**0.0061**	--	--	--	--	0.0012 U	**0.0031**	--	--	--	--	0.00097 U	0.0012 U	**0.0076**	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Carbon Tetrachloride	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Chlorobenzene	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Chloroethane	mg/Kg	--	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	Chloroform	mg/Kg	0.16	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Chloromethane	mg/Kg	--	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	cis-1,2-Dichloroethene	mg/Kg	800	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--

TABLE C-1

SOIL ANALYTICAL DATA SUMMARY

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	B-1-2.0 2-3 ft	B-1-8.0 7-8 ft	B-2-2.0 1.5-2.5 ft	B-2-8.0 8-9 ft	B-3-2.0 1.5-2.5 ft	B-3-8.0 7-8.5 ft	B-4-2.0 1.5-2.5 ft	B-4-8.0 7-8 ft	B-5-2.0 2-3 ft	B-5-8.0 7.5-8.5 ft	B-6-2.0 2-3 ft	B-6-8.0 7-8 ft	B-7-2.0 1.5-2.5 ft	B-7-8.0 8-9 ft	B-8-6.0 5.5-6.5 ft	B-8-11.0 10.5-11.5 ft	B-9-7.0 6-7.5 ft	B-9-13.0 13-14 ft	B-10-2.0 1.5-2.5 ft (fill)	B-10-7.0 6.5-7.5 ft	B-10-13.0 12-13.5 ft	B-11-8.0 8-9 ft	B-11-12.0 11.5-13 ft	B-12-2.0 2 ft (fill)	B-12-7.0 7 ft	B-12-13.0 13 ft	B-13-7.0 7-8 ft
VOCs	5035A/8260	Cis-1,3-Dichloropropene	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Dibromochloromethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Dibromomethane	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Dichlorodifluoromethane (CFC-12)	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**Ethylbenzene**	mg/Kg	0.02	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	**0.0031**	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Hexachlorobutadiene	mg/Kg	0.01	0.34 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	**Isopropylbenzene (Cumene)**	mg/Kg	8000	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	**0.0019**	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Methyl Iodide (Iodomethane)	mg/Kg	--	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	Methyl t-butyl ether	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**Methylene Chloride**	mg/Kg	0.18	**0.0080**	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	**n-Butylbenzene**	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	**0.0085**	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**n-Propylbenzene**	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	**0.0047**	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**Naphthalene**	mg/Kg	2.6	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**p-Isopropyltoluene**	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	**0.0036**	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**Sec-Butylbenzene**	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	**0.0048**	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Styrene	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Tert-Butylbenzene	mg/Kg	--	0.067 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**Tetrachloroethene**	mg/Kg	0.005	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Toluene	mg/Kg	6.4	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	Trans-1,2-Dichloroethene	mg/Kg	3.2	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Trans-1,3-Dichloropropene	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Trichloroethene	mg/Kg	0.01	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Trichlorofluoromethane (CFC-11)	mg/Kg	--	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	Vinyl Acetate	mg/Kg	--	0.0079 U	0.0067 U	0.0079 U	0.0082 U	0.0061 U	0.0050 U	0.0079 U	0.0089 U	--	--	--	--	0.0058 U	0.0065 U	--	--	--	--	0.0048 U	0.0058 U	0.0075 U	--	--	0.0050 U	0.0064 U	0.0044 U	--
VOCs	5035A/8260	Vinyl Chloride	mg/Kg	0.005	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	0.00097 U	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--
VOCs	5035A/8260	**Xylene, m-,p-**	mg/Kg	9.0	0.0031 U	0.0027 U	0.0032 U	0.0033 U	0.0025 U	0.0020 U	0.0032 U	0.0036 U	--	--	--	--	0.0023 U	0.0026 U	--	--	--	--	**0.012**	0.0023 U	0.0030 U	--	--	0.0020 U	0.0026 U	0.0018 U	--
VOCs	5035A/8260	**Xylene, o-**	mg/Kg	0.1	0.0016 U	0.0013 U	0.0016 U	0.0016 U	0.0012 U	0.00099 U	0.0016 U	0.0018 U	--	--	--	--	0.0012 U	0.0013 U	--	--	--	--	**0.0054**	0.0012 U	0.0015 U	--	--	0.0010 U	0.0013 U	0.00088 U	--

TABLE C-1

SOIL ANALYTICAL DATA SUMMARY

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	B-13-13.0 12.5-13.5 ft	B-14-7.0 7 ft	B-14-13.0 13 ft	B-15-2.0 2-2.5 ft (fill)	B-15-7.0 7-7.5 ft	B-15-13.0 12.5-13 ft	B-16-2.0 2-3 ft (fill)	B-16-7.0 7-8 ft	B-16-13.0 12.5-13.5 ft	B-17-2.0 2 ft	B-17-8.0 8 ft	B-18-2.0 1.5-2.5 ft	B-18-8.0 7.5-8.5 ft	B-19-2.0 1.5-2.5 ft	B-19-8.0 8 ft	B-20-2.0 2-3 ft	B-20-8.0 7-8 ft	B-21-2.0 2 ft	B-21-8.0 8 ft	B-22-2.0 2-3 ft	B-22-8.0 7-8 ft	B-23-2.0 2-3 ft	B-23-8.0 7-8 ft	B-24-2.0 1.5-2.5 ft	B-24-8.0 7.5-8.5 ft	B-26-2.0 2-3 ft	B-26-8.0 8-9 ft
BTEX	5035A/8021	Benzene	mg/Kg	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.020 U	0.020 U
BTEX	5035A/8021	Ethylbenzene	mg/Kg	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.067 U	0.053 U
BTEX	5035A/8021	Toluene	mg/Kg	6.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.067 U	0.053 U
BTEX	5035A/8021	Xylene, m-,p-	mg/Kg	9.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.067 U	0.053 U
BTEX	5035A/8021	Xylene, o-	mg/Kg	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.067 U	0.053 U
Fuels	NWTPH-Gx	Total petroleum hydrocarbons as gasoline	mg/Kg	30	--	--	--	5.3 U	5.8 U	7.5 U	5.3 U	--	--	5.8 U	6.6 U	5.8 U	5.1 U	4.7 U	6.9 U	5.6 U	12 U	7.1 U	7.9 U	5.9 U	7.5 U	5.8 U	7.6 U	8.5 U	7.0 U	6.7 U	5.3 U
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as diesel**	mg/Kg	2000	36 U	33 U	32 U	26 U	27 U	36 U	27 U	26 U	33 U	28 U	29 U	27 U	27 U	29 U	31 U	27 U	**5900**	32 U	33 U	**32**	32 U	27 U	33 U	32 U	30 U	30 U	27 U
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as lube oil**	mg/Kg	2000	72 U	66 U	63 U	53 U	54 U	72 U	54 U	52 U	66 U	57 U	58 U	53 U	54 U	57 U	61 U	53 U	**740 J**	63 U	66 U	**76**	65 U	55 U	66 U	64 U	61 U	59 U	54 U
Metals	6010/6020	Arsenic	mg/Kg	20	14 U	13 U	13 U	11 U	11 U	14 U	11 U	10 U	13 U	11 U	12 U	11 U	11 U	11 U	12 U	11 U	12 U	13 U	13 U	11 U	13 U	11 U	13 U	13 U	12 U	--	--
Metals	6010/6020	Cadmium	mg/Kg	--	0.72 U	0.66 U	0.63 U	0.53 U	0.54 U	0.72 U	0.54 U	0.52 U	0.66 U	0.57 U	0.58 U	0.53 U	0.54 U	0.57 U	0.61 U	0.53 U	0.58 U	0.63 U	0.66 U	0.54 U	0.65 U	0.55 U	0.66 U	0.64 U	0.61 U	--	--
Metals	6010/6020	**Chromium**	mg/Kg	1000	**15**	**12**	**9.7**	**28**	**9.2**	**13**	**36**	**8.6**	**10**	**25**	**9.6**	**22**	**14**	**11**	**12**	**12**	**12**	**11**	**9.9**	**8.5**	**7.6**	**8.5**	**11**	**12**	**11**	--	--
Metals	6010/6020	**Copper**	mg/Kg	36	**25**	**10**	**9.7**	**11**	**9**	**19**	**10**	**8.1**	**11**	**13**	**12**	**12**	**11**	**11**	**11**	**21**	**13**	**10**	**9.2**	**9.1**	**8.4**	**36**	**18**	**11**	**11**	--	--
Metals	6010/6020	**Lead**	mg/Kg	1000 (a)	7.2 U	6.6 U	6.3 U	5.3 U	5.4 U	7.2 U	5.4 U	5.2 U	6.6 U	5.7 U	5.8 U	5.3 U	**35**	5.7 U	6.1 U	**28**	**35**	6.3 U	6.6 U	5.4 U	6.5 U	**160**	**18**	6.4 U	6.1 U	--	--
Metals	7471	Mercury	mg/Kg	--	0.36 U	0.33 U	0.32 U	0.26 U	0.27 U	0.36 U	0.27 U	0.26 U	0.33 U	0.28 U	0.29 U	0.27 U	0.27 U	0.29 U	0.31 U	0.27 U	0.29 U	0.32 U	0.33 U	0.27 U	0.32 U	0.27 U	0.33 U	0.32 U	0.30 U	--	--
PCBs	8082	PCB-aroclor 1016	mg/Kg	--	--	--	--	0.0026 U	0.0027 U	0.0036 U	0.0027 U	--	--	0.0028 U	0.0029 U	0.0027 U	0.0027 U	0.0029 U	0.0031 U	0.0027 U	0.0029 U	0.0032 U	0.0033 U	0.0027 U	0.0032 U	0.0027 U	0.0033 U	--	--	--	--
PCBs	8082	PCB-aroclor 1221	mg/Kg	--	--	--	--	0.0026 U	0.0027 U	0.0036 U	0.0027 U	--	--	0.0028 U	0.0029 U	0.0027 U	0.0027 U	0.0029 U	0.0031 U	0.0027 U	0.0029 U	0.0032 U	0.0033 U	0.0027 U	0.0032 U	0.0027 U	0.0033 U	--	--	--	--
PCBs	8082	PCB-aroclor 1232	mg/Kg	--	--	--	--	0.0026 U	0.0027 U	0.0036 U	0.0027 U	--	--	0.0028 U	0.0029 U	0.0027 U	0.0027 U	0.0029 U	0.0031 U	0.0027 U	0.0029 U	0.0032 U	0.0033 U	0.0027 U	0.0032 U	0.0027 U	0.0033 U	--	--	--	--
PCBs	8082	PCB-aroclor 1242	mg/Kg	--	--	--	--	0.0026 U	0.0027 U	0.0036 U	0.0027 U	--	--	0.0028 U	0.0029 U	0.0027 U	0.0027 U	0.0029 U	0.0031 U	0.0027 U	0.0029 U	0.0032 U	0.0033 U	0.0027 U	0.0032 U	0.0027 U	0.0033 U	--	--	--	--
PCBs	8082	PCB-aroclor 1248	mg/Kg	--	--	--	--	0.0026 U	0.0027 U	0.0036 U	0.0027 U	--	--	0.0028 U	0.0029 U	0.0027 U	0.0027 U	0.0029 U	0.0031 U	0.0027 U	0.0029 U	0.0032 U	0.0033 U	0.0027 U	0.0032 U	0.0027 U	0.0033 U	--	--	--	--
PCBs	8082	PCB-aroclor 1254	mg/Kg	--	--	--	--	0.0026 U	0.0027 U	0.0036 U	0.0027 U	--	--	0.0028 U	0.0029 U	0.0027 U	0.0027 U	0.0029 U	0.0031 U	0.0027 U	0.0029 U	0.0032 U	0.0033 U	0.0027 U	0.0032 U	0.0027 U	0.0033 U	--	--	--	--
PCBs	8082	**PCB-aroclor 1260**	mg/Kg	--	--	--	--	0.0026 U	0.0027 U	0.0036 U	0.0027 U	--	--	0.0028 U	0.0029 U	0.0027 U	0.0027 U	0.0029 U	0.0031 U	**0.017**	**0.0038**	0.0032 U	0.0033 U	0.0027 U	0.0032 U	0.0027 U	0.0033 U	--	--	--	--
PAHs	8270	**1-Methylnaphthalene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	**0.20**	0.0084 U	0.0088 U	**0.0076**	0.0086 U	0.0073 U	0.0087 U	--	--	--	--
PAHs	8270	**2-Methylnaphthalene**	mg/Kg	320	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	**0.19**	0.0084 U	0.0088 U	0.0072 U	0.0086 U	0.0073 U	0.0087 U	--	--	--	--
PAHs	8270	**Acenaphthene**	mg/Kg	0.5	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	**0.024**	0.0084 U	0.0088 U	0.0072 U	0.0086 U	0.0073 U	0.0087 U	--	--	--	--
PAHs	8270	**Acenaphthylene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	**0.058**	0.0084 U	0.0088 U	0.0072 U	0.0086 U	0.0073 U	0.0087 U	--	--	--	--
PAHs	8270	**Anthracene**	mg/Kg	1	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	**0.016**	0.0084 U	0.0088 U	0.0072 U	0.0086 U	0.0073 U	0.0087 U	--	--	--	--
PAHs	8270	**Benzo(g,h,i)perylene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	0.015 U	0.0084 U	0.0088 U	0.0072 U	0.0086 U	**0.016**	0.0087 U	--	--	--	--
PAHs	8270	**Fluoranthene**	mg/Kg	2.5	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	**0.011**	0.0072 U	0.0076 U	0.0082 U	0.0071 U	0.015 U	0.0084 U	0.0088 U	0.0072 U	0.0086 U	**0.012**	0.0087 U	--	--	--	--
PAHs	8270	**Fluorene**	mg/Kg	0.6	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	**0.033**	0.0084 U	0.0088 U	0.0072 U	0.0086 U	0.0073 U	0.0087 U	--	--	--	--
PAHs	8270	**Naphthalene**	mg/Kg	2.6	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	**0.099**	0.0084 U	0.0088 U	0.0072 U	0.0086 U	0.0073 U	0.0087 U	--	--	--	--
PAHs	8270	**Phenanthrene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	**0.015**	0.0071 U	--	--	0.0075 U	0.0078 U	**0.0088**	0.0072 U	0.0076 U	0.0082 U	0.0071 U	**0.015**	0.0084 U	0.0088 U	**0.011**	0.0086 U	**0.0088**	0.0087 U	--	--	--	--
PAHs	8270	**Pyrene**	mg/Kg	3.3	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	**0.015**	0.0072 U	**0.013**	**0.0096**	0.0071 U	**0.034**	0.0084 U	0.0088 U	0.0072 U	0.0086 U	**0.015**	0.0087 U	--	--	--	--
cPAHs	8270-SIM	**Benzo(a)anthracene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	**0.0084**	0.0072 U	0.0076 U	0.0082 U	0.0071 U	0.015 U	0.0084 U	0.0088 U	0.0072 U	0.0086 U	**0.010**	0.0087 U	--	--	--	--
cPAHs	8270-SIM	**Benzo(a)pyrene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	**0.0085**	0.0072 U	0.0076 U	0.0082 U	0.0071 U	0.015 U	0.0084 U	0.0088 U	0.0072 U	0.0086 U	**0.014**	0.0087 U	--	--	--	--
cPAHs	8270-SIM	**Benzo(b)fluoranthene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	0.015 U	0.0084 U	0.0088 U	0.0072 U	0.0086 U	**0.013**	**0.0099**	--	--	--	--
cPAHs	8270-SIM	**Benzo(j,k)fluoranthene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	0.015 U	0.0084 U	0.0088 U	0.0072 U	0.0086 U	**0.012**	0.0087 U	--	--	--	--
cPAHs	8270-SIM	**Chrysene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	**0.0081**	0.0072 U	0.0076 U	0.0082 U	0.0071 U	**0.022**	0.0084 U	0.0088 U	0.0072 U	0.0086 U	**0.012**	0.0087 U	--	--	--	--
cPAHs	8270-SIM	Dibenzo(a,h)anthracene	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	0.015 U	0.0084 U	0.0088 U	0.0072 U	0.0086 U	0.0073 U	0.0087 U	--	--	--	--
cPAHs	8270-SIM	**Indeno(1,2,3-cd)pyrene**	mg/Kg	--	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	0.015 U	0.0084 U	0.0088 U	0.0072 U	0.0086 U	**0.011**	0.0087 U	--	--	--	--
cPAHs	8270-SIM	**Total cPAHs TEC (ND=0.5MRL)**	mg/Kg	18 (a)	--	--	--	0.0053 U	0.0055 U	0.0072 U	0.0054 U	--	--	0.0057 U	0.0059 U	**0.011**	0.0054 U	0.0057 U	0.0062 U	0.0054 U	**0.011**	0.0063 U	0.0066 U	0.0054 U	0.0065 U	**0.019**	**0.0071**	--	--	--	--
SVOCs	8270	1,2,4-Trichlorobenzene	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	1,2-Diphenylhydrazine	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	1,3-Dinitrobenzene	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2,3,4,6-Tetrachlorophenol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2,3,5,6-Tetrachlorophenol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2,3-DICHLOROANILINE	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2,4,5-Trichlorophenol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2,4,6-Trichlorophenol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2,4-Dichlorophenol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2,4-Dimethylphenol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2,4-Dinitrophenol	mg/Kg	--	--	--	--	0.18 U	0.18 U	0.24 U	0.18 U	--	--	0.19 U	0.19 U	0.18 U	0.18 U	0.19 U	0.20 U	0.18 U	0.96 U	0.21 U	0.22 U	0.18 U	0.22 U	0.18 U	0.22 U	--	--	--	--
SVOCs	8270	2,4-Dinitrotoluene	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2,6-Dinitrotoluene	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2-Chloronaphthalene	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2-Chlorophenol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2-Nitroaniline	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	2-Nitrophenol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	3,3'-Dichlorobenzidine	mg/Kg	--	--	--	--	0.18 U	0.18 U	0.24 U	0.18 U	--	--	0.19 U	0.19 U	0.18 U	0.18 U	0.19 U	0.20 U	0.18 U	0.96 U	0.21 U	0.22 U	0.18 U	0.22 U	0.18 U	0.22 U	--	--	--	--
SVOCs	8270	3-Nitroaniline	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	4,6-Dinitro-2-Methylphenol	mg/Kg	--	--	--	--	0.18 U	0.18 U	0.24 U	0.18 U	--	--	0.19 U	0.19 U	0.18 U	0.18 U	0.19 U	0.20 U	0.18 U	0.96 U	0.21 U	0.22 U	0.18 U	0.22 U	0.18 U	0.22 U	--	--	--	--
SVOCs	8270	4-Bromophenyl phenyl ether	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	4-Chloro-3-Methylphenol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	4-Chloroaniline	mg/Kg	--	--	--	--	0.18 U	0.18 U	0.24 U	0.18 U	--	--	0.19 U	0.19 U	0.18 U	0.18 U	0.19 U	0.20 U	0.18 U	0.96 U	0.21 U	0.22 U	0.18 U	0.22 U	0.18 U	0.22 U	--	--	--	--
SVOCs	8270	4-Chlorophenyl-Phenylether	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	4-Nitroaniline	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	4-Nitrophenol (p-Nitrophenol)	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Aniline	mg/Kg	--	--	--	--	0.18 U	0.18 U	0.24 U	0.18 U	--	--	0.19 U	0.19 U	0.18 U	0.18 U	0.19 U	0.20 U	0.18 U	0.96 U	0.21 U	0.22 U	0.18 U	0.22 U	0.18 U	0.22 U	--	--	--	--

TABLE C-1

SOIL ANALYTICAL DATA SUMMARY

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	B-13-13.0 12.5-13.5 ft	B-14-7.0 7 ft	B-14-13.0 13 ft	B-15-2.0 2-2.5 ft (fill)	B-15-7.0 7-7.5 ft	B-15-13.0 12.5-13 ft	B-16-2.0 2-3 ft (fill)	B-16-7.0 7-8 ft	B-16-13.0 12.5-13.5 ft	B-17-2.0 2 ft	B-17-8.0 8 ft	B-18-2.0 1.5-2.5 ft	B-18-8.0 7.5-8.5 ft	B-19-2.0 1.5-2.5 ft	B-19-8.0 8 ft	B-20-2.0 2-3 ft	B-20-8.0 7-8 ft	B-21-2.0 2 ft	B-21-8.0 8 ft	B-22-2.0 2-3 ft	B-22-8.0 7-8 ft	B-23-2.0 2-3 ft	B-23-8.0 7-8 ft	B-24-2.0 1.5-2.5 ft	B-24-8.0 7.5-8.5 ft	B-26-2.0 2-3 ft	B-26-8.0 8-9 ft
SVOCs	8270	Benzene, 1,4-Dinitro-	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Benzidine	mg/Kg	--	--	--	--	0.35 U	0.36 U	0.48 U	0.36 U	--	--	0.38 U	0.39 U	0.35 U	0.36 U	0.38 U	0.41 U	0.36 U	1.9 U	0.42 U	0.44 U	0.36 U	0.43 U	0.36 U	0.44 U	--	--	--	--
SVOCs	8270	Benzyl Alcohol	mg/Kg	--	--	--	--	0.18 U	0.18 U	0.24 U	0.18 U	--	--	0.19 U	0.19 U	0.18 U	0.18 U	0.19 U	0.20 U	0.18 U	0.96 U	0.21 U	0.22 U	0.18 U	0.22 U	0.18 U	0.22 U	--	--	--	--
SVOCs	8270	Bis(2-chloroethoxy)methane	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Bis(2-chloroethyl)ether	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Bis(2-chloroisopropyl)ether	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	**Bis(2-ethylhexyl)phthalate (BEHP)**	mg/Kg	0.13	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	**0.16***	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Butyl benzyl phthalate	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Carbazole	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Di-N-Octyl Phthalate	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Dibenzofuran	mg/Kg	160	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Dibutyl phthalate	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Diethyl phthalate	mg/Kg	0.9	--	--	--	0.18 U	0.18 U	0.24 U	0.18 U	--	--	0.19 U	0.19 U	0.18 U	0.18 U	0.19 U	0.20 U	0.18 U	0.96 U	0.21 U	0.22 U	0.18 U	0.22 U	0.18 U	0.22 U	--	--	--	--
SVOCs	8270	Dimethyl phthalate	mg/Kg	80000	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Hexachlorobenzene	mg/Kg	0.01	--	--	--	0.0070 U	0.0073 U	0.0096 U	0.0071 U	--	--	0.0075 U	0.0078 U	0.0071 U	0.0072 U	0.0076 U	0.0082 U	0.0071 U	0.039 U	0.0084 U	0.0088 U	0.0072 U	0.0086 U	0.0073 U	0.0087 U	--	--	--	--
SVOCs	8270	Hexachlorobutadiene	mg/Kg	0.01	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Hexachlorocyclopentadiene	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Hexachloroethane	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Isophorone	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	m,p-Cresol	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	N-Nitrosodi-n-propylamine	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	N-Nitrosodimethylamine	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	N-Nitrosodiphenylamine (as diphenylamine)	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Nitrobenzene	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	o-Cresol (2-methylphenol)	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	O-DINITROBENZENE	mg/Kg	--	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Pentachlorophenol	mg/Kg	0.1	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Phenol	mg/Kg	4.6	--	--	--	0.035 U	0.036 U	0.048 U	0.036 U	--	--	0.038 U	0.039 U	0.035 U	0.036 U	0.038 U	0.041 U	0.036 U	0.19 U	0.042 U	0.044 U	0.036 U	0.043 U	0.036 U	0.044 U	--	--	--	--
SVOCs	8270	Pyridine	mg/Kg	--	--	--	--	0.35 U	0.36 U	0.48 U	0.36 U	--	--	0.38 U	0.39 U	0.35 U	0.36 U	0.38 U	0.41 U	0.36 U	1.9 U	0.42 U	0.44 U	0.36 U	0.43 U	0.36 U	0.44 U	--	--	--	--
VOCs	5035A/8260	1,1,1,2-Tetrachloroethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,1,1-Trichloroethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,1,2,2-Tetrachloroethane	mg/Kg	0.005	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,1,2-Trichloroethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,1-Dichloroethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,1-Dichloroethene	mg/Kg	0.005	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,1-Dichloropropene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,2,3-Trichlorobenzene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,2,3-Trichloropropane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,2,4-Trichlorobenzene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	**1,2,4-Trimethylbenzene**	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,2-Dibromo-3-Chloropropane	mg/Kg	--	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	1,2-dibromoethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,2-Dichloroethane	mg/Kg	0.012	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,2-Dichloropropane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	**1,3,5-Trimethylbenzene**	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,3-Dichloropropane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	2,2-Dichloropropane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	**2-Butanone (MEK)**	mg/Kg	--	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	**0.0090**	--	--
VOCs	5035A/8260	2-Chloroethyl vinyl ether	mg/Kg	--	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	2-Chlorotoluene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	2-Hexanone	mg/Kg	--	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	4-Chlorotoluene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	4-Methyl-2-Pentanone (Methyl isobutyl ketone)	mg/Kg	--	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	**Acetone**	mg/Kg	72000	--	--	--	0.0050 U	0.0061 U	**0.017**	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	**0.0098**	**0.010**	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	**0.043**	--	--
VOCs	5035A/8260	**Benzene**	mg/Kg	0.02	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	**0.019**	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	**0.014**	--	--
VOCs	5035A/8260	Bromobenzene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Bromochloromethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Bromodichloromethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Bromoform (Tribromomethane)	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Bromomethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	**Carbon Disulfide**	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	**0.0040**	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	**0.0040**	0.0012 U	0.065 U	0.0014 U	**0.0040**	0.059 U	**0.0017**	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Carbon Tetrachloride	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Chlorobenzene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Chloroethane	mg/Kg	--	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	Chloroform	mg/Kg	0.16	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Chloromethane	mg/Kg	--	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	cis-1,2-Dichloroethene	mg/Kg	800	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--

TABLE C-1

SOIL ANALYTICAL DATA SUMMARY

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	B-13-13.0 12.5-13.5 ft	B-14-7.0 7 ft	B-14-13.0 13 ft	B-15-2.0 2-2.5 ft (fill)	B-15-7.0 7-7.5 ft	B-15-13.0 12.5-13 ft	B-16-2.0 2-3 ft (fill)	B-16-7.0 7-8 ft	B-16-13.0 12.5-13.5 ft	B-17-2.0 2 ft	B-17-8.0 8 ft	B-18-2.0 1.5-2.5 ft	B-18-8.0 7.5-8.5 ft	B-19-2.0 1.5-2.5 ft	B-19-8.0 8 ft	B-20-2.0 2-3 ft	B-20-8.0 7-8 ft	B-21-2.0 2 ft	B-21-8.0 8 ft	B-22-2.0 2-3 ft	B-22-8.0 7-8 ft	B-23-2.0 2-3 ft	B-23-8.0 7-8 ft	B-24-2.0 1.5-2.5 ft	B-24-8.0 7.5-8.5 ft	B-26-2.0 2-3 ft	B-26-8.0 8-9 ft
VOCs	5035A/8260	Cis-1,3-Dichloropropene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Dibromochloromethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Dibromomethane	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Dichlorodifluoromethane (CFC-12)	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	**Ethylbenzene**	mg/Kg	0.02	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	**0.0021**	--	--
VOCs	5035A/8260	Hexachlorobutadiene	mg/Kg	0.01	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	**Isopropylbenzene (Cumene)**	mg/Kg	8000	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	**0.043**	--	--
VOCs	5035A/8260	Methyl Iodide (Iodomethane)	mg/Kg	--	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	Methyl t-butyl ether	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	**Methylene Chloride**	mg/Kg	0.18	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	**0.0083**	**0.0095**	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	**n-Butylbenzene**	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	**0.38**	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	**0.030**	--	--
VOCs	5035A/8260	**n-Propylbenzene**	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	**0.067**	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	**0.11**	--	--
VOCs	5035A/8260	**Naphthalene**	mg/Kg	2.6	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	**0.0034**	--	--
VOCs	5035A/8260	**p-Isopropyltoluene**	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	**0.0019**	--	--
VOCs	5035A/8260	**Sec-Butylbenzene**	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	**0.071**	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	**0.018**	--	--
VOCs	5035A/8260	Styrene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Tert-Butylbenzene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	**Tetrachloroethene**	mg/Kg	0.005	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	**0.0026**	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	**0.0029**	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Toluene	mg/Kg	6.4	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	Trans-1,2-Dichloroethene	mg/Kg	3.2	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Trans-1,3-Dichloropropene	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Trichloroethene	mg/Kg	0.01	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Trichlorofluoromethane (CFC-11)	mg/Kg	--	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	Vinyl Acetate	mg/Kg	--	--	--	--	0.0050 U	0.0061 U	0.0062 U	0.0053 U	--	--	0.0057 U	0.0050 U	0.0061 U	0.0073 U	0.0069 U	0.0060 U	0.0060 U	0.33 U	0.0068 U	0.0066 U	0.29 U	0.0076 U	0.0078 U	0.0066 U	0.0068 U	0.0056 U	--	--
VOCs	5035A/8260	Vinyl Chloride	mg/Kg	0.005	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--
VOCs	5035A/8260	**Xylene, m-,p-**	mg/Kg	9.0	--	--	--	0.0020 U	0.0024 U	0.0025 U	0.0021 U	--	--	0.0023 U	0.0020 U	0.0024 U	0.0029 U	0.0027 U	0.0024 U	0.0024 U	0.13 U	0.0027 U	0.0026 U	0.12 U	0.0030 U	0.0031 U	0.0026 U	0.0027 U	0.0023 U	--	--
VOCs	5035A/8260	**Xylene, o-**	mg/Kg	0.1	--	--	--	0.0010 U	0.0012 U	0.0012 U	0.0011 U	--	--	0.0011 U	0.0010 U	0.0012 U	0.0015 U	0.0014 U	0.0012 U	0.0012 U	0.065 U	0.0014 U	0.0013 U	0.059 U	0.0015 U	0.0016 U	0.0013 U	0.0014 U	0.0011 U	--	--

Notes:

ft = Feet below ground surface
mg/Kg = Milligrams per kilogram
ND = Non-detect result
MRL = Method reporting limit
TEC = Toxic equivalent concentration
U = Not detected above the listed method reporting limit
J = Estimated concentration
BOLD typeface = Analyte/concentration detected above method reporting limit
= Analyte/sample/concentration exceeds screening level
-- = No value available or not analyzed
* Result may reflect laboratory contamination (BEHP is a common laboratory contaminant).
(a) Port screening levels for lead and total cPAHs TEC are based on an empirical demonstration that the soil-to-groundwater-to-surface water pathway is incomplete.

TABLE C-2

GROUNDWATER ANALYTICAL DATA SUMMARY[1]

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	Other Potentially Applicable Screening Levels (a)	B-1-11.0-WATER 6-11 ft	B-2-11.0-WATER 8-13 ft	B-3-11.0-WATER 6-11 ft	B-4-11.0-WATER 7-11 ft	B-7-11.0-WATER 8-13 ft	B-10-11.0-WATER 10-13 ft	B-10-25.0-WATER 21-25 ft	B-10-50.0-WATER 49-53 ft	B-12-11.0-WATER 10-15 ft	B-12-25.0-WATER[2] 26-28 ft	B-13-15.0-WATER 10-15 ft (b)	B-13-25.0-WATER 20-25 ft (b)
BTEX	8021	Benzene	mg/L	0.024	0.024	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	8021	Ethylbenzene	mg/L	0.049	6.1	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	8021	Toluene	mg/L	15	33	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	8021	Xylene, m-,p-	mg/L	15	0.67	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	8021	Xylene, o-	mg/L	0.166	0.96	--	--	--	--	--	--	--	--	--	--	--	--
Fuels	NWTPH-Gx	**Total petroleum hydrocarbons as gasoline**	mg/L	0.80	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	--	--	0.1 U	0.1 U	0.1 U	**0.15**
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as diesel**	mg/L	0.50	--	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	--	--	0.26 U	**0.48**	0.24 U	0.24 U
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as lube oil**	mg/L	0.50	--	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	--	--	0.41 U	**0.88**	0.39 U	0.39 U
Dissolved Metals	200.8	**Arsenic**	mg/L	0.0050	0.010 (c)	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0030 U	**0.0060**	**0.0093***	0.0030 U	0.0030 U	**0.0083***	0.0030 U
Dissolved Metals	200.8	**Cadmium**	mg/L	0.0090	--	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U
Dissolved Metals	200.8	**Chromium**	mg/L	0.050	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.059**	**0.10***	0.01 U	0.01 U	**0.039***	0.01 U
Dissolved Metals	200.8	**Copper**	mg/L	0.0031	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.045**	**0.052***	0.01 U	0.01 U	**0.054***	0.01 U
Dissolved Metals	200.8	**Lead**	mg/L	0.0081	--	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	**0.0047**	**0.0091***	0.0010 U	0.0010 U	**0.0085***	0.0010 U
Dissolved Metals	7470	Mercury	mg/L	0.00020	0.0019	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U
PCBs	8082	PCB-aroclor 1016	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1221	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1232	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1242	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1248	mg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1254	mg/L	0.0000017	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1260	mg/L	0.000020	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs	8270	1-Methylnaphthalene	mg/L	--	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
PAHs	8270	2-Methylnaphthalene	mg/L	--	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
PAHs	8270	Acenaphthene	mg/L	0.102	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
PAHs	8270	Acenaphthylene	mg/L	--	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
PAHs	8270	Anthracene	mg/L	0.041	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
PAHs	8270	**Benzo(g,h,i)perylene**	mg/L	--	--	--	0.0000098 U	0.0000098 U	--	**0.000013**	--	--	--	--	--	--	--
PAHs	8270	Fluoranthene	mg/L	0.051	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
PAHs	8270	Fluorene	mg/L	0.070	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
PAHs	8270	Naphthalene	mg/L	0.36	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
PAHs	8270	Phenanthrene	mg/L	--	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
PAHs	8270	Pyrene	mg/L	0.049	--	--	0.000098 U	0.000098 U	--	0.000095 U	--	--	--	--	--	--	--
cPAHs	8270-SIM	**Benzo(a)anthracene**	mg/L	0.00002	--	--	**0.000010**	0.0000098 U	--	**0.000015**	--	--	--	--	--	--	--
cPAHs	8270-SIM	Benzo(a)pyrene	mg/L	0.00002	--	--	0.0000098 U	0.0000098 U	--	0.0000095 U	--	--	--	--	--	--	--
cPAHs	8270-SIM	**Benzo(b)fluoranthene**	mg/L	0.00002	--	--	0.0000098 U	0.0000098 U	--	**0.000010**	--	--	--	--	--	--	--
cPAHs	8270-SIM	Benzo(j,k)fluoranthene	mg/L	0.00002	--	--	0.0000098 U	0.0000098 U	--	0.0000095 U	--	--	--	--	--	--	--
cPAHs	8270-SIM	**Chrysene**	mg/L	0.00002	--	--	0.0000098 U	0.0000098 U	--	**0.000019**	--	--	--	--	--	--	--
cPAHs	8270-SIM	Dibenzo(a,h)anthracene	mg/L	0.00002	--	--	0.0000098 U	0.0000098 U	--	0.0000095 U	--	--	--	--	--	--	--
cPAHs	8270-SIM	Indeno(1,2,3-cd)pyrene	mg/L	0.00002	--	--	0.0000098 U	0.0000098 U	--	0.0000095 U	--	--	--	--	--	--	--
cPAHs	8270-SIM	**Total cPAHs TEC (ND=0.5MRL)**	mg/L	0.00002	--	--	**0.0000079**	0.0000074 U	--	**0.0000089**	--	--	--	--	--	--	--
SVOCs	8270	1,2,4-Trichlorobenzene	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	1,2-Diphenylhydrazine	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	1,3-Dinitrobenzene	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2,3,4,6-Tetrachlorophenol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2,3,5,6-Tetrachlorophenol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2,3-DICHLOROANILINE	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2,4,5-Trichlorophenol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2,4,6-Trichlorophenol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2,4-Dichlorophenol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2,4-Dimethylphenol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2,4-Dinitrophenol	mg/L	--	--	--	0.0049 U	0.0049 U	--	0.0047 U	--	--	--	--	--	--	--
SVOCs	8270	2,4-Dinitrotoluene	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2,6-Dinitrotoluene	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2-Chloronaphthalene	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2-Chlorophenol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2-Nitroaniline	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	2-Nitrophenol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	3,3'-Dichlorobenzidine	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	3-Nitroaniline	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	4,6-Dinitro-2-Methylphenol	mg/L	--	--	--	0.0049 U	0.0049 U	--	0.0047 U	--	--	--	--	--	--	--
SVOCs	8270	4-Bromophenyl phenyl ether	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	4-Chloro-3-Methylphenol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	4-Chloroaniline	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	4-Chlorophenyl-Phenylether	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	4-Nitroaniline	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	4-Nitrophenol (p-Nitrophenol)	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--

TABLE C-2

GROUNDWATER ANALYTICAL DATA SUMMARY[1]

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	Other Potentially Applicable Screening Levels (a)	B-1-11.0-WATER 6-11 ft	B-2-11.0-WATER 8-13 ft	B-3-11.0-WATER 6-11 ft	B-4-11.0-WATER 7-11 ft	B-7-11.0-WATER 8-13 ft	B-10-11.0-WATER 10-13 ft	B-10-25.0-WATER 21-25 ft	B-10-50.0-WATER 49-53 ft	B-12-11.0-WATER 10-15 ft	B-12-25.0-WATER[2] 26-28 ft	B-13-15.0-WATER 10-15 ft (b)	B-13-25.0-WATER 20-25 ft (b)
SVOCs	8270	Aniline	mg/L	--	--	--	0.0049 U	0.0049 U	--	0.0047 U	--	--	--	--	--	--	--
SVOCs	8270	Benzene, 1,4-Dinitro-	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Benzidine	mg/L	--	--	--	0.0049 U	0.0049 U	--	0.0047 U	--	--	--	--	--	--	--
SVOCs	8270	Benzyl Alcohol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Bis(2-chloroethoxy)methane	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Bis(2-chloroethyl)ether	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Bis(2-chloroisopropyl)ether	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	**Bis(2-ethylhexyl)phthalate (BEHP)**	mg/L	0.0012	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Butyl benzyl phthalate	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Carbazole	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Di-N-Octyl Phthalate	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Dibenzofuran	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Dibutyl phthalate	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Diethyl phthalate	mg/L	0.903	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Dimethyl phthalate	mg/L	72.016	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Hexachlorobenzene	mg/L	0.0002	--	--	0.00020 U	0.00020 U	--	0.00019 U	--	--	--	--	--	--	--
SVOCs	8270	Hexachlorobutadiene	mg/L	0.0002	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Hexachlorocyclopentadiene	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Hexachloroethane	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	mg/L	--	--	--	0.0049 U	0.0049 U	--	0.0047 U	--	--	--	--	--	--	--
SVOCs	8270	Isophorone	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	m,p-Cresol	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	N-Nitrosodi-n-propylamine	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	N-Nitrosodimethylamine	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	N-Nitrosodiphenylamine (as diphenylamine)	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Nitrobenzene	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	o-Cresol (2-methylphenol)	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	O-DINITROBENZENE	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Pentachlorophenol	mg/L	0.0030	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	**Phenol**	mg/L	5.401	--	--	**0.0034**	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
SVOCs	8270	Pyridine	mg/L	--	--	--	0.00098 U	0.00098 U	--	0.00095 U	--	--	--	--	--	--	--
VOCs	8260	1,1,1,2-Tetrachloroethane	mg/L	--	0.074	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,1,1-Trichloroethane	mg/L	--	25	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,1,2,2-Tetrachloroethane	mg/L	0.0040	0.062	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,1,2-Trichloroethane	mg/L	--	0.079	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,1-Dichloroethane	mg/L	--	5.0	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,1-Dichloroethene	mg/L	0.0032	0.28	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,1-Dichloropropene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,2,3-Trichlorobenzene	mg/L	--	--	0.00031 U	0.00031 U	0.00031 U	0.00031 U	0.00030 U	0.00031 U	0.00031 U	0.00031 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,2,3-Trichloropropane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00025 U	0.0050 U
VOCs	8260	1,2,4-Trichlorobenzene	mg/L	--	8.4	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,2,4-Trimethylbenzene	mg/L	0.061	0.052	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,2-Dibromo-3-Chloropropane	mg/L	--	--	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.02 U
VOCs	8260	1,2-dibromoethane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/L	--	4.0	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,2-Dichloroethane	mg/L	0.037	0.042	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,2-Dichloropropane	mg/L	--	0.062	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,3,5-Trimethylbenzene	mg/L	--	0.054	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,3-Dichloropropane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/L	--	17	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	2,2-Dichloropropane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	2-Butanone (MEK)	mg/L	--	760	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.1 U
VOCs	8260	2-Chloroethyl vinyl ether	mg/L	--	--	0.0016 U	0.0032 U	0.0032 U	0.0032 U	0.0043 U	0.0013 U	0.0013 U	0.0013 U	0.0010 U	0.0010 U	0.0010 U	0.02 U
VOCs	8260	2-Chlorotoluene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	**2-Hexanone**	mg/L	--	--	0.0026 U	0.0026 U	0.0026 U	0.0026 U	0.0020 U	0.0026 U	0.0026 U	0.0026 U	0.0020 U	0.0020 U	0.0020 U	0.04 U
VOCs	8260	4-Chlorotoluene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	4-Methyl-2-Pentanone (Methyl isobutyl ketone)	mg/L	--	24	0.0025 U	0.0025 U	0.0025 U	0.0025 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.04 U
VOCs	8260	**Acetone**	mg/L	--	--	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.1 U
VOCs	8260	**Benzene**	mg/L	0.024	0.024	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	**0.064**	0.00020 U	**0.51**
VOCs	8260	Bromobenzene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Bromochloromethane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Bromodichloromethane	mg/L	--	0.0009	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Bromoform (Tribromomethane)	mg/L	--	2.0	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.02 U
VOCs	8260	Bromomethane	mg/L	--	0.028	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	**Carbon Disulfide**	mg/L	--	0.87	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	**0.00028**	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Carbon Tetrachloride	mg/L	--	0.0022	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Chlorobenzene	mg/L	--	0.22	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Chloroethane	mg/L	--	--	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.02 U
VOCs	8260	Chloroform	mg/L	0.012	0.012	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Chloromethane	mg/L	--	0.052	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.02 U
VOCs	8260	cis-1,2-Dichloroethene	mg/L	--	0.35	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U

TABLE C-2

GROUNDWATER ANALYTICAL DATA SUMMARY[1]

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	Other Potentially Applicable Screening Levels (a)	B-1-11.0-WATER 6-11 ft	B-2-11.0-WATER 8-13 ft	B-3-11.0-WATER 6-11 ft	B-4-11.0-WATER 7-11 ft	B-7-11.0-WATER 8-13 ft	B-10-11.0-WATER 10-13 ft	B-10-25.0-WATER 21-25 ft	B-10-50.0-WATER 49-53 ft	B-12-11.0-WATER 10-15 ft	B-12-25.0-WATER[2] 26-28 ft	B-13-15.0-WATER 10-15 ft (b)	B-13-25.0-WATER 20-25 ft (b)
VOCs	8260	Cis-1,3-Dichloropropene	mg/L	--	0.016	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Dibromochloromethane	mg/L	--	0.0022	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Dibromomethane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Dichlorodifluoromethane (CFC-12)	mg/L	--	0.022	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Ethylbenzene	mg/L	0.049	6.1	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Hexachlorobutadiene	mg/L	0.0002	0.0081	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	**Isopropylbenzene (Cumene)**	mg/L	1.6	1.6	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Methyl Iodide (Iodomethane)	mg/L	--	--	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.02 U
VOCs	8260	Methyl t-butyl ether	mg/L	--	6.1	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Methylene Chloride	mg/L	0.59	0.94	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.02 U
VOCs	8260	n-Butylbenzene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	**n-Propylbenzene**	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Naphthalene	mg/L	0.36	0.36	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0010 U	0.0010 U	0.0010 U	0.02 U
VOCs	8260	p-Isopropyltoluene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Sec-Butylbenzene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Styrene	mg/L	--	0.78	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Tert-Butylbenzene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Tetrachloroethene	mg/L	0.0033	0.010	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	**Toluene**	mg/L	15	33	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	**0.0014**	0.0010 U	0.02 U
VOCs	8260	Trans-1,2-Dichloroethene	mg/L	0.25	0.29	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Trans-1,3-Dichloropropene	mg/L	--	0.016	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Trichloroethene	mg/L	0.0084	0.0042	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Trichlorofluoromethane (CFC-11)	mg/L	--	0.26	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Vinyl Acetate	mg/L	--	17	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.02 U
VOCs	8260	Vinyl Chloride	mg/L	0.0024	0.0035	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
VOCs	8260	Xylene, m-,p-	mg/L	15	0.67	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.0080 U
VOCs	8260	Xylene, o-	mg/L	0.166	0.96	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0040 U
pH	FP/4500 HB	pH (lab measurement except as noted)	SU	6-8.5	--	7.20	8.20	7.90	7.90	7.50	8.00	7.68 (d)	8.43 (d)	7.54 (d)	--	8.10	8.30
Salinity	2520B	Salinity (lab measurement)	g/Kg	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Salinity	(d)	Salinity (field measurement)	g/Kg	--	--	0.3	0.1	0.3	0.5	0.1	0.8	--	1.9	1.5	--	0.7	0.1
Conductivity	(d)	Electrical conductivity	mS/cm	--	--	0.606	0.291	0.580	0.977	0.298	1.57	0.300	3.65	2.96	--	1.09	0.174
Turbidity	(d)	Turbidity (unfiltered sample)	NTU	--	--	387	0 (e)	536	96	287	462	296	690	288	--	>1,000	>1,000

TABLE C-2

GROUNDWATER ANALYTICAL DATA SUMMARY[1]

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	Other Potentially Applicable Screening Levels (a)	B-14-11.0-WATER 10-15 ft	B-14-25.0-WATER 25-27 ft	B-15-11.0-WATER 10-20 ft	B-16-11.0-WATER 15-20 ft	B-16-25.0-WATER 20-25 ft	B-16-50.0-WATER[2] 48-52 ft (b)	B-17-11.0-WATER 10-15 ft (b)	B-17-25.0-WATER 24.5-28.5 ft	B-19-11.0-WATER 5.5-10.5 ft	B-19-25.0-WATER 23-25 ft (b)	B-19-50.0-WATER 47-49 ft	B-21-11.0-WATER 7-12 ft
BTEX	8021	Benzene	mg/L	0.024	0.024	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	8021	Ethylbenzene	mg/L	0.049	6.1	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	8021	Toluene	mg/L	15	33	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	8021	Xylene, m-,p-	mg/L	15	0.67	--	--	--	--	--	--	--	--	--	--	--	--
BTEX	8021	Xylene, o-	mg/L	0.166	0.96	--	--	--	--	--	--	--	--	--	--	--	--
Fuels	NWTPH-Gx	**Total petroleum hydrocarbons as gasoline**	mg/L	0.80	--	0.1 U	0.1 U	0.1 U	0.1 U	--	--	0.1 U	0.1 U	0.1 U	0.1 U	--	0.1 U
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as diesel**	mg/L	0.50	--	0.26 U	**0.78**	0.26 U	0.27 U	--	--	0.26 U	0.29 U	0.26 U	0.28 U	--	0.26 U
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as lube oil**	mg/L	0.50	--	0.41 U	**1.3**	0.41 U	0.42 U	--	--	0.42 U	0.47 U	0.41 U	0.45 U	--	0.41 U
Dissolved Metals	200.8	**Arsenic**	mg/L	0.0050	0.010 (c)	**0.0063**	0.0030 U	**0.011***	0.0030 U	**0.022****	**0.27****	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0030 U
Dissolved Metals	200.8	**Cadmium**	mg/L	0.0090	--	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	**0.0042****	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U
Dissolved Metals	200.8	**Chromium**	mg/L	0.050	--	0.01 U	0.01 U	0.01 U	0.01 U	**0.11****	**12****	0.01 U	**0.037***	0.01 U	0.01 U	0.01 U	0.01 U
Dissolved Metals	200.8	**Copper**	mg/L	0.0031	--	0.01 U	**0.012**	0.01 U	0.01 U	**0.15****	**2.6****	0.01 U	**0.019***	0.01 U	0.01 U	0.01 U	0.01 U
Dissolved Metals	200.8	**Lead**	mg/L	0.0081	--	0.0010 U	**0.002**	0.0010 U	0.0010 U	**0.018****	**0.27****	0.0010 U	**0.0015***	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Dissolved Metals	7470	Mercury	mg/L	0.00020	0.0019	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	**0.0018****	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U
PCBs	8082	PCB-aroclor 1016	mg/L	--	--	--	--	--	--	--	--	0.000047 U	0.000047 U	--	--	--	--
PCBs	8082	PCB-aroclor 1221	mg/L	--	--	--	--	--	--	--	--	0.000047 U	0.000047 U	--	--	--	--
PCBs	8082	PCB-aroclor 1232	mg/L	--	--	--	--	--	--	--	--	0.000047 U	0.000047 U	--	--	--	--
PCBs	8082	PCB-aroclor 1242	mg/L	--	--	--	--	--	--	--	--	0.000047 U	0.000047 U	--	--	--	--
PCBs	8082	PCB-aroclor 1248	mg/L	--	--	--	--	--	--	--	--	0.000047 U	0.000047 U	--	--	--	--
PCBs	8082	PCB-aroclor 1254	mg/L	0.0000017	--	--	--	--	--	--	--	0.000047 U	0.000047 U	--	--	--	--
PCBs	8082	PCB-aroclor 1260	mg/L	0.000020	--	--	--	--	--	--	--	0.000047 U	0.000047 U	--	--	--	--
PAHs	8270	1-Methylnaphthalene	mg/L	--	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
PAHs	8270	2-Methylnaphthalene	mg/L	--	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
PAHs	8270	Acenaphthene	mg/L	0.102	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
PAHs	8270	Acenaphthylene	mg/L	--	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
PAHs	8270	Anthracene	mg/L	0.041	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
PAHs	8270	**Benzo(g,h,i)perylene**	mg/L	--	--	0.000010 U	--	--	--	--	--	0.0000094 U	0.0000095 U	0.0000095 U	--	--	--
PAHs	8270	Fluoranthene	mg/L	0.051	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
PAHs	8270	Fluorene	mg/L	0.070	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
PAHs	8270	Naphthalene	mg/L	0.36	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
PAHs	8270	Phenanthrene	mg/L	--	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
PAHs	8270	Pyrene	mg/L	0.049	--	0.00010 U	--	--	--	--	--	0.000094 U	0.000095 U	0.000095 U	--	--	--
cPAHs	8270-SIM	**Benzo(a)anthracene**	mg/L	0.00002	--	**0.000011**	--	--	--	--	--	0.0000094 U	**0.000012**	0.0000095 U	--	--	--
cPAHs	8270-SIM	Benzo(a)pyrene	mg/L	0.00002	--	0.000010 U	--	--	--	--	--	0.0000094 U	0.0000095 U	0.0000095 U	--	--	--
cPAHs	8270-SIM	**Benzo(b)fluoranthene**	mg/L	0.00002	--	0.000010 U	--	--	--	--	--	0.0000094 U	0.0000095 U	0.0000095 U	--	--	--
cPAHs	8270-SIM	Benzo(j,k)fluoranthene	mg/L	0.00002	--	0.000010 U	--	--	--	--	--	0.0000094 U	0.0000095 U	0.0000095 U	--	--	--
cPAHs	8270-SIM	**Chrysene**	mg/L	0.00002	--	0.000010 U	--	--	--	--	--	0.0000094 U	0.0000095 U	0.0000095 U	--	--	--
cPAHs	8270-SIM	Dibenzo(a,h)anthracene	mg/L	0.00002	--	0.000010 U	--	--	--	--	--	0.0000094 U	0.0000095 U	0.0000095 U	--	--	--
cPAHs	8270-SIM	Indeno(1,2,3-cd)pyrene	mg/L	0.00002	--	0.000010 U	--	--	--	--	--	0.0000094 U	0.0000095 U	0.0000095 U	--	--	--
cPAHs	8270-SIM	**Total cPAHs TEC (ND=0.5MRL)**	mg/L	0.00002	--	**0.0000082**	--	--	--	--	--	0.0000071 U	**0.0000079**	0.0000072 U	--	--	--
SVOCs	8270	1,2,4-Trichlorobenzene	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	1,2-Diphenylhydrazine	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	1,3-Dinitrobenzene	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2,3,4,6-Tetrachlorophenol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2,3,5,6-Tetrachlorophenol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2,3-DICHLOROANILINE	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2,4,5-Trichlorophenol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2,4,6-Trichlorophenol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2,4-Dichlorophenol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2,4-Dimethylphenol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2,4-Dinitrophenol	mg/L	--	--	0.0051 U	--	--	--	--	--	0.0047 U	0.0047 U	0.0047 U	--	--	--
SVOCs	8270	2,4-Dinitrotoluene	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2,6-Dinitrotoluene	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2-Chloronaphthalene	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2-Chlorophenol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2-Nitroaniline	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	2-Nitrophenol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	3,3'-Dichlorobenzidine	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	3-Nitroaniline	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	4,6-Dinitro-2-Methylphenol	mg/L	--	--	0.0051 U	--	--	--	--	--	0.0047 U	0.0047 U	0.0047 U	--	--	--
SVOCs	8270	4-Bromophenyl phenyl ether	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	4-Chloro-3-Methylphenol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	4-Chloroaniline	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	4-Chlorophenyl-Phenylether	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	4-Nitroaniline	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	4-Nitrophenol (p-Nitrophenol)	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--

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May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	Other Potentially Applicable Screening Levels (a)	B-14-11.0-WATER 10-15 ft	B-14-25.0-WATER 25-27 ft	B-15-11.0-WATER 10-20 ft	B-16-11.0-WATER 15-20 ft	B-16-25.0-WATER 20-25 ft	B-16-50.0-WATER[2] 48-52 ft (b)	B-17-11.0-WATER 10-15 ft (b)	B-17-25.0-WATER 24.5-28.5 ft	B-19-11.0-WATER 5.5-10.5 ft	B-19-25.0-WATER 23-25 ft (b)	B-19-50.0-WATER 47-49 ft	B-21-11.0-WATER 7-12 ft
SVOCs	8270	Aniline	mg/L	--	--	0.0051 U	--	--	--	--	--	0.0047 U	0.0047 U	0.0047 U	--	--	--
SVOCs	8270	Benzene, 1,4-Dinitro-	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Benzidine	mg/L	--	--	0.0051 U	--	--	--	--	--	0.0047 U	0.0047 U	0.0047 U	--	--	--
SVOCs	8270	Benzyl Alcohol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Bis(2-chloroethoxy)methane	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Bis(2-chloroethyl)ether	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Bis(2-chloroisopropyl)ether	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	**Bis(2-ethylhexyl)phthalate (BEHP)**	mg/L	0.0012	--	0.0010 U	--	--	--	--	--	0.00094 U	**0.0024*** **	0.00095 U	--	--	--
SVOCs	8270	Butyl benzyl phthalate	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Carbazole	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Di-N-Octyl Phthalate	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Dibenzofuran	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Dibutyl phthalate	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Diethyl phthalate	mg/L	0.903	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Dimethyl phthalate	mg/L	72.016	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Hexachlorobenzene	mg/L	0.0002	--	0.00020 U	--	--	--	--	--	0.00019 U	0.00019 U	0.00019 U	--	--	--
SVOCs	8270	Hexachlorobutadiene	mg/L	0.0002	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Hexachlorocyclopentadiene	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Hexachloroethane	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	mg/L	--	--	0.0051 U	--	--	--	--	--	0.0047 U	0.0047 U	0.0047 U	--	--	--
SVOCs	8270	Isophorone	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	m,p-Cresol	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	N-Nitrosodi-n-propylamine	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	N-Nitrosodimethylamine	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	N-Nitrosodiphenylamine (as diphenylamine)	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Nitrobenzene	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	o-Cresol (2-methylphenol)	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	O-DINITROBENZENE	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Pentachlorophenol	mg/L	0.0030	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	**Phenol**	mg/L	5.401	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
SVOCs	8270	Pyridine	mg/L	--	--	0.0010 U	--	--	--	--	--	0.00094 U	0.00095 U	0.00095 U	--	--	--
VOCs	8260	1,1,1,2-Tetrachloroethane	mg/L	--	0.074	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,1,1-Trichloroethane	mg/L	--	25	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,1,2,2-Tetrachloroethane	mg/L	0.0040	0.062	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,1,2-Trichloroethane	mg/L	--	0.079	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,1-Dichloroethane	mg/L	--	5.0	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,1-Dichloroethene	mg/L	0.0032	0.28	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,1-Dichloropropene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,2,3-Trichlorobenzene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,2,3-Trichloropropane	mg/L	--	--	0.00025 U	0.00025 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00025 U	0.00025 U	0.00020 U	0.00020 U	0.00020 U	0.00025 U
VOCs	8260	1,2,4-Trichlorobenzene	mg/L	--	8.4	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,2,4-Trimethylbenzene	mg/L	0.061	0.052	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,2-Dibromo-3-Chloropropane	mg/L	--	--	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
VOCs	8260	1,2-dibromoethane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/L	--	4.0	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,2-Dichloroethane	mg/L	0.037	0.042	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.0010 U	0.0010 U	0.0010 U	0.00020 U
VOCs	8260	1,2-Dichloropropane	mg/L	--	0.062	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,3,5-Trimethylbenzene	mg/L	--	0.054	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,3-Dichloropropane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/L	--	17	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	2,2-Dichloropropane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	2-Butanone (MEK)	mg/L	--	760	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
VOCs	8260	2-Chloroethyl vinyl ether	mg/L	--	--	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
VOCs	8260	2-Chlorotoluene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	**2-Hexanone**	mg/L	--	--	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	**0.0026**	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U
VOCs	8260	4-Chlorotoluene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	4-Methyl-2-Pentanone (Methyl isobutyl ketone)	mg/L	--	24	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U	0.0020 U
VOCs	8260	**Acetone**	mg/L	--	--	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	**0.0050**	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
VOCs	8260	**Benzene**	mg/L	0.024	0.024	0.00020 U	**0.015**	0.00020 U	0.00020 U	**0.0064**	**0.00080**	0.00020 U	0.00020 U	**0.0077**	0.00020 U	0.00020 U	**0.010**
VOCs	8260	Bromobenzene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Bromochloromethane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Bromodichloromethane	mg/L	--	0.0009	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Bromoform (Tribromomethane)	mg/L	--	2.0	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
VOCs	8260	Bromomethane	mg/L	--	0.028	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	**Carbon Disulfide**	mg/L	--	0.87	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	**0.0012**	0.00020 U	0.00020 U	0.00020 U	0.00020 U	**0.00026**	0.00020 U
VOCs	8260	Carbon Tetrachloride	mg/L	--	0.0022	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Chlorobenzene	mg/L	--	0.22	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Chloroethane	mg/L	--	--	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
VOCs	8260	Chloroform	mg/L	0.012	0.012	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Chloromethane	mg/L	--	0.052	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
VOCs	8260	cis-1,2-Dichloroethene	mg/L	--	0.35	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U

TABLE C-2

GROUNDWATER ANALYTICAL DATA SUMMARY[1]

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	Other Potentially Applicable Screening Levels (a)	B-14-11.0-WATER 10-15 ft	B-14-25.0-WATER 25-27 ft	B-15-11.0-WATER 10-20 ft	B-16-11.0-WATER 15-20 ft	B-16-25.0-WATER 20-25 ft	B-16-50.0-WATER[2] 48-52 ft (b)	B-17-11.0-WATER 10-15 ft (b)	B-17-25.0-WATER 24.5-28.5 ft	B-19-11.0-WATER 5.5-10.5 ft	B-19-25.0-WATER 23-25 ft (b)	B-19-50.0-WATER 47-49 ft	B-21-11.0-WATER 7-12 ft
VOCs	8260	Cis-1,3-Dichloropropene	mg/L	--	0.016	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Dibromochloromethane	mg/L	--	0.0022	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Dibromomethane	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Dichlorodifluoromethane (CFC-12)	mg/L	--	0.022	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Ethylbenzene	mg/L	0.049	6.1	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Hexachlorobutadiene	mg/L	0.0002	0.0081	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	**Isopropylbenzene (Cumene)**	mg/L	1.6	1.6	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	**0.00029**
VOCs	8260	Methyl Iodide (Iodomethane)	mg/L	--	--	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
VOCs	8260	Methyl t-butyl ether	mg/L	--	6.1	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Methylene Chloride	mg/L	0.59	0.94	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
VOCs	8260	n-Butylbenzene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	**n-Propylbenzene**	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Naphthalene	mg/L	0.36	0.36	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
VOCs	8260	p-Isopropyltoluene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Sec-Butylbenzene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Styrene	mg/L	--	0.78	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Tert-Butylbenzene	mg/L	--	--	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Tetrachloroethene	mg/L	0.0033	0.010	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	**Toluene**	mg/L	15	33	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	**0.0025**	0.0010 U
VOCs	8260	Trans-1,2-Dichloroethene	mg/L	0.25	0.29	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Trans-1,3-Dichloropropene	mg/L	--	0.016	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Trichloroethene	mg/L	0.0084	0.0042	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Trichlorofluoromethane (CFC-11)	mg/L	--	0.26	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Vinyl Acetate	mg/L	--	17	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
VOCs	8260	Vinyl Chloride	mg/L	0.0024	0.0035	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
VOCs	8260	Xylene, m-,p-	mg/L	15	0.67	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U	0.00040 U
VOCs	8260	Xylene, o-	mg/L	0.166	0.96	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
pH	FP/4500 HB	pH (lab measurement except as noted)	SU	6-8.5	--	8.30	8.40	8.50	7.90	8.60	8.70	7.00	8.50	7.30	8.90	8.20	7.40
Salinity	2520B	Salinity (lab measurement)	g/Kg	--	--	--	--	--	--	--	--	0.09	0.86	0.52	0.77	9.66	--
Salinity	(d)	Salinity (field measurement)	g/Kg	--	--	0.5	0.4	0.6	0.3	0.4	--	0.1	0.9	0.6	0.8	11.3	0.2
Conductivity	(d)	Electrical conductivity	mS/cm	--	--	0.958	0.786	1.20	0.688	0.773	--	0.170	1.74	1.11	1.58	19.1	0.408
Turbidity	(d)	Turbidity (unfiltered sample)	NTU	--	--	278	276	386	1,000	>1,000	--	237	769	>1,000	>1,000	529	164

TABLE C-2

GROUNDWATER ANALYTICAL DATA SUMMARY[1]

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	Other Potentially Applicable Screening Levels (a)	B-21-25.0-WATER 24-28 ft	B-21-50.0-WATER 46-50 ft (b)	B-22-11.0-WATER 6-11 ft	B-24-11.0-WATER 7-11 ft (b)	B-24-25.0-WATER 26-30 ft	B-25-11.0-WATER 8-12 ft	B-26-11.0-WATER 7-12 ft
BTEX	8021	Benzene	mg/L	0.024	0.024	--	--	--	--	--	0.0010 U	0.0010 U
BTEX	8021	Ethylbenzene	mg/L	0.049	6.1	--	--	--	--	--	0.0010 U	0.0010 U
BTEX	8021	Toluene	mg/L	15	33	--	--	--	--	--	0.0010 U	0.0010 U
BTEX	8021	Xylene, m-,p-	mg/L	15	0.67	--	--	--	--	--	0.0010 U	0.0010 U
BTEX	8021	Xylene, o-	mg/L	0.166	0.96	--	--	--	--	--	0.0010 U	0.0010 U
Fuels	NWTPH-Gx	**Total petroleum hydrocarbons as gasoline**	mg/L	0.80	--	0.4 U	--	0.1 U	**0.61**	0.1 U	0.1 U	0.1 U
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as diesel**	mg/L	0.50	--	0.26 U	--	0.26 U	**0.46 J**	0.26 U	0.27 U	0.26 U
Fuels	NWTPH-Dx	**Total petroleum hydrocarbons as lube oil**	mg/L	0.50	--	0.42 U	--	0.41 U	**0.60**	0.41 U	0.43 U	0.41 U
Dissolved Metals	200.8	**Arsenic**	mg/L	0.0050	0.010 (c)	0.0030 U	0.0030 U	0.0030 U	0.0030 U	0.0030 U	--	--
Dissolved Metals	200.8	**Cadmium**	mg/L	0.0090	--	0.0040 U	0.0040 U	0.0040 U	0.0040 U	0.0040 U	--	--
Dissolved Metals	200.8	**Chromium**	mg/L	0.050	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	--	--
Dissolved Metals	200.8	**Copper**	mg/L	0.0031	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	--	--
Dissolved Metals	200.8	**Lead**	mg/L	0.0081	--	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	--	--
Dissolved Metals	7470	Mercury	mg/L	0.00020	0.0019	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	--	--
PCBs	8082	PCB-aroclor 1016	mg/L	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1221	mg/L	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1232	mg/L	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1242	mg/L	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1248	mg/L	--	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1254	mg/L	0.0000017	--	--	--	--	--	--	--	--
PCBs	8082	PCB-aroclor 1260	mg/L	0.000020	--	--	--	--	--	--	--	--
PAHs	8270	1-Methylnaphthalene	mg/L	--	--	--	--	--	--	--	--	--
PAHs	8270	2-Methylnaphthalene	mg/L	--	--	--	--	--	--	--	--	--
PAHs	8270	Acenaphthene	mg/L	0.102	--	--	--	--	--	--	--	--
PAHs	8270	Acenaphthylene	mg/L	--	--	--	--	--	--	--	--	--
PAHs	8270	Anthracene	mg/L	0.041	--	--	--	--	--	--	--	--
PAHs	8270	**Benzo(g,h,i)perylene**	mg/L	--	--	--	--	--	--	--	--	--
PAHs	8270	Fluoranthene	mg/L	0.051	--	--	--	--	--	--	--	--
PAHs	8270	Fluorene	mg/L	0.070	--	--	--	--	--	--	--	--
PAHs	8270	Naphthalene	mg/L	0.36	--	--	--	--	--	--	--	--
PAHs	8270	Phenanthrene	mg/L	--	--	--	--	--	--	--	--	--
PAHs	8270	Pyrene	mg/L	0.049	--	--	--	--	--	--	--	--
cPAHs	8270-SIM	**Benzo(a)anthracene**	mg/L	0.00002	--	--	--	--	--	--	--	--
cPAHs	8270-SIM	Benzo(a)pyrene	mg/L	0.00002	--	--	--	--	--	--	--	--
cPAHs	8270-SIM	**Benzo(b)fluoranthene**	mg/L	0.00002	--	--	--	--	--	--	--	--
cPAHs	8270-SIM	Benzo(j,k)fluoranthene	mg/L	0.00002	--	--	--	--	--	--	--	--
cPAHs	8270-SIM	**Chrysene**	mg/L	0.00002	--	--	--	--	--	--	--	--
cPAHs	8270-SIM	Dibenzo(a,h)anthracene	mg/L	0.00002	--	--	--	--	--	--	--	--
cPAHs	8270-SIM	Indeno(1,2,3-cd)pyrene	mg/L	0.00002	--	--	--	--	--	--	--	--
cPAHs	8270-SIM	**Total cPAHs TEC (ND=0.5MRL)**	mg/L	0.00002	--	--	--	--	--	--	--	--
SVOCs	8270	1,2,4-Trichlorobenzene	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	1,2-Diphenylhydrazine	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	1,3-Dinitrobenzene	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,3,4,6-Tetrachlorophenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,3,5,6-Tetrachlorophenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,3-DICHLOROANILINE	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,4,5-Trichlorophenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,4,6-Trichlorophenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,4-Dichlorophenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,4-Dimethylphenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,4-Dinitrophenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,4-Dinitrotoluene	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2,6-Dinitrotoluene	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2-Chloronaphthalene	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2-Chlorophenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2-Nitroaniline	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	2-Nitrophenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	3,3'-Dichlorobenzidine	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	3-Nitroaniline	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	4,6-Dinitro-2-Methylphenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	4-Bromophenyl phenyl ether	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	4-Chloro-3-Methylphenol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	4-Chloroaniline	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	4-Chlorophenyl-Phenylether	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	4-Nitroaniline	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	4-Nitrophenol (p-Nitrophenol)	mg/L	--	--	--	--	--	--	--	--	--

TABLE C-2

GROUNDWATER ANALYTICAL DATA SUMMARY[1]

May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	Other Potentially Applicable Screening Levels (a)	B-21-25.0-WATER 24-28 ft	B-21-50.0-WATER 46-50 ft (b)	B-22-11.0-WATER 6-11 ft	B-24-11.0-WATER 7-11 ft (b)	B-24-25.0-WATER 26-30 ft	B-25-11.0-WATER 8-12 ft	B-26-11.0-WATER 7-12 ft
SVOCs	8270	Aniline	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Benzene, 1,4-Dinitro-	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Benzidine	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Benzyl Alcohol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Bis(2-chloroethoxy)methane	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Bis(2-chloroethyl)ether	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Bis(2-chloroisopropyl)ether	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	**Bis(2-ethylhexyl)phthalate (BEHP)**	mg/L	0.0012	--	--	--	--	--	--	--	--
SVOCs	8270	Butyl benzyl phthalate	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Carbazole	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Di-N-Octyl Phthalate	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Dibenzofuran	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Dibutyl phthalate	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Diethyl phthalate	mg/L	0.903	--	--	--	--	--	--	--	--
SVOCs	8270	Dimethyl phthalate	mg/L	72.016	--	--	--	--	--	--	--	--
SVOCs	8270	Hexachlorobenzene	mg/L	0.0002	--	--	--	--	--	--	--	--
SVOCs	8270	Hexachlorobutadiene	mg/L	0.0002	--	--	--	--	--	--	--	--
SVOCs	8270	Hexachlorocyclopentadiene	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Hexachloroethane	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Isophorone	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	m,p-Cresol	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	N-Nitrosodi-n-propylamine	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	N-Nitrosodimethylamine	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	N-Nitrosodiphenylamine (as diphenylamine)	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Nitrobenzene	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	o-Cresol (2-methylphenol)	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	O-DINITROBENZENE	mg/L	--	--	--	--	--	--	--	--	--
SVOCs	8270	Pentachlorophenol	mg/L	0.0030	--	--	--	--	--	--	--	--
SVOCs	8270	**Phenol**	mg/L	5.401	--	--	--	--	--	--	--	--
SVOCs	8270	Pyridine	mg/L	--	--	--	--	--	--	--	--	--
VOCs	8260	1,1,1,2-Tetrachloroethane	mg/L	--	0.074	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,1,1-Trichloroethane	mg/L	--	25	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,1,2,2-Tetrachloroethane	mg/L	0.0040	0.062	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,1,2-Trichloroethane	mg/L	--	0.079	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,1-Dichloroethane	mg/L	--	5.0	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,1-Dichloroethene	mg/L	0.0032	0.28	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,1-Dichloropropene	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,2,3-Trichlorobenzene	mg/L	--	--	0.0020 U	0.00020 U	0.00031 U	0.0030 U	0.00060 U	--	--
VOCs	8260	1,2,3-Trichloropropane	mg/L	--	--	0.0025 U	0.00025 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,2,4-Trichlorobenzene	mg/L	--	8.4	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,2,4-Trimethylbenzene	mg/L	0.061	0.052	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,2-Dibromo-3-Chloropropane	mg/L	--	--	0.01 U	0.0010 U	0.0010 U	0.01 U	0.0020 U	--	--
VOCs	8260	1,2-dibromoethane	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,2-Dichlorobenzene (o-Dichlorobenzene)	mg/L	--	4.0	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,2-Dichloroethane	mg/L	0.037	0.042	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,2-Dichloropropane	mg/L	--	0.062	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,3,5-Trimethylbenzene	mg/L	--	0.054	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,3-Dichlorobenzene (m-Dichlorobenzene)	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,3-Dichloropropane	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	1,4-Dichlorobenzene (p-Dichlorobenzene)	mg/L	--	17	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	2,2-Dichloropropane	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	2-Butanone (MEK)	mg/L	--	760	0.05 U	0.0050 U	0.0066 U	0.05 U	0.01 U	--	--
VOCs	8260	2-Chloroethyl vinyl ether	mg/L	--	--	0.01 U	0.0010 U	0.0016 U	0.043 U	0.0086 U	--	--
VOCs	8260	2-Chlorotoluene	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	**2-Hexanone**	mg/L	--	--	0.02 U	0.0020 U	0.0026 U	0.02 U	0.0040 U	--	--
VOCs	8260	4-Chlorotoluene	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	4-Methyl-2-Pentanone (Methyl isobutyl ketone)	mg/L	--	24	0.02 U	0.0020 U	0.0025 U	0.02 U	0.0040 U	--	--
VOCs	8260	**Acetone**	mg/L	--	--	0.05 U	0.0050 U	0.0077 U	0.05 U	0.01 U	--	--
VOCs	8260	**Benzene**	mg/L	0.024	0.024	**0.39**	**0.0014**	0.00020 U	**0.27**	**0.078**	--	--
VOCs	8260	Bromobenzene	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Bromochloromethane	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Bromodichloromethane	mg/L	--	0.0009	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Bromoform (Tribromomethane)	mg/L	--	2.0	0.01 U	0.0010 U	0.0010 U	0.01 U	0.0020 U	--	--
VOCs	8260	Bromomethane	mg/L	--	0.028	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	**Carbon Disulfide**	mg/L	--	0.87	0.0020 U	**0.00045**	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Carbon Tetrachloride	mg/L	--	0.0022	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Chlorobenzene	mg/L	--	0.22	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Chloroethane	mg/L	--	--	0.01 U	0.0010 U	0.0010 U	0.01 U	0.0020 U	--	--
VOCs	8260	Chloroform	mg/L	0.012	0.012	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Chloromethane	mg/L	--	0.052	0.01 U	0.0010 U	0.0010 U	0.01 U	0.0020 U	--	--
VOCs	8260	cis-1,2-Dichloroethene	mg/L	--	0.35	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--

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May-June 2014

Puget Sound Energy LNG Project

Tacoma, WA

Group	Analytical Method	Analyte	Units	Port Screening Level	Other Potentially Applicable Screening Levels (a)	B-21-25.0-WATER 24-28 ft	B-21-50.0-WATER 46-50 ft (b)	B-22-11.0-WATER 6-11 ft	B-24-11.0-WATER 7-11 ft (b)	B-24-25.0-WATER 26-30 ft	B-25-11.0-WATER 8-12 ft	B-26-11.0-WATER 7-12 ft
VOCs	8260	Cis-1,3-Dichloropropene	mg/L	--	0.016	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Dibromochloromethane	mg/L	--	0.0022	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Dibromomethane	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Dichlorodifluoromethane (CFC-12)	mg/L	--	0.022	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Ethylbenzene	mg/L	0.049	6.1	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Hexachlorobutadiene	mg/L	0.0002	0.0081	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	**Isopropylbenzene (Cumene)**	mg/L	1.6	1.6	0.0020 U	0.00020 U	0.00020 U	**0.010**	0.00040 U	--	--
VOCs	8260	Methyl Iodide (Iodomethane)	mg/L	--	--	0.01 U	0.0010 U	0.0010 U	0.01 U	0.0020 U	--	--
VOCs	8260	Methyl t-butyl ether	mg/L	--	6.1	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Methylene Chloride	mg/L	0.59	0.94	0.01 U	0.0010 U	0.0010 U	0.01 U	0.0020 U	--	--
VOCs	8260	n-Butylbenzene	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	**n-Propylbenzene**	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	**0.011**	0.00040 U	--	--
VOCs	8260	Naphthalene	mg/L	0.36	0.36	0.01 U	0.0010 U	0.0016 U	0.016 U	0.0032 U	--	--
VOCs	8260	p-Isopropyltoluene	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Sec-Butylbenzene	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Styrene	mg/L	--	0.78	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Tert-Butylbenzene	mg/L	--	--	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Tetrachloroethene	mg/L	0.0033	0.010	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	**Toluene**	mg/L	15	33	0.01 U	0.0010 U	0.0010 U	0.01 U	**0.0025**	--	--
VOCs	8260	Trans-1,2-Dichloroethene	mg/L	0.25	0.29	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Trans-1,3-Dichloropropene	mg/L	--	0.016	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Trichloroethene	mg/L	0.0084	0.0042	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Trichlorofluoromethane (CFC-11)	mg/L	--	0.26	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Vinyl Acetate	mg/L	--	17	0.01 U	0.0010 U	0.0010 U	0.01 U	0.0020 U	--	--
VOCs	8260	Vinyl Chloride	mg/L	0.0024	0.0035	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
VOCs	8260	Xylene, m-,p-	mg/L	15	0.67	0.0040 U	0.00040 U	0.00040 U	0.0040 U	0.00080 U	--	--
VOCs	8260	Xylene, o-	mg/L	0.166	0.96	0.0020 U	0.00020 U	0.00020 U	0.0020 U	0.00040 U	--	--
pH	FP/4500 HB	pH (lab measurement except as noted)	SU	6-8.5	--	8.20	8.00	7.60	7.00	8.60	6.90	6.70
Salinity	2520B	Salinity (lab measurement)	g/Kg	--	--	--	--	--	--	--	0.15	0.14
Salinity	(d)	Salinity (field measurement)	g/Kg	--	--	1.0	6.9	0.2	0.3	0.6	0.2	0.1
Conductivity	(d)	Electrical conductivity	mS/cm	--	--	2.04	11.8	0.326	0.586	1.17	0.317	0.278
Turbidity	(d)	Turbidity (unfiltered sample)	NTU	--	--	>1,000	>1,000	530	172	152	789	305

[1] The groundwater grab samples analyzed for this investigation were obtained using direct-push and sonic drilling methods; consequently, the tabulated data are considered screening-level data rather than definitive data.

[2] Temporary well casing was not purged prior to collecting sample due to low groundwater yield; sample may not be representative of the targeted depth interval.

ft = Feet below ground surface

mg/L = Milligrams per liter (parts per million)

g/Kg = Grams per kilogram (parts per thousand)

mS/cm = Millisiemens per centimeter

SU = pH standard units

NTU = Nephelometric turbidity units

VI = Vapor intrusion

ND = Non-detect result

MRL = Method reporting limit

TEC = Toxic equivalent concentration

U = Not detected above the listed method reporting limit

J = Estimated concentration

BOLD typeface = Analyte/concentration detected above method reporting limit

= Analyte/sample/concentration exceeds screening level

-- = No value available or not analyzed

* Per discussion with the Port of Tacoma, result may be biased high due to analytical interference from elevated salinity in the sample (as indicated by conductivity values >1 mS/cm).

** Result may be biased high based on the observed presence of solids at bottom of field-filtered sample (filtering did not remove all suspended particulates).

*** Result may reflect laboratory contamination (BEHP is a common laboratory contaminant).

(a) Listed values are Ecology Method C vapor intrusion screening levels (Ecology, 2009) unless otherwise indicated.

(b) A single depth was recorded on the field sampling form; the listed depth range (temporary well casing screened interval) was estimated based on the depth range of other samples collected on the same date and/or in the same vicinity.

(c) Federal Drinking Water Maximum Contaminant Level (MCL) (proposed surface water protection standard; Ecology, 2014)

(d) Field measurement

(e) Measurement is suspect based on measured turbidities of other samples and the fact that the sample was visibly cloudy.

Data Validation Report

Project: PSE Tacoma LNG – Environmental Site Assessment
GEI File No: 00186-914-02
Date: July 12, 2014

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of samples collected as part of the Environmental Site Assessment conducted in May and June 2014, and the associated laboratory and field quality control (QC) samples. The samples were collected at the Puget Sound Energy (PSE) Tacoma LNG Property of Interest located on the Blair-Hylebos Peninsula in Tacoma, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (National Functional Guidelines; USEPA, 2008) and USEPA Contract Laboratory Program National Functional Guidelines for Superfund Inorganic Methods Data Review (National Functional Guidelines; USEPA, 2010) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining whether:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The data validation included review of the following quality control (QC) elements, as applicable:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method, Trip, and Rinsate Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates
- Reporting Limits

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery groups (SDGs) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated (Bold typeface indicates one or more analytical results associated with the sample were qualified)
1405-178	(Soil Samples) B-2-2.0, B-2-8.0, B-3-2.0, B-3-8.0, B-4-2.0, B-4-8.0, B-23-2.0, B-23-8.0, B-26-2.0, and B-26-8.0
	(Water Samples) B-2-11.0-WATER, B-3-11.0-WATER, B-4-11.0-WATER, and B-26-11.0-WATER
1405-184	(Soil Samples) B-1-2.0, B-1-8.0, B-5-2.0, B-5-8.0, B-6-2.0, B-6-8.0, B-8-6.0, B-8-11.0, B-11-8.0, B-11-12.0, B-20-2.0, **B-20-8.0**, B-22-2.0, and B-22-8.0
	(Water Samples) B-1-11.0-WATER, and B-22-11.0-WATER
1405-193	(Soil Samples) B-10-2.0, B-10-7.0, and B-10-13.0
	(Water Samples) B-10-11.0-WATER, B-10-25.0-WATER, and B-10-50.0-WATER
1405-209	(Soil Samples) B-7-2.0, B-7-8.0, B-18-2.0, B-18-8.0, B-24-2.0, and B-24-8.0
	(Water Samples) B-7-11.0-WATER, **B-24-11.0-WATER**, and B-24-25.0-WATER
1405-229	(Soil Samples) B-17-2.0, B-17-8.0, B-21-2.0, and B-21-8.0
	(Water Samples) B-17-11.0-WATER, B-17-25.0-WATER, B-21-11.0-WATER, B-21-25.0-WATER, B-21-50.0-WATER, and B-25-11.0-WATER
1405-249	(Soil Samples) B-9-7.0, B-9-13.0, B-19-2.0, and B-19-8.0,
	(Water Samples) B-19-11.0-WATER, B-19-25.0-WATER, and B-19-50.0-WATER
1405-253	(Soil Samples) B-13-7.0, B-13-13.0, B-14-7.0, and B-14-13.0,

1405-253	(Water Samples) B-13-15.0-WATER, B-13-25.0-WATER, B-14-11.0-WATER, B-14-25.0-WATER
1405-255	(Soil Samples) B-12-2.0, B-12-7.0, and B-12-13.0
	(Water Samples) B-12-11.0-WATER and B-12-25.0-WATER
1406-007	(Soil Samples) B-15-2.0, B-15-7.0, B-15-13.0, B-16-2.0, B-16-7.0, and B-16-13.0
	(Water Samples) B-15-11.0-WATER, B-16-11.0-WATER, B-16-25.0-WATER, and B-16-50.0-WATER

CHEMICAL ANALYSIS PERFORMED

Onsite Environmental, Inc. in Redmond, Washington (OnSite), performed laboratory analysis on the soil and water samples using the following methods:

- Gasoline-Range Hydrocarbons by Method NWTPH-Gx
- Diesel- and Lube Oil-Range Hydrocarbons by Method NWTPH-Dx (with sulfuric acid and silica gel clean-up)
- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) by USEPA Method SW8021B
- Volatile Organic Compounds (VOCs) by USEPA Method SW8260B
- Semi-Volatile Organic Compounds (SVOCs) by USEPA Methods SW8270C/SW8270-SIM
- Polychlorinated Biphenyls (PCBs) by USEPA Method SW8082A
- Total and Dissolved Metals by USEPA Methods SW6010C/200.8 and SW7470A/7471B
- pH by SM 4500 HB

AmTest Inc. in Kirkland, Washington (AmTest), performed laboratory analysis on the water samples using the following methods:

- Salinity by SM 2520B

DATA VALIDATION SUMMARY

Data Package Completeness

Onsite was the primary laboratory that analyzed the soil and water samples. OnSite subcontracted the salinity analyses to AmTest. Both laboratories provided all required deliverables for this assessment. The laboratories followed adequate corrective action procedures and all identified anomalies were discussed in the case narratives.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COC forms were accurate and complete when submitted to and received from the laboratory.

Sample Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recovery (%R) values are calculated following analysis. All surrogate %R values for the field samples were within the laboratory control limits, with the exceptions listed below.

SDG 1405-178: (SVOCs) The %R value for 2,4,6-tribromophenol was less than the control limit in Sample B-3-8.0. Also, the %R value for phenol-d6 was greater than the control limit is Sample B-4-2.0. These samples were spiked with three acidic fraction surrogates, and in all cases at least two of these surrogates exhibited recoveries that were within the required control limits. No action was required for these surrogate outliers.

The %R value for terphenyl-d14 was greater than the control limit in Sample B-3-11.0-WATER. This sample was spiked with three base-neutral fraction surrogates, and in this case at least two of these surrogates exhibited recoveries that were within the required control limits. No action was required for this surrogate outlier.

SDG 1405-184: (SVOCs) The %R values for 2-fluorobiphenyl were greater than the control limits in Samples B-1-2.0 and B-20-8.0. These samples were spiked with three base-neutral fraction surrogates, and in all cases at least two of these surrogates exhibited recoveries that were within the required control limits. No action was required for these surrogate outliers.

SDG 1405-193: (VOCs) The %R value for dibromofluoromethane was greater than the control limit in Sample B-10-11.0-WATER. There were no positive results for any target analytes in this sample. No action was required for this surrogate outlier.

(SVOCs) The %R values for phenol-d6 were greater than the control limits in Samples B-10-2.0 and B-10-13.0. These samples were spiked with three acidic fraction surrogates, and in all cases at least two of these surrogates exhibited recoveries that were within the required control limits. No action was required for these surrogate outliers.

SDG 1405-209: (VOCs) The %R value for dibromofluoromethane was greater than the control limit in Sample B-24-11.0-WATER. There were no positive results for any target analytes in this sample. No action was required for this surrogate outlier.

SDG 1406-007: (SVOCs) The %R value for 2,4,6-tribromophenol was less than the control limits in Sample B-15-13.0. This sample was spiked with three acidic fraction surrogates, and in all cases at least two of these surrogates exhibited recoveries that were within the required control limits. No action was required for this surrogate outlier.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of field samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a %R value is calculated. In the event that a %R value for a particular analyte is outside the associated control limits in the MS sample, the laboratory is required to analyze a "post-spiked" sample in to further isolate any potential QC issues with the given analyte.

MS analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The control limits for MS samples are 75% to 125% for all of the analytes of interest for this study.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample is a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is treated much like an MS sample, without the possibility of matrix interference. As there is no actual sample matrix (such as soil or groundwater) in the analysis, the analytical expectations for accuracy and precision are usually more rigorous, and qualification would apply to all samples in the batch.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The control limits for laboratory control samples are specified in the laboratory documents as are the relative percent difference (RPD) values. The frequency requirements were met for all analyses, and the %R/RPD values were within the control limits.

Field Duplicates

No field duplicates were collected during this sampling event.

Reporting Limits and Miscellaneous

The contract required quantitation limits (CRQL) were met by the laboratory for all target analytes, with the exceptions listed below.

SDG 1405-184: (NWTPH-Dx) The contract-required reporting limits were not met for Diesel-Range Hydrocarbons in Sample B-1-2.0. The reporting limits were elevated because of the high concentration of Lube Oil-Range Hydrocarbons in the sample. Consequently, no action was taken.

Also, the laboratory recognized that the chromatogram for Lube Oil-Range Hydrocarbons in Sample B-20-8.0 did not match that of the calibration standard. For this reason, the positive result for Lube Oil-Range Hydrocarbons was qualified as estimated (J) in this sample.

SDG 1405-209: The laboratory recognized that the chromatogram for Diesel-Range Hydrocarbons in Sample B-24-11.0-WATER did not match that of the calibration standard. For this reason, the positive result for Diesel-Range Hydrocarbons was qualified as estimated (J) in this sample.

OVERALL ASSESSMENT

The laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD %R values. Precision was also acceptable, as demonstrated by the laboratory duplicate, LCS/LCSD, and MS/MSD RPD or absolute difference values.

Selected data were qualified as estimated (J) because chromatograms did not match those of the calibration standards.

All data, as qualified, are considered acceptable for their intended use.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review," EPA 540-R-10-011. January 2010.

GeoEngineers, Inc., "Sampling and Analysis Plan", prepared for Puget Sound Energy, April 24, 2014.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GEOENGINEERS

FIGURE A-1

Drilled	Start 5/21/2014	End 5/21/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Power Probe 9500D
Latitude Longitude	47.27523 -122.4004		System Datum	Geographic WGS84	Groundwater Date Measured	Depth to Water (ft) / Elevation (ft): See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		24						AC	2 inches asphalt concrete			
									SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
						E1							
									SP	Gray fine to medium sand with trace silt (loose, moist) (fill)			
			48										
	5												
									SP-SM	Gray fine to medium sand with silt (loose, wet) (Till)			Groundwater observed at approximately 6 feet at the time of drilling
						E2							
			48										
	10								SM	Gray silty fine to medium sanbd with occasional organics (shells and wood)			
			36										
						G3			ML	Gray silt with occasional fine sand			
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-1

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-2
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/20/2014	End 5/20/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Power Probe 9500D
Latitude Longitude	47.27506 -122.39887		System Datum	Geographic WGS84	Groundwater Date Measured	Depth to Water (ft) / Elevation (ft): See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		36						AC	2 inches asphalt concrete			
						E1			SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
						E2			SP-SM	Gray fine to medium sand with silt (medium dense, moist) (fill)			
			48										
	5												
						G3			ML	Gray silt with occasional fine sand and organics (wood) (soft, wet)			Groundwater observed at approximately 7 feet at the time of drilling
			48			E4			SP	Gray fine to medium sand with trace silt and occasional organics (shells) (loose, moist to wet)			
	10												
			36										
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-2

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-3
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/20/2014 End 5/20/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27574 Longitude -122.39941		System Datum Geographic WGS84		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft) — See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		42			E1			SM	Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)			
			48			G2			SP-SM	Gray fine to medium sand with silt (loose, moist) (fill)			
	5					G3			ML	Gray silt (soft, wet) (fill)			
			48			E4			SM	Gray silty fine sand (loose, wet) (fill)			Groundwater observed at approximately 7 feet at the time of drilling
	10					G5			ML	Gray silt with occasional fine sand (very soft, wet)			
			36						SM	Gray silty fine sand with occasional organics (shells) (loose, wet)			
	15					G6			ML	Gray silt with occasional fine sand (very soft, wet)			

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-3

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-4
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\018691402 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/20/2014	End 5/20/2014	Total Depth (ft)	15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data			Drilling Equipment	Power Probe 9500D
Latitude Longitude	47.27579 -122.39894		System Datum	Geographic WGS84		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft)	See Remarks
Notes:							

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		42						SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
						E1			SP-SM	Gray fine to medium sand with silt (loose, moist) (fill)			
			48										
	5								ML/SM	Interbedded gray silt and gray silty fine sand (loose/soft, wet) (fill)			Groundwater observed at approximately 5.5 feet at the time of drilling
			48			E2							
									ML	Gray silt with occasional fine sand (loose, wet)			
	10					G3							
			36						SM	Gray silty fine sand (loose, wet)			
									ML	Gray silt with occasional fine sand (soft, wet)			
						G4							
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-4

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-5
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/21/2014	End 5/21/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Power Probe 9500D
Latitude Longitude	47.27632 -122.39938		System Datum	Geographic WGS84	Groundwater Date Measured	Depth to Water (ft) / Elevation (ft): See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		24						AC	3 inches asphalt concrete			
									SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
						E1							
			12						SP-SM	Gray fine to medium sand with silt (loose, moist) (fill)			
	5												
			48			E2				Grades to wet at 9 feet			Groundwater observed at approximately 9 feet at the time of drilling
	10								ML	Gray silt with occasional fine sand (very soft, wet)			
						G3							
			36										
									SM	Gray silty fine sand (loose, wet)			
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-5

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-6
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/21/2014 End 5/21/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27545 Longitude -122.40109		System Datum Geographic WGS84		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		42						AC	2 inches asphalt concrete			
									SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
						E1							
									SP-SM	Gray fine to medium sand with silt (medium dense, moist) (fill)			
			48										
	5												
										Grades to wet at 7 feet			Groundwater observed at approximately 7 feet at the time of drilling
			48			E2							
	10												
									SM	Gray silty fine to medium sand with occasional organics (shells) (loose, wet)			
			36										
									SM/ML	Interbedded silty fine to medium sand and gray silt with occasional sand, with occasional organics (wood and shells) (loose/very soft, wet)			
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-6

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-7
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/27/2014 End 5/27/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum Undetermined		Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27578 Longitude -122.40161		System Datum Geographic WGS84		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft) — See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		48						AC	2 inches asphalt concrete			
									SM	Brown silty fine to medium sand with gravel (loose, moist) (fill)			
									SP-SM	Gray fine to medium sand with silt (medium dense, moist)			
			48										
	5									Becomes dark gray			
			48							Becomes wet at 8 feet			Groundwater observed at approximately 8 feet at the time of drilling
	10												
			36										
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-7

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-8
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/21/2014	End 5/21/2014	Total Depth (ft) 20	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Power Probe 9500D
Latitude Longitude	47.27578 -122.40064		System Datum	Geographic WGS84	Groundwater Date Measured / Depth to Water (ft) / Elevation (ft)	See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		48						AC	6 inches asphalt concrete			
									SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
						E1							
			48						SM	Gray silty fine to medium sand (loose to medium dense, moist)			
	5												
						E2							
			48							Grades to wet			
	10								ML	Gray silt with fine sand (very stiff, wet)			Groundwater observed at approximately 10 feet at the time of drilling
						E3			SM	Gray silty fine to medium sand (loose, moist)			
			48										
									SP-SM	Gray fine to medium sand with silt and occasional organics (shells) (loose, wet)			
									SM	Gray silty fine to medium sand (loose, wet)			
	15												
			48						ML/SM	Gray silt with occasional fine sand with interbedded silty fine to medium sand lenses (very stiff/loose, wet)			
						G4							
	20												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-8

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-9
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/29/2014	End 5/29/2014	Total Depth (ft) 20	Logged By BL/GH Checked By MM	Driller Cascade Drilling, Inc.	Drilling Method Sonic
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Geoprobe 8/40LS
Latitude Longitude	47.27613 -122.40039		System Datum	Geographic WGS84	Groundwater Date Measured / Depth to Water (ft) / Elevation (ft)	See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		60						CC	4 inches concrete			
									SM	Brown silty fine to medium sand with occasional gravel (medium dense, moist) (fill)			
						E1				Grades to with gravel			
	5		36						SP-SM	Gray fine to medium sand with silt (loose, moist) (fill)			
						E2							
									ML	Gray silt with occasional sand and organics (wood) (soft, wet)			
	10		60						SM	Gray silty fine to medium sand (loose, wet) (fill)			Groundwater observed at approximately 10 feet at the time of drilling
						E3							
	15		60						ML	Gray silt with occasional fine sand (very soft, wet)			
									SM	Gray silty fine to medium sand (loose, wet)			
	20												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-9

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-10
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/22/2014 End 5/22/2014	Total Depth (ft) 20	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27651 Longitude -122.39978		System Datum Geographic WGS84		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft) — See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		48						AC	4 inches asphalt concrete			
									SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
						E1							
			48										
	5								SP-SM	Gray fine to medium sand with silt (loose, moist) (fill)			
						E2							
			48										
									ML	Gray silt (very soft, wet) (fill)			Groundwater observed at approximately 9.5 feet at the time of drilling
						G3							
	10								SM	Gray silt fine to medium sand with occasional organics (wood) (loose, wet)			
			48						ML	Gray silt with occasional fine sand (very stiff, wet)			
						E4							
									SM	Gray silty fine to medium sand (loose, wet)			
	15												
			48						ML	Gray silt with occasional fine sand (very stiff, wet)			
						G5							
									SM/ML	Interbedded gray silty fine sand and gray silt (loose/very stiff, wet)			
	20												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-10

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-11
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/21/2014	End 5/21/2014	Total Depth (ft) 20	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data		Drilling Equipment	Power Probe 9500D
Latitude 47.27708 Longitude -122.39877		System Datum	Geographic WGS84	Groundwater Date Measured / Depth to Water (ft) / Elevation (ft)	See Remarks
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		24						CC	6 inches concrete			
									SP-SM	Brown fine to coarse sand with silt and gravel (dense, moist) (fill)			
						E1							
			36										
	5												
									ML	Brown silt with occasional fine sand (soft, moist) (fill)			
									SP-SM	Gray fine to medium sand with silt (loose, moist) (fill)			
			48			E2							
	10								SP	Gray fine to medium sand with trace silt (loose, moist) (fill)			Groundwater observed at approximately 11 feet at the time of drilling
			48			E3							
	15												
			48										
									ML	Gray silt with occasional fine sand (very soft, wet)			
	20								SP-SM	Gray fine to medium sand with silt (loose, wet)			

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-11

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-12
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/30/2014	End 5/30/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Cascade Drilling, Inc.	Drilling Method Sonic
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Geoprobe 8/40LS
Latitude Longitude	47.27737 -122.39937		System Datum	Geographic WGS84	Groundwater Date Measured / Depth to Water (ft) / Elevation (ft)	See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		60						SM	Brown silty fine to coarse sand with gravel (medium dense, moist)			
						E1							
	5		60						SP-SM	Gray silty fine to medium sand (loose, moist)			
						E2							
	10		60							Becomes wet			
						E3							
									ML	Gray sandy silt (soft, wet)			
									SM	Gray silty fine to medium sand with organics (shells) (soft, wet)			
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-12

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-13
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/30/2014	End 5/30/2014	Total Depth (ft) 15	Logged By BL/GH	Checked By MM	Driller Cascade Drilling, Inc.	Drilling Method Sonic
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data			Drilling Equipment	Geoprobe 8/40LS
Latitude	47.27702		System Datum	Geographic WGS84		Groundwater	
Longitude	-122.39966					Date Measured / Depth to Water (ft) / Elevation (ft)	See Remarks
Notes:							

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		60						CC	4 inches concrete			
									SM	Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)			
						E1							
									SP-SM	Gray fine to medium sand with silt (loose, moist) (fill)			
	5		60										
						E2							
									SM	Gray silty fine to medium sand with occasional organics (shells) (loose, moist) (fill)			
	10		60										Groundwater observed at approximately 10 feet at the time of drilling
										Grades to wet at 11 feet			
						E3							
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-13

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-14
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/30/2014	End 5/30/2014	Total Depth (ft) 15	Logged By BL/GH	Checked By MM	Driller Cascade Drilling, Inc.	Drilling Method Sonic
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data			Drilling Equipment	Geoprobe 8/40LS
Latitude	47.27686		System Datum	Geographic WGS84		Groundwater	
Longitude	-122.40009					Date Measured / Depth to Water (ft) / Elevation (ft)	See Remarks
Notes:							

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		60						AC	7 inches asphalt concrete			
						E1			SM	Brown silty fine to coarse sand with gravel (medium dense, moist)			
	5		60						SP-SM	Gray fine to medium sand with silt (loose, moist)			
						E2							
	10		60						SM	Gray silty sand (soft, wet)			
						E3							
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-14

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-15
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 6/2/2014	End 6/2/2014	Total Depth (ft) 20	Logged By BL/GH Checked By MM	Driller Cascade Drilling, Inc.	Drilling Method Sonic
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Geoprobe 8/40LS
Latitude Longitude	47.27651 -122.40055		System Datum	Geographic WGS84	Groundwater Date Measured	Depth to Water (ft) / Elevation (ft): See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		60						CC	6 inches concrete			
									SM	Brown silty fine to coarse sand with occasional gravel (medium dense, moist)			
						E1				With gravel			
	5		60						SP-SM	Gray fine to medium sand with silt (loose, moist)			
						E2							
	10		60										
									SM	Gray silty fine to coarse sand with gravel (loose, wet)			
						E3			ML	Gray silt with sand (soft, wet)			
									SM	Gray silty fine to coarse sand with gravel (loose, wet)			
	15		60										
	20												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-15

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-16
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 6/2/2014	End 6/2/2014	Total Depth (ft) 20	Logged By BL/GH Checked By MM	Driller Cascade Drilling, Inc.	Drilling Method Sonic
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Geoprobe 8/40LS
Latitude Longitude	47.2762 -122.40105		System Datum	Geographic WGS84	Groundwater Date Measured	Depth to Water (ft) / Elevation (ft): See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		36						CC	4 inches concrete			
									SM	Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)			
						E1							
	5		60										
									SP-SM	Gray fine to medium sand with silt and occasional gravel and organics (shells) (loose, moist) (fill)			
						E2							
	10		60										
										Grades to wet at 12 feet			Groundwater observed at approximately 12 feet at the time of drilling
						E3							
									SM	Gray silty fine to medium sand with occasional organics (shells, grass) (loose, wet)			
	15		60										
	20												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-16

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-17
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/28/2014 End 5/28/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum Undetermined		Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27745 Longitude -122.39808		System Datum Geographic WGS84		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		28						AC	3 inches asphalt concrete			
									SM	Brown silty sand with gravel (medium dense, moist)			
						E2			SP-SM	Gray fine to medium sand with silt (loose, moist)			
			42										
	5												
						E1				Becomes wet at 7 feet			Groundwater observed at approximately 6.6 feet at the time of drilling
			48										
	10												
			36										
									ML	Gray silt with sand (soft, wet0			
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-17

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-18
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/27/2014 End 5/27/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum Undetermined		Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27761 Longitude -122.3987		System Datum Geographic WGS84		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		48						AC	5 inches asphalt concrete			
									SM	Brown silty fine to coarse sand with gravel			
						E1			SP-SM	Gray fine to medium sand with silt (loose, moist)			
			42										
	5									Grades to brown			
			42			E2							
										Becomes wet at 9 feet			
	10								SP-SM	Black sand with silt and trace gravel (gravel subangular up to 2 inches in diamter) (loose, wet)			
			36										
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-18

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-19
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/29/2014	End 5/29/2014	Total Depth (ft) 20	Logged By BL/GH Checked By MM	Driller Cascade Drilling, Inc.	Drilling Method Sonic
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Geoprobe 8/40LS
Latitude Longitude	47.27651 -122.39978		System Datum	Geographic WGS84	Groundwater Date Measured	Depth to Water (ft) / Elevation (ft): See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		48						AC	5 inches asphalt concrete			
									SM	Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)			
						E1							
									SP-SM	Gray fine to medium sand with silt and occasional organics (shells) (loose, moist) (fill)			
	5		60										
						E2				Grades to wet at 8 feet			
	10		96										
	15								SM	Gray silty fine to medium sand with occasional organics (shells and wood) (loose, wet)			
									SP-SM	Gray fine to medium sand with silt (loose, wet)			
	20												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-19

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-20
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/21/2014 End 5/21/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27792 Longitude -122.40019		System Datum Geographic WGS84		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft) — See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		42						AC	2 inches asphalt concrete			
									SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
									SP-SM	Gray fine to medium sand with silt (loose, moist) (fill)			
						E1							
			48										
	5												
										Grades to wet at 7 feet			Groundwater observed at approximately 7 feet at the time of drilling
			48			E2							
	10												
			36										
						E3			SM	Gray silty fine to medium sand with occasional organics (shells) (loose, wet)			
									ML	Gray silt (very soft, wet)			
	15								SM	Gray silty fine to medium sand (loose, wet)			

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-20

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-21
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/28/2014	End 5/28/2014	Total Depth (ft)	15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data			Drilling Equipment	Power Probe 9500D
Latitude Longitude	47.27726 -122.40038		System Datum	Geographic WGS84		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft)	See Remarks
Notes:							

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		42						AC	2 inches asphalt concrete			
									SM	Brown silty sand with gravel			
						E1			SP-SM	Gray fine to medium sand with silt (medium dense, moist)			
			48										
	5												
									ML	Gray silt with sand (soft, moist to wet)			
									SP-SM	Dark gray to black fine to medium sand with silt (loose, wet)			Groundwater observed at approximately 6.5 feet at the time of drilling
			48			E2							
	10												
			36										
									ML/SM	Interbedded gray silt and gray silty sand (loose/soft, wet)			
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-21

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-22
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/21/2014 End 5/21/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27682 Longitude -122.40075		System Datum Geographic WGS84		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		42						AC	2 inches asphalt concrete			
									SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
						E1			SP-SM	Brown fine to medium sand with silt (loose, moist) (fill)			
			48			E2							
	5								SM	Gray silty fine to medium sand (loose, moist)			
									ML	Gray silt (very soft, wet) (fill)			
									SM	Gray silty fine to medium sand (loose, wet) (fill)			
			48			E3							
	10								ML	Gray silt (very soft, wet)			
									SP-SM	Gray fine to medium sand with silt (loose, wet)			
			36										
										Grades to with occasional organics (shells)			
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-22

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-23
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/20/2014 End 5/20/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum Undetermined		Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27721 Longitude -122.39767		System Datum Geographic WGS84		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft) See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		30						GP-GM	Brown gravel with sand and silt (dense, moist) (fill)			
									SP-SM	Gray fine to medium sand with silt (medium dense, moist) (fill)			
						E1							
			42										
	5									Grades to wet at 6.5 feet			
			48			E2							
									SM	Gray silty fine to medium sand (medium dense, wet) (fill)			
	10												
			36						ML	Gray sandy silt (medium stiff, wet)			
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-23

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-24
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled Start 5/27/2014 End 5/27/2014	Total Depth (ft) 15	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data		Drilling Equipment Power Probe 9500D
Latitude 47.27761 Longitude -122.39989		System Datum Geographic WGS84		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft) — See Remarks
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		48						AC	2 inches asphalt concrete			
									SM	Brown silty fine to medium sand (very loose, moist)			
						E1			SP-SM	Gray fine to medium sand with silt (loose, moist)			
			48										
	5									Becomes wet at 6.5 feet			
			48			E2			SP-SM	Black fine to medium sand with silt (loose, wet)			Petroleum odor
	10												
			36										Petroleum odor
	15												

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-24

GeoEngineers

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-25
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Drilled	Start 5/20/2014	End 5/20/2014	Total Depth (ft) 12	Logged By BL/GH Checked By MM	Driller Holocene Drilling, Inc.	Drilling Method Direct Push
Surface Elevation (ft) Vertical Datum	Undetermined		Hammer Data		Drilling Equipment	Power Probe 9500D
Latitude Longitude	47.27695 -122.39822		System Datum	Geographic WGS84	Groundwater Date Measured	Depth to Water (ft) / Elevation (ft): See Remarks
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0		36						GP-GM	Brown gravel with silt and sand (medium dense, moist) (fill)			
						E1			SP	Gray fine to medium sand with trace silt (medium dense, moist) (fill)			
			48										
	5								SP-SM	Gray fine to medium sand with silt (medium dense, moist) (fill)			
			48			E2							
	10					E3							4 feet of heave at 12 feet

Note: See Figure A-1 for explanation of symbols.

Log of Boring B-26

GEOENGINEERS

Project: PSE Tacoma LNG
Project Location: Tacoma, Washington
Project Number: 0186-914-02

Figure A-26
Sheet 1 of 1

Tacoma: Date:9/5/14 Path:\\TAC\PROJECTS\0018691402\GINT\0186914 02 GEOTECH SAMPLES.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_STANDARD

Appendix D-1: Construction Emissions

Summary of Terminal Construction Emissions - Criteria Pollutants
PSE LNG

Equipment	NOx (tons/year)	CO (tons/year)	SO_2 (tons/year)	VOC (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
2015 - Construction Equipment	11.5	6.84	0.43	1.07	0.88	0.88
2015 - Road Vehicles/Commuting	0.02	0.004	2.13E-05	7.29E-04	1.10E-03	9.88E-04
2015 - Fugitive Dust					8.29	0.83
2015 - Total Emissions	11.5	6.84	0.43	1.07	9.17	1.71
2016 - Construction Equipment	15.8	8.92	0.11	2.02	1.31	1.31
2016 - Road Vehicles/Commuting	0.36	1.54	4.03E-03	2.86E-02	2.94E-02	1.94E-02
2016 - Fugitive Dust					0.73	0.18
2016 - Total Emissions	16.1	10.5	0.12	2.05	2.08	1.51
2017 - Construction Equipment	11.1	6.24	0.02	1.54	0.93	0.93
2017 - Road Vehicles/Commuting	0.30	1.96	5.66E-03	3.03E-02	3.06E-02	1.70E-02
2017 - Fugitive Dust					1.08	0.26
2017 - Total Emissions	11.4	8.20	0.02	1.57	2.04	1.21
2018 - Construction Equipment	5.74	3.27	0.01	0.84	0.48	0.48
2018 - Road Vehicles/Commuting	0.008	0.002	1.23E-05	3.34E-04	4.72E-04	4.08E-04
2018 - Fugitive Dust					8.83E-04	2.17E-04
2018 - Total Emissions	5.75	3.27	0.01	0.84	0.48	0.48
Project TOTAL:	**44.8**	**28.8**	**0.58**	**5.53**	**13.8**	**4.91**

Summary of Terminal Construction Emissions - GHG
PSE LNG

Equipment	CO_2 (metric ton/year)	CH_4 (metric ton/year)	N_2O (metric ton/year)	CO2e (metric ton/year)
2015 - Construction Equipment	2,061	2.58E-02	4.06E-02	2,074
2015 - Road Vehicles/Commuting	2.54	3.51E-05	2.60E-06	2.55
2015 - Fugitive Dust				
2015 - Total Emissions	2,063	0.03	0.04	2,076
2016 - Construction Equipment	3,778	5.49E-02	3.84E-02	3,791
2016 - Road Vehicles/Commuting	224	2.54E-03	9.25E-04	225
2016 - Fugitive Dust				
2016 - Total Emissions	4,003	0.06	0.04	4,016
2017 - Construction Equipment	2,910	4.71E-02	2.87E-02	2,920
2017 - Road Vehicles/Commuting	305	3.27E-03	1.22E-03	305
2017 - Fugitive Dust				
2017 - Total Emissions	3,214	0.05	0.03	3,225
2018 - Construction Equipment	1,698	2.75E-02	1.67E-02	1,703
2018 - Road Vehicles/Commuting	1.50	2.58E-05	1.57E-06	1.50
2018 - Fugitive Dust				
2018 - Total Emissions	1,699	0.028	0.017	1,705
Project TOTAL:	**10,980**	**0.16**	**0.13**	**11,021**

Equipment List	No.	Equipment Use Duration (months)	Horsepower	Utilization	Load Factor	NOx Emission Factor (g/hp-hr)	CO Emission Factor (g/hp-hr)	SO_2 Emission Factor (g/hp-hr)	VOC Emisson Factor (g/hp-hr)	PM_{10} Emission Factor (g/hp-hr)	$PM_{2.5}$ Emission Factor (g/hp-hr)	NOx (tons/year)	CO (tons/year)	SO_2 (tons/year)	VOC (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Upland Construction (demo, soil, utilities)																	
Cat 345 Backhoe 4 cy	1	6	165	75%	21%	4.373	2.600	0.004	0.664	0.501	0.501	0.154	0.092	0.000	0.023	0.018	0.018
100 Ton Crawler Crane	1	6	250	85%	43%	2.271	0.491	0.003	0.188	0.098	0.098	0.282	0.061	0.000	0.023	0.012	0.012
200 Ton Crawler Crane	1	6	300	85%	43%	2.271	0.491	0.003	0.188	0.098	0.098	0.338	0.073	0.000	0.028	0.015	0.015
22 Ton Hydrocrane	1	6	85	85%	43%	2.951	1.733	0.004	0.255	0.251	0.251	0.125	0.073	0.000	0.011	0.011	0.011
30 Ton Hydrocrane	1	6	100	85%	43%	2.951	1.733	0.004	0.255	0.251	0.251	0.147	0.086	0.000	0.013	0.012	0.012
Air Compressor	2	6	55	100%	59%	4.058	1.090	0.004	0.227	0.181	0.181	0.358	0.096	0.000	0.020	0.016	0.016
Cat Compactor	2	6	65	85%	59%	4.373	2.600	0.004	0.664	0.501	0.501	0.387	0.230	0.000	0.059	0.044	0.044
Cat D6 Dozer	2	6	65	85%	59%	3.866	2.663	0.004	0.309	0.327	0.327	0.342	0.236	0.000	0.027	0.029	0.029
Crew Truck, 3/4 ton	2	6	250	85%	59%	3.356	2.090	0.004	0.216	0.219	0.219	1.143	0.712	0.001	0.074	0.075	0.075
Dump Trucks 15 cy	2	6	285	75%	59%	1.135	0.274	0.003	0.141	0.045	0.045	0.389	0.094	0.001	0.048	0.015	0.015
Flatbed Truck (Matl. Handling)	1	6	200	85%	59%	1.317	0.519	0.003	0.150	0.121	0.121	0.179	0.071	0.000	0.020	0.017	0.017
Forklift, 8,000 lbs	1	6	85	50%	59%	3.734	2.535	0.004	0.284	0.294	0.294	0.127	0.086	0.000	0.010	0.010	0.010
Fuel Truck	2	6	200	85%	59%	1.317	0.519	0.003	0.150	0.121	0.121	0.359	0.142	0.001	0.041	0.033	0.033
Loader, Cat 966, 4 cy	2	6	100	85%	59%	4.645	5.700	0.004	0.924	0.832	0.832	0.633	0.777	0.001	0.126	0.113	0.113
Manlifts	1	6	50	85%	59%	5.594	6.316	0.004	1.643	0.907	0.907	0.191	0.215	0.000	0.056	0.031	0.031
In-water Construction																	
Forklift, 8,000 lbs	2	6	65	75%	59%	3.734	2.535	0.004	0.284	0.294	0.294	0.292	0.198	0.000	0.022	0.023	0.023
Air Compressor	4	6	55	100%	59%	4.058	1.090	0.004	0.227	0.181	0.181	0.716	0.192	0.001	0.040	0.032	0.032
Crane, 60 ton	3	6	290	85%	43%	2.271	0.491	0.003	0.188	0.098	0.098	0.981	0.212	0.001	0.081	0.042	0.042
Crew Truck, 3/4 ton	3	6	250	25%	59%	3.356	2.090	0.004	0.216	0.219	0.219	0.504	0.314	0.001	0.032	0.033	0.033
Diesel Pile Driver Hammer	3	6	85	85%	43%	3.866	2.663	0.004	0.309	0.327	0.327	0.490	0.337	0.000	0.039	0.041	0.041
Flatbed Truck (Matl. Handling)	3	6	200	85%	59%	1.317	0.519	0.003	0.150	0.121	0.121	0.538	0.212	0.001	0.061	0.050	0.050
Fuel Truck	2	6	200	25%	59%	1.317	0.519	0.003	0.150	0.121	0.121	0.106	0.042	0.000	0.012	0.010	0.010
Loader, Cat 966, 4 cy	2	6	100	75%	59%	4.645	5.700	0.004	0.924	0.832	0.832	0.559	0.685	0.001	0.111	0.100	0.100
Personnel Work Boat	1	6	63	75%	45%	6.800	5.000	1.300	0.270	0.400	0.388	0.196	0.144	0.038	0.008	0.012	0.011
Tug/Work Barge w/crane	1	6	560	85%	45%	6.800	5.000	1.300	0.270	0.300	0.291	1.979	1.455	0.378	0.079	0.087	0.085
											Annual Total	**11.52**	**6.84**	**0.43**	**1.07**	**0.88**	**0.88**

Notes:

- Emission factors for NOx, CO, SOx, VOC, PM10, PM2.5 and CO2 are average NONROAD emission rates for the State of Washington.
- Emission factors for CH4 and N2O are from the Climate Registry 2014 Default Emission Factors, Table 13.7.
- Assume 48 hours per week; 4.28 weeks per month = 205 hrs/month
- Tugboat, Workboat, and Personnel Boat Emissions factors from U.S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report April 2009, Table 3-8: Harbor Craft Emission Factors (g/kWh)
- Tugboat and Work barge EFs are in 'g/kWh' - engine size listed for these boats are in 'kWh' not 'hp'
- Work Boat and Tug Load Factor: Table 3-3: EPA Load Factors for Harbor Craft

Equipment List	No.	Equipment Use Duration[a] (months)	Horsepower	Utilization	Load Factor	NOx Emission Factor (g/hp-hr)	CO Emission Factor (g/hp-hr)	SO_2 Emission Factor (g/hp-hr)	VOC Emisson Factor (g/hp-hr)	PM_{10} Emission Factor (g/hp-hr)	$PM_{2.5}$ Emission Factor (g/hp-hr)	NOx (tons/year)	CO (tons/year)	SO_2 (tons/year)	VOC (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Upland Construction (demo, soil, utilities)																	
Cat 345 Backhoe 4 cy	1	6	165	75%	21%	3.992	2.330	0.004	0.606	0.462	0.462	0.141	0.082	0.000	0.021	0.016	0.016
100 Ton Crawler Crane	1	6	250	85%	43%	1.945	0.429	0.003	0.175	0.086	0.086	0.242	0.053	0.000	0.022	0.011	0.011
200 Ton Crawler Crane	1	6	300	85%	43%	1.945	0.429	0.003	0.175	0.086	0.086	0.290	0.064	0.000	0.026	0.013	0.013
22 Ton Hydrocrane	1	6	85	85%	43%	2.558	1.542	0.003	0.230	0.221	0.221	0.108	0.065	0.000	0.010	0.009	0.009
30 Ton Hydrocrane	1	6	100	85%	43%	2.558	1.542	0.003	0.230	0.221	0.221	0.127	0.077	0.000	0.011	0.011	0.011
Air Compressor	2	6	55	100%	59%	3.846	0.908	0.003	0.207	0.150	0.150	0.339	0.080	0.000	0.018	0.013	0.013
Cat Compactor	2	6	65	85%	59%	3.719	2.408	0.004	0.280	0.286	0.286	0.329	0.213	0.000	0.025	0.025	0.025
Cat D6 Dozer	2	6	65	85%	59%	3.230	1.769	0.003	0.192	0.183	0.183	0.286	0.157	0.000	0.017	0.016	0.016
Crew Truck, 3/4 ton	2	6	250	85%	59%	0.859	0.203	0.003	0.137	0.029	0.029	0.293	0.069	0.001	0.047	0.010	0.010
Dump Trucks 15 cy	2	6	285	75%	59%	0.859	0.203	0.003	0.137	0.029	0.029	0.294	0.070	0.001	0.047	0.010	0.010
Flatbed Truck (Matl. Handling)	1	6	200	85%	59%	0.933	0.322	0.003	0.141	0.063	0.063	0.127	0.044	0.000	0.019	0.009	0.009
Forklift, 8,000 lbs	1	6	85	50%	59%	3.595	2.265	0.004	0.257	0.256	0.256	0.122	0.077	0.000	0.009	0.009	0.009
Fuel Truck	2	6	200	85%	59%	0.933	0.322	0.003	0.141	0.063	0.063	0.254	0.088	0.001	0.038	0.017	0.017
Loader, Cat 966, 4 cy	2	6	100	85%	59%	4.285	5.288	0.004	0.839	0.764	0.764	0.584	0.721	0.001	0.114	0.104	0.104
Manlifts	1	6	50	85%	59%	5.423	5.873	0.004	1.516	0.848	0.848	0.185	0.200	0.000	0.052	0.029	0.029
In-water Construction																	
Forklift, 8,000 lbs	2	1	65	75%	59%	3.595	2.265	0.004	0.257	0.256	0.256	0.047	0.030	0.000	0.003	0.003	0.003
Air Compressor	4	1	55	100%	59%	3.846	0.908	0.003	0.207	0.150	0.150	0.113	0.027	0.000	0.006	0.004	0.004
Crane, 60 ton	3	1	290	85%	43%	1.945	0.429	0.003	0.175	0.086	0.086	0.140	0.031	0.000	0.013	0.006	0.006
Crew Truck, 3/4 ton	3	1	250	25%	59%	0.859	0.203	0.003	0.137	0.029	0.029	0.022	0.005	0.000	0.003	0.001	0.001
Diesel Pile Driver Hammer	3	1	85	85%	43%	3.719	2.408	0.004	0.280	0.286	0.286	0.078	0.051	0.000	0.006	0.006	0.006
Flatbed Truck (Matl. Handling)	3	1	200	85%	59%	0.933	0.322	0.003	0.141	0.063	0.063	0.064	0.022	0.000	0.010	0.004	0.004
Fuel Truck	2	1	200	25%	59%	0.933	0.322	0.003	0.141	0.063	0.063	0.012	0.004	0.000	0.002	0.001	0.001
Loader, Cat 966, 4 cy	2	1	100	75%	59%	4.285	5.288	0.004	0.839	0.764	0.764	0.086	0.106	0.000	0.017	0.015	0.015
Personnel Work Boat	1	1	63	75%	59%	6.800	5.000	1.300	0.270	0.400	0.388	0.043	0.032	0.008	0.002	0.003	0.002
Tug/Work Barge w/crane	1	1	560	85%	59%	6.800	5.000	1.300	0.270	0.300	0.291	0.432	0.318	0.083	0.017	0.019	0.019
LNG Facility Construction (including Storage Tank)																	
Cat 345 Backhoe 4 cy	1	7	165	85%	21%	3.992	2.330	0.004	0.606	0.462	0.462	0.186	0.109	0.000	0.028	0.022	0.022
100 Ton Crawler Crane	2	7	250	85%	43%	1.945	0.429	0.003	0.175	0.086	0.086	0.564	0.124	0.001	0.051	0.025	0.025
200 Ton Crawler Crane	3	7	300	85%	43%	1.945	0.429	0.003	0.175	0.086	0.086	1.014	0.224	0.002	0.091	0.045	0.045
22 Ton Hydrocrane	4	7	85	85%	43%	2.558	1.542	0.003	0.230	0.221	0.221	0.504	0.304	0.001	0.045	0.044	0.044
30 Ton Hydrocrane	3	7	100	85%	43%	2.558	1.542	0.003	0.230	0.221	0.221	0.445	0.268	0.001	0.040	0.038	0.038
Air Compressor	4	7	55	85%	59%	3.846	0.908	0.003	0.207	0.150	0.150	0.673	0.159	0.001	0.036	0.026	0.026
Cat Compactor	3	7	65	85%	59%	3.719	2.408	0.004	0.280	0.286	0.286	0.577	0.373	0.001	0.043	0.044	0.044
Cat D6 Dozer	3	7	65	85%	59%	3.230	1.769	0.003	0.192	0.183	0.183	0.501	0.274	0.001	0.030	0.028	0.028
Concrete Pump	3	7	150	85%	59%	4.245	2.355	0.004	0.473	0.426	0.426	1.519	0.843	0.001	0.169	0.152	0.152
Crane, 60 ton	1	7	290	50%	43%	1.945	0.429	0.003	0.175	0.086	0.086	0.192	0.042	0.000	0.017	0.008	0.008
Crew Truck, 3/4 ton	6	7	250	85%	59%	0.859	0.203	0.003	0.137	0.029	0.029	1.024	0.242	0.003	0.163	0.034	0.034
Dump Trucks 15 cy	1	7	285	75%	59%	0.859	0.203	0.003	0.137	0.029	0.029	0.172	0.041	0.001	0.027	0.006	0.006
Flatbed Truck (Matl. Handling)	3	7	200	85%	59%	0.933	0.322	0.003	0.141	0.063	0.063	0.445	0.154	0.001	0.067	0.030	0.030
Forklift, 8,000 lbs	3	7	85	50%	59%	3.595	2.265	0.004	0.257	0.256	0.256	0.429	0.270	0.000	0.031	0.031	0.031
Fuel Truck	3	7	200	85%	59%	0.933	0.322	0.003	0.141	0.063	0.063	0.445	0.154	0.001	0.067	0.030	0.030
Loader, Cat 966, 4 cy	3	7	100	85%	59%	4.285	5.288	0.004	0.839	0.764	0.764	1.022	1.261	0.001	0.200	0.182	0.182
Manlifts	6	7	50	85%	59%	5.423	5.873	0.004	1.516	0.848	0.848	1.293	1.401	0.001	0.362	0.202	0.202
											Annual Total	**15.8**	**8.92**	**0.11**	**2.02**	**1.31**	**1.31**

Notes:

- Emission factors for NOx, CO, SOx, VOC, PM10, PM2.5 and CO2 are average NONROAD emission rates for the State of Washington.
- Emission factors for CH4 and N2O are from the Climate Registry 2014 Default Emission Factors, Table 13.7.
- Assume 48 hours per week; 4.28 weeks per month 205 hrs/month
- Tugboat, Workboat, and Personnel Boat Emissions factors from U.S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report April 2009, Table 3-8: Harbor Craft Emission Factors (g/kWh)
- Tugboat and Work barge EFs are in 'g/kWh' - engine size listed for these boats are in 'kWh' not 'hp'
- Work Boat and Tug Load Factor: Table 3-3: EPA Load Factors for Harbor Craft

Equipment List	No.	Equipment Use Duration (months)	Horsepower	Utilization	Load Factor	NOx Emission Factor (g/hp-hr)	CO Emission Factor (g/hp-hr)	SO_2 Emission Factor (g/hp-hr)	VOC Emisson Factor (g/hp-hr)	PM_{10} Emission Factor (g/hp-hr)	$PM_{2.5}$ Emission Factor (g/hp-hr)	NOx (tons/year)	CO (tons/year)	SO_2 (tons/year)	VOC (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
LNG Facility Construction (no Storage Tank Construction)																	
100 Ton Crawler Crane	2	12	250	85%	43%	1.672	0.371	0.003	0.166	0.074	0.074	0.830	0.184	0.001	0.082	0.037	0.037
200 Ton Crawler Crane	2	12	300	85%	43%	1.672	0.371	0.003	0.166	0.074	0.074	0.996	0.221	0.002	0.099	0.044	0.044
22 Ton Hydrocrane	3	12	85	85%	43%	2.191	1.359	0.003	0.208	0.193	0.193	0.555	0.344	0.001	0.053	0.049	0.049
30 Ton Hydrocrane	2	12	100	85%	43%	2.191	1.359	0.003	0.208	0.193	0.193	0.435	0.270	0.001	0.041	0.038	0.038
Air Compressor	3	12	55	85%	59%	3.647	0.734	0.003	0.189	0.120	0.120	0.820	0.165	0.001	0.042	0.027	0.027
Cat Compactor	2	12	65	85%	59%	3.585	2.163	0.004	0.254	0.248	0.248	0.635	0.383	0.001	0.045	0.044	0.044
Cat D6 Dozer	2	12	65	85%	59%	3.162	1.503	0.003	0.177	0.151	0.151	0.560	0.266	0.001	0.031	0.027	0.027
Concrete Pump	2	12	150	85%	59%	3.981	2.214	0.004	0.445	0.397	0.397	1.628	0.905	0.001	0.182	0.162	0.162
Crane, 60 ton	1	12	290	50%	43%	1.672	0.371	0.003	0.166	0.074	0.074	0.283	0.063	0.001	0.028	0.013	0.013
Crew Truck, 3/4 ton	4	12	250	85%	59%	0.633	0.163	0.003	0.135	0.020	0.020	0.863	0.222	0.004	0.183	0.027	0.027
Flatbed Truck (Matl. Ha	2	12	200	85%	59%	0.675	0.239	0.003	0.137	0.039	0.039	0.368	0.130	0.001	0.074	0.021	0.021
Forklift, 8,000 lbs	2	12	85	25%	59%	3.471	2.007	0.004	0.233	0.223	0.223	0.237	0.137	0.000	0.016	0.015	0.015
Fuel Truck	2	12	200	85%	59%	0.675	0.239	0.003	0.137	0.039	0.039	0.368	0.130	0.001	0.074	0.021	0.021
Loader, Cat 966, 4 cy	2	12	100	85%	59%	3.941	4.895	0.004	0.759	0.698	0.698	1.074	1.334	0.001	0.207	0.190	0.190
Manlifts	4	12	50	85%	59%	5.256	5.441	0.004	1.393	0.790	0.790	1.433	1.483	0.001	0.380	0.215	0.215
											Annual Total	**11.1**	**6.24**	**0.02**	**1.54**	**0.93**	**0.93**

Notes:

- Emission factors for NOx, CO, SOx, VOC, PM10, PM2.5 and CO2 are average NONROAD emission rates for the State of Washington.
- Emission factors for CH4 and N2O are from the Climate Registry 2014 Default Emission Factors, Table 13.7.
- Assume 48 hours per week; 4.28 weeks per month 205 hrs/month

Equipment List	No.	Equipment Use Duration (months)	Horsepower	Utilization	Load Factor	NOx Emission Factor (g/hp-hr)	CO Emission Factor (g/hp-hr)	SO_2 Emission Factor (g/hp-hr)	VOC Emisson Factor (g/hp-hr)	PM_{10} Emission Factor (g/hp-hr)	$PM_{2.5}$ Emission Factor (g/hp-hr)	NOx (tons/year)	CO (tons/year)	SO_2 (tons/year)	VOC (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
LNG Facility Construction (no Storage Tank Construction)																	
100 Ton Crawler Crane	2	7	250	85%	43%	1.432	0.317	0.003	0.159	0.062	0.062	0.415	0.092	0.001	0.046	0.018	0.018
200 Ton Crawler Crane	2	7	300	85%	43%	1.432	0.317	0.003	0.159	0.062	0.062	0.498	0.110	0.001	0.055	0.022	0.022
22 Ton Hydrocrane	3	7	85	85%	43%	1.849	1.183	0.003	0.188	0.167	0.167	0.273	0.175	0.000	0.028	0.025	0.025
30 Ton Hydrocrane	2	7	100	85%	43%	1.849	1.183	0.003	0.188	0.167	0.167	0.214	0.137	0.000	0.022	0.019	0.019
Air Compressor	3	7	55	85%	59%	3.465	0.572	0.003	0.172	0.092	0.092	0.454	0.075	0.000	0.023	0.012	0.012
Cat Compactor	2	7	65	85%	59%	3.473	1.930	0.003	0.232	0.216	0.216	0.359	0.199	0.000	0.024	0.022	0.022
Cat D6 Dozer	2	7	65	85%	59%	3.110	1.257	0.003	0.164	0.121	0.121	0.321	0.130	0.000	0.017	0.012	0.012
Concrete Pump	2	7	150	85%	59%	3.726	2.078	0.004	0.417	0.370	0.370	0.889	0.496	0.001	0.099	0.088	0.088
Crane, 60 ton	1	7	290	50%	43%	1.432	0.317	0.003	0.159	0.062	0.062	0.141	0.031	0.000	0.016	0.006	0.006
Crew Truck, 3/4 ton	4	7	250	85%	59%	0.446	0.139	0.003	0.133	0.015	0.015	0.355	0.110	0.002	0.106	0.012	0.012
Flatbed Truck (Matl. Ha	2	7	200	85%	59%	0.472	0.192	0.003	0.134	0.025	0.025	0.150	0.061	0.001	0.043	0.008	0.008
Forklift, 8,000 lbs	2	7	85	25%	59%	3.361	1.762	0.003	0.211	0.192	0.192	0.134	0.070	0.000	0.008	0.008	0.008
Fuel Truck	2	7	200	85%	59%	0.472	0.192	0.003	0.134	0.025	0.025	0.150	0.061	0.001	0.043	0.008	0.008
Loader, Cat 966, 4 cy	2	7	100	85%	59%	3.625	4.557	0.004	0.694	0.641	0.641	0.576	0.725	0.001	0.110	0.102	0.102
Manlifts	4	7	50	85%	59%	5.096	5.021	0.004	1.273	0.734	0.734	0.810	0.798	0.001	0.202	0.117	0.117
											Annual Total	**5.74**	**3.27**	**0.01**	**0.84**	**0.48**	**0.48**

Notes:

- Emission factors for NOx, CO, SOx, VOC, PM10, PM2.5 and CO2 are average NONROAD emission rates for the State of Washington.
- Emission factors for CH4 and N2O are from the Climate Registry 2014 Default Emission Factors, Table 13.7.
- Assume 48 hours per week; 4.28 weeks per month 205 hrs/month

Equipment List	No.	Equipment Use Duration (months)	Horsepower	Utilization	Load Factor	Fuel Use Rate (gal/hr)	CO_2 Emission Factor (g/hp-hr)	CH_4 Emission Factor (g/gal)	N_2O Emission Factor (g/gal)	CO_2 (metric ton/year)	CH_4 (metric ton/year)	N_2O (metric ton/year)	CO2e (metric ton/year)
Upland Construction (demo, soil, utilities)													
Cat 345 Backhoe 4 cy	1	6	165	75%	21%	0.518	624	0.740	0.450	22	3.9E-04	2.4E-04	22
100 Ton Crawler Crane	1	6	250	85%	43%	0.174	530	0.740	0.450	66	1.5E-04	9.0E-05	66
200 Ton Crawler Crane	1	6	300	85%	43%	0.174	530	0.740	0.450	79	1.5E-04	9.0E-05	79
22 Ton Hydrocrane	1	6	85	85%	43%	0.422	590	0.740	0.450	25	3.6E-04	2.2E-04	25
30 Ton Hydrocrane	1	6	100	85%	43%	0.422	590	0.740	0.450	29	3.6E-04	2.2E-04	29
Air Compressor	2	6	55	100%	43%	1.020	590	0.740	0.450	38	2.1E-03	1.2E-03	38
Cat Compactor	2	6	65	85%	59%	0.732	595	0.740	0.450	53	1.3E-03	7.6E-04	53
Cat D6 Dozer	2	6	65	85%	59%	0.489	595	0.740	0.450	53	8.4E-04	5.1E-04	53
Crew Truck, 3/4 ton	2	6	250	85%	59%	0.074	536	0.740	0.450	183	1.3E-04	7.6E-05	183
Dump Trucks 15 cy	2	6	285	75%	59%	0.074	536	0.740	0.450	184	1.1E-04	6.7E-05	184
Flatbed Truck (Matl. Handling)	1	6	200	85%	59%	0.112	536	0.740	0.450	73	9.6E-05	5.8E-05	73
Forklift, 8,000 lbs	1	6	85	50%	59%	0.653	595	0.740	0.450	20	3.3E-04	2.0E-04	20
Fuel Truck	2	6	200	85%	59%	0.112	536	0.740	0.450	146	1.9E-04	1.2E-04	146
Loader, Cat 966, 4 cy	2	6	100	85%	21%	0.646	693	0.740	0.450	34	1.1E-03	6.7E-04	34
Manlifts	1	6	50	85%	21%	3.661	691	0.740	0.450	8	3.1E-03	1.9E-03	9
In-water Construction													
Forklift, 8,000 lbs	2	6	65	75%	59%	0.653	595	0.740	0.450	47	9.8E-04	6.0E-04	47
Air Compressor	4	6	55	100%	43%	1.020	590	0.740	0.450	76	4.1E-03	2.5E-03	77
Crane, 60 ton	3	6	290	85%	43%	0.174	530	0.740	0.450	229	4.5E-04	2.7E-04	229
Crew Truck, 3/4 ton	3	6	250	25%	59%	0.074	536	0.740	0.450	81	5.5E-05	3.4E-05	81
Diesel Pile Driver Hammer	3	6	85	85%	59%	0.732	595	0.740	0.450	103	1.9E-03	1.1E-03	104
Flatbed Truck (Matl. Handling)	3	6	200	85%	59%	0.112	536	0.740	0.450	219	2.9E-04	1.7E-04	219
Fuel Truck	2	6	200	25%	59%	0.112	536	0.740	0.450	43	5.6E-05	3.4E-05	43
Loader, Cat 966, 4 cy	2	6	100	75%	21%	0.646	693	0.740	0.450	30	9.7E-04	5.9E-04	30
Personnel Work Boat	1	6	63	75%	45%	--	690	0.020	0.090	20	5.8E-04	2.6E-03	21
Tug/Work Barge w/crane	1	6	560	85%	45%	--	690	0.020	0.090	201	5.8E-03	2.6E-02	209
									Annual Total	**2,061**	**2.58E-02**	**4.06E-02**	**2,074**

Notes:

- Assume 48 hours per week; 4.28 weeks per month 205 hrs/month
- Emission factors for NOx, CO, SOx, VOC, PM10, PM2.5 and CO2 are average NONROAD emission rates for the State of Washington.
- Emission factors for CH4 and N2O are from the Climate Registry 2014 Default Emission Factors, Table 13.7.
- Tugboat, Workboat, and Personnel Boat Emissions factors from U.S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report April 2009, Table 3-8: Harbor Craft Emission Factors (g/kWh)
- Tugboat and Work barge EFs are in 'g/kWh' - engine size listed for these boats are in 'kWh' not 'hp'
- Work Boat and Tug Load Factor: Table 3-3: EPA Load Factors for Harbor Craft
- Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 = 1
GWP CH_4 = 25
GWP N_2O = 298

Equipment List	No.	Equipment Use Duration (months)	Horsepower	Utilization	Load Factor	Fuel Use Rate (gal/hr)	CO_2 Emission Factor (g/hp-hr)	CH_4 Emission Factor (g/gal)	N_2O Emission Factor (g/gal)	CO_2 (metric ton/year)	CH_4 (metric ton/year)	N_2O (metric ton/year)	CO2e (metric ton/year)
Upland Construction (demo, soil, utilities)													
Cat 345 Backhoe 4 cy	1	6	165	75%	21%	0.52	625	0.740	0.450	22	3.9E-04	2.4E-04	22
100 Ton Crawler Crane	1	6	250	85%	43%	0.17	530	0.740	0.450	66	1.5E-04	9.0E-05	66
200 Ton Crawler Crane	1	6	300	85%	43%	0.17	530	0.740	0.450	79	1.5E-04	9.0E-05	79
22 Ton Hydrocrane	1	6	85	85%	43%	0.42	590	0.740	0.450	25	3.6E-04	2.2E-04	25
30 Ton Hydrocrane	1	6	100	85%	43%	0.42	590	0.740	0.450	29	3.6E-04	2.2E-04	29
Air Compressor	2	6	55	100%	43%	1.02	590	0.740	0.450	38	2.1E-03	1.2E-03	38
Cat Compactor	2	6	65	85%	59%	0.73	595	0.740	0.450	53	1.3E-03	7.6E-04	53
Cat D6 Dozer	2	6	65	85%	59%	0.49	596	0.740	0.450	53	8.4E-04	5.1E-04	53
Crew Truck, 3/4 ton	2	6	250	85%	59%	0.07	536	0.740	0.450	183	1.3E-04	7.6E-05	183
Dump Trucks 15 cy	2	6	285	75%	59%	0.07	536	0.740	0.450	184	1.1E-04	6.7E-05	184
Flatbed Truck (Matl. Handling)	1	6	200	85%	59%	0.11	536	0.740	0.450	73	9.6E-05	5.8E-05	73
Forklift, 8,000 lbs	1	6	85	50%	59%	0.65	595	0.740	0.450	20	3.3E-04	2.0E-04	20
Fuel Truck	2	6	200	85%	59%	0.11	536	0.740	0.450	146	1.9E-04	1.2E-04	146
Loader, Cat 966, 4 cy	2	6	100	85%	21%	0.65	693	0.740	0.450	34	1.1E-03	6.7E-04	34
Manlifts	1	6	50	85%	21%	3.66	691	0.740	0.450	8	3.1E-03	1.9E-03	9
In-water Construction													
Forklift, 8,000 lbs	2	1	65	75%	59%	0.65	595	0.740	0.450	8	1.6E-04	1.0E-04	8
Air Compressor	4	1	55	100%	43%	1.02	590	0.740	0.450	13	6.8E-04	4.2E-04	13
Crane, 60 ton	3	1	290	85%	43%	0.17	530	0.740	0.450	38	7.4E-05	4.5E-05	38
Crew Truck, 3/4 ton	3	1	250	25%	59%	0.07	536	0.740	0.450	13	9.2E-06	5.6E-06	13
Diesel Pile Driver Hammer	3	1	85	85%	59%	0.73	595	0.740	0.450	17	3.1E-04	1.9E-04	17
Flatbed Truck (Matl. Handling)	3	1	200	85%	59%	0.11	536	0.740	0.450	37	4.8E-05	2.9E-05	37
Fuel Truck	2	1	200	25%	59%	0.11	536	0.740	0.450	7	9.4E-06	5.7E-06	7
Loader, Cat 966, 4 cy	2	1	100	75%	21%	0.65	693	0.740	0.450	5	1.6E-04	9.9E-05	5
Personnel Work Boat	1	1	63	75%	45%	--	690	0.020	0.090	3	1.2E-04	5.3E-04	3
Tug/Work Barge w/crane	1	1	560	85%	45%	--	690	0.020	0.090	33	1.2E-03	5.3E-03	35
LNG Facility Construction (including Storage Tank)													
Cat 345 Backhoe 4 cy	1	7	165	85%	21%	0.52	625	0.740	0.450	29	5.2E-04	3.1E-04	29
100 Ton Crawler Crane	2	7	250	85%	43%	0.17	530	0.740	0.450	154	3.5E-04	2.1E-04	154
200 Ton Crawler Crane	3	7	300	85%	43%	0.17	530	0.740	0.450	277	5.2E-04	3.2E-04	277
22 Ton Hydrocrane	4	7	85	85%	43%	0.42	590	0.740	0.450	116	1.7E-03	1.0E-03	117
30 Ton Hydrocrane	3	7	100	85%	43%	0.42	590	0.740	0.450	102	1.3E-03	7.7E-04	103
Air Compressor	4	7	55	85%	43%	1.02	590	0.740	0.450	75	4.1E-03	2.5E-03	76
Cat Compactor	3	7	65	85%	59%	0.73	595	0.740	0.450	92	2.2E-03	1.3E-03	93
Cat D6 Dozer	3	7	65	85%	59%	0.49	596	0.740	0.450	92	1.5E-03	8.9E-04	93
Concrete Pump	3	7	150	85%	43%	1.06	589	0.74	0.45	154	3.2E-03	1.9E-03	154
Crane, 60 ton	1	7	290	50%	43%	0.17	530	0.740	0.450	52	1.0E-04	6.2E-05	52
Crew Truck, 3/4 ton	6	7	250	85%	59%	0.07	536	0.740	0.450	640	4.4E-04	2.7E-04	640
Dump Trucks 15 cy	1	7	285	75%	59%	0.07	536	0.740	0.450	107	6.5E-05	3.9E-05	107
Flatbed Truck (Matl. Handling)	3	7	200	85%	59%	0.11	536	0.740	0.450	256	3.3E-04	2.0E-04	256
Forklift, 8,000 lbs	3	7	85	50%	59%	0.65	595	0.740	0.450	71	1.1E-03	7.0E-04	71
Fuel Truck	3	7	200	85%	59%	0.11	536	0.740	0.450	256	3.3E-04	2.0E-04	256
Loader, Cat 966, 4 cy	3	7	100	85%	21%	0.65	693	0.740	0.450	59	1.9E-03	1.2E-03	59
Manlifts	6	7	50	85%	21%	3.66	691	0.740	0.450	59	2.2E-02	1.3E-02	63
									Annual Total	**3,778**	**5.49E-02**	**3.84E-02**	**3,791**

Notes:

- Assume 48 hours per week; 4.28 weeks per month 205 hrs/month
- Emission factors for NOx, CO, SOx, VOC, PM10, PM2.5 and CO2 are average NONROAD emission rates for the State of Washington.
- Emission factors for CH4 and N2O are from the Climate Registry 2014 Default Emission Factors, Table 13.7.
- Tugboat, Workboat, and Personnel Boat Emissions factors from U.S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report April 2009, Table 3-8: Harbor Craft Emission Factors (g/kWh)
- Tugboat and Work barge EFs are in 'g/kWh' - engine size listed for these boats are in 'kWh' not 'hp'
- Work Boat and Tug Load Factor: Table 3-3: EPA Load Factors for Harbor Craft
- Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 = 1
GWP CH_4 = 25
GWP N_2O = 298

Equipment List	No.	Equipment Use Duration (months)	Horsepower	Utilization	Load Factor	Fuel Use Rate (gal/hr)	CO_2 Emission Factor (g/hp-hr)	CH_4 Emission Factor (g/gal)	N_2O Emission Factor (g/gal)	CO_2 (metric ton/year)	CH_4 (metric ton/year)	N_2O (metric ton/year)	CO2e (metric ton/year)
LNG Facility Construction (no Storage Tank Construction)													
100 Ton Crawler Crane	2	12	250	85%	43%	0.174	531	0.740	0.450	263	5.9E-04	3.6E-04	264
200 Ton Crawler Crane	2	12	300	85%	43%	0.174	531	0.740	0.450	316	5.9E-04	3.6E-04	316
22 Ton Hydrocrane	3	12	85	85%	43%	0.422	590	0.740	0.450	149	2.2E-03	1.3E-03	150
30 Ton Hydrocrane	2	12	100	85%	43%	0.422	590	0.740	0.450	117	1.4E-03	8.8E-04	117
Air Compressor	3	12	55	85%	43%	1.020	590	0.740	0.450	97	5.2E-03	3.2E-03	98
Cat Compactor	2	12	65	85%	59%	0.732	595	0.740	0.450	105	2.5E-03	1.5E-03	106
Cat D6 Dozer	2	12	65	85%	59%	0.489	596	0.740	0.450	106	1.7E-03	1.0E-03	106
Concrete Pump	2	12	150	85%	43%	1.058	589	0.740	0.450	175	3.6E-03	2.2E-03	176
Crane, 60 ton	1	12	290	50%	43%	0.174	531	0.740	0.450	90	1.7E-04	1.1E-04	90
Crew Truck, 3/4 ton	4	12	250	85%	59%	0.074	536	0.740	0.450	731	5.0E-04	3.1E-04	731
Flatbed Truck (Matl. Handling)	2	12	200	85%	59%	0.112	536	0.740	0.450	292	3.8E-04	2.3E-04	292
Forklift, 8,000 lbs	2	12	85	25%	59%	0.653	595	0.740	0.450	41	6.6E-04	4.0E-04	41
Fuel Truck	2	12	200	85%	59%	0.112	536	0.740	0.450	292	3.8E-04	2.3E-04	292
Loader, Cat 966, 4 cy	2	12	100	85%	21%	0.646	694	0.740	0.450	67	2.2E-03	1.3E-03	68
Manlifts	4	12	50	85%	21%	3.661	692	0.740	0.450	67	2.5E-02	1.5E-02	72
									Annual Total	**2,910**	**4.71E-02**	**2.87E-02**	**2,920**

Notes:

- Assume 48 hours per week; 4.28 weeks per month 205 hrs/month
- Emission factors for NOx, CO, SOx, VOC, PM10, PM2.5 and CO2 are average NONROAD emission rates for the State of Washington.
- Emission factors for CH4 and N2O are from the Climate Registry 2014 Default Emission Factors, Table 13.7.
- Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 = 1
GWP CH_4 = 25
GWP N_2O = 298

Equipment List	No.	Equipment Use Duration (months)	Horsepower	Utilization	Load Factor	Fuel Use Rate (gal/hr)	CO_2 Emission Factor (g/hp-hr)	CH_4 Emission Factor (g/gal)	N_2O Emission Factor (g/gal)	CO_2 (metric ton/year)	CH_4 (metric ton/year)	N_2O (metric ton/year)	CO2e (metric ton/year)
LNG Facility Construction (no Storage Tank Construction)													
100 Ton Crawler Crane	2	7	250	85%	43%	0.174	531	0.740	0.450	154	3.5E-04	2.1E-04	154
200 Ton Crawler Crane	2	7	300	85%	43%	0.174	531	0.740	0.450	184	3.5E-04	2.1E-04	185
22 Ton Hydrocrane	3	7	85	85%	43%	0.422	590	0.740	0.450	87	1.3E-03	7.7E-04	87
30 Ton Hydrocrane	2	7	100	85%	43%	0.422	590	0.740	0.450	68	8.4E-04	5.1E-04	69
Air Compressor	3	7	55	85%	43%	1.020	590	0.740	0.450	56	3.1E-03	1.9E-03	57
Cat Compactor	2	7	65	85%	59%	0.732	595	0.740	0.450	62	1.5E-03	8.9E-04	62
Cat D6 Dozer	2	7	65	85%	59%	0.489	596	0.740	0.450	62	9.8E-04	5.9E-04	62
Concrete Pump	2	7	150	85%	43%	1.058	589	0.740	0.450	102	2.1E-03	1.3E-03	103
Crane, 60 ton	1	7	290	50%	43%	0.174	531	0.740	0.450	52	1.0E-04	6.2E-05	52
Crew Truck, 3/4 ton	4	7	250	85%	59%	0.074	536	0.740	0.450	426	2.9E-04	1.8E-04	426
Flatbed Truck (Matl. Handling)	2	7	200	85%	59%	0.112	536	0.740	0.450	171	2.2E-04	1.4E-04	171
Forklift, 8,000 lbs	2	7	85	25%	59%	0.653	595	0.740	0.450	24	3.8E-04	2.3E-04	24
Fuel Truck	2	7	200	85%	59%	0.112	536	0.740	0.450	171	2.2E-04	1.4E-04	171
Loader, Cat 966, 4 cy	2	7	100	85%	21%	0.646	694	0.740	0.450	39	1.3E-03	7.8E-04	40
Manlifts	4	7	50	85%	21%	3.661	692	0.740	0.450	39	1.5E-02	8.9E-03	42
									Annual Total	**1,698**	**2.75E-02**	**1.67E-02**	**1,703**

Notes:

- Assume 48 hours per week; 4.28 weeks per month 205 hrs/month
- Emission factors for NOx, CO, SOx, VOC, PM10, PM2.5 and CO2 are average NONROAD emission rates for the State of Washington.
- Emission factors for CH4 and N2O are from the Climate Registry 2014 Default Emission Factors, Table 13.7.
- Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 = 1

GWP CH_4 = 25

GWP N_2O = 298

Road Vehicle Terminal Construction Criteria Pollutant Emissions
PSE LNG

Construction Vehicle Emissions - Winter 2015

Vehicle Class	Area From Which Workers Commute	VMT	NOx Running Exhaust (g/mi)	CO Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	PM_{10} Running Exhaust (g/mi)	$PM_{2.5}$ Running Exhaust (g/mi)	NOx (tons/year)	CO (tons/year)	SOx (tons/year)	VOCs (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Construction Workers	Seattle-Tacoma	0	0.262	2.826	0.006	0.036	0.030	0.017	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Heavy Duty Delivery Trucks		38	14.1	3.11	0.01	0.524	0.793	0.710	6.0E-04	1.3E-04	6.2E-07	2.2E-05	3.3E-05	3.0E-05
									6.0E-04	**1.3E-04**	**6.2E-07**	**2.2E-05**	**3.3E-05**	**3.0E-05**

Construction Vehicle Emissions - Summer 2015

Vehicle Class	Area From Which Workers Commute	VMT	NOx Running Exhaust (g/mi)	CO Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	PM_{10} Running Exhaust (g/mi)	$PM_{2.5}$ Running Exhaust (g/mi)	NOx (tons/year)	CO (tons/year)	SOx (tons/year)	VOCs (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Construction Workers	Seattle-Tacoma	0	0.233	1.827	0.006	0.036	0.020	0.008	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Heavy Duty Delivery Trucks		1,224	12.7	3.11	0.02	0.524	0.793	0.710	1.7E-02	4.2E-03	2.1E-05	7.1E-04	1.1E-03	9.6E-04
									1.7E-02	**4.2E-03**	**2.1E-05**	**7.1E-04**	**1.1E-03**	**9.6E-04**
									1.8E-02	**4.3E-03**	**2.1E-05**	**7.3E-04**	**1.1E-03**	**9.9E-04**

Construction Vehicle Emissions - Winter 2016

Vehicle Class	Area From Which Workers Commute	VMT	NOx Running Exhaust (g/mi)	CO Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	PM_{10} Running Exhaust (g/mi)	$PM_{2.5}$ Running Exhaust (g/mi)	NOx (tons/year)	CO (tons/year)	SOx (tons/year)	VOCs (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Construction Workers	Seattle-Tacoma	309,120	0.219	2.676	0.006	0.030	0.030	0.017	7.5E-02	9.1E-01	1.9E-03	1.0E-02	1.0E-02	5.6E-03
Heavy Duty Delivery Trucks		9,999	12.8	2.86	0.01	0.480	0.718	0.637	1.4E-01	3.2E-02	1.6E-04	5.3E-03	7.9E-03	7.0E-03
									2.2E-01	**9.4E-01**	**2.1E-03**	**1.5E-02**	**1.8E-02**	**1.3E-02**

Construction Vehicle Emissions - Summer 2016

Vehicle Class	Area From Which Workers Commute	VMT	NOx Running Exhaust (g/mi)	CO Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	PM_{10} Running Exhaust (g/mi)	$PM_{2.5}$ Running Exhaust (g/mi)	NOx (tons/year)	CO (tons/year)	SOx (tons/year)	VOCs (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Construction Workers	Seattle-Tacoma	309,120	0.196	1.695	0.006	0.030	0.020	0.008	0.067	0.578	0.002	0.010	0.007	0.003
Heavy Duty Delivery Trucks		5,789	11.6	2.86	0.02	0.480	0.718	0.637	0.074	0.018	0.000	0.003	0.005	0.004
									0.141	**0.596**	**0.002**	**0.013**	**0.011**	**0.007**
									0.356	**1.539**	**0.004**	**0.029**	**0.029**	**0.019**

Construction Vehicle Emissions - Winter 2017

Vehicle Class	Area From Which Workers Commute	VMT	NOx Running Exhaust (g/mi)	CO Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	PM_{10} Running Exhaust (g/mi)	$PM_{2.5}$ Running Exhaust (g/mi)	NOx (tons/year)	CO (tons/year)	SOx (tons/year)	VOCs (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Construction Workers	Seattle-Tacoma	302,400	0.184	2.559	0.005	0.025	0.029	0.016	0.061	0.853	0.002	0.008	0.010	0.005
Heavy Duty Delivery Trucks		6,355	11.5	2.62	0.01	0.439	0.640	0.562	0.081	0.018	0.000	0.003	0.004	0.004
									0.142	**0.871**	**0.002**	**0.011**	**0.014**	**0.009**

Construction Vehicle Emissions - Summer 2017

Vehicle Class	Area From Which Workers Commute	VMT	NOx Running Exhaust (g/mi)	CO Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	PM_{10} Running Exhaust (g/mi)	$PM_{2.5}$ Running Exhaust (g/mi)	NOx (tons/year)	CO (tons/year)	SOx (tons/year)	VOCs (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Construction Workers	Seattle-Tacoma	614,880	0.166	1.593	0.005	0.025	0.020	0.008	0.112	1.080	0.004	0.017	0.013	0.005
Heavy Duty Delivery Trucks		4,161	10.4	2.62	0.02	0.439	0.640	0.562	0.048	0.012	0.000	0.002	0.003	0.003
									0.160	**1.092**	**0.004**	**0.019**	**0.016**	**0.008**
									0.302	**1.963**	**0.006**	**0.030**	**0.031**	**0.017**

Construction Vehicle Emissions - Winter 2018

Vehicle Class	Area From Which Workers Commute	VMT	NOx Running Exhaust (g/mi)	CO Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	PM_{10} Running Exhaust (g/mi)	$PM_{2.5}$ Running Exhaust (g/mi)	NOx (tons/year)	CO (tons/year)	SOx (tons/year)	VOCs (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Construction Workers	Seattle-Tacoma	0	0.156	2.464	0.005	0.021	0.029	0.016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Heavy Duty Delivery Trucks		456	10.3	2.38	0.01	0.397	0.561	0.485	5.19E-03	1.20E-03	7.25E-06	2.00E-04	2.82E-04	2.44E-04
									5.19E-03	**1.20E-03**	**7.25E-06**	**2.00E-04**	**2.82E-04**	**2.44E-04**

Construction Vehicle Emissions - Summer 2018

Vehicle Class	Area From Which Workers Commute	VMT	NOx Running Exhaust (g/mi)	CO Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	VOCs Running Exhaust (g/mi)	PM_{10} Running Exhaust (g/mi)	$PM_{2.5}$ Running Exhaust (g/mi)	NOx (tons/year)	CO (tons/year)	SOx (tons/year)	VOCs (tons/year)	PM_{10} (tons/year)	$PM_{2.5}$ (tons/year)
Construction Workers	Seattle-Tacoma	0	0.141	1.512	0.005	0.021	0.020	0.007	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Heavy Duty Delivery Trucks		306	9.3	2.38	0.01	0.397	0.561	0.485	3.1E-03	8.0E-04	5.1E-06	1.3E-04	1.9E-04	1.6E-04
									3.1E-03	**8.0E-04**	**5.1E-06**	**1.3E-04**	**1.9E-04**	**1.6E-04**
									8.3E-03	**2.0E-03**	**1.2E-05**	**3.3E-04**	**4.7E-04**	**4.1E-04**

Notes:
EFs from EPA MOVES model.
Construction Worker vehicles assumed to be ID 21 - Passenger Car. Heavy-Duty Delivery trucks assumed to be 61 - Combination Short-haul truck.
Assume 48 hours per week; 4.28 weeks per month

Month/Year	Season	# work days/month	# of Cars/day	# cars/month	Car VMT/month[a]	# of Trucks/month	Truck VMT/month[a]	Total On-Site VMT/month (Car and Truck)
Jan-15	Winter 2015	26.6	0	0	0	0	0	0
Feb-15		24.0	0	0	0	0	0	0
Mar-15		26.6	0	0	0	0	0	0
Apr-15	Summer 2015	25.7	0	0	0	0	0	0
May-15		26.6	0	0	0	0	0	0
Jun-15		25.7	0	0	0	85	331	331
Jul-15		26.6	0	0	0	85	320	320
Aug-15		26.6	0	0	0	75	282	282
Sep-15		25.7	0	0	0	75	292	292
Oct-15	Winter 2015	26.6	0	0	0	5	19	19
Nov-15		25.7	0	0	0	5	19	19
Dec-15		26.6	0	0	0	0	0	0
Jan-16	Winter 2016	26.6	0	0	0	0	0	0
Feb-16		24.9	0	0	0	0	0	0
Mar-16		26.6	0	0	0	0	0	0
Apr-16	Summer 2016	25.7	0	0	0	0	0	0
May-16		26.6	0	0	0	0	0	0
Jun-16		25.7	0	0	0	174	677	677
Jul-16		26.6	98	2,604	104,160	244	918	105,078
Aug-16		26.6	98	2,604	104,160	294	1,106	105,266
Sep-16		25.7	98	2,520	100,800	794	3,088	103,888
Oct-16	Winter 2016	26.6	98	2,604	104,160	844	3,176	107,336
Nov-16		25.7	98	2,520	100,800	894	3,477	104,277
Dec-16		26.6	98	2,604	104,160	889	3,346	107,506
Jan-17	Winter 2017	26.6	98	2,604	104,160	888	3,342	107,502
Feb-17		24.0	98	2,352	94,080	329	1,371	95,451
Mar-17		26.6	98	2,604	104,160	279	1,050	105,210
Apr-17	Summer 2017	25.7	98	2,520	100,800	279	1,085	101,885
May-17		26.6	98	2,604	104,160	252	948	105,108
Jun-17		25.7	98	2,520	100,800	189	735	101,535
Jul-17		26.6	98	2,604	104,160	139	523	104,683
Aug-17		26.6	98	2,604	104,160	139	523	104,683
Sep-17		25.7	98	2,520	100,800	89	346	101,146
Oct-17	Winter 2017	26.6	0	0	0	78	294	294
Nov-17		25.7	0	0	0	39	152	152
Dec-17		26.6	0	0	0	39	147	147
Jan-18	Winter 2018	26.6	0	0	0	39	147	147
Feb-18		24.0	0	0	0	39	163	163
Mar-18		26.6	0	0	0	39	147	147
Apr-18	Summer 2018	25.7	0	0	0	41	159	159
May-18		26.6	0	0	0	39	147	147
Jun-18		25.7	0	0	0	0	0	0
Jul-18		26.6	0	0	0	0	0	0
Aug-18		26.6	0	0	0	0	0	0
Sep-18		25.7	0	0	0	0	0	0
Oct-18	Winter 2018	26.6	0	0	0	0	0	0
Nov-18		25.7	0	0	0	0	0	0
Dec-18		26.6	0	0	0	0	0	0

Base on info from

Cars VMT round trip	40	mi/day
Truck VMT round trip	100	mi/day

Note: Commute round-trip distance was assumed

Road Vehicle Terminal Construction Criteria Pollutant Emissions
PSE LNG

Construction Vehicle Emissions - Winter 2015

Vehicle Class	Area From Which Workers Commute	VMT	CO_2 Running Exhaust (g/mi)	CH4 (g/mi)	N_2O (g/mi)	CO_2 (metric tons/year)	CH_4 (metric tons/year)	N_2O (metric tons/year)	CO2e (metric tons/year)
Construction Workers	Seattle-Tacoma	0	311	0.004	0.002	0.000	0.0E+00	0.0E+00	0.000
Heavy Duty Delivery Trucks		38	1,942	0.028	0.002	0.074	1.1E-06	7.9E-08	0.074
					Total	**0.074**	**1.1E-06**	**7.9E-08**	**0.074**

Construction Vehicle Emissions - Summer 2015

Vehicle Class	Area From Which Workers Commute	VMT	CO_2 Running Exhaust (g/mi)	CH4 (g/mi)	N_2O (g/mi)	CO_2 (metric tons/year)	CH_4 (metric tons/year)	N_2O (metric tons/year)	CO2e (metric tons/year)
Construction Workers	Seattle-Tacoma	0	325.206	0.004	0.002	0.00	0.0E+00	0.0E+00	0.00
Heavy Duty Delivery Trucks		1,224	2,017	0.028	0.002	2.47	3.4E-05	2.5E-06	2.47
					Total	**2.47**	**3.4E-05**	**2.5E-06**	**2.47**
					Annual Total	**2.54**	**3.5E-05**	**2.6E-06**	**2.55**

Construction Vehicle Emissions - Winter 2016

Vehicle Class	Area From Which Workers Commute	VMT	CO_2 Running Exhaust (g/mi)	CH4 (g/mi)	N_2O (g/mi)	CO_2 (metric tons/year)	CH_4 (metric tons/year)	N_2O (metric tons/year)	CO2e (metric tons/year)
Construction Workers	Seattle-Tacoma	309,120	306	0.003	0.001	95	1.0E-03	4.5E-04	95
Heavy Duty Delivery Trucks		9,999	1,942	0.030	0.002	19.4	3.0E-04	2.1E-05	19.4
					Total	**114**	**0.001**	**4.7E-04**	**114**

Construction Vehicle Emissions - Summer 2016

Vehicle Class	Area From Which Workers Commute	VMT	CO_2 Running Exhaust (g/mi)	CH4 (g/mi)	N_2O (g/mi)	CO_2 (metric tons/year)	CH_4 (metric tons/year)	N_2O (metric tons/year)	CO2e (metric tons/year)
Construction Workers	Seattle-Tacoma	309,120	319.323	0.003	0.001	99	1.0E-03	4.5E-04	99
Heavy Duty Delivery Trucks		5,789	2,018	0.030	0.002	11.68	1.7E-04	1.2E-05	11.69
					Total	**110**	**0.001**	**4.6E-04**	**111**
					Annual Total	**224**	**0.003**	**0.001**	**225**

Construction Vehicle Emissions - Winter 2017

Vehicle Class	Area From Which Workers Commute	VMT	CO_2 Running Exhaust (g/mi)	CH4 (g/mi)	N_2O (g/mi)	CO_2 (metric tons/year)	CH_4 (metric tons/year)	N_2O (metric tons/year)	CO2e (metric tons/year)
Construction Workers	Seattle-Tacoma	302,400	300	0.003	0.001	91	9.5E-04	4.0E-04	91
Heavy Duty Delivery Trucks		6,355	1,942	0.032	0.002	12.34	2.0E-04	1.3E-05	12.35
					Total	**103**	**0.001**	**4.1E-04**	**103**

Construction Vehicle Emissions - Summer 2017

Vehicle Class	Area From Which Workers Commute	VMT	CO_2 Running Exhaust (g/mi)	CH4 (g/mi)	N_2O (g/mi)	CO_2 (metric tons/year)	CH_4 (metric tons/year)	N_2O (metric tons/year)	CO2e (metric tons/year)
Construction Workers	Seattle-Tacoma	614,880	313.79	0.003	0.001	193	2.0E-03	8.1E-04	193
Heavy Duty Delivery Trucks		4,161	2,018	0.032	0.002	8.40	1.3E-04	8.6E-06	8.40
					Total	**201**	**0.002**	**0.001**	**202**
					Annual Total	**305**	**0.003**	**0.001**	**305**

Construction Vehicle Emissions - Winter 2018

Vehicle Class	Area From Which Workers Commute	VMT	CO_2 Running Exhaust (g/mi)	CH4 (g/mi)	N_2O (g/mi)	CO_2 (metric tons/year)	CH_4 (metric tons/year)	N_2O (metric tons/year)	CO2e (metric tons/year)
Construction	Seattle-Tacoma	0	295	0.003	0.001	0.000	0.0E+00	0.0E+00	0.000
Heavy Duty Delivery Trucks		456	1,942	0.034	0.002	0.885	1.5E-05	9.4E-07	0.886
					Total	**0.885**	**1.5E-05**	**9.4E-07**	**0.886**

Construction Vehicle Emissions - Summer 2018

Vehicle Class	Area From Which Workers Commute	VMT	CO_2 Running Exhaust (g/mi)	CH4 (g/mi)	N_2O (g/mi)	CO_2 (metric tons/year)	CH_4 (metric tons/year)	N_2O (metric tons/year)	CO2e (metric tons/year)
Construction Workers	Seattle-Tacoma	0	308.46	0.003	0.001	0.000	0.0E+00	0.0E+00	0.000
Heavy Duty Delivery Trucks		306	2,019	0.034	0.002	0.618	1.0E-05	6.3E-07	0.619
					Total	**0.618**	**1.0E-05**	**6.3E-07**	**0.619**
					Annual Total	**1.50**	**2.6E-05**	**1.6E-06**	**1.50**

Notes:
EFs from EPA MOVES model.
Construction Worker vehicles assumed to be ID 21 - Passenger Car. Heavy-Duty Delivery trucks assumed to be 61 - Combination Short-haul truck.
Assume 48 hours per week; 4.28 weeks per month
Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 =	1
GWP CH_4 =	21
GWP N_2O =	310

Month/Year	Season	# work days/month	# of Cars/day	# cars/month	Car VMT/month	# of Trucks/month	Truck VMT/month	Total On-Site VMT/month (Car and Truck)
Jan-15	Winter 2015	26.6	0	0	0	0	0	0
Feb-15		24.0	0	0	0	0	0	0
Mar-15		26.6	0	0	0	0	0	0
Apr-15	Summer 2015	25.7	0	0	0	0	0	0
May-15		26.6	0	0	0	0	0	0
Jun-15		25.7	0	0	0	85	331	331
Jul-15		26.6	0	0	0	85	320	320
Aug-15		26.6	0	0	0	75	282	282
Sep-15		25.7	0	0	0	75	292	292
Oct-15	Winter 2015	26.6	0	0	0	5	19	19
Nov-15		25.7	0	0	0	5	19	19
Dec-15		26.6	0	0	0	0	0	0
Jan-16	Winter 2016	26.6	0	0	0	0	0	0
Feb-16		24.9	0	0	0	0	0	0
Mar-16		26.6	0	0	0	0	0	0
Apr-16	Summer 2016	25.7	0	0	0	0	0	0
May-16		26.6	0	0	0	0	0	0
Jun-16		25.7	0	0	0	174	677	677
Jul-16		26.6	98	2,604	104,160	244	918	105,078
Aug-16		26.6	98	2,604	104,160	294	1,106	105,266
Sep-16		25.7	98	2,520	100,800	794	3,088	103,888
Oct-16	Winter 2016	26.6	98	2,604	104,160	844	3,176	107,336
Nov-16		25.7	98	2,520	100,800	894	3,477	104,277
Dec-16		26.6	98	2,604	104,160	889	3,346	107,506
Jan-17	Winter 2017	26.6	98	2,604	104,160	888	3,342	107,502
Feb-17		24.0	98	2,352	94,080	329	1,371	95,451
Mar-17		26.6	98	2,604	104,160	279	1,050	105,210
Apr-17	Summer 2017	25.7	98	2,520	100,800	279	1,085	101,885
May-17		26.6	98	2,604	104,160	252	948	105,108
Jun-17		25.7	98	2,520	100,800	189	735	101,535
Jul-17		26.6	98	2,604	104,160	139	523	104,683
Aug-17		26.6	98	2,604	104,160	139	523	104,683
Sep-17		25.7	98	2,520	100,800	89	346	101,146
Oct-17	Winter 2017	26.6	0	0	0	78	294	294
Nov-17		25.7	0	0	0	39	152	152
Dec-17		26.6	0	0	0	39	147	147
Jan-18	Winter 2018	26.6	0	0	0	39	147	147
Feb-18		24.0	0	0	0	39	163	163
Mar-18		26.6	0	0	0	39	147	147
Apr-18	Summer 2018	25.7	0	0	0	41	159	159
May-18		26.6	0	0	0	39	147	147
Jun-18		25.7	0	0	0	0	0	0
Jul-18		26.6	0	0	0	0	0	0
Aug-18		26.6	0	0	0	0	0	0
Sep-18		25.7	0	0	0	0	0	0
Oct-18	Winter 2018	26.6	0	0	0	0	0	0
Nov-18		25.7	0	0	0	0	0	0
Dec-18		26.6	0	0	0	0	0	0

Cars VMT round trip	40	mi/day
Truck VMT round trip	100	mi/day

Note: Commute round-trip distance was assumed

Fugitive Dust Terminal Construction Emissions
PSE LNG

I. Site grading fugitive emissions

Site Prep/Disturbance	PM_{10} Tons/ Acre-month[1]	Acres worked	Months	Uncontrolled PM_{10} Emissions (tons)	Uncontrolled $PM_{2.5}$ Emissions (Ton)[4]	Seasonal Controls	Controlled PM_{10} Emissions (tons)	Controlled $PM_{2.5}$ Emissions (Ton)
Tacoma LNG Facility	0.11	32.2	6.0	21.25	2.13	61%	8.29	0.83

Notes:
(1) Emission factors from WRAP Fugitive Dust Handbook, September 2006, Table 3-2.
(2) Acres worked from Chapter 2, Project Description, Draft EIS.
(4) The PM2.5/PM10 ratio for fugitive dust from construction and demolition activities is 0.1.(WRAP, section 3.4.1)
(5) Table 3-6. Control Efficiencies for Control Measures for Construction/Demolition: Construction site watering: MRI, April 2001, test series 701. 3.2-hour watering interval
(6) Site grading assumed to occur in 2015.

II. On-site on-road car/truck travel fugitive emissions

Operation- Car/Truck Travel onsite	Annual VMTs	PM_{10} Emission Factor (lb/VMT)	PM2.5 Emission Factor (lb/VMT)	PM_{10} Emissions (ton/year)	$PM_{2.5}$ Emissions (tons/year)
Year 2015	1,263	0.002	0.001	1.46E-03	3.59E-04
Year 2016	634,028	0.002	0.001	7.35E-01	1.80E-01
Year 2017	927,795	0.002	0.001	1.08E+00	2.64E-01
Year 2018	762	0.002	0.001	8.83E-04	2.17E-04

Notes:
- PM10 and PM2.5 emission factors for paved surface from AP-42, 13.2.1.3, Equation 2: E = k (sL)^0.91 x W^1.02 x (1 - P/4N)

Where,		
k = particle size multiplier_PM10	0.0022	lb/VMT
k = particle size multiplier_PM2.5	0.00054	lb/VMT
sL = road silt loading	0.2	g/m2
W = average fleet vehicle weight	4.91	tons
P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period,	147	days
N = number of days in the averaging period (e.g., 365 for annual, 91 for seasonal, 30 for monthly)	365	days

- Road surface silt loading taken from "Urban area local roads" category used in Dept of Ecology - Washington State 2011 County Emissions Inventory (April 25, 2014), Table 3-5
- Wet days source: U.S. National Oceanic and Atmospheric Administration, Comparative Climatic Data, annual. Table 382. Mean Number of Days With precipitaion of .01 Inch or More -- Selected Cities (Seattle-Tacoma) http://www.ncdc.noaa.gov/oa/climate/climateproducts.html
- Other miscellaneous data used to calculate on-road fugitive emissions:

Average Vehicle Weight		
Cars avg weight	2	tons
Heavy Duty Truck avg weight	20	tons
# of Cars in project	38,388	# veh
# of HD Trucks in project	7,399	# veh
Total # Vehicles	45,787	# veh
Avg Veh. Weight (weighted average)	4.91	tons

Notes:
- Number of cars and trucks comes from 'Road Vehicle' calculation tab
- Cars assumed to be 2 tons on average, Heavy Duty trucks assumed to be HD Vehicle Class 7 (~20 tons)

Total VMT Traveled (Cars and Truck)		
Year 2015	1,263	VMT/yr
Year 2016	634,028	VMT/yr
Year 2017	927,795	VMT/yr
Year 2018	762	VMT/yr

Notes:
- VMT data comes from 'Road Vehicle' calculation tab
- Assumed 1 mile traveld on-site per day per heavy-duty deliery truck and commuting car.

III. Total fugitive emissions

Construction Year	PM_{10} Emissions (ton/yr)	$PM_{2.5}$ Emissions (tons/year)
Year 2015	8.29	0.83
Year 2016	0.73	0.18
Year 2017	1.08	0.26
Year 2018	8.83E-04	2.17E-04

Appendix D-2: Operations Emissions

Air Emissions Summary

Tacoma LNG Project

Source	Potential to Emit (lb/hour)									Potential to Emit (ton/year)												
Description	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**CO**	**SO_2**	**VOC**	**H_2SO_4**	**TAPS**	**HAPS**	**PM_{10}**	**$PM_{2.5}$**	**NOx**	**CO**	**SO_2**	**VOC**	**H_2SO_4**	**TAPS**	**HAPS**	**CO_2**	**CH_4**	**N_2O**	**CO2e (metric)**
Emission Units																						
Pretreatment Heater	0.06	0.06	0.31	0.63	0.007	0.18	3.46E-04	0.95	1.58E-02	0.28	0.28	1.36	2.75	0.03	0.79	1.52E-03	4.14	6.90E-02	4,343	8.19E-02	8.19E-03	3,952
Enclosed Ground Flare (pilot and vent gas)	0.10	0.10	1.44	2.93	1.24	1.65	0.06	5.62	6.29E-02	0.46	0.46	6.32	12.8	5.45	7.23	2.73E-01	24.6	2.75E-01	16,113	1.02E-01	1.02E-02	14,654
Emergency Flare	3.8E-03	3.8E-03	0.04	0.09	4.20E-04	0.03	2.10E-05	0.13	9.52E-04	0.02	0.02	0.19	0.39	0.002	0.11	9.21E-05	0.58	4.17E-03	199	3.76E-03	3.76E-04	181
LNG Vaporizer (Back-Up)	0.21	0.21	1.04	2.11	0.02	0.60	1.16E-03	3.17	5.28E-02	0.11	0.11	0.52	1.05	0.01	0.30	5.80E-04	1.59	2.64E-02	979	3.14E-02	3.14E-03	981
1600 KW Emergency Diesel Generator	0.71	0.71	21.4	12.3	0.02	1.13	-	34.6	0.0	0.18	0.18	5.36	3.09	0.01	0.28	-	8.65	5.90E-03	612	2.48E-02	4.96E-03	614
Total	**1.09**	**1.09**	**24.3**	**18.1**	**1.30**	**3.59**	**0.06**	**44.5**	**0.16**	**1.03**	**1.03**	**13.8**	**20.1**	**5.50**	**8.72**	**0.27**	**39.6**	**0.38**	**22,246**	**2.44E-01**	**2.69E-02**	**20,381**
Fugitives - Pretreatment, Liquefaction, Regasification, and Marine																						
Tacoma LNG Processes	-	-	-	-	-	6.6E-04	-		-	-	-	-	-	-	2.89E-03	-	-	-	-	2.1	-	51.2
Refrigerant losses						17.6									77.0					14		318
Total	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**17.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**77.0**	**0.0**	**0.0**	**0.0**	**0.0**	**16.1**	**0.0**	**369**
Summary																						
Total for Permit (Pretreatment, Terminal, and Fugitives)	**1.09**	**1.09**	**24.3**	**18.1**	**1.30**	**21.2**	**0.06**	**44.46**	**0.16**	**1.03**	**1.03**	**13.8**	**20.1**	**5.50**	**85.7**	**0.27**	**39.6**	**0.38**	**22,246**	**16.3**	**0.03**	**20,751**
Grand Total																						

Description	**Threshold**												
Title V Permit	100	100	100	100	100	100	100		10 individual or 25 combined	100	100	100	100,000
PSD	250	250	250	250	250	250	250		10 individual or 25 combined	250	250	250	100,000

HAP Summary

Tacoma LNG Project

Hazardous Air Pollutant	PTE (tons/year)					
	Pretreatment Heater	LNG Vaporizer (Back-Up)	Enclosed Flare	Emergency Flare	Terminal Emergency Generator	Total
2-Methylnaphthalene	8.78E-07	3.4E-07	3.5E-06	5.3E-08		**4.8E-06**
2,2,4-Trimethylpentane						**0.0E+00**
3-Methylchloranthrene	6.58E-08	2.5E-08	2.6E-07	4.0E-09		**3.6E-07**
7,12-Dimethylbenz(a)anthracene	5.85E-07	2.2E-07	2.3E-06	3.5E-08		**3.2E-06**
1,2,4-Trimethylbenzene						**0.0E+00**
Acenaphthene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	1.8E-05	**1.8E-05**
Acenaphthylene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	3.5E-05	**3.5E-05**
Acetaldehyde					9.5E-05	**9.5E-05**
Acrolein					3.0E-05	**3.0E-05**
Anthracene	8.78E-08	3.4E-08	3.5E-07	5.3E-09	4.6E-06	**5.1E-06**
Benzo(a)anthracene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	2.3E-06	**2.7E-06**
Benzene	7.68E-05	2.9E-05	3.1E-04	4.7E-06	2.9E-03	**3.3E-03**
Benzo(a)pyrene	4.39E-08	1.7E-08	1.8E-07	2.7E-09	9.6E-07	**1.2E-06**
Benzo(b)fluoranthene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	4.2E-06	**4.5E-06**
Benzo(g,h,i)perylene	4.39E-08	1.7E-08	1.8E-07	2.7E-09	2.1E-06	**2.3E-06**
Benzo(k)fluoranthene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	8.2E-07	**1.2E-06**
Chrysene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	5.7E-06	**6.1E-06**
Dibenz(a,h)anthracene	4.39E-08	1.7E-08	1.8E-07	2.7E-09	1.3E-06	**1.5E-06**
Dichlorobenzene	4.39E-05	1.7E-05	1.8E-04	2.7E-06		**2.4E-04**
Ethylbenzene						**0.0E+00**
Fluoranthene	1.10E-07	4.2E-08	4.4E-07	6.6E-09	1.5E-05	**1.6E-05**
Fluorene	1.02E-07	3.9E-08	4.1E-07	6.2E-09	4.8E-05	**4.9E-05**
Formaldehyde	2.74E-03	1.0E-03	1.1E-02	1.7E-04	3.0E-04	**1.5E-02**
Hexane	6.58E-02	2.5E-02	2.6E-01	4.0E-03		**3.6E-01**
Indeno(1,2,3-cd)pyrene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	1.6E-06	**1.9E-06**
Naphthalene	2.23E-05	8.5E-06	8.9E-05	1.4E-06	4.9E-04	**6.1E-04**
Propylene Oxide						**0.0E+00**
Phenanthrene	6.22E-07	2.4E-07	2.5E-06	3.8E-08	1.5E-04	**1.6E-04**
Pyrene	1.83E-07	7.0E-08	7.3E-07	1.1E-08	1.4E-05	**1.5E-05**
Toluene	1.24E-04	4.8E-05	5.0E-04	7.5E-06	1.1E-03	**1.7E-03**
Xylenes					7.2E-04	**7.2E-04**
Arsenic	7.31E-06	2.8E-06				**1.0E-05**
Beryllium	4.39E-07	1.7E-07				**6.1E-07**
Cadmium	4.02E-05	1.5E-05				**5.6E-05**
Chromium	5.12E-05	2.0E-05				**7.1E-05**
Cobalt	3.07E-06	1.2E-06				**4.2E-06**
Manganese	1.39E-05	5.3E-06				**1.9E-05**
Mercury	9.51E-06	3.6E-06				**1.3E-05**
Nickel	7.68E-05	2.9E-05				**1.1E-04**
Selenium	8.78E-07	3.4E-07				**1.2E-06**
Total	**6.90E-02**	**2.64E-02**	**2.75E-01**	**4.17E-03**	**5.90E-03**	**0.38**

PTE: Potential to Emit

TAP Summary

Tacoma LNG Project

Toxic Air Pollutant	PTE (tons/year) Pretreatment Heater	LNG Vaporizer (Back-Up)	Enclosed Flare	Emergency Flare	Diesel Emergency Generator	Total
3-Methylchloranthrene	6.58E-08	2.5E-08	2.6E-07	4.0E-09		**3.6E-07**
7,12-Dimethylbenz(a)anthracene	5.85E-07	2.2E-07	2.3E-06	3.5E-08		**3.2E-06**
Acetaldehyde					9.5E-05	**9.5E-05**
Acrolein					3.0E-05	**3.0E-05**
Benzo(a)anthracene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	2.3E-06	**2.7E-06**
Benzene	7.68E-05	2.9E-05	3.1E-04	4.7E-06	2.9E-03	**3.3E-03**
Benzo(a)pyrene	4.39E-08	1.7E-08	1.8E-07	2.7E-09	9.6E-07	**1.2E-06**
Benzo(b)fluoranthene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	4.2E-06	**4.5E-06**
Benzo(k)fluoranthene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	8.2E-07	**1.2E-06**
Chrysene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	5.7E-06	**6.1E-06**
Dibenz(a,h)anthracene	4.39E-08	1.7E-08	1.8E-07	2.7E-09	1.3E-06	**1.5E-06**
Formaldehyde	2.74E-03	1.0E-03	1.1E-02	1.7E-04	3.0E-04	**1.5E-02**
hydrogen sulfide			2.1E-02	0.0E+00		**2.1E-02**
Indeno(1,2,3-cd)pyrene	6.58E-08	2.5E-08	2.6E-07	4.0E-09	1.6E-06	**1.9E-06**
Naphthalene	2.23E-05	8.5E-06	8.9E-05	1.4E-06	4.9E-04	**6.1E-04**
Propylene					1.0E-02	**1.0E-02**
Toluene	1.24E-04	4.8E-05	5.0E-04	7.5E-06	1.1E-03	**1.7E-03**
Xylenes					7.2E-04	**7.2E-04**
Arsenic	7.31E-06	2.8E-06				**1.0E-05**
Beryllium	4.39E-07	1.7E-07				**6.1E-07**
Cadmium	4.02E-05	1.5E-05				**5.6E-05**
Cobalt	3.07E-06	1.2E-06				**4.2E-06**
Copper	3.11E-05	1.2E-05				**4.3E-05**
Manganese	1.39E-05	5.3E-06				**1.9E-05**
Mercury	9.51E-06	3.6E-06				**1.3E-05**
Selenium	8.78E-07	3.4E-07				**1.2E-06**
Vanadium	8.41E-05	3.2E-05				**1.2E-04**
Carbon monoxide (CO)	2.75E+00	1.1E+00	1.3E+01	3.9E-01	3.1E+00	**2.0E+01**
Diesel Particulate Matter	0.00E+00	0.0E+00	0.0E+00	0.0E+00	1.8E-01	**1.8E-01**
Nitrogen dioxide (NO2)	1.36E+00	5.2E-01	6.3E+00	1.9E-01	5.4E+00	**1.4E+01**
Sulfur dioxide (SO2)	3.03E-02	1.2E-02	5.5E+00	1.8E-03	5.8E-03	**5.5E+00**
Total	**4.14**	**1.59**	**24.6**	**0.58**	**8.65**	**39.6**

PTE: Potential to Emit

Common Name	CAS#	Averaging Period	ASIL (µg/m3)	SQER (lb/averaging period)	De Minimis (lb/averaging period)
3-Methylchloranthrene	56-49-5	year	0.00016	0.0305	0.00153
7,12-Dimethylbenz(a)anthracene	57-97-6	Year	1.41E-05	0.00271	0.000135
Acetaldehyde	75-07-0	Year	0.37	71	3.55
Acrolein	107-02-8	24-hour	0.06	0.00789	0.000394
Benzo(a)anthracene	56-55-3	Year	0.00909	1.74	0.0872
Benzene	71-43-2	Year	0.0345	6.62	0.331
Benzo(a)pyrene	50-32-8	Year	0.00091	0.174	0.00872
Benzo(b)fluoranthene	205-99-2	Year	0.00909	1.74	0.0872
Benzo(k)fluoranthene	207-08-9	Year	0.00909	1.74	0.0872
Chrysene	218-01-9	Year	0.00909	1.74	0.0872
Dibenz(a,h)anthracene	53-70-3	Year	0.00083	0.16	0.00799
Formaldehyde	50-00-0	Year	0.167	32	1.6
hydrogen sulfide	7783-06-4	24-hour	2	0.263	0.0131
Indeno(1,2,3-cd)pyrene	193-39-5	Year	0.00909	1.74	0.0872
Naphthalene	91-20-3	Year	0.0294	5.64	0.282
Propylene	115-07-1	24-hour	3000	394	19.7
Toluene	108-88-3	24-hour	5000	657	32.9
Xylenes	(multiple)	24-hour	221	29	1.45
Arsenic	--	Year	0.0003	0.0581	0.00291
Beryllium	--	Year	0.00042	0.08	0.004
Cadmium	7440-43-9	Year	0.00024	0.0457	0.00228
Cobalt	7440-48-4	24-hour	0.1	0.013	0.000657
Copper	--	1-hour	100	0.219	0.011
Manganese	--	24-hour	0.04	0.00526	0.000263
Mercury	7439-97-6	24-hour	0.09	0.0118	0.000591
Selenium	--	24-hour	20	2.63	0.131
Vanadium	7440-62-2	24-hour	0.2	0.0263	0.00131
Carbon monoxide (CO)	630-08-0	1-hr	23000	50.4	1.14
Diesel Particulate Matter	--	year	0.00333	0.639	0.032
Nitrogen dioxide (NO2)	10102-44-0	1-hr	470	1.03	0.457
Sulfur dioxide (SO2)	7446-09-05	1-hr	660	1.45	0.457

Pretreatment Natural Gas Heater for Dehydrator Regeneration and Amine Reboiler
Tacoma LNG Project

Fuel	Natural Gas/BOG	
Heat Content	1018	Btu/scf
Annual Operation for PTE	8760	hours/year
Total Heater Capacity	8.5	MMBTU/hour
Number of Heaters	1 or 2	
Fd	8710	dscf/MMBtu
Sulfur Content of Fuel	5	ppm
Exhaust percent O2	3	%
Exhaust flow rate	1441	dscf/min
NOx Emission Limit	30	ppm
CO Emission Limit	100	ppm
VOC Emissions as methane	50	ppm

	Emission Factor		Heater PTE	
Pollutant	**(lb/MMSCF)**	**(lb/MMBTU)**	**(lb/hour)**	**(tons/year)**
NO_x[a]		0.036	0.31	1.36
CO[a]		0.074	0.63	2.75
VOC[a]		0.021	0.18	0.79
SO_2[b]		8.1E-04	0.01	0.03
PM_{10}[c]	7.6	7.5E-03	0.06	0.28
$PM_{2.5}$[c]	7.6	7.5E-03	0.06	0.28
H_2SO_4 Mist[b]	3.46E-04	4.1E-05	3.46E-04	1.52E-03
Total TAPs			0.95	4.14
Total HAPs[d]			0.02	0.07

	Emission Factor[d]		Each Heater PTE			
Speciated Organic Compounds	**(lb/MMSCF)**	**(lb/MMBTU)**	**(lb/hour)**	**(tons/year)**	**HAPS**	**TAPS**
2-Methylnaphthalene	2.4E-05	2.4E-08	2.0E-07	8.8E-07	x	
3-Methylchloranthrene	1.8E-06	1.8E-09	1.5E-08	6.6E-08	x	x
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.6E-08	1.3E-07	5.9E-07	x	x
Acenaphthene	1.8E-06	1.8E-09	1.5E-08	6.6E-08	x	
Acenaphthylene	1.8E-06	1.8E-09	1.5E-08	6.6E-08	x	
Anthracene	2.4E-06	2.4E-09	2.0E-08	8.8E-08	x	
Benzo(a)anthracene	1.8E-06	1.8E-09	1.5E-08	6.6E-08	x	x
Benzene	2.1E-03	2.1E-06	1.8E-05	7.7E-05	x	x
Benzo(a)pyrene	1.2E-06	1.2E-09	1.0E-08	4.4E-08	x	x
Benzo(b)fluoranthene	1.8E-06	1.8E-09	1.5E-08	6.6E-08	x	x
Benzo(g,h,i)perylene	1.2E-06	1.2E-09	1.0E-08	4.4E-08	x	
Benzo(k)fluoranthene	1.8E-06	1.8E-09	1.5E-08	6.6E-08	x	x
Chrysene	1.8E-06	1.8E-09	1.5E-08	6.6E-08	x	x
Dibenz(a,h)anthracene	1.2E-06	1.2E-09	1.0E-08	4.4E-08	x	x
Dichlorobenzene	1.2E-03	1.2E-06	1.0E-05	4.4E-05	x	
Fluoranthene	3.0E-06	2.9E-09	2.5E-08	1.1E-07	x	
Fluorene	2.8E-06	2.8E-09	2.3E-08	1.0E-07	x	
Formaldehyde	7.5E-02	7.4E-05	6.3E-04	2.7E-03	x	x
Hexane	1.8E+00	1.8E-03	1.5E-02	6.6E-02	x	
Indeno(1,2,3-cd)pyrene	1.8E-06	1.8E-09	1.5E-08	6.6E-08	x	x
Naphthalene	6.1E-04	6.0E-07	5.1E-06	2.2E-05	x	x
Phenanthrene	1.7E-05	1.7E-08	1.4E-07	6.2E-07	x	
Pyrene	5.0E-06	4.9E-09	4.2E-08	1.8E-07	x	
Toluene	3.4E-03	3.3E-06	2.8E-05	1.2E-04	x	x
Arsenic	2.0E-04	2.0E-07	1.7E-06	7.3E-06	x	x
Beryllium	1.2E-05	1.2E-08	1.0E-07	4.4E-07	x	x
Cadmium	1.1E-03	1.1E-06	9.2E-06	4.0E-05	x	x
Chromium	1.4E-03	1.4E-06	1.2E-05	5.1E-05	x	
Cobalt	8.4E-05	8.3E-08	7.0E-07	3.1E-06	x	x
Copper	8.5E-04	8.3E-07	7.1E-06	3.1E-05		x
Manganese	3.8E-04	3.7E-07	3.2E-06	1.4E-05	x	x
Mercury	2.6E-04	2.6E-07	2.2E-06	9.5E-06	x	x
Nickel	2.1E-03	2.1E-06	1.8E-05	7.7E-05	x	
Selenium	2.4E-05	2.4E-08	2.0E-07	8.8E-07	x	x
Vanadium	2.3E-03	2.3E-06	1.9E-05	8.4E-05		x

Notes:
Chromium emissions assumed to be Chromium 3+ (CrO3) and are not a TAP

Greenhouse Gases	**Emission Factor (Natural Gas) kg/MMBtu**	**Reference**	**Capacity (MMBTU/year)**	**PTE (metric ton/yr)**	**PTE (ton/yr)**
CO_2	53.02	40 CFR 98 Subpart C Equation C-1(b) (Tier 1)	74,460	3,948	4.3E+03
N_2O[e]	1.0E-04	40 CFR 98 Subpart C Equation C-8(b) Tiers (1 & 3)	74,460	0.0074	8.2E-03
CH_4[e]	1.0E-03	40 CFR 98 Subpart C Equation C-8(b) (Tiers 1 & 3)	74,460	0.074	0.1
CO_2e[f]		40 CFR 98 Part A		3,951.9	4,347.1

Notes:
PTE: Potential to Emit

[a] NOx, CO and VOC emissions based on CBI design specification.

[b] SO_2 emission factors based on treated gas maximum design concentration of 5 ppm S.

[c] Emission Factor from Table 1.4-2: Compilation of Air Pollutant Emission Factors (AP-42), July 1998. U.S. Environmental Protection Agency, from EPA's TTN web site as of January 7, 2012. lb/MMSCF to lb/MMBTU conversion 1,020 MMBTU/MMSCF

[d] Emission Factor from Table 1.4-3,4: Compilation of Air Pollutant Emission Factors (AP-42), July 1998. U.S. Environmental Protection Agency, from EPA's TTN web site as of January 7, 2012 Conversion from lb/MMSCF to lb/MMBTU assumes natural gas HHV of 1,020 MMBTU/MMSCF.

[e] Eqn C-8(b): CH_4 or N_2O = 1 x 10^{-3} x Fuel x EF
Fuel =Annual Natural Gas Combusted, (MMBTU/Year)
EF = Fuel-specific default CH_4 or N_2O emission factor for natural gas, from Table C-2 of 40 CFR Part 98 Subpart C (kg CH_4 or N_2O/MMBTU)
1 x 10^{-3} = Conversion Factor from Kilograms to Metric Tons

[f] CO_2e = (GWP CO_2 x CO_2 metric ton/yr) + (GWP CH4 x CH4 metric ton/yr) + (GWP N_2O x N_2O metric ton/yr)
Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 =	1	GWP CH_4 =	25	GWP N_2O =	298

LNG Vaporizer (Back-Up)
Tacoma LNG Project

Fuel	Natural Gas/BOG	
Heat Content	926	btu/scf
Annual Operation for PTE	1000	hours/year
Total Heater Capacity[a]	28.5	MMBTU/hour
Fd	8710	dscf/MMBtu
Sulfur Content of Fuel	5	ppm
Exhaust percent O2	3	%
Exhaust flow rate	4831	dscf/min
NO_x Emission Limit	30	ppm
CO Emission Limit	100	ppm
VOC Emissions as methane	50	ppm

	Emission Factor		Heater PTE	
Pollutant	**(lb/MMSCF)**	**(lb/MMBTU)**	**(lb/hour)**	**(tons/year)**
NO_x[a]		0.036	1.04	0.52
CO[a]		0.074	2.11	1.05
SO_2[b]		8.1E-04	0.02	0.01
PM_{10}[c]	7.6	7.5E-03	0.21	0.11
$PM_{2.5}$[c]	7.6	7.5E-03	0.21	0.11
VOC[d]		0.021	0.60	0.30
H_2SO_4 Mist[b]		4.1E-05	1.16E-03	5.80E-04
Total TAPs			3.17	1.59
Total HAPs			0.05	0.03

	Emission Factor[e]		Each Heater PTE			
Speciated Organic Compounds	**(lb/MMSCF)**	**(lb/MMBTU)**	**(lb/hour)**	**(tons/year)**	**HAP**	**TAP**
2-Methylnaphthalene	2.4E-05	2.4E-08	6.7E-07	3.4E-07	x	
3-Methylchloranthrene	1.8E-06	1.8E-09	5.0E-08	2.5E-08	x	x
7,12-Dimethylbenz(a)anthracene	1.6E-05	1.6E-08	4.5E-07	2.2E-07	x	x
Acenaphthene	1.8E-06	1.8E-09	5.0E-08	2.5E-08	x	
Acenaphthylene	1.8E-06	1.8E-09	5.0E-08	2.5E-08	x	
Anthracene	2.4E-06	2.4E-09	6.7E-08	3.4E-08	x	
Benzo(a)anthracene	1.8E-06	1.8E-09	5.0E-08	2.5E-08	x	x
Benzene	2.1E-03	2.1E-06	5.9E-05	2.9E-05	x	x
Benzo(a)pyrene	1.2E-06	1.2E-09	3.4E-08	1.7E-08	x	x
Benzo(b)fluoranthene	1.8E-06	1.8E-09	5.0E-08	2.5E-08	x	x
Benzo(g,h,i)perylene	1.2E-06	1.2E-09	3.4E-08	1.7E-08	x	
Benzo(k)fluoranthene	1.8E-06	1.8E-09	5.0E-08	2.5E-08	x	x
Chrysene	1.8E-06	1.8E-09	5.0E-08	2.5E-08	x	x
Dibenz(a,h)anthracene	1.2E-06	1.2E-09	3.4E-08	1.7E-08	x	x
Dichlorobenzene	1.2E-03	1.2E-06	3.4E-05	1.7E-05	x	
Fluoranthene	3.0E-06	2.9E-09	8.4E-08	4.2E-08	x	
Fluorene	2.8E-06	2.7E-09	7.8E-08	3.9E-08	x	
Formaldehyde	7.5E-02	7.4E-05	2.1E-03	1.0E-03	x	x
Hexane	1.8E+00	1.8E-03	5.0E-02	2.5E-02	x	
Indeno(1,2,3-cd)pyrene	1.8E-06	1.8E-09	5.0E-08	2.5E-08	x	x
Naphthalene	6.1E-04	6.0E-07	1.7E-05	8.5E-06	x	x
Phenanthrene	1.7E-05	1.7E-08	4.8E-07	2.4E-07	x	
Pyrene	5.0E-06	4.9E-09	1.4E-07	7.0E-08	x	
Toluene	3.4E-03	3.3E-06	9.5E-05	4.8E-05	x	x
Arsenic	2.0E-04	2.0E-07	5.6E-06	2.8E-06	x	x
Beryllium	1.2E-05	1.2E-08	3.4E-07	1.7E-07	x	x
Cadmium	1.1E-03	1.1E-06	3.1E-05	1.5E-05	x	x
Chromium	1.4E-03	1.4E-06	3.9E-05	2.0E-05	x	
Cobalt	8.4E-05	8.2E-08	2.3E-06	1.2E-06	x	x
Copper	8.5E-04	8.3E-07	2.4E-05	1.2E-05		x
Manganese	3.8E-04	3.7E-07	1.1E-05	5.3E-06	x	x
Mercury	2.6E-04	2.5E-07	7.3E-06	3.6E-06	x	x
Nickel	2.1E-03	2.1E-06	5.9E-05	2.9E-05	x	
Selenium	2.4E-05	2.4E-08	6.7E-07	3.4E-07	x	x
Vanadium	2.3E-03	2.3E-06	6.4E-05	3.2E-05		x

Notes:
Chromium emissions assumed to be Chromium 3+ (CrO3) and are not a TAP

Greenhouse Gases	**EF (Natural Gas) kg/MMBtu**	**Reference**	**Capacity (MMBTU/year)**	**Heater PTE (metric ton/yr)**	**Heaters PTE (ton/yr)**
CO_2[a]	53.02	40 CFR 98 Subpart C Equation C-1(b) (Tier 1)	28,500	1,511	979
N_2O[f]	1.0E-04	40 CFR 98 Subpart C Equation C-8(b) Tiers (1 & 3)	28,500	2.85E-03	3.14E-03
CH_4[f]	1.0E-03	40 CFR 98 Subpart C Equation C-8(b) (Tiers 1 & 3)	28,500	2.85E-02	3.14E-02
CO2e[g]		40 CFR 98 Part A			981

Notes:
PTE: Potential to Emit
[a] Emissions based on generic BACT for Boilers and Heaters 10 to 50 MMBtu/hr. The unit may be one 28.5 MMBtu/hr unit or two units adding up to 28.5 MMBtu/hr.
[b] SO_2 emission factors based on treated gas maximum design concentration of 5 ppm S.
[c] Emission Factor from Table 1.4-2: Compilation of Air Pollutant Emission Factors (AP-42), July 1998. U.S. Environmental Protection Agency, from EPA's TTN web site as of January 4, 2012. lb/MMSCF to lb/MMBTU conversion 1,020 MMBTU/MMSCF
[d] VOC emission factor from CBI document Estimated Air Emissions - Tacoma LNG Project

[e] Emission Factor from Table 1.4-3,4: Compilation of Air Pollutant Emission Factors (AP-42), July 1998. U.S. Environmental Protection Agency, from EPA's TTN web site as of January 7, 2012 Conversion from lb/MMSCF to lb/MMBTU assumes natural gas HHV of 1,020 MMBTU/MMSCF.
[f] Eqn C-8(b): CH_4 or N_2O = 1 x 10^{-3} x Fuel x EF
Fuel =Annual Natural Gas Combusted, (MMBTU/Year)
1 x 10^{-3} = Conversion Factor from Kilograms to Metric Tons
[g] CO_2e = (GWP CO_2 x CO_2 metric ton/yr) + (GWP CH4 x CH4 metric ton/yr) + (GWP N_2O x N_2O metric ton/yr)
Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 = 1 GWP CH_4 = 25 GWP N_2O = 298

Enclosed Ground Flare
Tacoma LNG Project

Annual Operation of Pilots	8760	hours per year
Number of Pilots	6	
Pilot Gas Flow Rate	65,000	btu/hour
Total Pilot Gas Flow Rate	390,000	btu/hour
	0.39	MMBtu/hr
	3,416	MMBtu/year
	4.431	MMSCF/year
Fd for Natural Gas	8,710	dscf/MMBtu
H2S Content of NG to Pilots	5	ppm
Exhaust percent O2	15	%
Exhaust flow rate	201	dscf/min
NO_x Emission Limit	30	ppm
CO Emission Limit	100	ppm
VOC Emissions as methane	50	ppm
Annual operation of process	8760	hours/year
Normal vent flow to Flare:	10.2	MMBtu/hr
	310	Btu/scf
	0.033	MMScf/hr
	32,903	scf/hr
CO_2 content of vent gas:	65	% of total
Design maximum total sulfur	0.17	lb S/MMBtu
H_2S Content of Process Gas	60	ppm
	27.3	% of total
TBM (C4H10S) Content of Process Gas	120	ppm
	54.5	% of total
MES (C3H8S) Content of Process Gas	40	ppm
	18.2	% of total
Fd for Natural Gas	8710	dscf/MMBtu
Exhaust percent O2	15	%
Exhaust flow rate	6508	dscf/min
NO_x Emissions	30	ppm
CO Emissions	100	ppm
VOC Emissions	100	ppm
Pilot Gas Heating Value	771	MMBTU/MMSCF
Destruction Efficiency of Flare	99	percent

	Emissions from Pilots				Emissions from Process Gases					Total Emissions	
Pollutant	Emission Factor (lbs/MMSCF)	Emission Factor (lbs/MMBTU)	PTE (lbs/hour)	PTE (tons/year)	Emission Factor (lbs/MMSCF)	Emission Factor (lbs/MMBTU)	Percent control	PTE (lbs/hour)	PTE (tons/year)	PTE (lbs/hour)	PTE (tons/year)
NO_x[a]	87	0.112	0.04	0.19	43	0.137		1.40	6.13	1.44	6.32
CO[a]	176	0.228	0.09	0.39	86	0.278		2.84	12.44	2.93	12.83
VOC[a]	50	0.065	0.03	0.11	49	0.159		1.63	7.12	1.65	7.23
SO_2[b]	0.83	1.08E-03	4.20E-04	1.8E-03	38	0.122		1.24	5.45	1.24	5.45
PM_{10}[c]	7.6	9.86E-03	3.84E-03	1.7E-02	7.6	9.86E-03		0.10	0.44	0.10	0.46
$PM_{2.5}$[c]	7.6	9.86E-03	3.84E-03	1.7E-02	7.6	9.86E-03		0.10	0.44	0.10	0.46
H_2SO_4 Mist[b]	4.15E-02	5.39E-05	2.10E-05	9.2E-05	1.89E+00	6.10E-03		0.06	0.27	0.06	0.27
CO_2 (Non-combustion)								2444	10703	2444	10703
CO_2 (Combustion)											
Sulfur Compounds											
Total Sulfur[b]					0.37	0.000	99	4.84E-03	2.12E-02	4.84E-03	2.12E-02
H_2S					0.10	0.000	99	1.32E-03	5.78E-03	1.32E-03	5.78E-03
TBM (C4H10S)					0.20	0.000	99	2.64E-03	1.16E-02	2.64E-03	1.16E-02
MES (C3H8S)					0.07	0.000	99	8.79E-04	3.85E-03	8.79E-04	3.85E-03
HAPS[d]			9.5E-04	4.2E-03				6.2E-02	2.71E-01	6.29E-02	2.75E-01
2-Methylnaphthalene	2.40E-05	3.11E-08	1.2E-08	5.3E-08	2.40E-05	7.74E-08		7.9E-07	3.46E-06	8.02E-07	3.51E-06
3-Methylchloranthrene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		5.9E-08	2.59E-07	6.01E-08	2.63E-07
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.08E-08	8.1E-09	3.5E-08	1.60E-05	5.16E-08		5.3E-07	2.31E-06	5.35E-07	2.34E-06
Acenaphthene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		5.9E-08	2.59E-07	6.01E-08	2.63E-07
Acenaphthylene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		5.9E-08	2.59E-07	6.01E-08	2.63E-07
Anthracene	2.40E-06	3.11E-09	1.2E-09	5.3E-09	2.40E-06	7.74E-09		7.9E-08	3.46E-07	8.02E-08	3.51E-07
Benz(a)anthracene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		5.9E-08	2.59E-07	6.01E-08	2.63E-07
Benzene	2.10E-03	2.72E-06	1.1E-06	4.7E-06	2.10E-03	6.77E-06		6.9E-05	3.03E-04	7.02E-05	3.07E-04
Benzo(a)pyrene	1.20E-06	1.56E-09	6.1E-10	2.7E-09	1.20E-06	3.87E-09		3.9E-08	1.73E-07	4.01E-08	1.76E-07
Benzo(b)fluoranthene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		5.9E-08	2.59E-07	6.01E-08	2.63E-07
Benzo(g,h,i)perylene	1.20E-06	1.56E-09	6.1E-10	2.7E-09	1.20E-06	3.87E-09		3.9E-08	1.73E-07	4.01E-08	1.76E-07
Benzo(k)fluoranthene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		5.9E-08	2.59E-07	6.01E-08	2.63E-07
Chrysene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		5.9E-08	2.59E-07	6.01E-08	2.63E-07
Dibenzo(a,h)anthracene	1.20E-06	1.56E-09	6.1E-10	2.7E-09	1.20E-06	3.87E-09		3.9E-08	1.73E-07	4.01E-08	1.76E-07
Dichlorobenzene	1.20E-03	1.56E-06	6.1E-07	2.7E-06	1.20E-03	3.87E-06		3.9E-05	1.73E-04	4.01E-05	1.76E-04
Fluoranthene	3.00E-06	3.89E-09	1.5E-09	6.6E-09	3.00E-06	9.68E-09		9.9E-08	4.32E-07	1.00E-07	4.39E-07
Fluorene	2.80E-06	3.63E-09	1.4E-09	6.2E-09	2.80E-06	9.03E-09		9.2E-08	4.04E-07	9.35E-08	4.10E-07
Formaldehyde	7.50E-02	9.73E-05	3.8E-05	1.7E-04	7.50E-02	2.42E-04		2.5E-03	1.08E-02	2.51E-03	1.10E-02
Hexane	1.80E+00	2.33E-03	9.1E-04	4.0E-03	1.80E+00	5.81E-03		5.9E-02	2.59E-01	6.01E-02	2.63E-01
Indeno(1,2,3-cd)pyrene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		5.9E-08	2.59E-07	6.01E-08	2.63E-07
Naphthalene	6.10E-04	7.91E-07	3.1E-07	1.4E-06	6.10E-04	1.97E-06		2.0E-05	8.79E-05	2.04E-05	8.93E-05
Phenanthrene	1.70E-05	2.20E-08	8.6E-09	3.8E-08	1.70E-05	5.48E-08		5.6E-07	2.45E-06	5.68E-07	2.49E-06
Pyrene	5.00E-06	6.49E-09	2.5E-09	1.1E-08	5.00E-06	1.61E-08		1.6E-07	7.21E-07	1.67E-07	7.32E-07
Toluene	3.40E-03	4.41E-06	1.7E-06	7.5E-06	3.40E-03	1.10E-05		1.1E-04	4.90E-04	1.14E-04	4.98E-04

Natural Gas

Greenhouse Gases	Emission Factor (Natural Gas) kg/MMBtu	Reference	Flare (Pilot Gas) (MMBTU/year)	Flare (Pilot) PTE[e,f,g] (metric ton/yr)	Flare (Pilot) PTE (ton/yr)	Flare (Vent Gas) (MMBTU/year)	Flare (Vent Gas) PTE[e,f,g] (metric ton/yr)	Flare (Vent Gas) PTE (ton/yr)	Total Flare PTE[e,f,g] (metric ton/yr)	Total Flare PTE[e] (ton/yr)
CO_2 - Combustion	53.02	40 CFR 98 Subpart C Equation C-1(b) (Tier 1)	3,416	181.1	199.3	89,352	4,737	5,211	4,919	5,410
CO_2- Non Combustion							9,730	10,703	9,730	10,703
CO_2 - Total				181.1	199.3		14,467	15,914	14,649	16,113
N_2O	1.0E-04	40 CFR 98 Subpart C Equation C-8(b) Tiers (1 & 3)	3,416	3.4E-04	3.8E-04	89,352	8.9E-03	9.8E-03	9.28E-03	1.02E-02
CH_4	1.0E-03	40 CFR 98 Subpart C Equation C-8(b) (Tiers 1 & 3)	3,416	3.4E-03	3.8E-03	89,352	8.9E-02	9.8E-02	9.28E-02	1.02E-01
CO_2e		40 CFR 98 Part A		181	199		14,472	15,920	14,654	16,119

Notes:

PTE: Potential to Emit

[a] NO_x and CO from CBI. VOC for pilot from CBI and VOC emission factors for flare obtained from AP-42 Table 13.5-1.

[b] Conservative design value of 1 lb/MMBtu total sulfur provided by CBI. Sulfuric acid mist emissions (SO3/H2SO4) are based on a 5% conversion of SO2 to SO3 by the flare. Speciated sulfur content based on percent of total provided by CBI

[c] PM_{10} and $PM_{2.5}$ is assumed to equal PM. PM_{10}, $PM_{2.5}$, and SO_2 emission factor obtained from AP-42, Chapter 1.4 Natural Gas Combustion, Conversion from lb/MMSCF to lb/MMBTU assumes natural gas HHV of 1,020 MMBTU/MMSCF.

[d] Emission Factors for HAPs obtained from AP-42 Table 1.4-3. Total HAPs were calculated based on the sum of the individual HAP emissions.

[e] Eqn C-1b: $CO_2 = 1 \times 10^{-3}$ x Gas x EF
Gas = Annual Gas Usage (MMBTU/Year)
EF = Fuel-specific default CO_2 emission factor for natural gas and propane, from Table C-1 of 40 CFR Part 98 Subpart C (kg CO_2/MMBTU)

1×10^{-3} = Conversion Factor from Kilograms to Metric Tons

[f] Eqn C-8(b): CH_4 or $N_2O = 1 \times 10^{-3}$ x Fuel x EF
Fuel =Annual Natural Gas Combusted, (MMBTU/Year)
EF = Fuel-specific default CH_4 or N_2O emission factor for natural gas and propane, from Table C-2 of 40 CFR Part 98 Subpart C (kg CH_4 or
1×10^{-3} = Conversion Factor from Kilograms to Metric Tons

[g] CO_2e = (GWP CO_2 x CO_2 metric ton/yr) + (GWP CH4 x CH4 metric ton/yr) + (GWP N_2O x N_2O metric ton/yr)
Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 =	1	GWP CH_4 =	25
GWP N_20 =	298		

Emergency Flare
Tacoma LNG Project

Annual Operation of Pilots	8760	hours per year
Number of Pilots	6	
Pilot Gas Flow Rate	65,000	btu/hour
Total Pilot Gas Flow Rate	390,000	btu/hour
	0.39	MMBtu/hr
	3,416	MMBtu/year
	4.431	MMSCF/year
Fd for Natural Gas	8,710	dscf/MMBtu
H_2S Content of NG to Pilots	5	ppm
Exhaust percent O2	15	%
Exhaust flow rate	201	dscf/min
NO_x Emission Limit	30	ppm
CO Emission Limit	100	ppm
VOC Emissions as methane	50	ppm
Annual operation of process	8760	hours/year
Normal vent flow to Flare:	0.0	MMBtu/hr
	310	Btu/scf
	0.000	MMScf/hr
	0	scf/hr
CO_2 content of vent gas:	65	% of total
Design maximum total sulfur	1	lb S/MMBtu
H_2S Content of Process Gas	60	ppm
	27.3	% of total
TBM (C4H10S) Content of Process Gas	120	ppm
	54.5	% of total
MES (C3H8S) Content of Process Gas	40	ppm
	18.2	% of total
Fd for Natural Gas	8710	dscf/MMBtu
Exhaust percent O2	15	%
Exhaust flow rate	0	dscf/min
NO_x Emissions	30	ppm
CO Emissions	100	ppm
Pilot Gas Heating Value	771	MMBTU/MMSCF
Destruction Efficiency of Flare	99	percent

	Emissions from Pilots				Emissions from Process Gases					Total Emissions	
Pollutant	Emission Factor (lbs/MMSCF)	Emission Factor (lbs/MMBTU)	PTE (lbs/hour)	PTE (tons/year)	Emission Factor (lbs/MMSCF)	Emission Factor (lbs/MMBTU)	Percent control	PTE (lbs/hour)	PTE (tons/year)	PTE (lbs/hour)	PTE (tons/year)
NO_x[a]	87	0.112	0.04	1.9E-01	43	0.137		0.00	0.00	4.38E-02	1.92E-01
CO[a]	176	0.228	0.09	3.9E-01	86	0.278		0.00	0.00	8.88E-02	3.89E-01
VOC[a]	50	0.065	0.03	1.1E-01	49	0.159		0.00	0.00	2.54E-02	1.11E-01
SO_2[b]	0.83	1.08E-03	4.20E-04	1.8E-03	37.82	1.22E-01		0.00	0.00	4.20E-04	1.84E-03
PM_{10}[c]	7.6	9.86E-03	3.84E-03	1.7E-02	7.6	9.86E-03		0.00	0.00	3.84E-03	1.68E-02
$PM_{2.5}$[c]	7.6	9.86E-03	3.84E-03	1.7E-02	7.6	9.86E-03		0.00	0.00	3.84E-03	1.68E-02
H_2SO_4 Mist[b]	4.15E-02	5.39E-05	2.10E-05	9.2E-05	1.89E+00	6.10E-03		0.00	0.00	2.10E-05	9.21E-05
CO_2 (Non-combustion)								0.00	0.00	0.00E+00	0.00E+00
CO_2 (Combustion)											
Sulfur Compounds											
Total Sulfur[b]					0.37	0.000	99	0.00E+00	0.00E+00	0.00E+00	0.00E+00
H_2S					0.10	0.000	99	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TBM (C4H10S)					0.20	0.000	99	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MES (C3H8S)					0.07	0.000	99	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HAPS[d]			9.5E-04	4.2E-03				0.0E+00	0.00E+00	9.52E-04	4.17E-03
2-Methylnaphthalene	2.40E-05	3.11E-08	1.2E-08	5.3E-08	2.40E-05	7.74E-08		0.0E+00	0.00E+00	1.21E-08	5.32E-08
3-Methylchloranthrene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		0.0E+00	0.00E+00	9.11E-10	3.99E-09
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.08E-08	8.1E-09	3.5E-08	1.60E-05	5.16E-08		0.0E+00	0.00E+00	8.09E-09	3.54E-08
Acenaphthene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		0.0E+00	0.00E+00	9.11E-10	3.99E-09
Acenaphthylene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		0.0E+00	0.00E+00	9.11E-10	3.99E-09
Anthracene	2.40E-06	3.11E-09	1.2E-09	5.3E-09	2.40E-06	7.74E-09		0.0E+00	0.00E+00	1.21E-09	5.32E-09
Benz(a)anthracene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		0.0E+00	0.00E+00	9.11E-10	3.99E-09
Benzene	2.10E-03	2.72E-06	1.1E-06	4.7E-06	2.10E-03	6.77E-06		0.0E+00	0.00E+00	1.06E-06	4.65E-06
Benzo(a)pyrene	1.20E-06	1.56E-09	6.1E-10	2.7E-09	1.20E-06	3.87E-09		0.0E+00	0.00E+00	6.07E-10	2.66E-09
Benzo(b)fluoranthene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		0.0E+00	0.00E+00	9.11E-10	3.99E-09
Benzo(g,h,i)perylene	1.20E-06	1.56E-09	6.1E-10	2.7E-09	1.20E-06	3.87E-09		0.0E+00	0.00E+00	6.07E-10	2.66E-09
Benzo(k)fluoranthene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		0.0E+00	0.00E+00	9.11E-10	3.99E-09
Chrysene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		0.0E+00	0.00E+00	9.11E-10	3.99E-09
Dibenzo(a,h)anthracene	1.20E-06	1.56E-09	6.1E-10	2.7E-09	1.20E-06	3.87E-09		0.0E+00	0.00E+00	6.07E-10	2.66E-09
Dichlorobenzene	1.20E-03	1.56E-06	6.1E-07	2.7E-06	1.20E-03	3.87E-06		0.0E+00	0.00E+00	6.07E-07	2.66E-06
Fluoranthene	3.00E-06	3.89E-09	1.5E-09	6.6E-09	3.00E-06	9.68E-09		0.0E+00	0.00E+00	1.52E-09	6.65E-09
Fluorene	2.80E-06	3.63E-09	1.4E-09	6.2E-09	2.80E-06	9.03E-09		0.0E+00	0.00E+00	1.42E-09	6.20E-09
Formaldehyde	7.50E-02	9.73E-05	3.8E-05	1.7E-04	7.50E-02	2.42E-04		0.0E+00	0.00E+00	3.79E-05	1.66E-04
Hexane	1.80E+00	2.33E-03	9.1E-04	4.0E-03	1.80E+00	5.81E-03		0.0E+00	0.00E+00	9.11E-04	3.99E-03
Indeno(1,2,3-cd)pyrene	1.80E-06	2.33E-09	9.1E-10	4.0E-09	1.80E-06	5.81E-09		0.0E+00	0.00E+00	9.11E-10	3.99E-09
Naphthalene	6.10E-04	7.91E-07	3.1E-07	1.4E-06	6.10E-04	1.97E-06		0.0E+00	0.00E+00	3.09E-07	1.35E-06
Phenanthrene	1.70E-05	2.20E-08	8.6E-09	3.8E-08	1.70E-05	5.48E-08		0.0E+00	0.00E+00	8.60E-09	3.77E-08
Pyrene	5.00E-06	6.49E-09	2.5E-09	1.1E-08	5.00E-06	1.61E-08		0.0E+00	0.00E+00	2.53E-09	1.11E-08
Toluene	3.40E-03	4.41E-06	1.7E-06	7.5E-06	3.40E-03	1.10E-05		0.0E+00	0.00E+00	1.72E-06	7.53E-06

Natural Gas

Greenhouse Gases	Emission Factor (Natural Gas) kg/MMBtu	Reference	Flare (Pilot Gas) (MMBTU/year)	Flare (Pilot) PTE[e,f,g] (metric ton/yr)	Flare (Pilot) PTE (ton/yr)	Flare (Vent Gas) (MMBTU/year)	Flare (Vent Gas) PTE[e,f,g] (metric ton/yr)	Flare (Vent Gas) PTE (ton/yr)	Total Flare PTE[e,f,g] (metric ton/yr)	Total Flare PTE (ton/yr)
CO_2 - Combustion	53.02	40 CFR 98 Subpart C Equation C-1(b) (Tier 1)	3,416	181.14	199.25	0.00	0.00	0.00	181	199
CO_2- Non Combustion							0.00	0.00	0.00	0.00
CO_2 - Total				181.14	199.25		0.00	0.00	181	199
N_2O	1.0E-04	40 CFR 98 Subpart C Equation C-8(b) Tiers (1 & 3)	3,416	3.4E-04	3.8E-04	0.00	0.0E+00	0.0E+00	3.42E-04	3.76E-04
CH_4	1.0E-03	40 CFR 98 Subpart C Equation C-8(b) (Tiers 1 & 3)	3,416	3.4E-03	3.8E-03	0.00	0.0E+00	0.0E+00	3.42E-03	3.76E-03
CO_2e		40 CFR 98 Part A		181.3	199.5		0.00	0.00	181	199

Notes:

PTE: Potential to Emit

[a]NO_x and CO from CBI. VOC for pilot from CBI and VOC emission factors for flare obtained from AP-42 Table 13.5-1.

[b]Conservative design value of 1 lb/MMBtu total sulfur provided by CBI. Sulfuric acid mist emissions (SO3/H2SO4) are based on a 5% conversion of SO2 to SO3 by the flare. Speciated sulfur content based on percent of total provided by CBI

[c]PM_{10} and $PM_{2.5}$ is assumed to equal PM. PM_{10}, $PM_{2.5}$,and SO_2 emission factor obtained from AP-42, Chapter 1.4 Natural Gas Combustion, Conversion from lb/MMSCF to lb/MMBTU assumes natural gas HHV of 1,020 MMBTU/MMSCF.

[d]Emission Factors for HAPs obtained from AP-42 Table 1.4-3. Total HAPs were calculated based on the sum of the individual HAP emissions.

[e]Eqn C-1b: $CO_2 = 1 \times 10^{-3} \times$ Gas x EF

Gas = Annual Gas Usage (MMBTU/Year)

EF = Fuel-specific default CO_2 emission factor for natural gas and propane, from Table C-1 of 40 CFR Part 98 Subpart C (kg CO_2/MMBTU)

1×10^{-3} = Conversion Factor from Kilograms to Metric Tons

[f]Eqn C-8(b): CH_4 or $N_2O = 1 \times 10^{-3} \times$ Fuel x EF

Fuel =Annual Natural Gas Combusted, (MMBTU/Year)

EF = Fuel-specific default CH_4 or N_2O emission factor for natural gas and propane, from Table C-2 of 40 CFR Part 98 Subpart C (kg CH_4 or

1×10^{-3} = Conversion Factor from Kilograms to Metric Tons

[g]CO_2e = (GWP CO_2 x CO_2 metric ton/yr) + (GWP CH4 x CH4 metric ton/yr) + (GWP N_2O x N_2O metric ton/yr)

Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 =	1	GWP CH_4 =	25
GWP N_20 =	298		

Pretreatment Fugitives
Tacoma LNG Project

Annual Hours	8760 hours/year						Methane PTE		VOC PTE[d]	
Components	Phase	Oil and Gas Emission Factors[a] (lb/hr/component)	Actual Component Count[b]	Assumed % Methane Content[c]	Assumed % VOC Content[c]	28 MID Credit[a] (%)	(lb/hour)	(ton/year)	(lb/hour)	(ton/year)
Valves[e]	Gas/Vapor	0.0099	902	96.6	0.1	97	2.59E-01	1.13E+00	3.64E-04	1.60E-03
	Light Liquid	0.0055	0	96.6	0.1	97	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Heavy Liquid	0.00001848	0	96.6	0.1	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pressure Relief Valves	Gas/Vapor	0.0194	43	96.6	0.1	97	2.41E-02	1.05E-01	3.39E-05	1.48E-04
Pump Seals	Light Liquid	0.0286	0	96.6	0.1	93	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Heavy Liquid	0.00113	3	96.6	0.1	0	3.27E-03	1.43E-02	4.61E-06	2.02E-05
Flanges/Connectors	Gas/Vapor	0.000858	315	96.6	0.1	30	1.83E-01	7.99E-01	2.57E-04	1.13E-03
	Light Liquid	0.000242	0	96.6	0.1	30	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Heavy Liquid	0.000000858	0	96.6	0.1	30	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Compressor Seals[f]	Gas/Vapor	0.0194	0	96.6	0.1	95	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sampling Connections	All	0.033	0	96.6	0.1	97	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total							0.47	2.05	6.60E-04	2.89E-03
Total CH_4 (metric ton/year)								1.87		
Total CO_2e (metric ton/year)[g]								46.6		
Total CO_2e (ton/year)								51.2		

Notes:
PTE: Potential to Emit

[a]Values obtained from Table 2-4. Oil and Gas Productions of *EPA-453/R-95-017 Protocol for Leak Detection Estimates* , EPA (1995), Emissions Factors For Equipment Leak Fugitive Components , TCEQ (January 2008), and Volatile Organic Compound (VOC) Equipment Leak Fugitives, TCEQ (Effective July 1, 1994, Modified March 28, 1996, August 19 and November 16, 1998).
[b]Component counts provided by CBI and shown below.
[c]Used highest methane content from Case 2 Sendout. VOC content sum of ethane, propane, i-butane, n-butane, i-pentane, n-pentane, n-hexanes from Case 1 liquification.
[d]VOC Potential to Emit, lb/hour = Oil and Gas Factor, lb/hr/component x Actual Component Count X 1-28 MID Credit/100
[e]Did not include Instrumentation valves
[f]Compressor seal emissions calculated below.
[g]Per 40 CFR 98 - Mandatory Gas Reporting, Subpart A, Table A-1, Total CO2e I equal to Methane Potential to Emit, Metric Ton X Global Warming Potential
CH_4 Global Warming Potential = 25

TFFP Valve Count

Type	Number off-Skid	Number On-Skid[h]	Total
Gate - Flanged	38	11	49
Gate - Socket Weld	233	70	303
Globe - Socket Weld	20	6	26
Ball - Flanged	18	5	23
Ball - Socket Weld	201	60	261
Check - Flanged	25	8	33
Check - Socket Weld	31	9	40
Control - Flanged	85	26	111
Butterfly - Flanged	43	13	56
Total	694	208	902
Relief - Flanged	33	10	43

[h]Add 30 percent to off-skid valves to get on-skid valves.

Fugitive Emissions - Refrigerant losses through Compressor Seals

Constituent	lb/hour	lb/year[1]	ton/year	metric ton/yr
Methane	3.20	28000	14	
Ethylene	6.85	60000	30	
Propane	4.34	38000	19	
iso-Pentane	6.39	56000	28	
Nitrogen	2.17	19000	9.5	
Total VOC	17.6	154000	77	
GHG as CO_2e	79.9	700000	350	318

Storage Tanks
Propane Storage Vessel - 4500gal (6'Dia x 20'T/T)
Pentane Storage Vessel - 4500gal (6'Dia x 20'T/T)
Ethylene Storage Vessel - 4500gal (6'Dia x 20'T/T)
Heavies Knockout Storage Vessel - 4500gal (6'Dia x 20'T/T)
MRL Storage Vessel (can only be roughly 15% full of liquid with system completely evacuated to vessel) - 30,000gal (10'Dia x 50'T/T)

Emergency Generator (1)
Tacoma LNG Project

Fuel	Diesel	Note: May be natural gas, calculated for Diesel
Number of Generators	1	
Annual Operation for PTE[a]	500	hours/year (Each)
Emergency Generator Capacity	1,600	KW

Note: Greater than 600 HP -> Large Stationary Diesel Engine

Pollutant	Emission Factor[b] (g/KW-hour)	Emission Factor[b] (lb/KW-hour)	PTE[f,g] (lb/hour)	PTE[f,g] (tons/year)
NO_x[c]	6.08	1.34E-02	21.4	5.36
CO[c]	3.50	7.72E-03	12.3	3.09
SO_2[d]	0.007	1.45E-05	0.02	0.006
PM_{10}[c]	0.20	4.41E-04	0.71	0.18
$PM_{2.5}$[c]	0.20	4.41E-04	0.71	0.18
TOC[c]	0.32	7.05E-04	1.13	0.28
Total TAPs			34.6	8.65
Total HAPs			2.36E-02	5.90E-03

Speciated Organic Compounds	Emission Factor[e] (lb/MMBTU)	Emission Factor[e] (lb/KW-hour)[f]	PTE (lb/hour)	PTE (tons/year)	HAPS	TAPS
Benzene	7.76E-04	7.28E-06	1.16E-02	2.91E-03	x	x
Toluene	2.81E-04	2.64E-06	4.22E-03	1.05E-03	x	x
Xylenes	1.93E-04	1.81E-06	2.90E-03	7.24E-04	x	x
Propylene	2.79E-03	2.62E-05	4.19E-02	1.05E-02		x
Formaldehyde	7.89E-05	7.40E-07	1.18E-03	2.96E-04	x	x
Acetaldehyde	2.52E-05	2.36E-07	3.78E-04	9.46E-05	x	x
Acrolein	7.88E-06	7.39E-08	1.18E-04	2.96E-05	x	x
Naphthalene	1.30E-04	1.22E-06	1.95E-03	4.88E-04	x	x
Acenaphthylene	9.23E-06	8.66E-08	1.39E-04	3.46E-05	x	
Acenaphthene	4.68E-06	4.39E-08	7.02E-05	1.76E-05	x	
Fluorene	1.28E-05	1.20E-07	1.92E-04	4.80E-05	x	
Phenanthrene	4.08E-05	3.83E-07	6.12E-04	1.53E-04	x	
Anthracene	1.23E-06	1.15E-08	1.85E-05	4.61E-06	x	
Fluoranthene	4.03E-06	3.78E-08	6.05E-05	1.51E-05	x	
Pyrene	3.71E-06	3.48E-08	5.57E-05	1.39E-05	x	
Benzo(a)anthracene	6.22E-07	5.83E-09	9.33E-06	2.33E-06	x	x
Chrysene	1.53E-06	1.44E-08	2.30E-05	5.74E-06	x	x
Benzo(b)fluoranthene	1.11E-06	1.04E-08	1.67E-05	4.16E-06	x	x
Benzo(k)fluoranthene	2.18E-07	2.04E-09	3.27E-06	8.18E-07	x	x
Benzo(a)pyrene	2.57E-07	2.41E-09	3.86E-06	9.64E-07	x	x
Indeno(1,2,3-cd)pyrene	4.14E-07	3.88E-09	6.21E-06	1.55E-06	x	x
Dibenz(a,h)anthracene	3.46E-07	3.25E-09	5.19E-06	1.30E-06	x	x
Benzo(g,h,i)perylene	5.56E-07	5.22E-09	8.34E-06	2.09E-06	x	
TOTAL PAH	2.12E-04	1.99E-06	3.18E-03	7.95E-04	x	

Green House Gases	EF Distillate Fuel Oil #2 (kg/MMBtu)	Engine Break-Specific Fuel Consumption (MMBTU/HP-hr)	PTE (lb/yr)	PTE (ton/yr)
CO_2[g]	73.96	0.007	1,223,563	612
N_2O[h]	6.0E-04	0.007	9.93	5.0E-03
CH_4[h]	3.0E-03	0.007	49.6	2.5E-02
CO_2e[i]				614

Notes:

PTE: Potential to Emit

[a]100 hours per year for testing and maintenance per 40 CFR Part 60 Subpart IIII 60.4211(f)

[b]Emission Factor, lb/HP-hour = Emission Factor g/HP-hour x 1 lb/ 453.59 g

[c]PM, CO, NOx, TOC emission factor is based on the applicable Tier 2 emission standard stated in US Code of Federal Regulations, Title 40, Part 89 [40 CFR Part 89].

The EPA's Tier 2 NOx + NMHC emission factor was apportioned to NOx and VOC by a ratio of 0.95 and 0.05, respectively, according to "The Carl Moyer Program Guidelines - Approved Revisions 2011", released March 27, 2013, California Environmental Protection Agency - Air Resources Board, Table D-25: Pollutant Fractions NOx+NMHC Standards

[d]Emission factor for SO_2 based on a maximum sulfur content of 15 ppm per 40 CFR Part 60 Subpart IIII (§60.4207 (b))

SO_2 Emission Factor, g/HP-hour = %S/100 × ρf, lb/gal × CF1, gram/lb × 1/MW_S g/g-mole × MR × $MWSO_2$, g/g-mole × 1/HHV, BTU/gal × BSFC, BTU/HP-hr

where:

%S = Percent Sulfur by weight =	Concentration of Sulfur,	0.0015	%
ρf = density of fuel (lb/gal) =		7.08	lb/gal (from Diesel Fuel MSDS)
CF1 = grams to pounds conversion factor =		453.59	grams/lb
MW_S = Molecular Weight of Sulfur		32	g/g-mole
MR = Molar ratio (S + O2 => SO2) =		1	
MW_{SO2} = Molecular Weight of SO_2 =		64	g/g-mole
HHV = Diesel Higher Heating Value =		137,000	BTU/Gallon (from footnote (a) of AP-42 Table 3.4-1)
BSFC = Engine Brake-Specific Fuel Consumption =		7000	BTU/HP-hour (from footnote (e) of AP-42 Table 3.4-1)
SO_2 Emission Factor =	4.92E-03	g/HP-hour = 1.45E-05	lb/kW-hour
Conversion Factor	1.34	HP/KW	

[e]Emission Factor from Table 3.4-3,4: Compilation of Air Pollutant Emission Factors (AP-42), October 1996. U.S. Environmental Protection Agency, from EPA's TTN web site as of January 7, 2012.

[f]Conversion using 7000 BTU/HP-hr Engine Brake-Specific Fuel Consumption as in Note (e)

[g]Potential to emit calculated using 40 CFR 98 Subpart C Equation C-1

Fuel = Annual Gas Usage (gallons/year)
HHV = Default high heat value of the fuel, from Table C-1 of this subpart.
EF = Fuel-specific default CO_2 emission factor for Distillate Fuel Oil No. 2, from Table C-1 of 40 CFR Part 98 Subpart C (kg CO_2/MMBTU)

1×10^{-3} = Conversion Factor from Kilograms to Metric Tons

[h]Potential to emit calculated using 40 CFR 98 Subpart C

Fuel = Annual Usage (gallons/year)
HHV = Default high heat value of the fuel, from Table C-1 of this subpart .
EF = Fuel-specific default CH_4 or N_2O emission factor for Distillate Fuel Oil No. 2, from Table C-2 of 40 CFR Part 98 Subpart C (kg CH_4 or N_2O/MMBTU)

1×10^{-3} = Conversion Factor from Kilograms to Metric Tons

[i]CO_2e = (GWP CO_2 x CO_2 metric ton/yr) + (GWP CH4 x CH4 metric ton/yr) + (GWP N_2O x N_2O metric ton/yr)

Global Warming Potential (GWP) for Selected GHG - 40 CFR 98 Subpart A, Table A-1

GWP CO_2 =	1
GWP CH_4 =	25
GWP N_2O =	298

APPENDIX E

Wetland Delineation Report

Report

Wetland and Waters Delineation Report for Tacoma LNG Project – Pierce County, Washington

Prepared for

Puget Sound Energy, Inc.

November 2014

Prepared by

CH2MHILL®

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3 Soils Map
4 Wetlands and Waters Delineation Map

Disclaimer

CH2M HILL Engineers, Inc. (CH2M HILL) has prepared this report for use by Puget Sound Energy (PSE). The results and conclusions of this report represent the professional opinion of CH2M HILL. They are based in part upon examination of public domain information concerning the project site.

Work performed during preparation of this report will conform to accepted standards in the field of jurisdictional wetland determination and delineation using the following:

- *Corps of Engineers Wetlands Delineation Manual* (U.S. Army Corps of Engineers [USACE] 1987),
- *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2010); and

Effective March 14, 2011, the Washington Department of Ecology repealed Washington Administrative Code (WAC) 173-22-080 (the state delineation manual) and replaced it with a revision of WAC 173-22-035 that states that delineations should be done according to the currently approved federal manual and supplements (listed above). This eliminated the requirement to also complete delineations according to the *Washington State Wetlands Identification and Delineation Manual* (Ecology 1997).]

The findings and conclusions contained in this report represent the best professional judgment and knowledge of the investigators. It should be considered a Preliminary Jurisdictional Determination until it has been reviewed and approved by Ecology and the Seattle District of the USACE. Final determination of jurisdictional wetland and other waters boundaries pertinent to Section 404 of the Clean Water Act is the responsibility of the USACE. Additionally, various agencies of the State of Washington and the local jurisdictions may require review of final site development plans that could potentially affect zoning, buffer requirements, water quality, and/or habitat functions of lands in question.

1.0 Introduction

CH2M HILL conducted a wetland delineation to identify potentially jurisdictional wetlands and other waters for components of the proposed Puget Sound Energy (PSE) Tacoma LNG Project (Project) (see Figure 1, figures provided at end of this report).

The Project would include construction and operation of a small-scale facility to produce liquefied natural gas (LNG) to fuel marine vessels and to provide LNG fuel to various industries in the Puget Sound area via LNG bunkering barges and tanker trucks. This facility would also have the capability to convert LNG back into natural gas for reinjection into the PSE natural gas distribution system during periods of high demand (referred to as peak shaving). This wetland delineation includes review of the following Project components:

- **Tacoma LNG Facility:** Liquefies and stores LNG and includes facilities to transfer stored LNG to the Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos Waterway, or tanker trucks onsite. Also includes facilities to gasify stored LNG and inject into the PSE natural gas distribution system.
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and in-water trestle and loading platform in Blair Waterway to fuel TOTE vessels.

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located on the Blair-Hylebos peninsula in the Port of Tacoma within the City of Tacoma. The Tacoma LNG Facility would receive natural gas from PSE's existing natural gas pipeline system, chill it to a liquid state, and store it for delivery to a public- and private-sector customer base. The proposed improvements in the vicinity of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would include demolition of certain upland and in-water structures, stabilization of the Hylebos Waterway shoreline, construction of a new pier in the Hylebos Waterway, and construction of a new LNG loading platform in the Blair Waterway.

The purpose of this report is to identify and describe wetlands and other waters within the project area. This report is intended to support the project's Clean Water Act Section 404 permit application to the Seattle District of the U.S. Army Corps of Engineers (USACE). It is also provided to support permits and compliance required by state and local jurisdictions.

2.0 Methods

The delineation study area was established around the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System components and totaled 33.5 acres (Figure 1). The study area for the Tacoma LNG Facility site totals approximately 33 acres including the portion of the Hybelos Waterway where new piers will be constructed. The study area for the TOTE Marine Vessel LNG Fueling System site totals 0.5 acre.

2.1 Literature Review

A review of the following digital data sources was conducted to determine the recorded and potential locations of wetlands and other waters in the study area:

- National Wetland Inventory (NWI)
- Pierce County wetland inventory
- City of Tacoma wetland inventory
- Google Earth aerial photography imagery
- U.S. Geological Survey (USGS) 7.5-minute series topographic maps
- United States Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) soil survey (Pierce County Area) and hydric soils list for Pierce County Areas
- National Hydrography Database

Existing stream and wetland mapping is shown on Figure 2. Soils mapping and hydric soil map units are shown on Figure 3.

2.2 Field Delineation

The site was surveyed on December 6, 2012.

2.2.1 Wetlands

Field work followed procedures in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (Version 2.0)* (USACE, 2010).

The routine onsite wetland determination method was used to observe vegetation, soils, and hydrological conditions at representative locations. The USACE National Wetland Plant List (Lichvar, 2009) was used to determine the hydrophytic status of vegetation.

No wetlands or wetland indicators were observed within the study area and no wetland determination data forms were completed.

2.2.2 Other Waters

The Hylebos and Blair waterways are tidally-influenced portions of Puget Sound's Commencement Bay. The landward limit of Section 404 jurisdiction for tidal waters is defined in USACE regulation 33 CFR § 328.4(b) as the "high tide line." According to the USACE Seattle District on-line Electronic Permit Guidebook (USACE, 2013), USACE has determined that the landward limit of Section 404 jurisdiction for tidal waters in Washington State is the line of "mean higher high water." The NOAA tidal datum for the Tacoma tide gauge, located on Commencement Bay, is the nearest tidal datum available and was used to determine the elevation of mean higher high water for the Hylebos and Blair waterways.

3.0 Results

3.1 Site Description

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are described separately.

3.1.1 Tacoma LNG Facility Site

The Tacoma LNG Facility site would be located within the Port of Tacoma's industrial development district on the Blair-Hylebos peninsula. The 33 acre site is generally located north of East 11th Street, east of Alexander Avenue, south of Commencement Bay, and on the west shoreline of the Hylebos Waterway (see Figure 1.1). The upland portion of the site is approximately 30 acres and the aquatic area is approximately 3 acres.

The Tacoma LNG Facility site is primarily developed for industrial maritime use and is composed of four separate parcels. These parcels are distinguished by Pierce County parcel numbers: 2275200532, 5000350021, 2275200502, and 5000350040.

The boundaries for these parcels include both in-water and upland areas, reflecting a total acreage of approximately 33 acres. There are several existing buildings and structures currently located on the proposed Tacoma LNG Facility site. These include a small, abandoned pier on Parcel 2275200532; a series of storage sheds and metal structures on Parcel 5000350021; and a large pier, two vacant U.S. Naval and Marine Reserve buildings, and a structure housing a furnace steam boiler on Parcel 2275200502. Parcel 5000350040 is predominantly paved and does not contain aboveground structures.

This area historically was mud flats and estuarine wetlands associated with Commencement Bay. The Hylebos Waterway was constructed during a series of port development projects from the 1920s through the 1970s. The waterway was created by dredging through the tidal marsh and using the dredged material to create the adjacent uplands (Port, 2009). Elevations of the upland areas are from 15 to 18 feet above mean lower low water. The upland areas are a mix of existing buildings, paved, and gravel-covered areas. The Hylebos Waterway shoreline at the site is generally developed in a manner that is consistent with maritime industrial uses.

3.1.2 TOTE Marine Vessel LNG Fueling System

The TOTE Marine Vessel LNG Fueling System site would be located on a 0.5 acre portion of Pierce County parcel 5000350011, which is developed for industrial maritime use. The boundary of this 68.1 acres parcel encompasses both aquatic and upland areas. Parcel 5000350011 is primarily a paved parking area for ship containers, but includes some small buildings and structures.

The construction corridor for the underground cryogenic pipeline from the Tacoma LNG Facility site would be approximately 20 feet wide. The cryogenic pipeline corridor would cross East Alexander Avenue and would traverse the TOTE site to reach the in-water fueling platform.

3.2 Wetlands

No wetlands were identified within the study area.

3.3 Other Waters

Locations of other waters in and adjacent to the study area are shown on Figure 4. The Hylebos and Blair waterways are tidally-influenced arms of Commencement Bay. The mean higher high water elevation for the Hylebos and Blair waterways is 11.8 feet above mean lower low water, based on the NOAA tidal datum for the Tacoma tide gauge, located on Commencement Bay.

The portion of the Hylebos Waterway shoreline adjacent to the Tacoma LNG Facility site contains two existing piers. The first pier, located at the northeast corner of Parcel 2275200532 is approximately 40 feet by 15 feet with an approximately 90-foot walkway. This small creosote-treated timber pier is abandoned and in disrepair. A larger creosote-treated timber pier in the Hylebos Waterway measuring roughly 600 feet by 25 feet is located in the

center of the site's shoreline on Parcel 2275200502. The bank of the Hylebos Waterway is a constructed timber bulkhead supported by timber piling. Waterway depths drop to 35 to 40 feet below mean lower low water at the northeast edge of the study area.

The shoreline along the Blair Waterway is developed with wharves, piers, and riprap armored slopes. It is generally sloped at approximately 40 to 60 percent and is covered with various slope protection materials including riprap, concrete and asphalt pieces, and various debris. Several existing in-water structures in the Blair Waterway are associated with existing TOTE operations: one timber T-pier, three concrete piers, and one concrete breasting dolphin.

4.0 Jurisdictional Determinations

All the waters and wetlands delineated in this report are potentially subject to federal and/or state jurisdiction. Jurisdictional determinations, including the applicability of exemptions, are made by a case-by case basis by Ecology and USACE.

4.1 Waters of the State

"Surface waters of the state" include lakes, rivers, ponds, streams, inland waters, saltwaters, wetlands, and all other surface waters and water courses within the jurisdiction of the state of Washington (Washington Administrative Code 173-201A-020).

The Hylebos Waterway and the Blair Waterway waters of the state.

4.2 Waters of the United States

USACE asserts jurisdiction over the following waters:

- Traditional navigable waters (TNWs)
- Wetlands adjacent to TNWs
- Nonnavigable tributaries of TNWs that are relatively permanent waters (RPWs) where the tributaries typically flow year-round or have continuous flow at least seasonally (that is, typically 3 months)
- Wetlands that directly abut (that is, have a continuous surface connection to) such tributaries (EPA and USACE, 2008)

USACE will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a TNW:

- Nonnavigable tributaries that are not relatively permanent
- Wetlands adjacent to nonnavigable tributaries that are not relatively permanent
- Wetlands adjacent to but that do not directly abut a relatively permanent nonnavigable tributary (EPA and USACE, 2008)

The Hylebos Waterway and the Blair Waterway are waters of the United States.

4.3 Traditional Navigable Waters (TNWs)

USACE asserts jurisdiction over "traditional navigable waters," which are waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commence, including all waters which are subject to the ebb and flow of the tide. USACE Seattle District has identified the Puget Sound, including Commencement Bay and the Hybelos and Blair waterways, as navigable waters for the purposes of regulation under Section 404 (USACE, 2008).

5.0 Literature Cited

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Figures

Legend

- Proposed Tacoma LNG Facility Site Boundary
- TOTE Marine Vessel LNG Fueling System
- Parcel Boundary

0 500 Feet

PUGET SOUND ENERGY
The Energy To Do Great Things

Sources:
Esri, DigitalGlobe aerial imagery web mapping service
(c) 2010 Microsoft Corporation and its data suppliers

Tacoma LNG Project

Figure G-1
Project Area
Wetland Delineation Report

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Legend

- Proposed Tacoma LNG Facility Site Boundary
- TOTE Marine Vessel LNG Fueling System
- City of Tacoma Wetlands

National Wetlands Inventory

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lacustrine Wetlands
- Riverine

National Hydrography Dataset Flowline

- Artificial Path
- Canal/Ditch
- Coastline
- Connector
- Stream/River

0 500 Feet

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The Energy To Do Great Things

Sources:
USGS, USFWS, Local Jurisdictions, Bing Maps aerial imagery web mapping service (c) 2010 Microsoft Corporation and its data suppliers

Tacoma LNG Project

Figure G-2
Existing Stream and Wetland Mapping
Wetland Delineation Report

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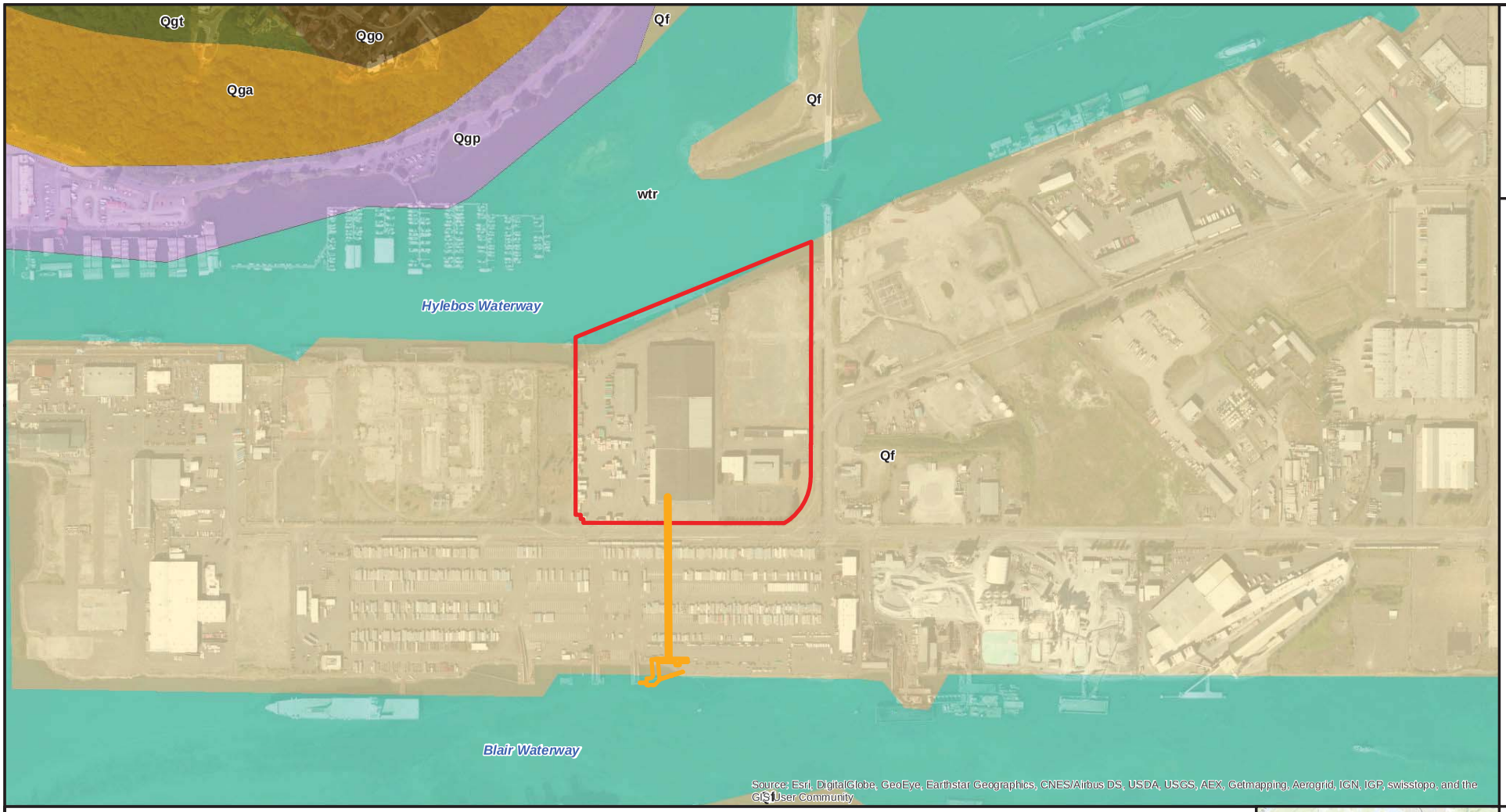

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System

Soils

- Qf - artificial fill, including modified land
- Qga - advance continental glacial outwash, Fraser-age
- Qgo - continental glacial outwash, Fraser-age
- Qgp - continental glacial drift, pre-Fraser
- Qgt - continental glacial till, Fraser-age
- wtr - water

0 500 Feet

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The Energy To Do Great Things

Sources:
U. S. Geological Survey (USGS)
National Geologic Mapping Program
Esri, DigitalGlobe aerial imagery
web mapping service (c) 2010 Microsoft Corporation
and its data suppliers

Tacoma LNG Project

Figure G-3
Soils
Wetland Delineation Report

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Legend

- Proposed Tacoma LNG Facility Site Boundary
- TOTE Marine Vessel LNG Fueling System
- Mean Higher High Water
- Culvert
- Unclassified Water

0 500 Feet

PUGET SOUND ENERGY
The Energy To Do Great Things

Sources:
USGS, USFWS, Local Jurisdictions, Esri, DigitalGlobe aerial imagery web mapping service (c) 2010 Microsoft Corporation and its data suppliers

Tacoma LNG Project

Figure G-4
Wetlands and Other Waters
Wetland Delineation Report

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APPENDIX F

Stormwater Mapbook

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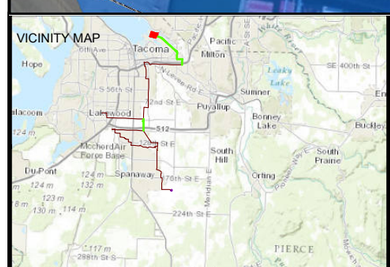


Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

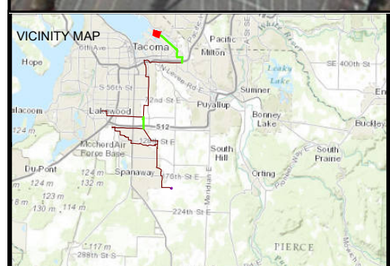
N E S W

0 50 100
Feet

Tacoma
City of Tacoma

Figure F-1
Tacoma LNG Facility
Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N E S W

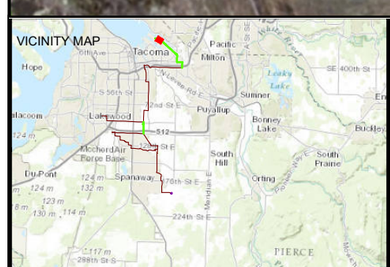
0 50 100 Feet

Tacoma

City of Tacoma

Figure F-2 Segment A - Map 01 Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

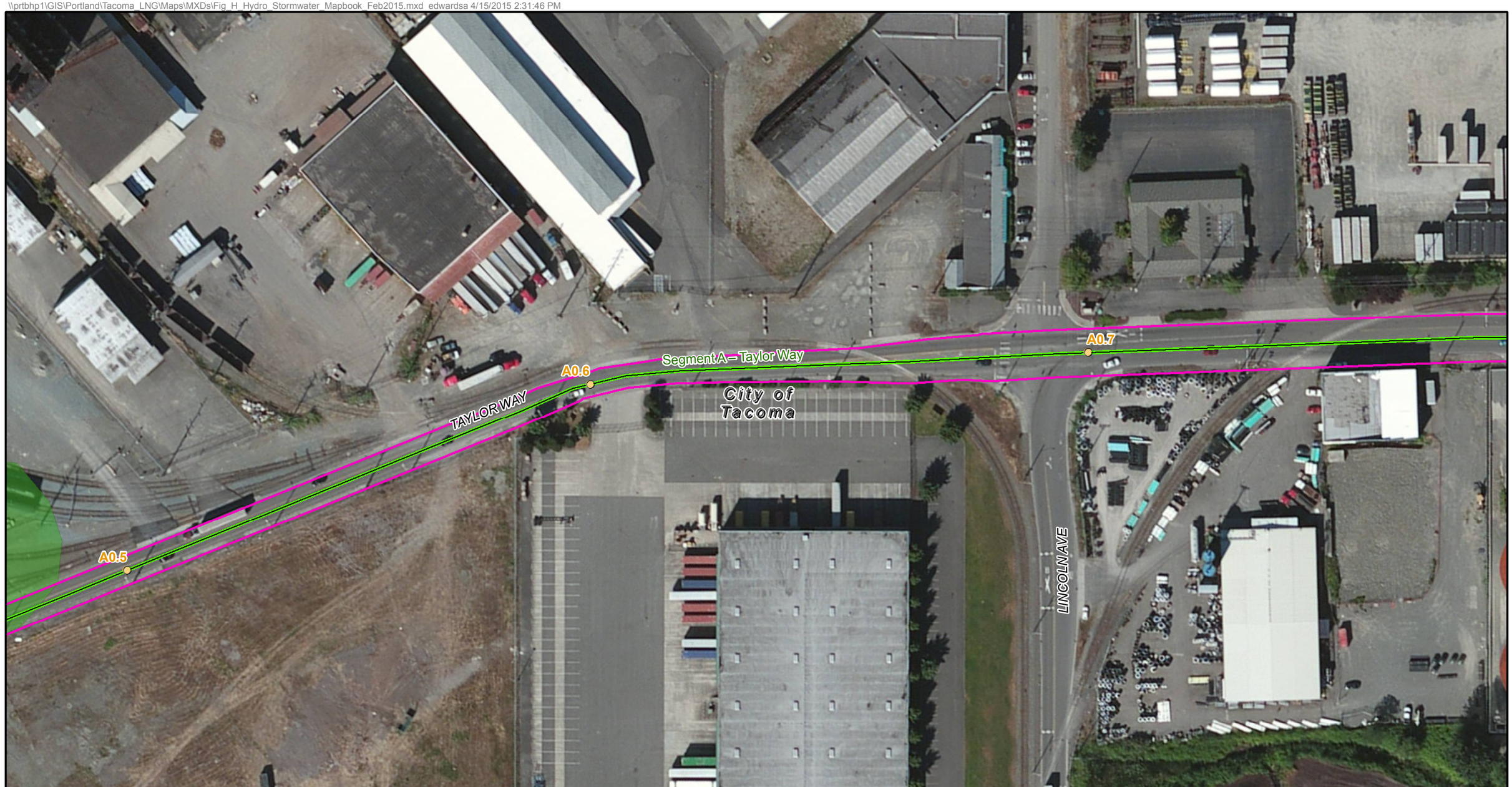
N E S W

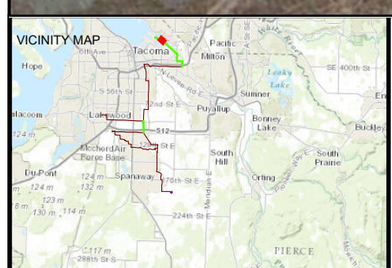
0 50 100 Feet

City of Tacoma

Figure F-3 Segment A - Map 02 Hydro Features

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N E S W

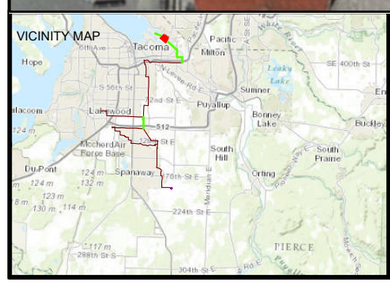
0 50 100 Feet

Tacoma

City of Tacoma

Figure F-4 Segment A - Map 03 Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N W E S

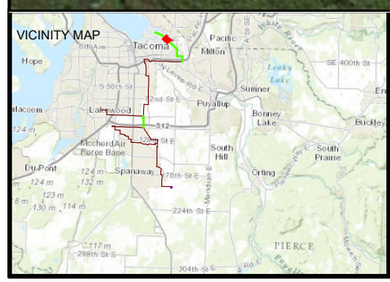
0 50 100 Feet

Tacoma

City of Tacoma

Figure F-5 Segment A - Map 04 Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N W E S

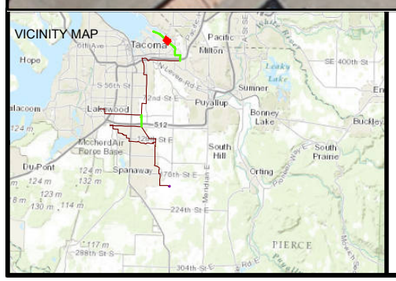
0 50 100 Feet

Tacoma

City of Tacoma

Figure F-6 Segment A - Map 05 Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N W E S

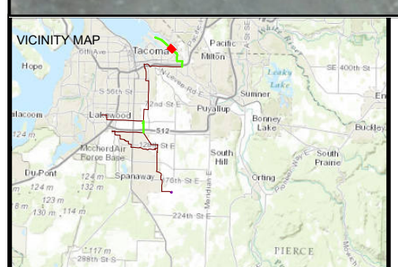
0 50 100 Feet

Tacoma

City of Tacoma

Figure F-7 Segment A - Map 06 Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N E S W

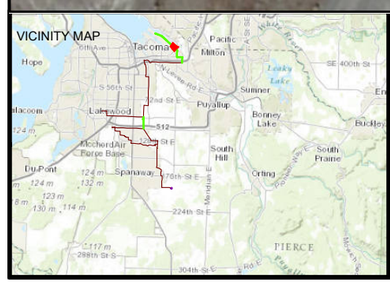
0 50 100 Feet

Tacoma

City of Tacoma

Figure F-8 Segment A - Map 07 Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

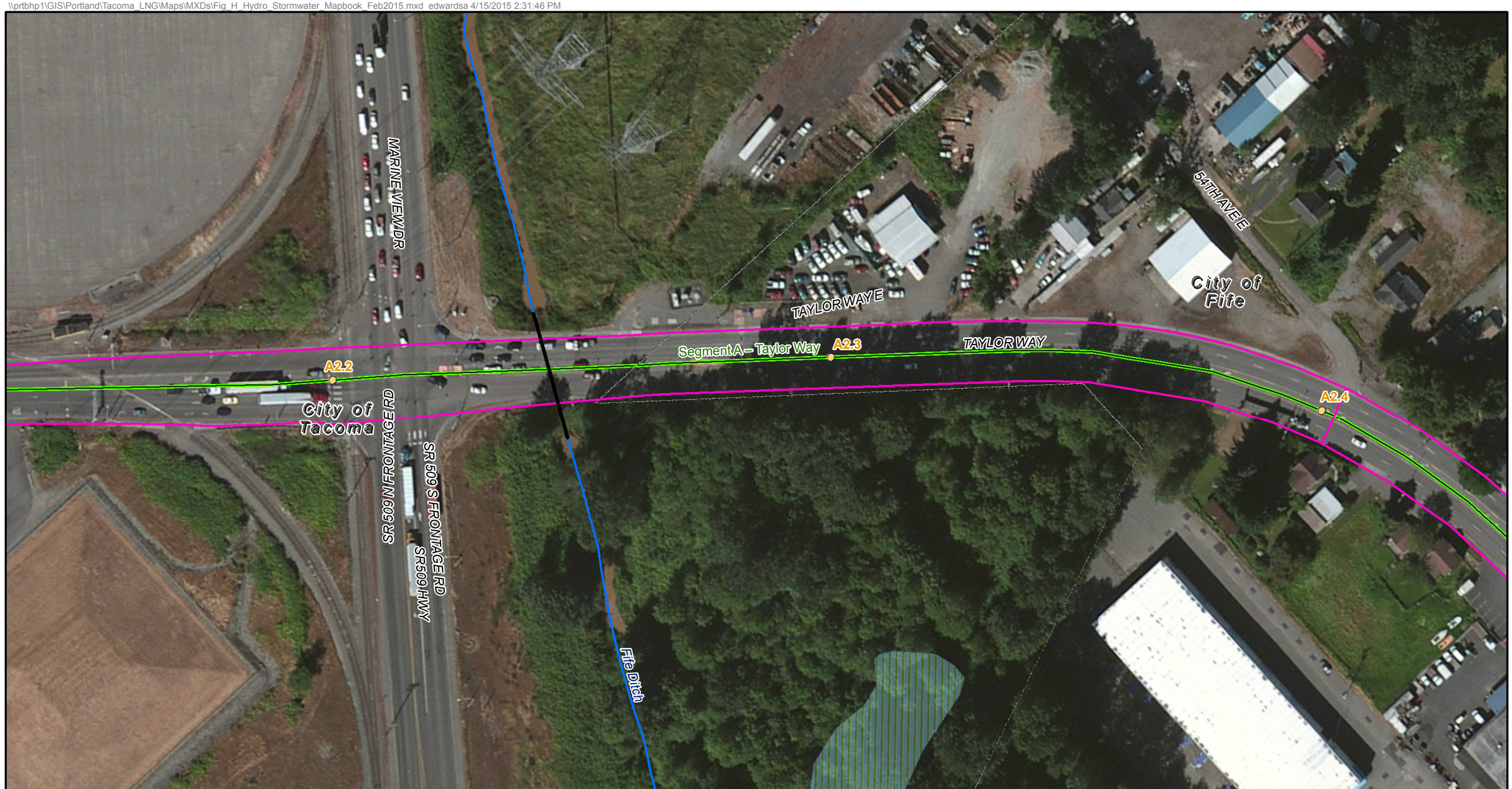
N W E S

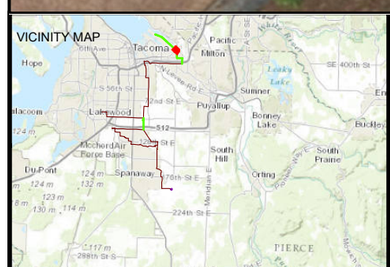
0 50 100 Feet

City of Tacoma

Figure F-9 Segment A - Map 08 Hydro Features

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

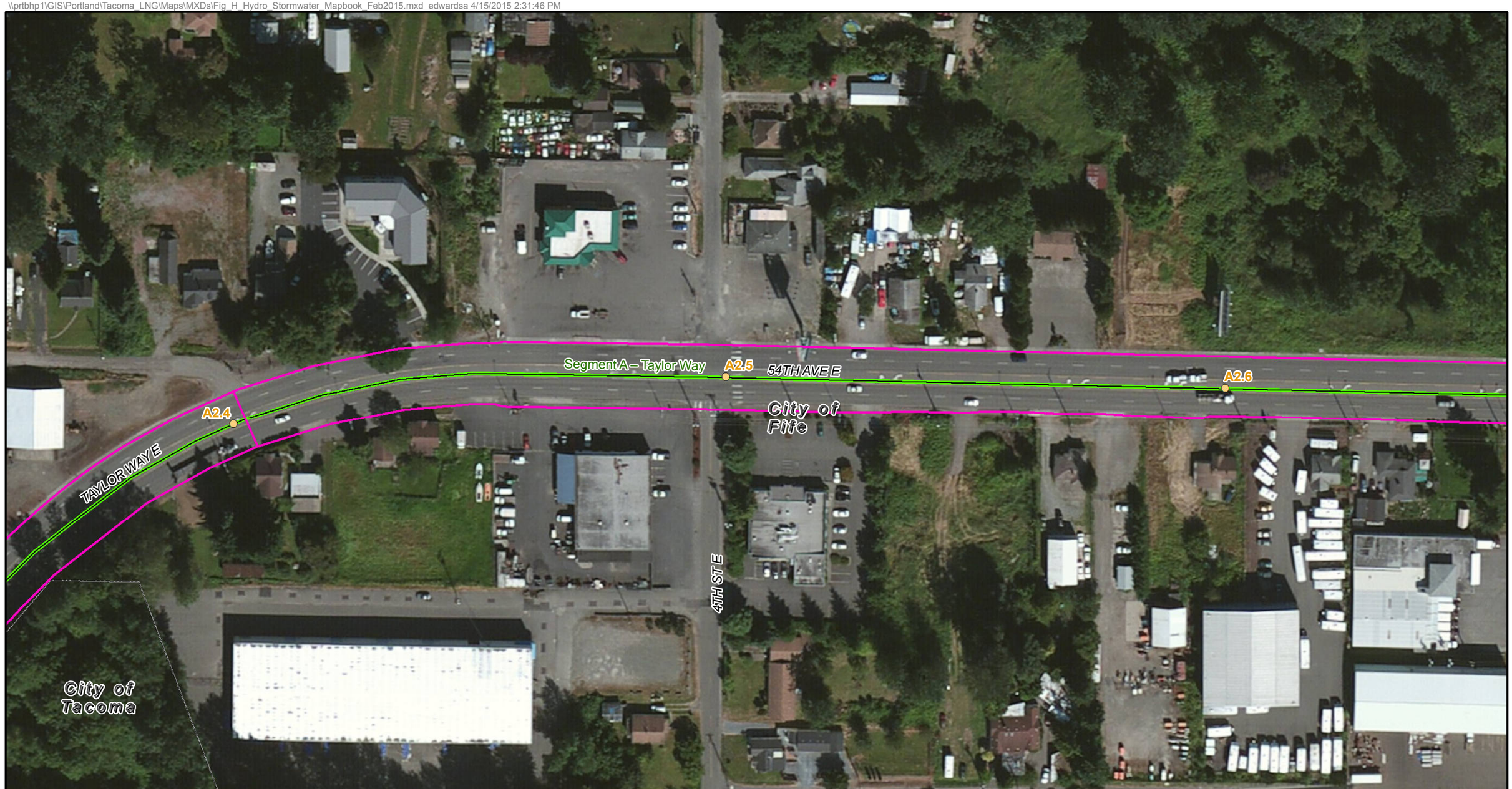
N E S W

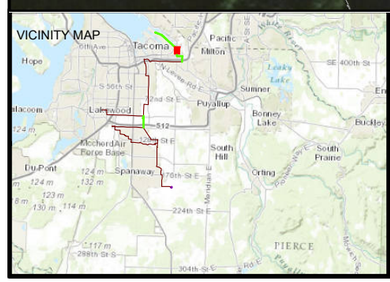
0 50 100 Feet

City of Tacoma

Figure F-10
Segment A - Map 09
Hydro Features

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N E S W

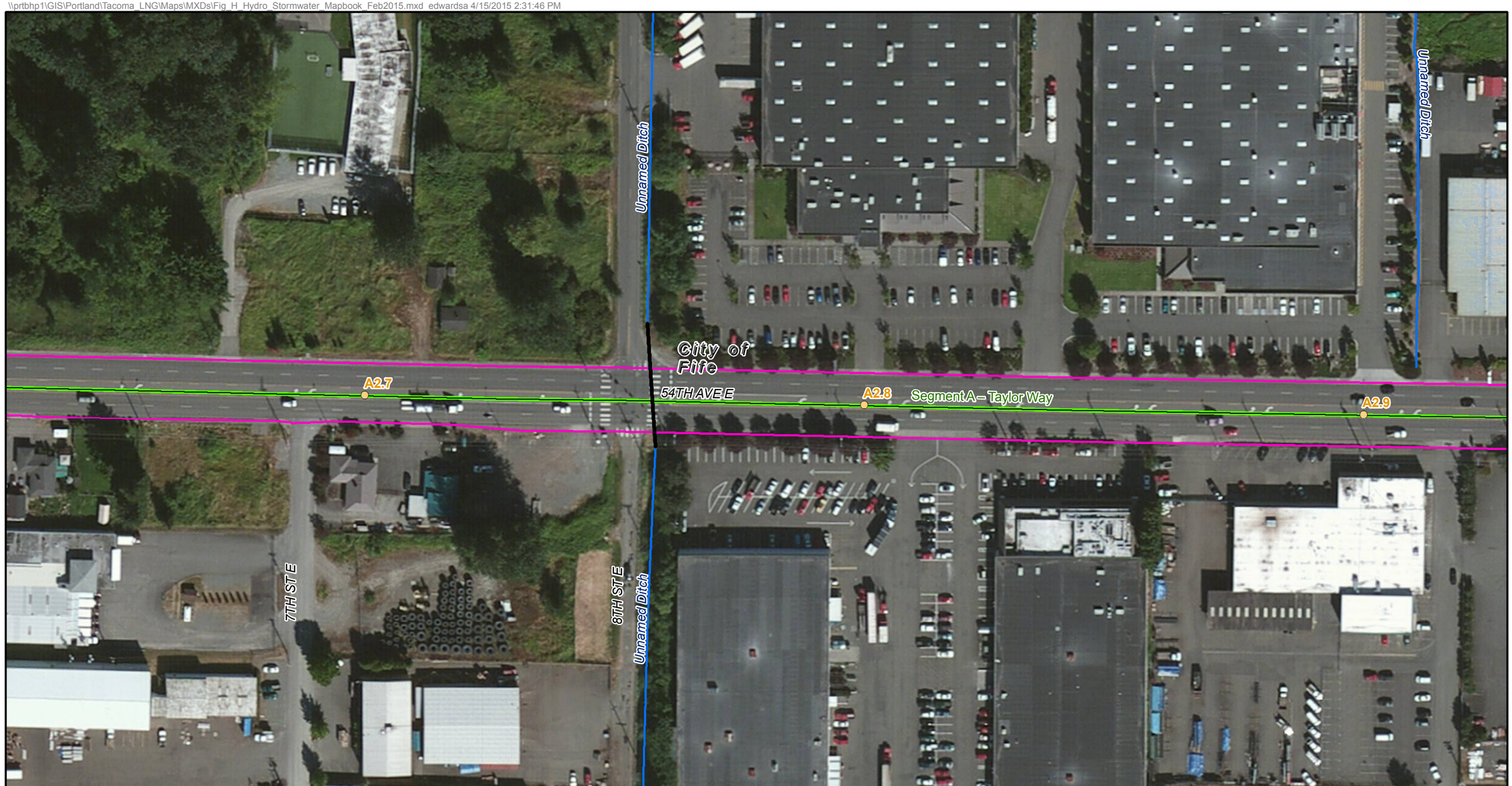
0 50 100 Feet

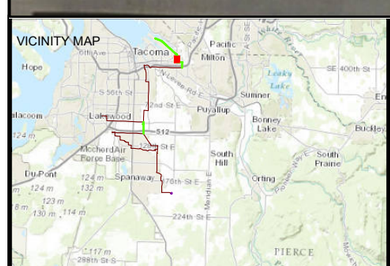
Tacoma

City of Tacoma

Figure F-11
Segment A - Map 10
Hydro Features

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N E S W

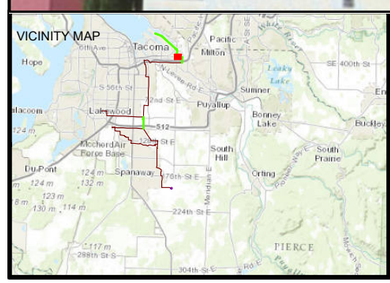
0 50 100 Feet

Tacoma

City of Tacoma

Figure F-12
Segment A - Map 11
Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N W E S

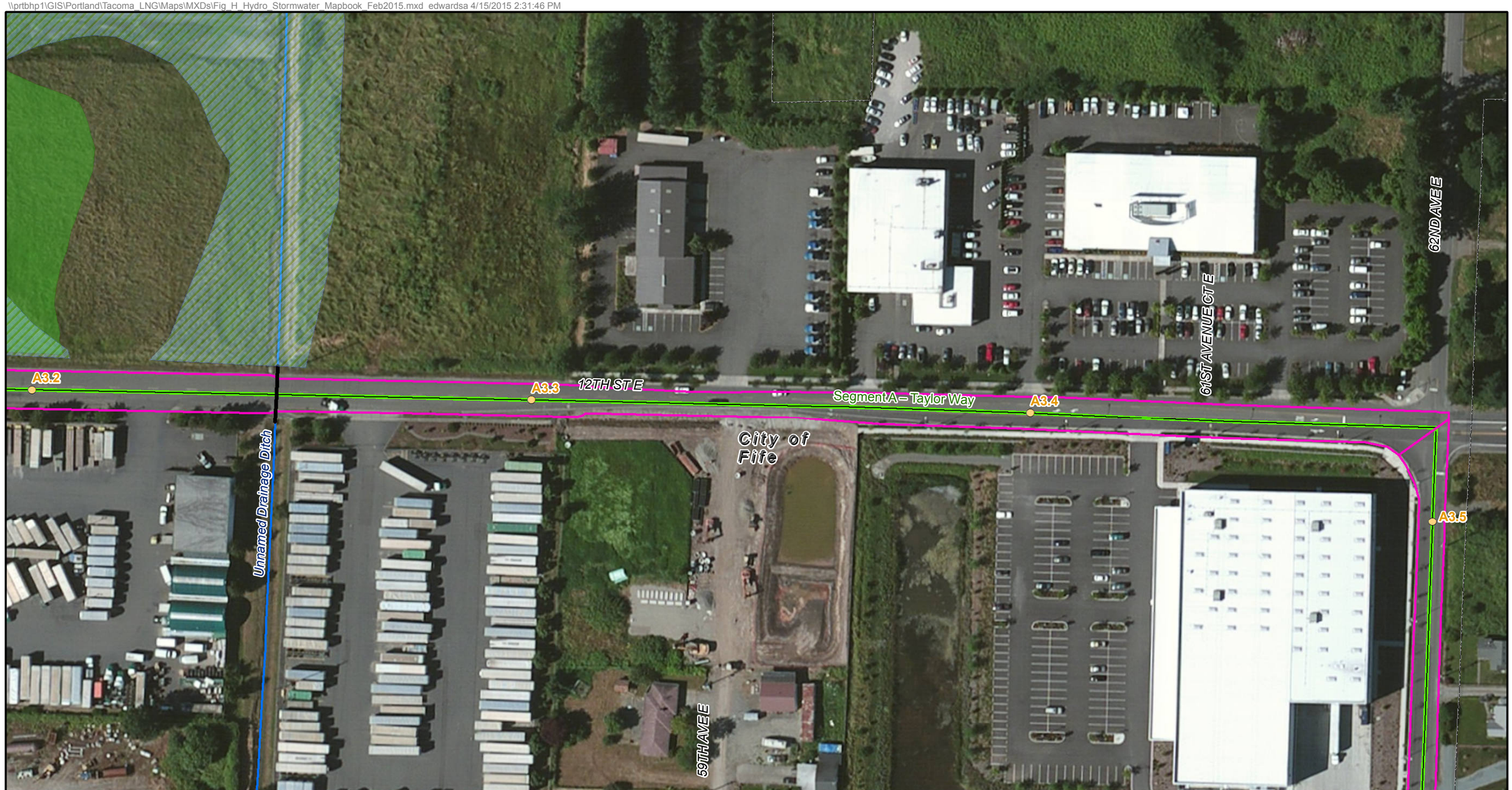
0 50 100 Feet

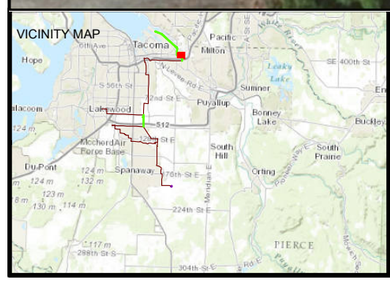
Tacoma

City of Tacoma

Figure H-13
Segment A - Map 12
Hydro FeatureF

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N W E S

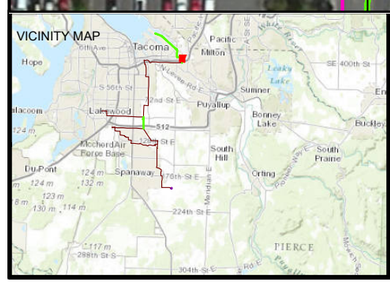
0 50 100 Feet

Tacoma

City of Tacoma

Figure F-14
Segment A - Map 13
Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N E S W

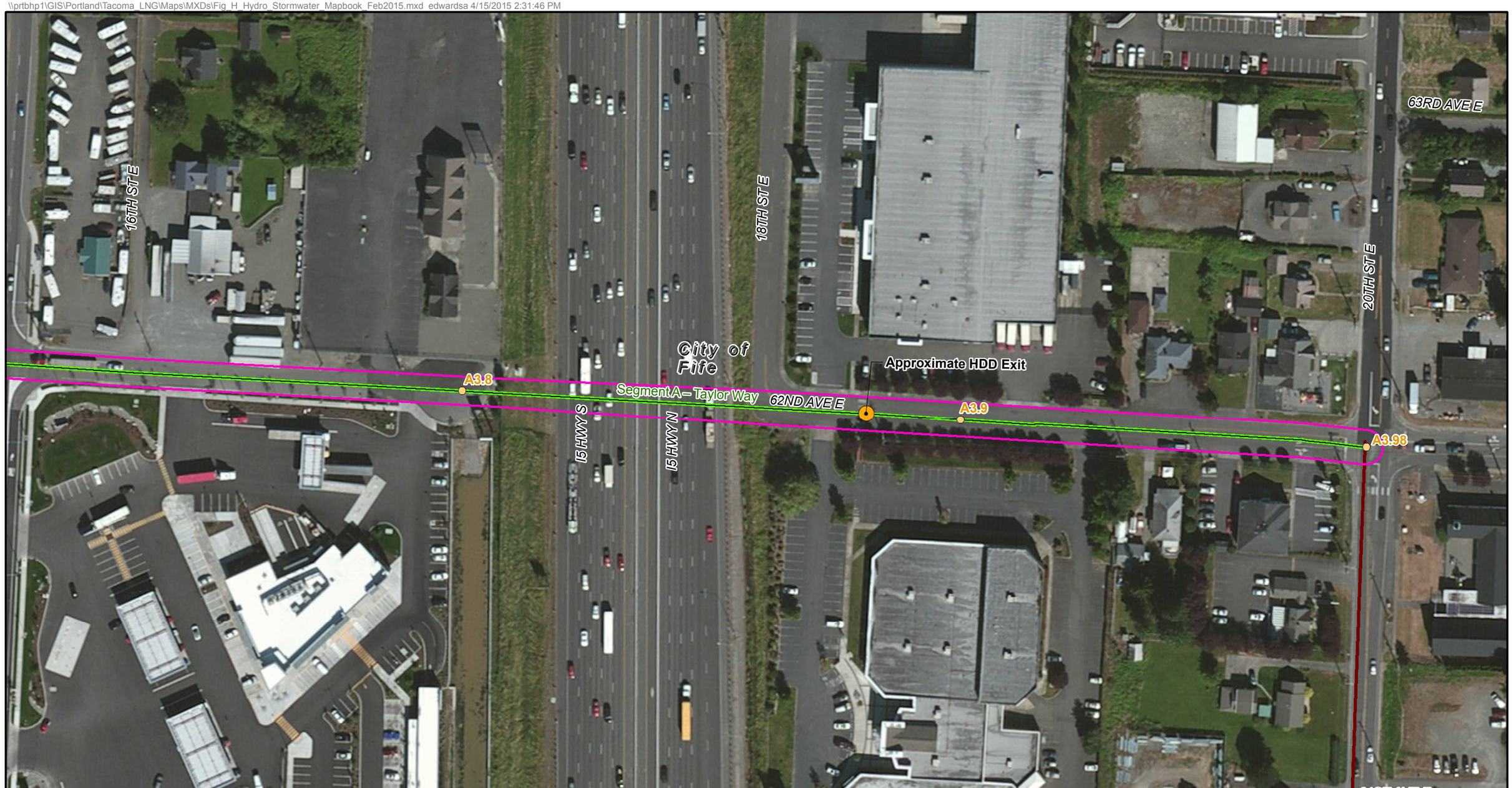
0 50 100 Feet

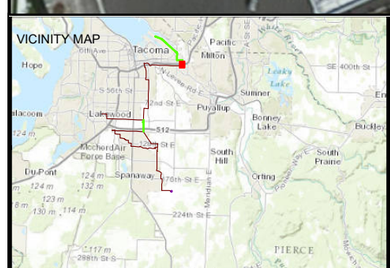
Tacoma

City of Tacoma

Figure HF15
Segment A - Map 14
Hydro Features

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N W E S

0 50 100 Feet

Tacoma

City of Tacoma

Figure F-16
Segment A - Map 15
Hydro Features

Tacoma LNG Project

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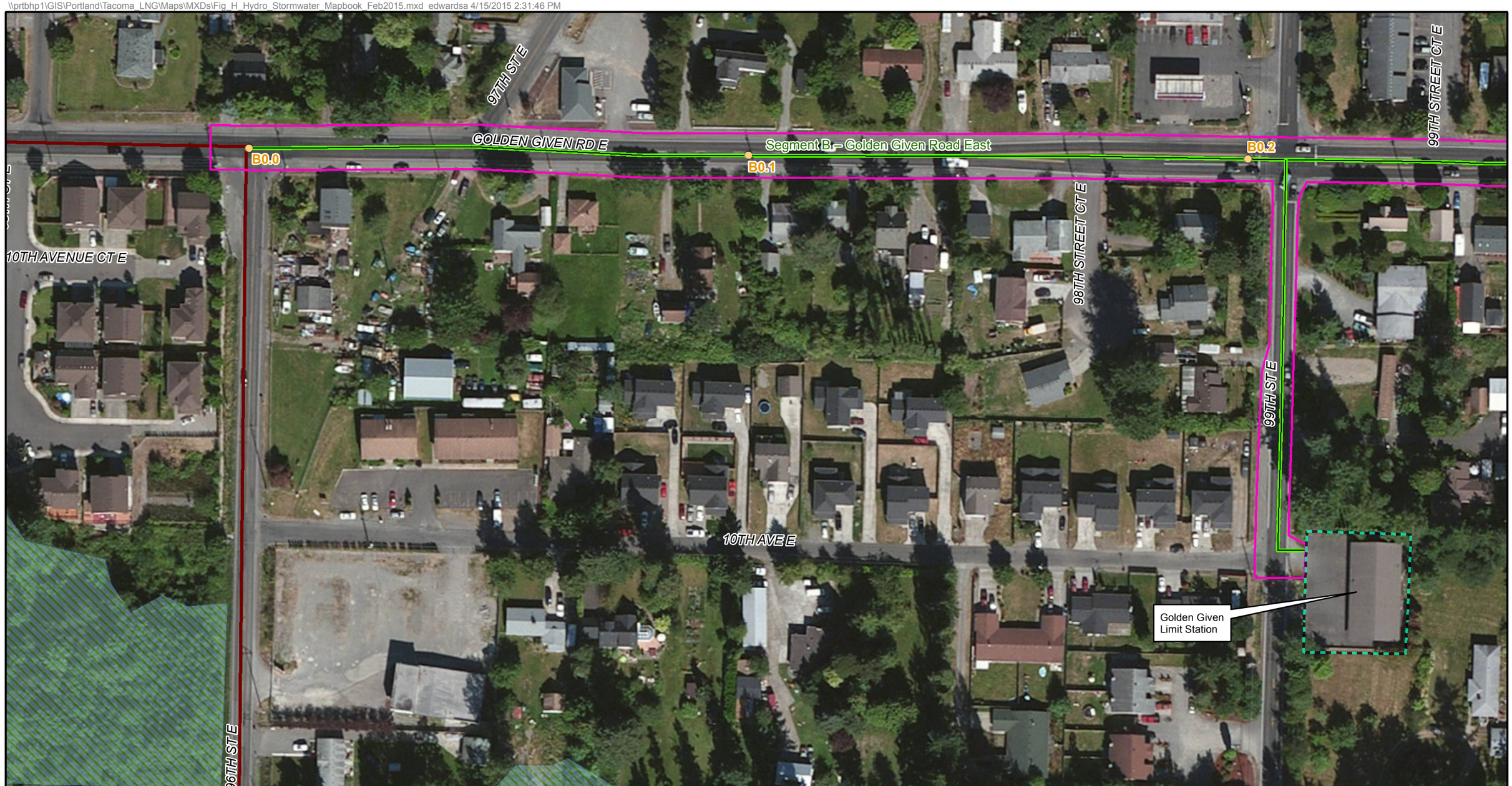
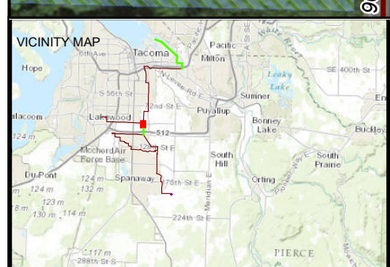




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N E S W

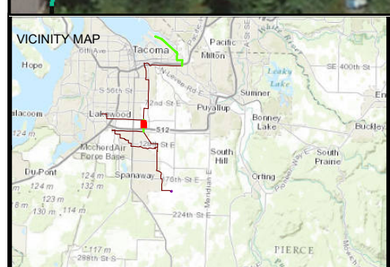
0 50 100 Feet

Tacoma

City of Tacoma

Figure HF17
Segment B - Map 01
Hydro Features

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N E S W

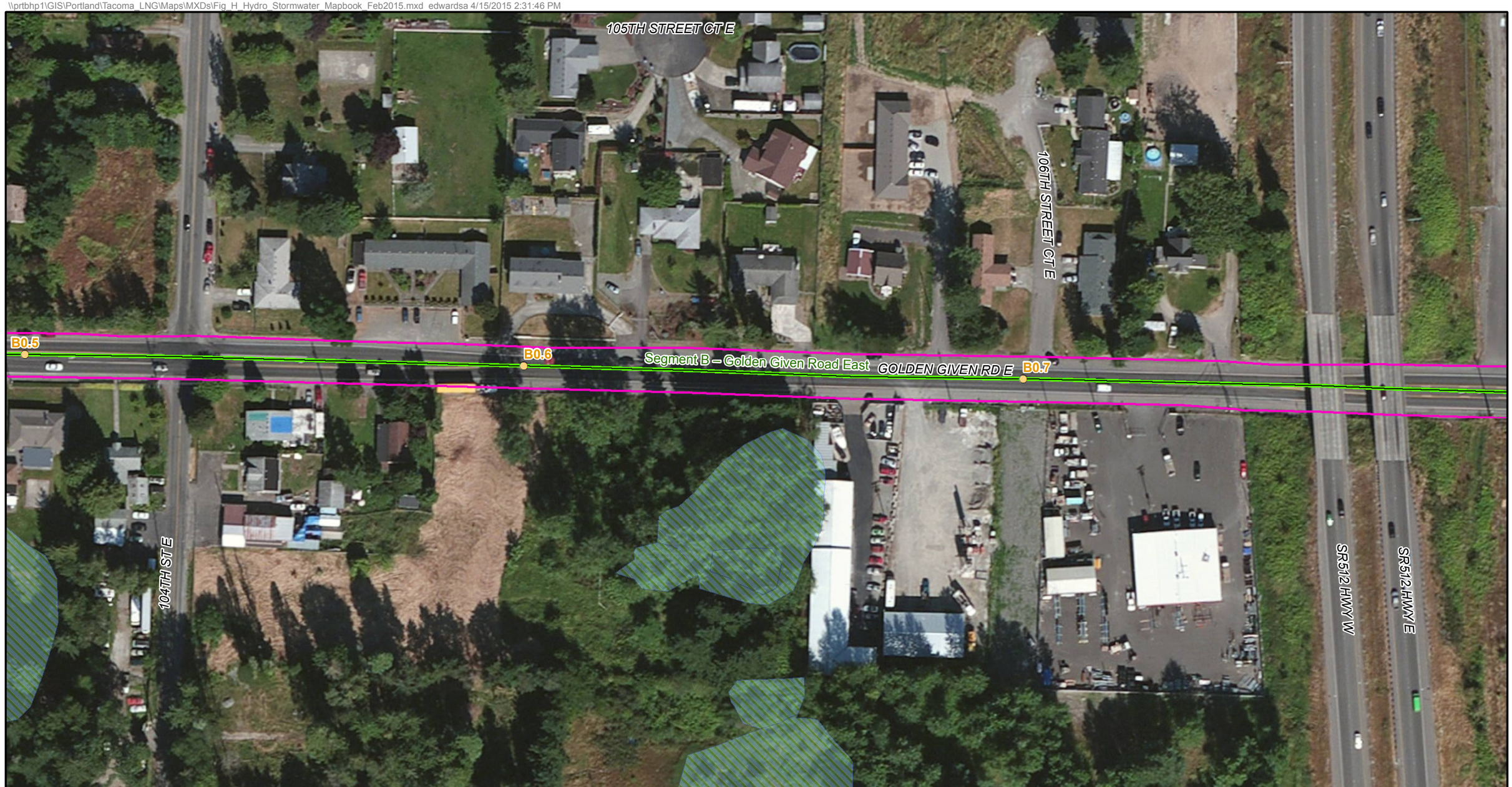
0 50 100 Feet

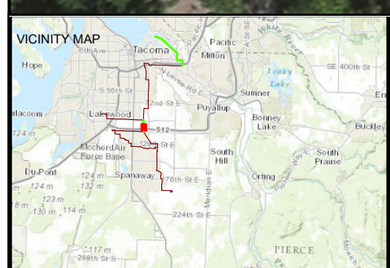
Tacoma

City of Tacoma

Figure F-18
Segment B- Map 02
Hydro Features

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N E S W

0 50 100 Feet

City of Tacoma

Figure F-19
Segment B- Map 03
Hydro Features

Tacoma LNG Project

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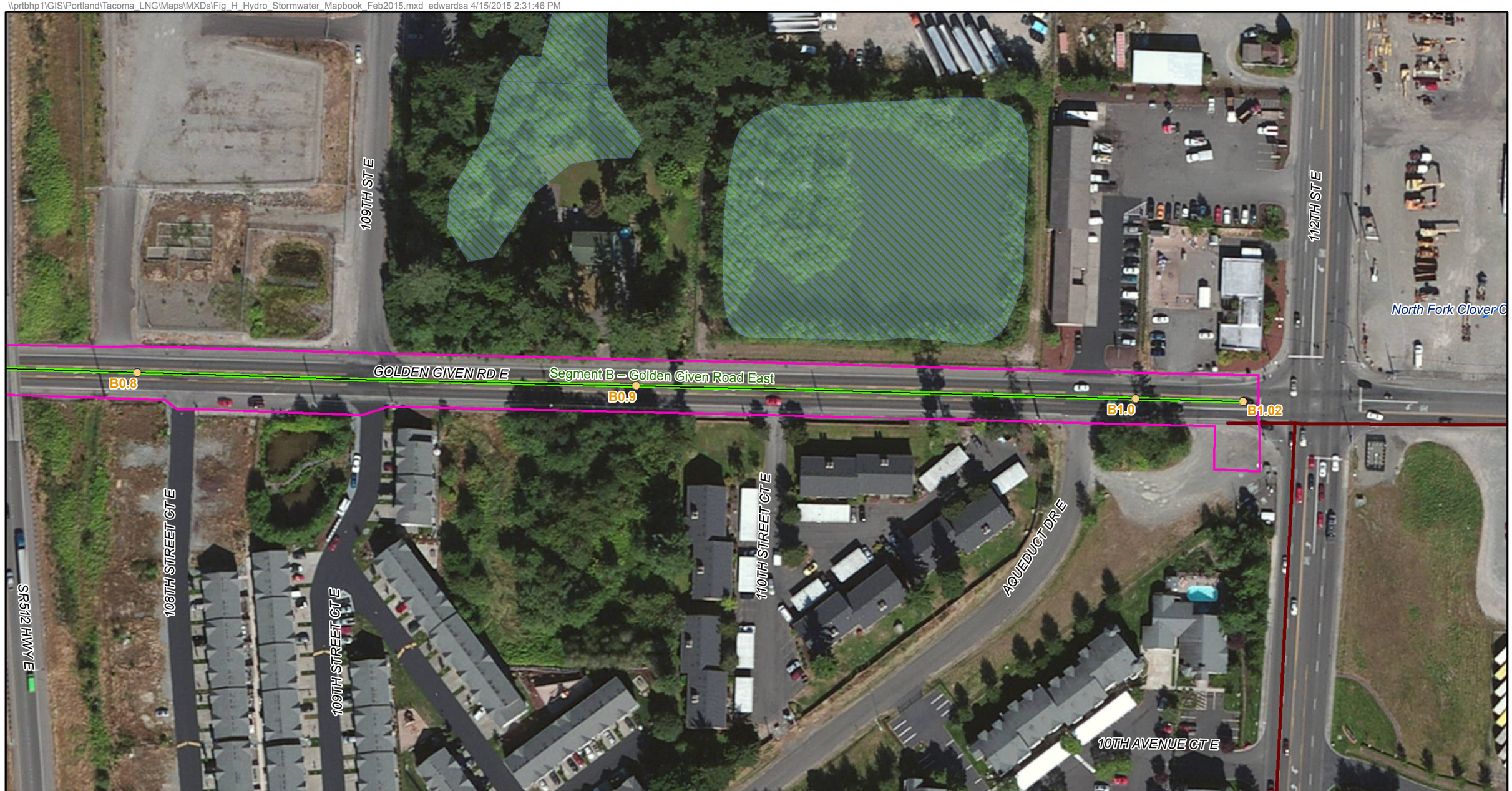

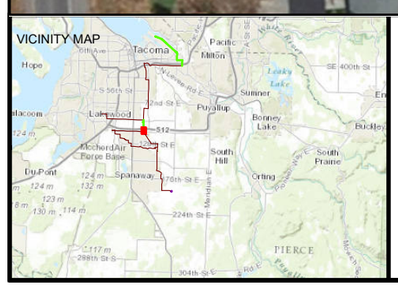

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N W E S

0 50 100 Feet

Tacoma

City of Tacoma

Figure F-20
Segment B- Map 04
Hydro Features

Tacoma LNG Project

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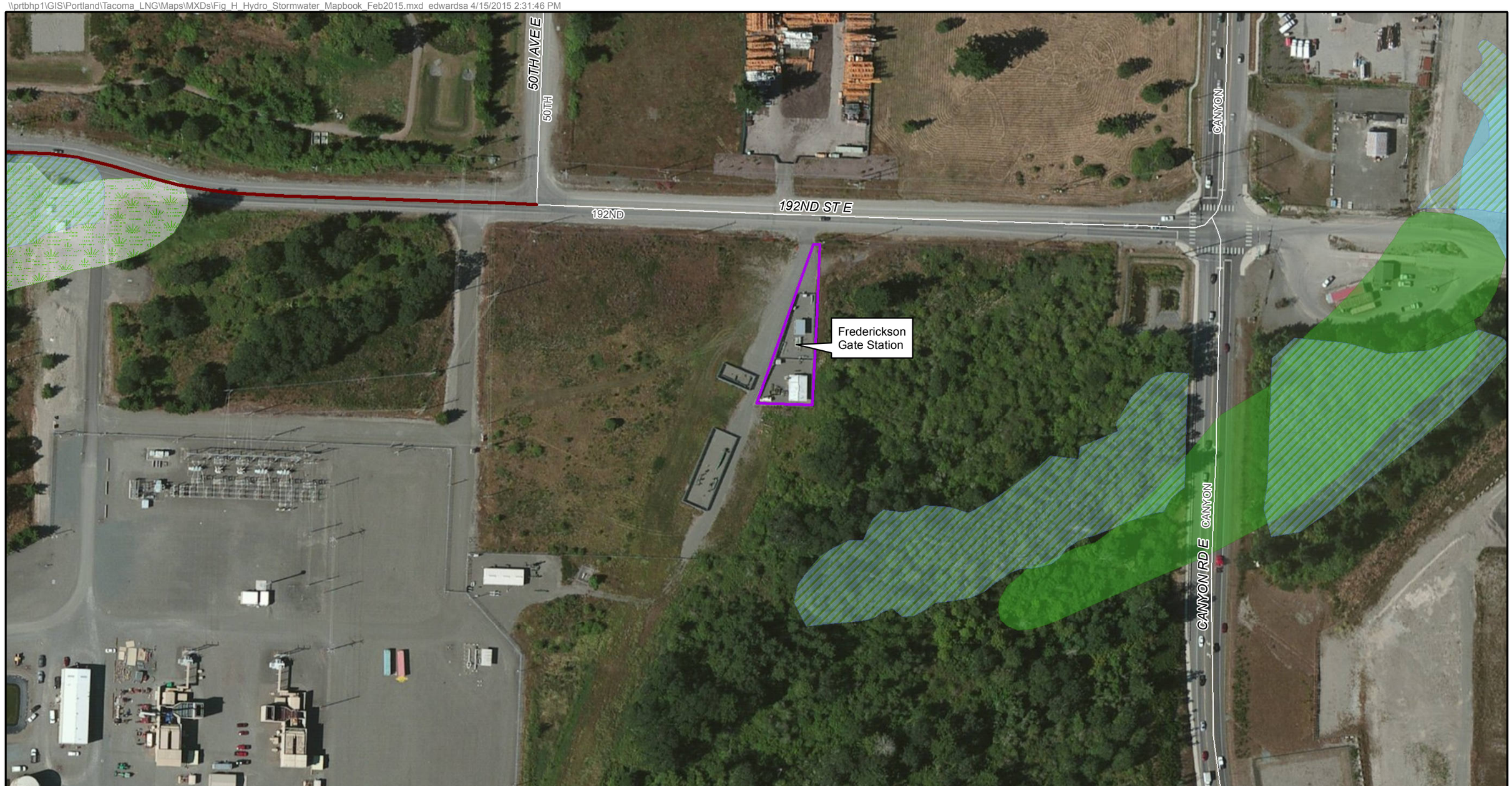
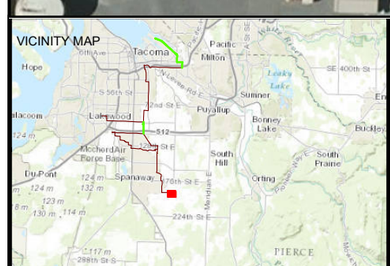




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed Loading Platform
- Proposed Pier
- Frederickson Gate Station
- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Workspace
- Culvert
- Stream / River
- Stream / River
- City Limit Boundary
- Wetlands from Pierce County

National Wetlands Inventory Wetland Types

- Estuarine and Marine Deepwater
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

N W E S

0 50 100 Feet

Tacoma

City of Tacoma

Figure F-21 Frederickson Gate Station Hydro Features

Tacoma LNG Project

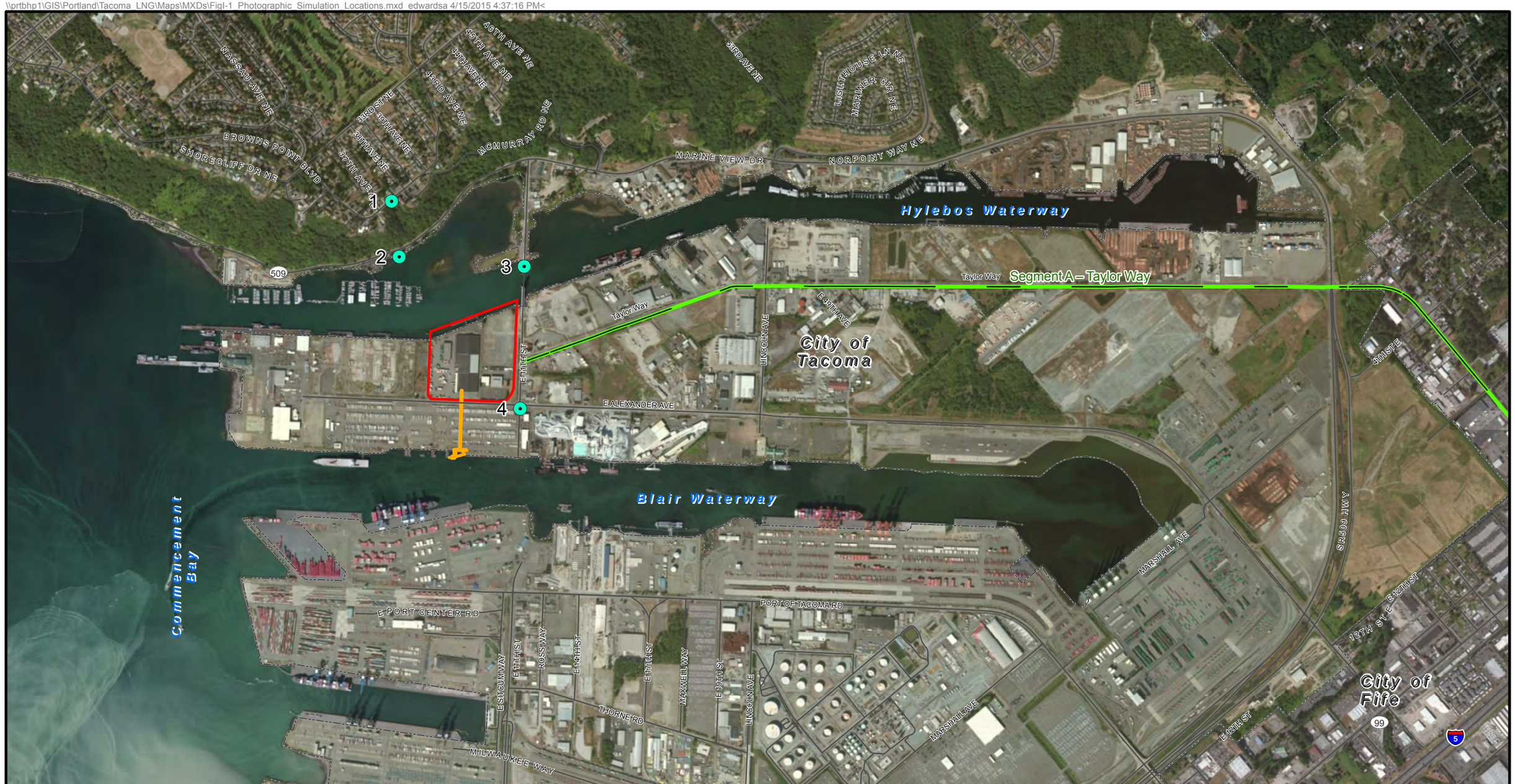
Appendix G-1: Visual Simulations

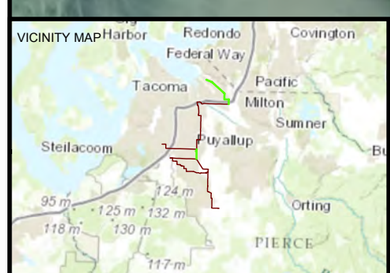
Existing Conditions and Photographic Simulations from Key Observation Points

This appendix contains a series of four paired photographs. The first photograph in each pair shows existing conditions at representative locations around the Tacoma LNG Facility site. The second photograph in each pair shows a photographic simulation of the view as it would appear when the facility is in place. The representative locations are referred to as key observation points (KOPs). Each KOP is located within the visual assessment area. **Figure I-1** in this appendix depicts the locations from which each photograph was taken.

The photographs are organized and titled as follows:

- KOP1:
  - KOP 1a: Existing view to the south of the Tacoma LNG Facility site from the sidewalk of Browns Point Boulevard north of McMurray Ravine.
  - KOP 1b: View with Tacoma LNG Facility.
- KOP2:
  - KOP 2a: Existing view to the south of the Tacoma LNG Facility site from parking area near marina off of Marine View Drive.
  - KOP 2b: View with Tacoma LNG Facility.
- KOP3:
  - KOP 3a: Existing view to the west of the Tacoma LNG Facility site from sidewalk on the Hylebos Bridge (East 11th Street).
  - KOP 3b: View with Tacoma LNG Facility.
- KOP4:
  - KOP 4a: View to the northwest of the Tacoma LNG Facility site from the corner of East Alexander Avenue and East 11th Street.
  - KOP 4b: View with Tacoma LNG Facility.





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Simulation Locations
- Tacoma LNG Facility Boundary
- TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- City Limit Boundary

0 1,000 2,000 Feet

City of Tacoma

Figure G-1
Photographic Simulation Locations

Tacoma LNG Project

KOP 1a: Existing view to the south of the Tacoma LNG Facility site from the sidewalk of Browns Point Boulevard north of McMurray Ravine.

KOP 1b: View with Tacoma LNG Facility.

KOP 2a: Existing view to the south of the Tacoma LNG Facility site from parking area near marina off of Marine View Drive.

KOP 2b: View with Tacoma LNG Facility.

KOP 3a: Existing view to the west of the Tacoma LNG Facility site from sidewalk on the Hylebos Bridge (East 11th Street).

KOP 3b: View with Tacoma LNG Facility.

KOP 4a: View to the northwest of the Tacoma LNG Facility site from the corner of East Alexander Avenue and East 11th Street.

KOP 4b: View with Tacoma LNG Facility.

Appendix G-2: Site Characterization Photos

Character Photographs

This appendix contains a series of photographs that were taken from locations within the visual assessment area of the Tacoma LNG Project. Some of the photographs illustrate the character of landscapes within the visual assessment area. Other photographs illustrate how visible, or not visible, the Tacoma LNG Facility site is from various locations in the assessment area looking toward the site. The Proposed Action would not result in changes to the viewed landscape from areas where the Tacoma LNG Facility site cannot be seen.

Table J-1 describes the photographs in this appendix. The photographs were taken using a digital single-lens reflex camera set to take photos with a focal length equivalent to a photo taken with a 35-millimeter (mm) camera using a 50-mm lens. This setting is the generally accepted setting for visual assessment in that it captures views that closely resemble what the human eye sees in a landscape. **Figure J-1** shows the locations where each character photograph was taken.

TABLE G-1
Description of Character Photographs of Existing Conditions

Location Number	Approximate Viewing Distance to Tacoma LNG Facility Site	Location	Notes
1	2 miles	Cliff House Restaurant parking area	Twilight view from well-known viewpoint in Browns Point area west of Tacoma LNG Facility site. Note west end of Blair Peninsula behind empty anchored container ship.
2	2 miles	Herron Ridge Drive NE	Twilight view from subdivision above Marine View Drive west of Tacoma LNG Facility site. Tyee Marina seen in foreground. Roof of existing large building on Tacoma LNG Facility site can be seen as a long horizontal reflected feature.
3	0.4 mile	Browns Point Boulevard from sidewalk overlooking McMurray Ravine	Provides unobstructed view from the north toward the Tacoma LNG Facility site.
4	0.25 mile	Along Marine View Drive	Can see parts of site, although boat at marina partially block some views of it.
5	1 mile	On slope below Point Woodworth subdivision and above Norpointe Way NE	Difficult to see Tacoma LNG Facility site because of Hylebos Bridge and other obstructions. Can see bridge opening and large tank farm.
6	0.7 mile	Along edge of Hylebos Waterway looking west towards tank farm	Example of industrial-maritime character of the waterway and residences on the slope north of Marine View Drive.
7	0.1 mile	Looking west along Taylor Way at Tacoma LNG Project	Example of industrial character of lands adjacent to Taylor Way.
8	0.2 mile	Blair Waterway	Example of industrial-maritime character of Blair Waterway and area south of Blair Peninsula.
9	Adjacent to site	Corner of East 11th Street and Alexander Avenue looking north toward bridge	Can see edge of Tacoma LNG Facility site, East 11th Street, Hylebos Bridge, and slope north of Marine View Drive.
10	2.2 miles	Downtown overlook	Example of appearance of the industrial area north of downtown when viewed from downtown.
11	3 miles	Ruston Way walking path on pier of Silver Cloud Hotel	Example of the appearance of the industrial area as seen from Ruston Way.

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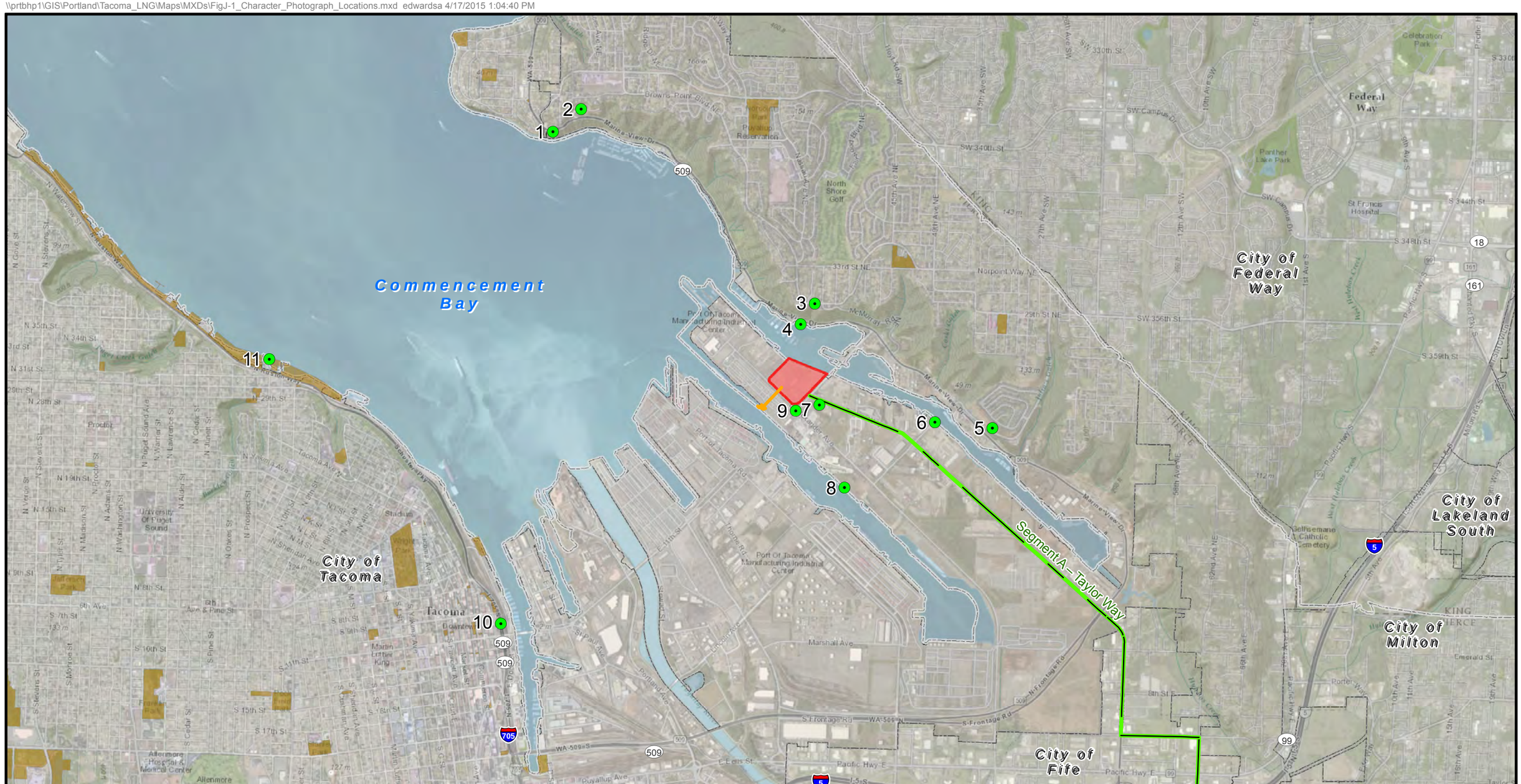
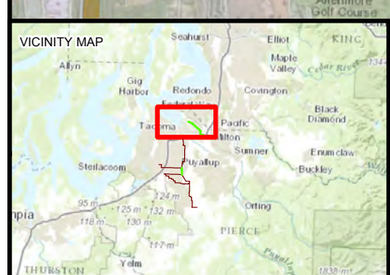




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Photograph Locations
- Tacoma LNG Facility Boundary
- TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- City Limit Boundary
- County Boundary
- Parks

N W E S

0 1,500 3,000 Feet

Tacoma

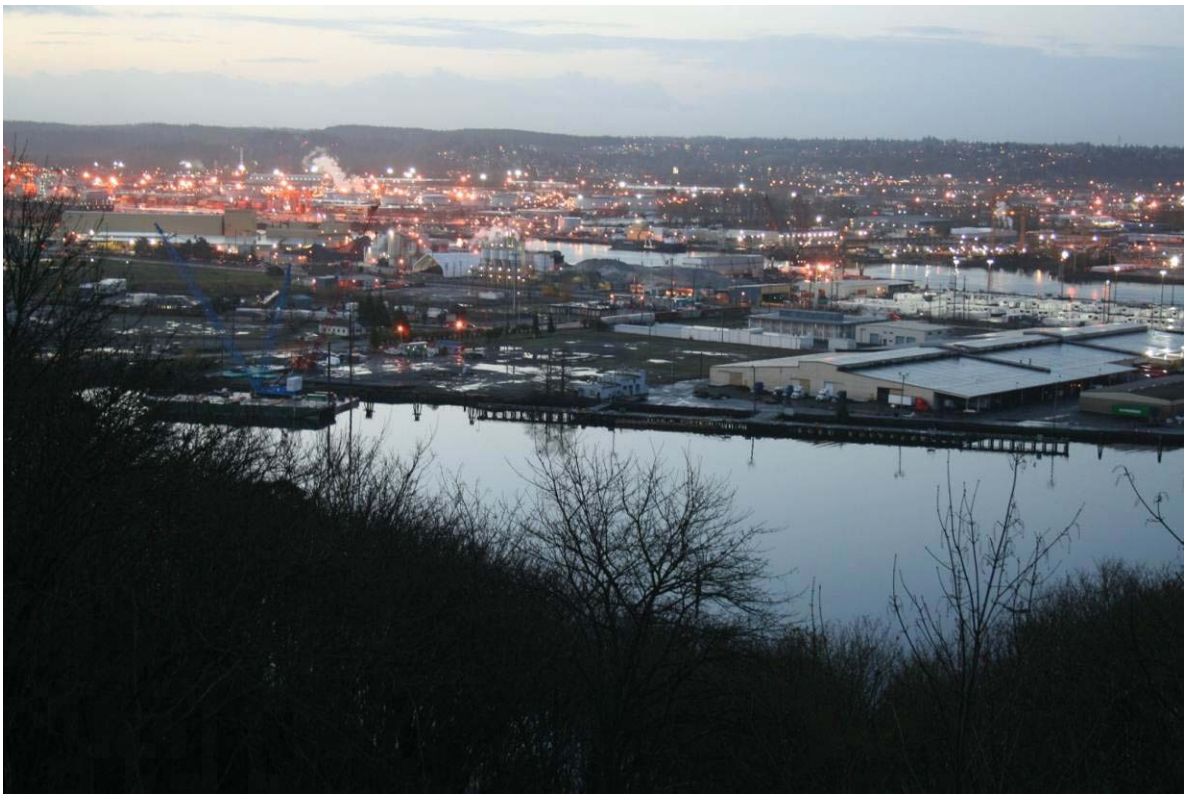
City of Tacoma

Figure G-1
Character Photograph Locations

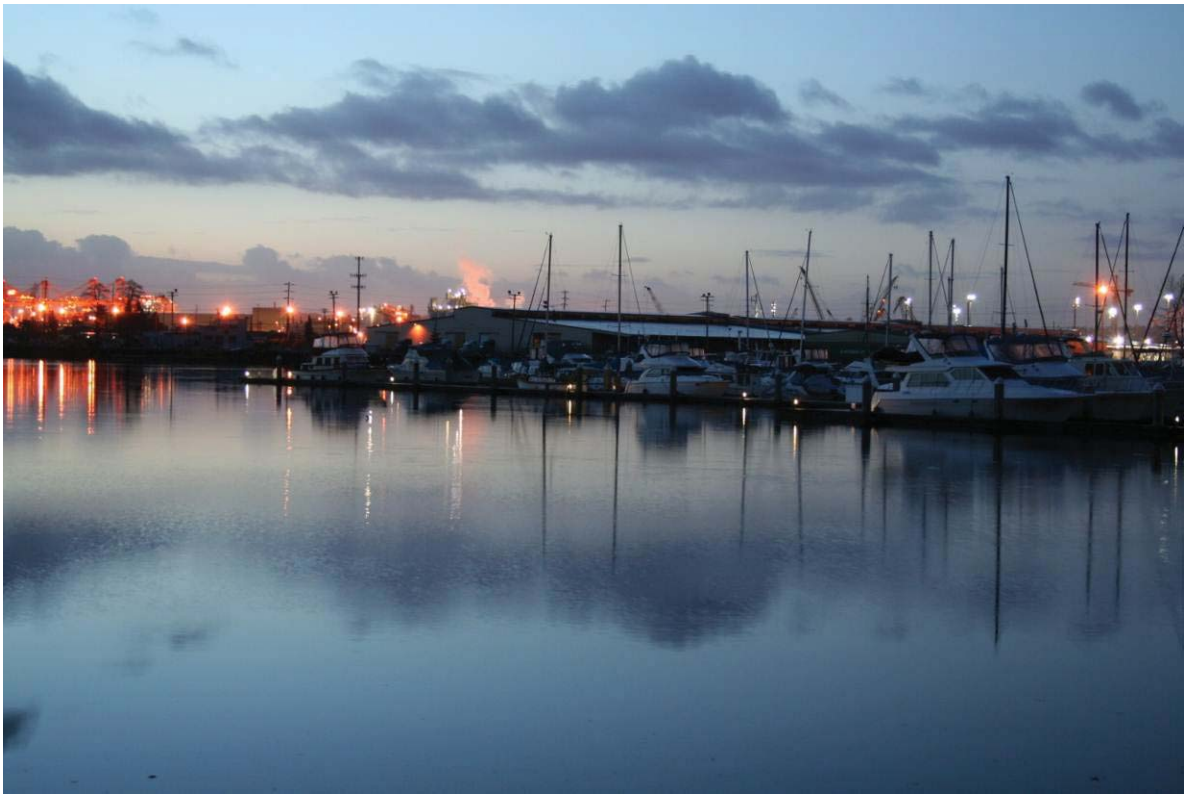
Tacoma LNG Project

Location 1. Cliff House Restaurant parking area.

Location 2. Herron Ridge Drive NE.

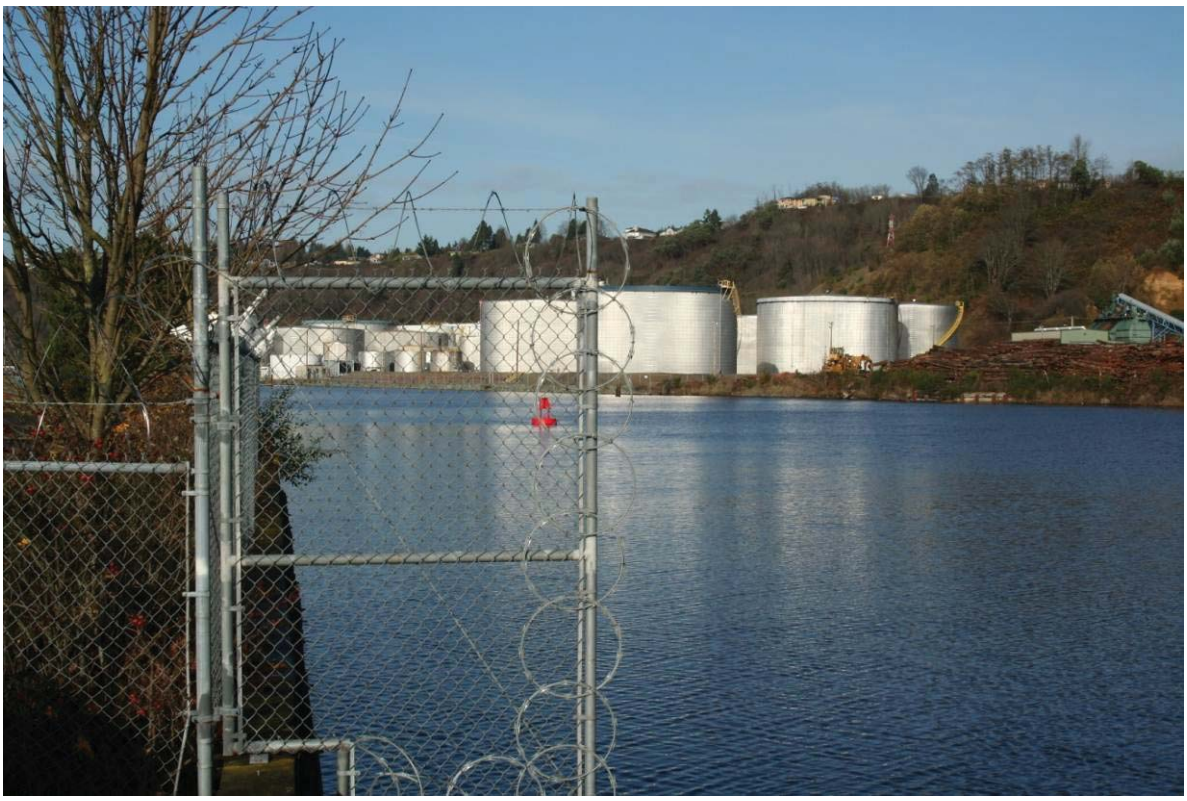


Location 3. Browns Point Boulevard from sidewalk overlooking McMurray Ravine.



Location 4. Along Marine View Drive.

Location 5. On slope below Point Woodworth Subdivision and above Norpointe Way NE.



Location 6. Along edge of Hylebos Waterway looking west toward tank farm.

Location 7. Looking west along Taylor Way at Tacoma LNG Project.

Location 8. Blair Waterway.

Location 9. Corner of East 11th Street and Alexander Avenue looking north toward bridge.

Location 10. Downtown overlook.

Location 11. Ruston Way walking path on pier of Silver Cloud Hotel.

Appendix H-1: Correspondence with Tribes

PUGET SOUND ENERGY
The Energy To Do Great Things

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734
PSE.com

August 8, 2014 **Hand Delivered**

Puyallup Indian Tribe
Bill Sterud, Chairman
5722 66th Ave E
Puyallup, WA 98371

Re: Request for meeting with the Puyallup Tribe for PSE project plans at the Port of Tacoma

Dear Chairman:

The purpose of this letter is to provide an introduction and background on a project at the Port of Tacoma for which Puget Sound Energy (PSE) will soon be seeking permits from various government agencies. PSE recognizes that the Puyallup Tribe is an important stakeholder and we would like to introduce you to the project and give you an opportunity to address PSE directly with any questions. We hope this letter is the beginning of a frequent dialogue and good communication with the Puyallup Tribe regarding our project.

Proposed Project:

PSE is undertaking a lease agreement with the Port of Tacoma for a 33-acre site on the Blair-Hylebos Peninsula in the Port of Tacoma. This is an area of the Port that has been designated for redevelopment for the last several years. PSE intends to develop a natural gas liquefaction and storage facility to meet its customers' gas demands and to provide a cleaner-burning fuel that meets or exceeds applicable regional, state and federal air quality standards. The PSE facility would liquefy natural gas at a rate of 250,000 gallons daily for use as a reduced-emissions fuel for marine vessels and land-based vehicles, as well as for utility peak shaving during periods of high demand on the PSE system. The natural gas would be supplied from PSE's existing natural gas pipeline distribution system. A single 8-million gallon, non-pressurized LNG storage tank, inclusive of full-containment inner and outer tanks with interstitial insulation, would be located on the site. The Tacoma LNG facility would be built to the nation's highest and most current safety standards.

Permitting Process:

Tacoma LNG will require state agency permits and/or approvals under the State Environmental Policy Act (SEPA), and federal agency permits and/or approvals under the National Environmental Policy Act (NEPA) including permits from the US Army Corps of Engineers. PSE understands that the Puyallup Tribe is entitled to consultation by the federal agencies in accordance with these permitting processes, and PSE would like to request an introductory meeting with the Puyallup Tribe to begin the discussion of the Tacoma LNG Project in greater detail.

Time Frame:

PSE will stipulate to an Environmental Impact Statement and likely submit permit applications beginning in late August or September. The PSE project, technical and legal staff would be able to meet with you and any technical staff that you deem appropriate as soon as you are available. PSE is genuine in the desire to have open communication about this project. We like you and your staff have many other projects and obligations to juggle; these dates are the most immediate times that we can meet with you, but please let us know if you require later dates.

1. August 11
2. August 14
3. August 19

This meeting can take place in Tacoma at the PSE Office at 3130 South 38th St in Tacoma or at a location in your tribal government facility. Please contact Larry Tornberg, PSE's Sr. Siting Project Manager, at 425-456-2691 or email larry.tornberg@pse.com to coordinate the details for a meeting.

Sincerely,

Roger Garratt
Director Strategic Initiatives
Tacoma LNG Project
PUGET SOUND ENERGY

PUGET SOUND ENERGY

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734
PSE.com

September 18, 2014

Honorable Virginia Cross
Chairwoman, Muckleshoot Tribal Council
39015 172nd Ave SE
Auburn, WA 98092

Re: Tacoma LNG Project; PSE Proposal to Meet

Honorable Chairwoman Cross,

I am the Puget Sound Energy ("PSE") siting manager for the company's proposed Tacoma LNG Project ("Project") at the Blair-Hylebos Peninsula. It is my responsibility to coordinate and solicit input from all agency and tribal stakeholders involved in the project permitting process. The Project will undergo permit review by local, state and federal agencies. PSE has stipulated that an Environmental Impact Statement ("EIS") should be prepared for Tacoma LNG under the Washington State Environmental Policy Act ("SEPA"). The City of Tacoma will serve as the SEPA lead agency responsible for conducting environmental review on the Project.

My purpose in writing today is to follow up on a phone call I made to you last Thursday, September 11, 2014. In your absence the Muckleshoot Administrative Officer referred me to Mardee Marquard. I left voice mail with Mardee sharing my purpose in calling, which was to personally advise you, as Chairman of the Tribal Council, that the Muckleshoot Indian Tribe will soon be receiving a notice from the City with information about opportunities to offer public comments on the scope of the EIS.

PSE would welcome the Muckleshoot Tribe's participation in the public scoping and comment processes for the Project, and would welcome any additional opportunity to hear the Muckleshoot Tribe's concerns and comments in person before or afterwards. PSE has developed a Project website, www.tacomacleanlng.com, which may be helpful for you and your staff in gathering information about our proposal. However, a website cannot replace the value of meeting with each other in person.

PSE would very much like to set up a meeting time with you and any technical staff that you think appropriate. Please let me know what dates and times work for you in the next few weeks. PSE would be happy to meet at a location on your tribal government campus for your convenience, or we can host the meeting at our Tacoma office.

Please contact me at 425-456-2691 or larry.tornberg@pse.com to coordinate potential meeting times.

Sincerely,

Larry Tornberg

Larry Tornberg
PSE

PUGET SOUND ENERGY

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734
PSE.com

September 19, 2014

Honorable Bill Sterud
Chairman, Puyallup Tribal Council
3009 E Portland Ave
Tacoma, WA 98404

Re: Proposal to meet to discuss PSE's proposed project on the Blair-Hylebos Peninsula

Honorable Chairman Sterud,

I am the Puget Sound Energy ("PSE") siting manager for the company's proposed Tacoma LNG Project ("Project") at the Blair-Hylebos Peninsula. It is my responsibility to coordinate and solicit input from all agency and tribal stakeholders involved in the project permitting process. You will kindly recall that I had previously outlined, in an August 8, 2014 letter, PSE's desire to meet in order to discuss and provide an overview of the Project. PSE recognizes that the Puyallup Tribe of Indians may have specific concerns or questions about our proposed facility and the company understands that having clear lines of communication will be helpful. Since the August 8 letter was sent, PSE has developed a project website, www.tacomacleanlng.com, which may be helpful for you and your staff in gathering information about our proposal. However, a website cannot replace the value of meeting with each other in person.

PSE would very much like to set up a meeting time with you and any technical staff that you think appropriate. Please let me know what dates and times work for you in the next few weeks. PSE would be happy to meet at a location on your tribal government campus for your convenience, or we can host the meeting at our Tacoma office.

The Tacoma LNG is a project will undergo permit review by local, state and federal agencies. PSE has stipulated that an Environmental Impact Statement ("EIS") should be prepared for Tacoma LNG under the Washington State Environmental Policy at Ch. 43.21C RCW. The City of Tacoma will serve as the SEPA lead agency responsible for conducting environmental review on the Project.

Last Thursday afternoon, September 11, 2014, I tried to contact you via phone. I was referred by the Puyallup Tribe of Indians' administrative office operator to your staff assistant. I left a voice message indicating my purpose in calling was to personally advise you, as Chairman of the Tribal Council, that the Puyallup Tribe will soon be receiving a notice from the City with information about opportunities to offer public comments on the scope of the EIS. PSE would welcome the Puyallup Tribe's participation in the public scoping and comment processes for the Project, and would welcome any additional opportunity to hear the Puyallup Tribe's concerns and comments in person before or afterwards.

Please contact me at 425-456-2691 or larry.tornberg@pse.com to coordinate potential meeting times.

Sincerely,

Larry Tornberg

Larry Tornberg
PSE

Appendix H-2: Summary of Archaeological Data

Archaeological Data

TABLE H-1
Previous Archaeological Investigations Conducted within 0.25 mile of the Tacoma LNG Project Area of Potential Effect

Report	Location Vicinity	Description	Results	Reference
Seattle, Washington, Cultural Resources Assessment of 502 54th Avenue East and 503 53rd Avenue East, Fife, Pierce County, Washington	Segment A	Pedestrian survey and shovel testing	No archaeological sites or historic properties recorded in the vicinity of the Tacoma LNG Project	Gillespie et al., 2008
Cultural Resources Investigations for the City of Fife's 20th Street East Widening Project, Pierce County, Washington	Segment A	Pedestrian survey	No archaeological sites or historic properties recorded in the vicinity of the Tacoma LNG Project	Luttrell, 2007
Results of Archaeological Monitoring for the Hylebos Bridge Rehabilitation Project, Pierce County, Washington	Segment A	Archaeological monitoring	No archaeological sites or historic properties recorded in the vicinity of the Tacoma LNG Project	Shong and Miss, 2010
Results of Archaeological Monitoring for the Port Parcel 88 Combined Habitat Project, Port of Tacoma, Pierce County, Washington	Segment A	Archaeological monitoring	Recorded precontact sites 45PI1188 and 45PI1203	Shong and Miss, 2011
Archaeological Monitoring of the Tacoma Rail Sound Refining Spur Track Project, 1601 Taylor Way, Tacoma, Pierce County, Washington	Segment A	Archaeological monitoring	No archaeological sites or historic properties recorded in the vicinity of the Tacoma LNG Project	Trautman and Williams, 2011
Results of Testing at Xaxtl'abish 1 (45PI974), Hylebos Creek, Pierce County, Washington	Segment A	Archaeological testing of precontact site 45PI974	Recommended eligible for listing on the NRHP	Shantry et al., 2010
Cultural Resources Report: Wildlands of Washington Hauff Property, Tacoma, Washington	Segment A	Pedestrian survey and shovel testing	No archaeological sites or historic properties recorded in the vicinity of the Tacoma LNG Project	Goetz and Rust, 2008
Cultural Resource Investigations for the Washington State Department of Transportation's SR 167: Puyallup to SR 509 Project, Pierce County, Washington	Segment A	Pedestrian survey and shovel testing	Recorded precontact site 45PI488 and historic era site 45PI490	Luttrell, 2004
Historical Resources Survey, Naval & Marine Corps Reserve Center, Tacoma, Washington	Segments A and B	Historic property survey	Sixteen historic properties recorded, none recommended as eligible for the NRHP	HHM, Inc., 2008
Puyallup Tribal Terminal Cultural Resources Assessment, Pierce County, Washington	Segments A and B	Pedestrian survey, shovel testing, and trenching	No archaeological sites or historic properties recorded in the vicinity of the Tacoma LNG Project	Cooper, 2009b
Cultural Resources Survey of the	Segment B	Pedestrian survey and	No archaeological sites or	Gall et al., 2012

TABLE H-1

Previous Archaeological Investigations Conducted within 0.25 mile of the Tacoma LNG Project Area of Potential Effect

Report	Location Vicinity	Description	Results	Reference
Proposed Woods at Golden Given Project Area, Parkland, Pierce County, Washington		shovel testing	historic properties recorded in the vicinity of the Tacoma LNG Project	
Resources Assessment of the SR 7: SR 507 to SR 512 Safety Project, Pierce County, Washington	Segment B	Pedestrian survey and shovel testing	No archaeological sites or historic properties recorded in the vicinity of the Tacoma LNG Project	Hamilton, 2005
Cultural Resources Assessment for the Spanaway Loop Road South Improvement Project, Pierce County, Washington	Segment B	Pedestrian survey and shovel testing	No archaeological sites or historic properties recorded in the vicinity of the Tacoma LNG Project	Gill, 2005

NRHP = National Register of Historic Places

TABLE H-2

Historic Built Environment within 300 feet of the Tacoma LNG Project Area of Potential Effect

Building Type/Name	NRHP Status	Year Built	Reference	General Location
Naval Reserve Training Center–Bldg. 40, Berthing Wharf	Recommended not eligible	1942	Moore, 2008a	Northeast side of Tacoma LNG Facility
Naval Reserve Training Center–Bldg. 60, Berthing Wharf	Recommended not eligible	1942	Moore, 2008b	Northeast side of Tacoma LNG Facility
Naval Reserve Training Center–Bldg. 61, Boat Mooring Float	Recommended not eligible	1953	Moore, 2008c	Northeast side of Tacoma LNG Facility
Warehouse	Undetermined	1962	Artifact Consulting, Inc., 2011	Segment A
Industrial storage	Undetermined	1929	Artifact Consulting, Inc., 2011	Segment A
House	Undetermined	Unknown	Gallacci, 1982	Segment A
Commercial building	Undetermined	1963	Artifact Consulting, Inc., 2011	Segment A
Industrial facility	Undetermined	1935	Artifact Consulting, Inc., 2011	Segment A
Commercial building	Undetermined	1920	Artifact Consulting, Inc., 2011	Segment A
House	Undetermined	1948	Artifact Consulting, Inc., 2011	Segment A
House	Undetermined	1935	Luttrell, 2007	Segment A
Formerly a house, converted in 1988 to commercial building	Determined not eligible for the NRHP	1948	Feldman, 2007	Segment A
House	Undetermined	1929	Artifact Consulting, Inc., 2011	Segment B
House	Undetermined	1941	Artifact Consulting, Inc., 2011	Segment B
House	Undetermined	1955	Artifact Consulting, Inc., 2011	Segment B
House	Undetermined	1930	Artifact Consulting, Inc., 2011	Segment B
House	Undetermined	1902	Artifact Consulting, Inc., 2011	Segment B

TABLE H-2
Previous Archaeological Investigations Conducted within 0.25 mile of the Tacoma LNG Project Area of Potential Effect

Report	Location Vicinity	Description	Results	Reference
House	Undetermined	1955	Artifact Consulting, Inc., 2011	Segment B
House	Undetermined	1964	Artifact Consulting, Inc., 2011	Segment B
House	Undetermined	1964	Artifact Consulting, Inc., 2011	Segment B

NRHP = National Register of Historic Places

TABLE H-3
Archaeological Sites Recorded within 0.25 Mile of the Tacoma LNG Project Area of Potential Effect

Site	Location Vicinity	Distance from APE (miles)	Type	Description	NRHP Status	Reference
45PI488	Segment A	0.25	Precontact	Subsurface fire-cracked rock, charcoal, lithic debitage, and one flaked stone tool	Eligible	Luttrell, 2001
45PI974	Segment A	0.16	Precontact isolate	Shell midden with faunal remains, bone tools, and charcoal	Unevaluated	Shantry, 2009
45PI975	Tacoma LNG Facility	0.25	Historic	Ceramics, bottle glass, and a comb	Unevaluated	Cooper, 2009a
45PI1188	Segment A	0.22	Precontact	Basal-notched projectile point	Unevaluated	Shong, 2010a
45PI1203	Segment A	0.22	Precontact	Fire-cracked rock and faunal remains	Unevaluated	Shong, 2010b
45PI1235	Segment A	0.25	Historic	Historic refuse dumps, foundations, and drain pipes	Unevaluated	Shong, 2011

NRHP = National Register of Historic Places

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Appendix H-3: Unanticipated Discoveries Plan

Unanticipated Discovery Plan

PLAN AND PROCEDURES FOR THE UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS FOR TACOMA LNG PROJECT, PIERCE COUNTY, WASHINGTON

1.0 Introduction

Puget Sound Energy (PSE) proposes to construct and operate a small-scale, liquefied natural gas (LNG) facility on Commencement Bay in the city of Tacoma, Washington. Associated with the proposed facility are a cryogenic pipeline for conveying LNG directly to the Totem Ocean Trailer Express (TOTE) site for fueling of marine vessels in Blair Waterway, and pipeline upgrades that would occur in the cities of Tacoma and Fife, Washington, as well as in unincorporated Pierce County. This Unanticipated Discovery Plan outlines the training and procedures to follow, in accordance with state and federal laws, if cultural resources or human remains are discovered during construction.

2.0 Recognizing Cultural Resources

Puget Sound Energy will require all construction personnel to participate in Cultural Resources Sensitivity Training. The purpose of the training is to instruct Project personnel on the sensitivity of cultural resources in the Project area, and introduce them to the tribe's perspective on potential impacts. DAHP staff and individuals from the Puyallup Tribe of Indians will be invited to contribute to this training. The training will focus on:

1. Why the training is required
2. What are cultural resources
3. How are cultural resources protected
4. What is the cultural and historical background of the project location
5. What types of cultural resources might be encountered
6. What to do if an inadvertent discovery is made during construction

A cultural resource is an item of historical, traditional, or cultural importance. The item could be prehistoric or historic. Examples are as follows:

- A multispecies accumulation of shell (shell-midden) with associated bone, stone, antler or wood artifacts, burned rocks, or charcoal
- Bones that appear to be human or animal bones associated with a shell-midden (i.e., with associated artifacts or cooking features)
- An area of charcoal or very dark stained soil with associated artifacts
- Artifacts made of chipped or ground stone (i.e., an arrowhead, adze, or metate) or an accumulation (more than one) of cryptocrystalline stone flakes (lithic debitage)
- Items made of botanical materials
- Clusters of tin cans, bottles, and agricultural or military equipment that appear to be older than 50 years

3.0 Onsite Responsibilities

STEP 1: STOP WORK IMMEDIATELY

If a PSE construction worker or equipment operator, contractor, or subcontractor believes that he or she has uncovered any cultural resource during construction of the Project, all work adjacent to the discovery must stop. The discovery location should not be left unsecured at any time.

STEP 2: NOTIFY PROJECT MANAGEMENT IMMEDIATELY

Contact the PSE Project manager as follows:

Project Construction Manager:

Jim Hogan
(425) 462-3957
(425) 466-6934
jim.hogan@pse.com

If the above contact cannot be reached, contact the Project's assigned Cultural Resources Specialist:

Robin McClintock
Cell: (503) 329-2458
RMcClint@ch2m.com

STEP 3: NOTIFY THE WASHINGTON DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION (DAHP) IMMEDIATELY

The PSE Project Manager or Project Cultural Resources Specialists will notify the Washington DAHP immediately.

STEP 4: CONSULTATION AND DOCUMENTATION

The PSE Project Manager will participate in consultation with DAHP and affiliated Tribes. After consultation, PSE will complete a written plan of action describing the disposition of cultural resources and will execute their prescribed duties within that plan of action.

4.0 Further Contacts and Consultation

The PSE's Project Manager's specific responsibilities are as follows:

- **Secure the Site**: The PSE Project Manager is responsible for taking appropriate steps to protect and secure the discovery site. All work will stop in an area adequate to provide for the total security, protection, and integrity of the resource. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Work in the immediate area will not resume until treatment of the discovery has been completed following provisions for treating archaeological/cultural material in consultation with the Tribe.
- **Direct Construction Elsewhere Onsite:** The PSE Project Manager will direct construction to resume away from cultural resources where appropriate and in communication with the Tribes.
  - If the find consists of human remains or funerary objects, the special procedures outlined in Section 5.0 will be followed.
  - The PSE Project Manager will contact the state agency (Washington DAHP).
- **Contact Project Cultural Resources Specialist:** If the Project Cultural Resources Specialist has not yet been reached in earlier attempts, the PSE Project Manager will do so.

5.0 Special Procedures for the Discovery of Human Skeletal Material

In accordance with *Inadvertent Discovery of Human Skeletal Remains on Non-Federal and Non-Tribal Land in the State of Washington* (RCWs 68.50.645, 27.44.055, and 68.60.055):

If ground-disturbing activities encounter human skeletal remains during the course of construction, then all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance. The finding of human skeletal remains will be reported to the county medical examiner/coroner and local law enforcement in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed. The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or nonforensic. If the county medical examiner/coroner determines the remains are nonforensic, then they will report that finding to the Washington DAHP, who will then take jurisdiction over the remains. The DAHP will notify any appropriate cemeteries and all affected tribes of the find. The State Physical Anthropologist will make a determination of whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and the affected tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

Pierce County Sheriff's Department

Paul A. Pastor—Sheriff
930 Tacoma Avenue South
Tacoma, WA 98402
(253) 798-7530

Pierce County Medical Examiner

Thomas B. Clark, MD—Chief Medical Examiner
3619 Pacific Avenue
Tacoma, WA 98418
(253) 798-6494

Washington Department of Archaeology and Historic Preservation (DAHP)

Rob Whitlam—State Archaeologist
email: Rob.Whitlam@dahp.wa.gov
(360) 586-3080

Guy Tasa—State Physical Anthropologist
email: Guy.Tasa@dahp.wa.gov
(360) 586-3534

Puyallup Tribe of Indians

Brendon Reynon
Cultural Resources Program Director
Puyallup Tribe of Indians
3009 Portland Avenue
Tacoma, WA 98404
(253) 573-7986

6.0 Proceeding with Construction

Project construction outside the discovery location may continue while documentation and assessment of the cultural resources proceed. The PSE Project Manager must determine the boundaries of the discovery location. Construction may continue at the discovery location only after the process outlined in this plan is followed and the Washington DAHP (and federal agencies, if any) determines that compliance with state and federal laws is complete.

Appendix I-1: Transportation Discipline Report

From Appendix K in Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement (February 2009)

Transportation Discipline Report

Blair-Hylebos Peninsula Terminal Redevelopment Project

Prepared for:
Port of Tacoma
One Sitcum Plaza
Tacoma, WA 98421

Prepared by:
David Evans and Associates, Inc.
415-118th Ave. SE
Bellevue, WA 98005

DAVID EVANS AND ASSOCIATES INC

February 2009

Shading indicates new or updated information provided subsequent to issuance of the Draft EIS.

Summary

The Blair-Hylebos Peninsula Terminal Redevelopment Project is expected to generate 3,902 new daily trips (2,824 trucks and 1,078 autos) and displace 2,562 daily trips (1,021 trucks and 1,541 autos). This is a net increase of 1,803 trucks and a net decrease of 463 automobiles, all associated with the YTTI terminal. There are no additional trips, above background growth, anticipated for the TOTE relocation. The expansion of the Washington United Terminals wharf is only expected to generate 1 additional truck trip in each direction in the PM peak period.

Delays to rail operations due to increased project rail traffic will be slightly over acceptable levels with a delay ratio of expected train movement time to unimpeded time of 1.34 (the delay ratio considered acceptable by the Port of Tacoma is 1.30). This delay ratio is not expected to significantly impact rail operations on the peninsula.

Road and rail improvements on the peninsula are proposed to mitigate the transportation impacts. New roadways and an overpass structure on the peninsula will allow traffic to avoid major at-grade rail crossings. All new roadways and intersections will operate at an acceptable level of service. Sidewalks will be constructed adjacent to all new roadways, improving pedestrian mobility as compared to existing conditions.

Off-site improvements include the addition of turn lanes at the Taylor Way/SR 509 intersection and installation of a traffic signal at the 54th Avenue East/I-5 northbound ramps (these improvements are also identified as mitigation in previous Port environmental documents for the development of the EB1 terminal, but have not yet been implemented).

The intersections of 54th Ave E/4th St E, 54th Ave E/SR 99, Port of Tacoma Road/SR 99, Port of Tacoma Road/20th Street E, 70th Avenue E/SR 99, and 70th Avenue E/20th Street E are below the City of Fife standard of LOS D for all future scenarios. The BHTRP project has no impact on the intersections of Port of Tacoma Road/SR 99 and Port of Tacoma Road/20th Street E. The BHTRP project increases delay at the other intersections. After implementation of the proposed mitigation, those intersections will remain below the LOS standard, and will remain so until construction of SR 167 or other improvements are implemented or both.

The intersection of Lincoln Avenue/Taylor Way will experience significant train delays. Although the proposed improvements will mitigate the impacts for the majority of traffic, a small number of motorists travelling between Totem Ocean Trailer Express or YTTI and Pierce County Terminal will experience delays or increased travel distance to avoid the train delays.

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Appendix A: Rail Study

Acronyms and Abbreviations

BHTRP	Blair-Hylebos Terminal Redevelopment project
EB1	East Blair 1 Terminal (also known as Kaiser marshalling yard)
EB	eastbound
GMA	Growth Management Act
ITE	Institute of Transportation Engineers
LOS	level of service
NB	northbound
PCT	Pierce County Terminal
POTR	Port of Tacoma Road
SB	southbound
SR	State Route
TEU	Twenty-foot equivalent units
WB	westbound
WSDOT	Washington State Department of Transportation
WUT	Washington United Terminals
YTTI	Yusen Terminal Tacoma, Inc.

1.0 Introduction

The proposed Blair-Hylebos Terminal Redevelopment (BHTRP) project site (site) is located on Port of Tacoma (Port) property[1] on the peninsula between the Blair Waterway and the Hylebos Waterway, on the west side of the Blair Waterway (Washington United Terminal [WUT]) and south of the Blair Waterway turning basin in Tacoma, Washington. The site and the two waterways (Blair and Hylebos) are located within the Port of Tacoma's Industrial Development District, which is adjacent to Commencement Bay. The project location and transportation study area is shown in Figure 1.

1.1 Proposed Action

The Proposed Action includes relocation of the existing Totem Ocean Trailer Express (TOTE) terminal, construction of the new Yusen Terminal Tacoma, Inc. (YTTI) Terminal and expansion of the wharf for the WUT Terminal (Figure 2). Road and rail infrastructure improvements will be completed on the Blair-Hylebos Peninsula, including new roadways, a grade separation north of the intersection of Taylor Way/SR 509 and a new rail yard with supporting approach tracks.

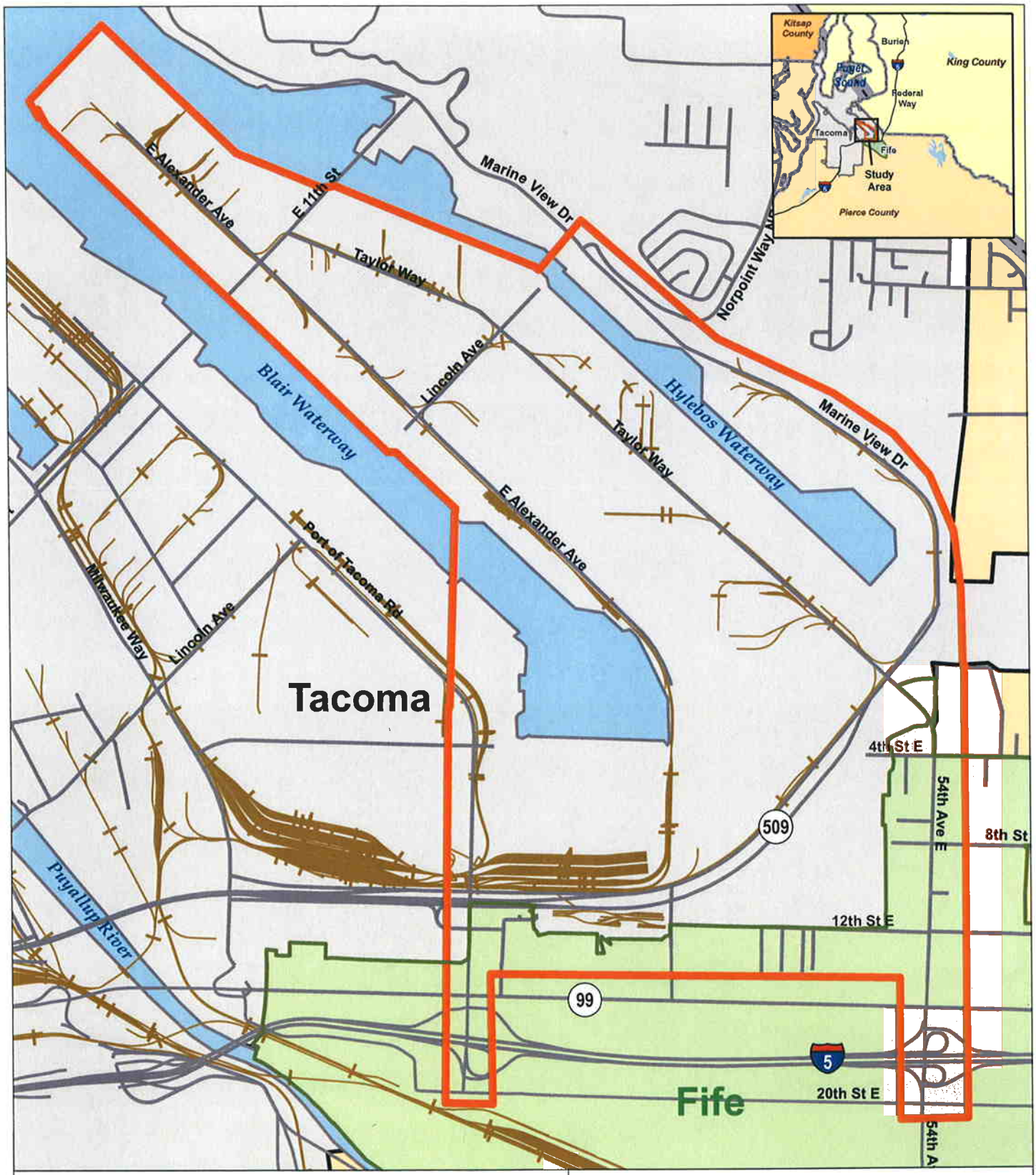
The existing TOTE Terminal will be relocated to the north tip of the peninsula to make room for the new YTTI Terminal. Operations are expected to remain unchanged. Any additional truck trips associated with TOTE operations as a result of the proposal have been captured in the background traffic growth. The new YTTI Terminal will be constructed in the general area of the existing TOTE Terminal. The terminal development is anticipated to be complete by July 2012. It is expected that the YTTI terminal capacity will be 1.4 million 20-foot equivalent units (TEUs). It is assumed that the YTTI terminal will operate at peak capacity during its first full year of operation (2013). It is also assumed by the Port of Tacoma and the YTTI terminal designers that seventy percent of containers will be transported by rail, with the remaining thirty percent transported by truck. This assumed mode split is based on similar terminal operations within the Port.

The WUT on Port of Tacoma Road (POTR) will have a wharf expansion and minor associated terminal improvements. The WUT terminal operations are not expected to change, but are expected to experience growth of 3 percent per year with or without the wharf expansion.

1.1.1 Road Improvements (From South to North)

The SR 509/Taylor Way intersection will be expanded to include two left-turn lanes on northbound (NB) and southbound (SB) SR 509 at Taylor Way for the movements to NB Taylor Way and SB 54th Avenue East, respectively (Figure 2). Right-turn pockets will be added for the following movements: NB 54th Avenue East to EB Marine View Drive, SB Taylor Way to westbound (WB) SR 509 and eastbound (EB) SR 509 to SB 54th Avenue East. All of the foregoing improvements, plus a signal at 54th and I-5 NB ramp, are also identified as mitigation in previous Port environmental documents for development of the EB1 terminal.

[1] Acquisition of properties within the project area that are not currently owned by the Port of Tacoma is in progress.



Transportation Study Area
County Boundary
Road
Rail
Water body

The intersections of 70th Avenue East/SR 99, 70th Avenue East/20th Street East and 70th Avenue East/Valley Avenue East are outside the transportation study area, but have been included in the LOS tables

Blair-Hylebos Terminal Redevelopment Project

Figure 1: Vicinity Map

N W E S

0 0.125 0.25 0.5
Miles

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Two 14-foot travel lanes with a 12-foot center turn lane will be constructed in the present location of Taylor Way. A sidewalk will be added on the east side of Taylor Way and a new driveway will be constructed into the Glacier property. Approximately 880 feet north of the SR 509/54th Avenue intersection, Taylor Way will head west into the Taylor Way Grade Separation, a three-lane structure with sidewalk which crosses the Arrival/Departure Rail tracks and the Taylor Way intermodal yard. This overpass will provide access to the Pierce County Terminal (PCT) and the future Taylor Yard via a two-lane side street just west of the structure. Taylor Way will remain in its existing location north to the Lincoln Avenue intersection, consisting of two 14-foot travel lanes, a 12-foot center turn lane, and sidewalk on the west side. Two driveways for access into the Carlile property will be provided near their present locations.

The Taylor Way Bypass route will be constructed on the east side of the peninsula, connecting to existing Taylor Way approximately 2,500 feet north of the overpass structure. Between the Taylor Way overpass and Lincoln Avenue, the roadway will consist of two 14-foot travel lanes, a 12-foot center turn lane, and sidewalk on the east side. This route can be used when rail operations block Taylor Way near Lincoln Avenue. Access from the Taylor Way Bypass into the Carlile property will be provided approximately 1,200 feet south of their existing administration building. Access into the Buffelen property will be provided near the existing portion of Lincoln Avenue east of Taylor Avenue, which will be vacated. The new bypass route will be constructed in compliance with City of Tacoma lighting standards, spaced approximately 150 feet apart.

North of Lincoln Avenue, Taylor Way will remain in its existing location for approximately 2,400 feet until relocating to the east, and tying into a relocated Taylor Way/East 11th Street intersection. This section of roadway will consist of two 14-foot travel lanes, a 12-foot center turn lane, and sidewalk on the easterly side.

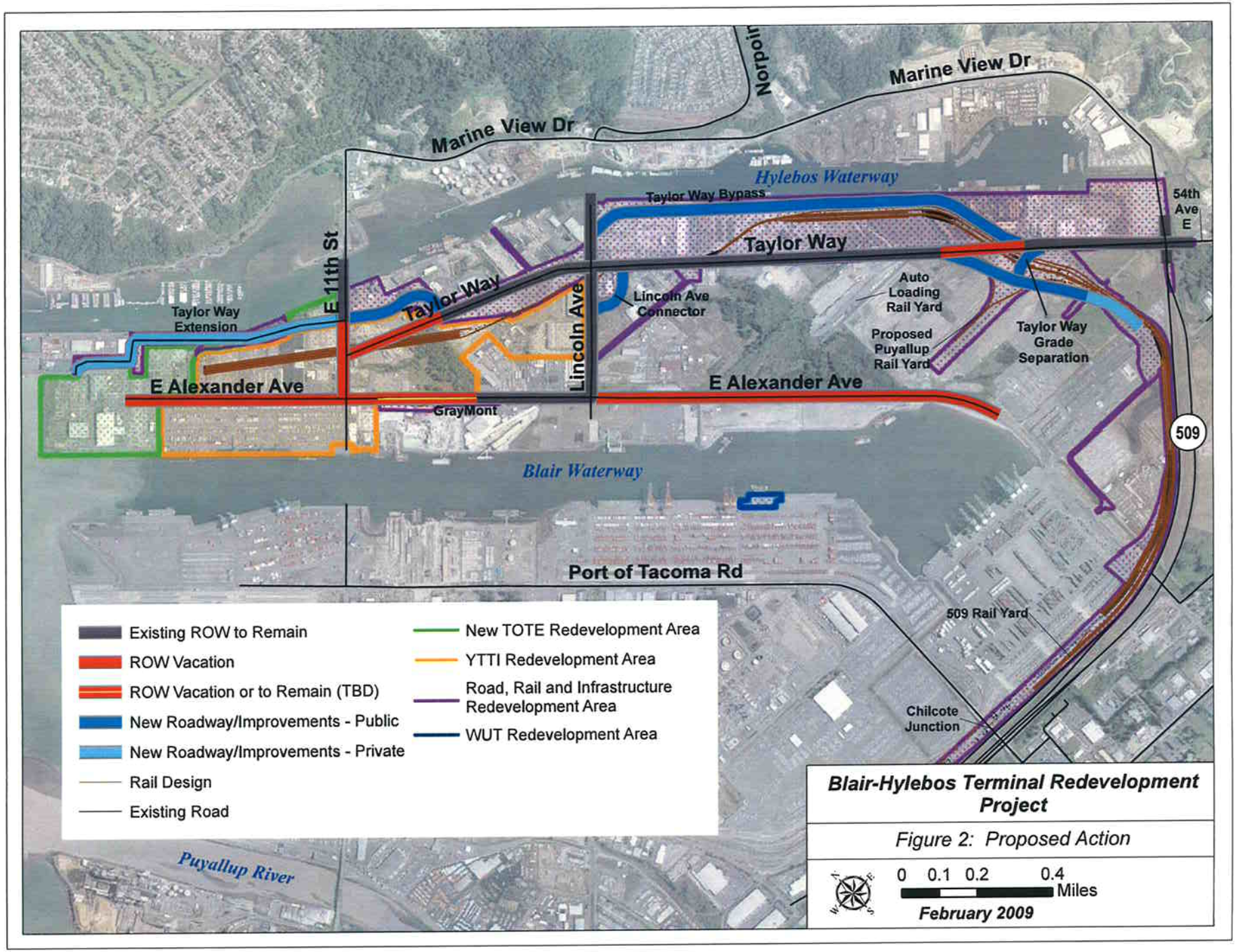
From East 11th Street, Taylor Way will continue on the east side of the Blair Hylebos Peninsula, terminating in a cul-de-sac near the existing Trident Seafoods plant and the Army Reserve Center at the north end of the peninsula. The roadway will consist of two 12-foot lanes with 8-foot shoulders and no sidewalks.

From the intersection of Taylor Way and Lincoln Avenue, the roadway will consist of two 14-foot lanes and a 12-foot center turn lane approximately 400 feet west of the proposed YTTI gate and transition to connect to the existing Lincoln Avenue roadway east of Alexander Avenue. The portion of Alexander Avenue south of Lincoln Avenue and north of Graymont will be vacated, leaving the remaining section in its existing condition (two 14-foot lanes with 10-foot shoulders). The Lincoln Avenue/Taylor Way intersection would be revised and would operate with several signals timed and coordinated to allow multiple movements at one time. During times when trains block the intersection, the new intersection configuration would allow the following movements: right-turns from eastbound Lincoln Avenue to southbound Taylor Way; left-turns from northbound Taylor Way to westbound Lincoln Avenue; right-turns from northbound Taylor Way Bypass to northbound Taylor Way; and, left-turns from southbound Taylor Way to eastbound (and ultimately southbound) Taylor Way Bypass. Appropriate signage would be provided to direct drivers from SR 509 to the most direct route when the intersection is blocked with a train.

1.1.2 Rail Improvements (From South to North)

The rail system starts at the east end of the Tacoma Rail Yard with a series of revised turnouts and crossovers to improve the connection between the Tacoma Rail Yard and Chilcote Junction (Figure 2). The rail then continues east through the 509 Rail Yard where four tracks are added to provide a total of seven Arrival/Departure tracks, each capable of holding an 8,000-foot-long train. In this area, a series of turnouts are also added to the existing PCT Loading Yard, which is currently stub-ended. The turnouts will improve operations and allow the PCT Loading Yard to operate from either end. The seven Arrival/Departure tracks curve around the existing PCT gate where they neck down through a series of crossovers and head northeast towards the new Taylor Way Grade Separation. After the crossovers, the tracks expand into the Taylor Yard, the Taylor Intermodal Yard, and the Taylor Auto Loading Yard. Before entering the new grade separation, the Taylor Auto Loading Yard access track splits off and goes west into the Taylor Auto Loading Yard, which consists of six tracks, each approximately 1,300 feet long. Another track adjacent to the Taylor Auto Loading Yard continues on to connect into the Taylor dock track.

As the remaining tracks go under the Taylor Way Grade Separation, the tracks split off into the Taylor Yard and the Taylor Loading Yard. A separate track going to the Taylor Loading Yard maintains access to the Puyallup Tribe's existing Intermodal Yard. After passing under the new grade separation, the tracks turn north. The Taylor Loading Yard, which is located adjacent to the existing Taylor Way, consists of eight tracks, each capable of holding seven 305-foot-long railcars. The Taylor Yard consists of fourteen tracks, each capable of holding half a train or fourteen 270-foot-long railcars. At the north end of the Taylor Yard and Taylor Loading Yard, the tracks come back together into two tracks and head north along the east side of the existing Taylor Way until they reach the intersection of Lincoln Avenue/Taylor Way. From there, the two tracks head northeast into the YTTI Intermodal Yard where they expand into six tracks, each capable of holding half a train or fourteen 270-foot-long railcars. The tracks end at the north end of the YTTI Intermodal Yard.



Blair-Hylebos Terminal Redevelopment Project

Figure 2: Proposed Action

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1.2 Alternative 1 - Lincoln Overpass Alternative

Many components of the Lincoln Overpass Alternative are identical to the Proposed Action, including relocation of the existing TOTE terminal, construction of the new YTTI Terminal and expansion of the wharf for the WUT Terminal (Figure 3). Rail infrastructure improvements are also identical to the Proposed Action, including a grade separation and new rail yard with supporting approach tracks. The road improvements are the primary difference between the two alternatives.

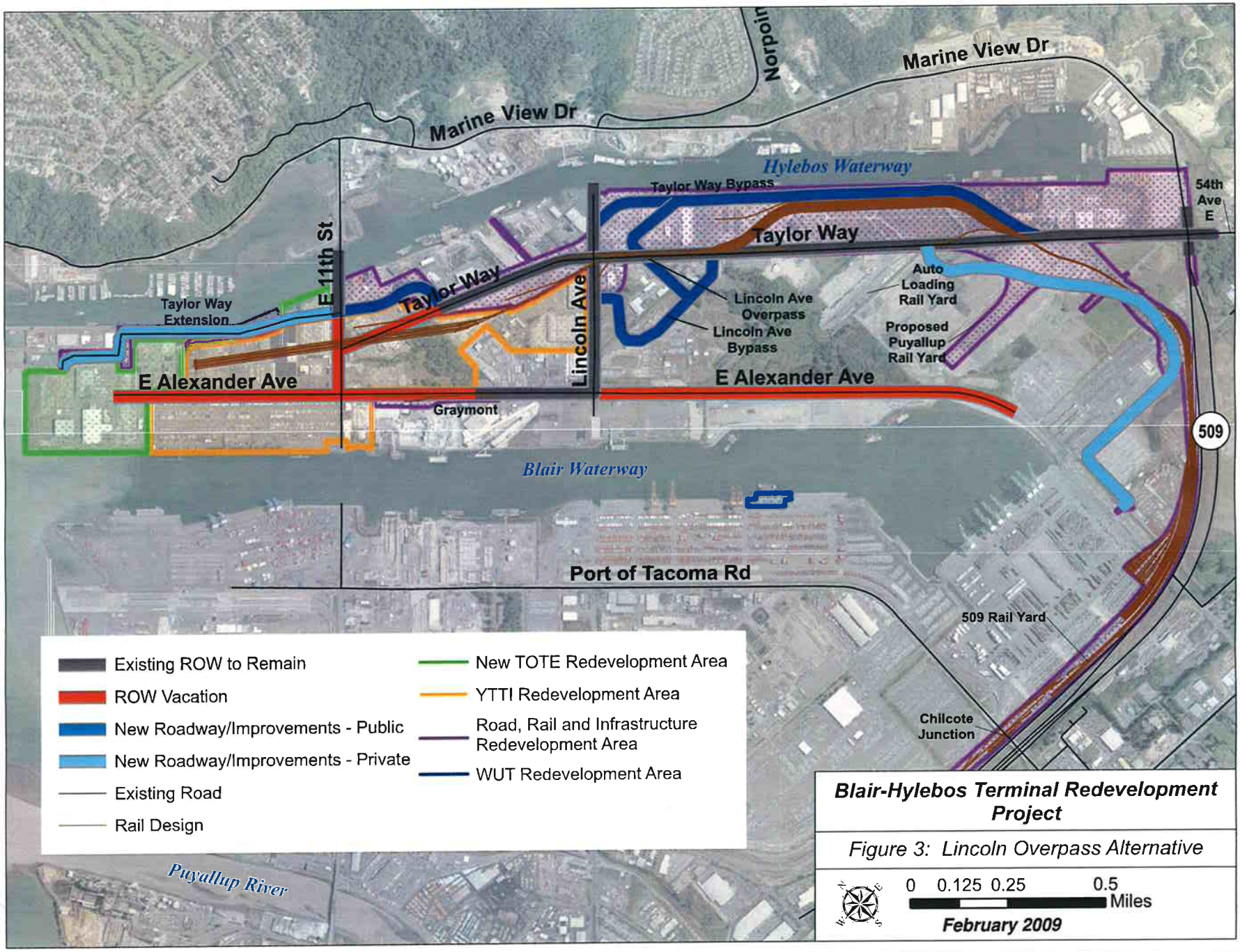
The following road improvements are identical to the Proposed Action:

- Expansion of the SR 509/Taylor Way intersection.
- Construction of two 14-foot travel lanes, a 12-foot center turn lane, and sidewalk on Taylor Way, with access driveways onto the Glacier property.
- Construction of the Taylor Way Bypass to the east (south of Lincoln Avenue) and the Taylor Way Extension north of East 11th Street.

The proposed road improvements are highlighted as they differ from the Proposed Action:

The Lincoln Overpass Alternative will construct a Lincoln Avenue Bypass and Overpass south of existing Lincoln Avenue (Figure 3). A structure will be provided over the proposed rail tracks for the Taylor Way Bypass south of the current Lincoln Avenue intersection. The crossing will consist of two 14-foot travel lanes, a 12-foot center turn lane, 4-foot shoulders, and sidewalk on the northern side. Existing Taylor Way between the Lincoln Avenue Crossing and the PCT gate will consist of two 14-foot lanes with a 12-foot center turn lane and sidewalk on the west side.

The north and south sections of Alexander Avenue will be vacated, leaving only a small section north of Lincoln Avenue in its existing condition (two 14-foot lanes with 10-foot shoulders).



Blair-Hylebos Terminal Redevelopment Project

Figure 3: Lincoln Overpass Alternative

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1.3 Alternative 2 – Straight Overpass Alternative

The Straight Overpass Alternative (Figure 4) is identical to the Proposed Action, with the exception of the configuration of the overpass structure for Taylor Way over the rail yard and the re-orientation of the intersection of Taylor Way and the PCT access road. In addition, EB1 will access the PCT access road under this alternative as compared to a direct access to Taylor Way under the Proposed Action.

The primary operational differences are 1) there would be no elevated intersection, and 2) traffic from PCT, Tacoma Power and BPA properties would cross the rail tracks that lead to the auto loading yard at grade whereas the Proposed Action includes a grade separation for traffic to those properties.

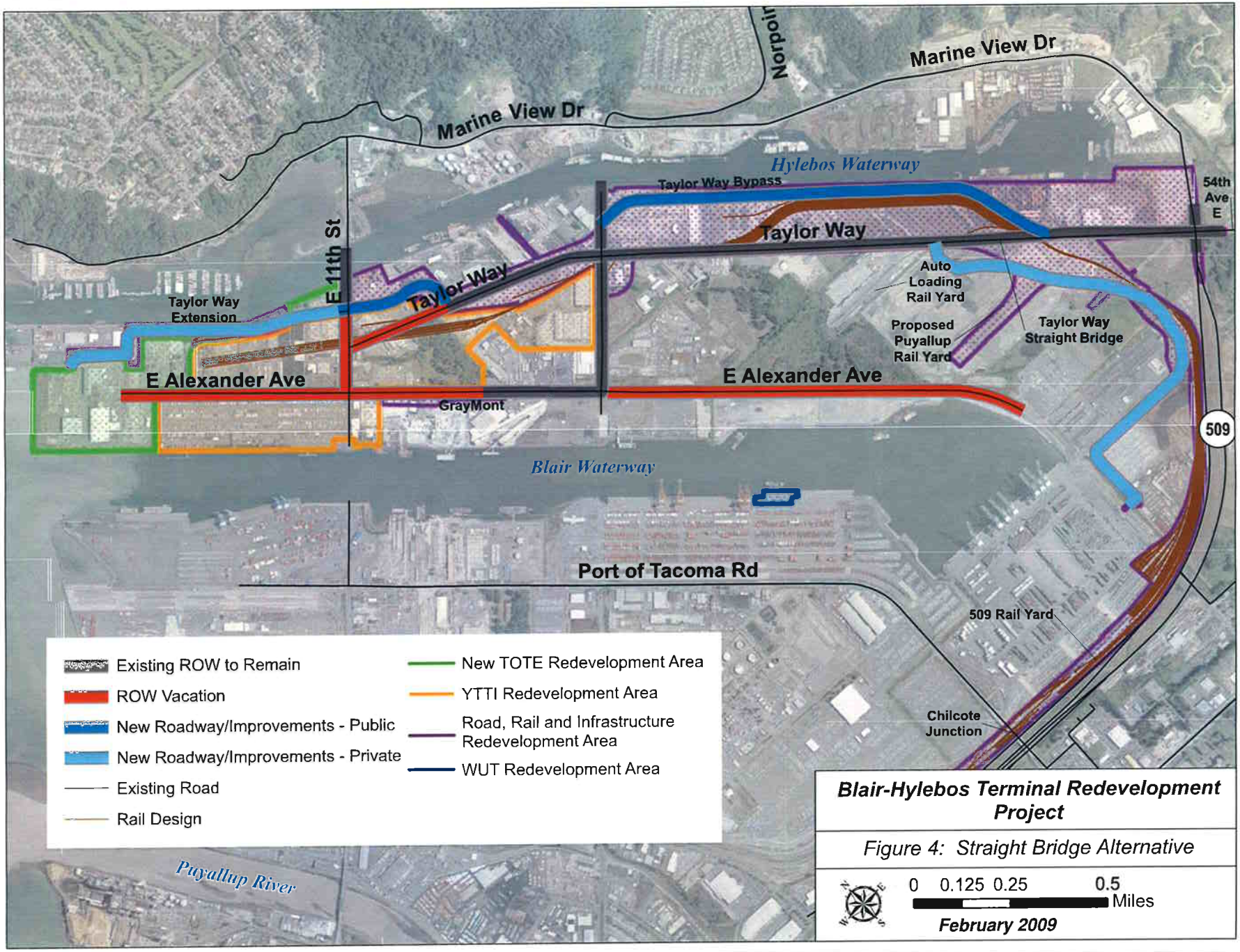
The primary benefit of Alternative 2 is the elimination an elevated intersection that would force surface traffic, much of which would be trucks, to stop on an incline.

1.4 Alternative 3 - No Action Alternative

The No Action Alternative includes the existing 48-acre TOTE Terminal (no relocation) and operation of a new 47-acre container terminal and a new 58-acre Break Bulk/Auto Terminal (Figure 5). The new container terminal is expected to have an annual throughput between 230,000 and 300,000 TEUs. Based on an e-mail from KPFF Engineers to the Port of Tacoma dated May 12, 2008, the Port assumes that eighty percent of the containers would be transported by rail, with the remaining 20 percent transported by truck. The new Break Bulk/Auto Terminal is expected to handle 78,000 autos per year and between 120,000 and 160,000 metric tons of break bulk cargo per year. The autos are assumed to be transported 75 percent by rail and 25 percent by truck. The break bulk cargo is assumed to be transported 10 percent by rail and 90 percent by truck.

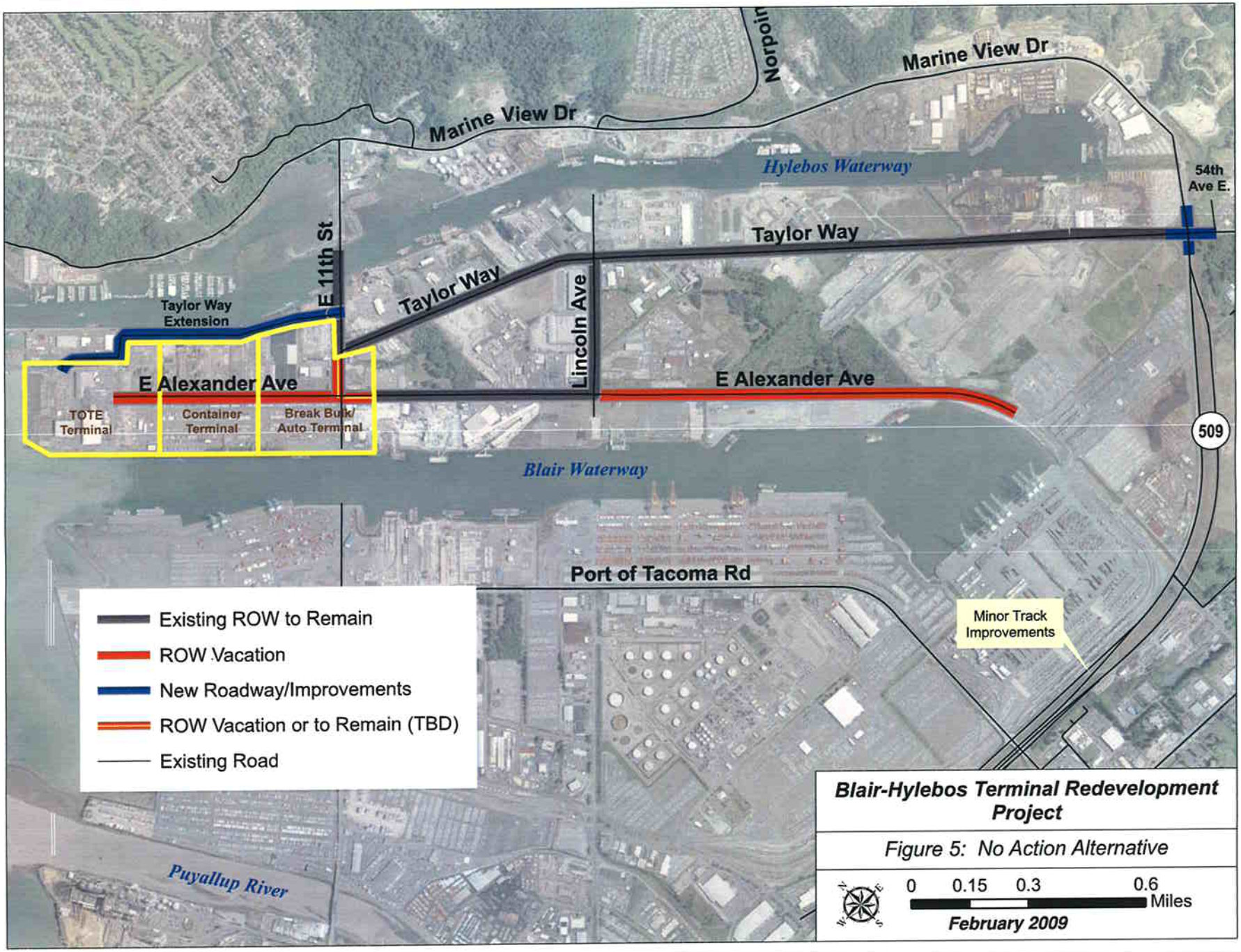
The No Action Alternative makes use of the existing roadway system but incorporates two elements from the Proposed Action: the SR 509/Taylor Way intersection expansion and Taylor Way modifications north of East 11th Street. The No Action Alternative also includes the construction of a traffic signal at 54th Avenue East/I-5 NB ramps as identified in previous Port environmental documents.

No change is anticipated to existing rail infrastructure, with the exception of minor upgrades to portions of the existing rail lines on the Blair Hylebos Peninsula. Service will be maintained to the existing rail-served properties.



Blair-Hylebos Terminal Redevelopment Project

Figure 4: Straight Bridge Alternative



Blair-Hylebos Terminal Redevelopment Project

Figure 5: No Action Alternative

2.0 Studies and Coordination

2.1 Study Methods

Existing transportation conditions, along with plans and development regulations associated with the alternatives, were analyzed. Existing transportation information was developed through site visits, review of recent aerial photography, and other secondary sources. The consistency of the proposal with adopted plans and development regulations was evaluated by reviewing comprehensive plans, and development regulations for the City of Tacoma and the City of Fife.

Key intersections were identified in consultation with the City of Tacoma and the City of Fife. Peak hour turning movement traffic counts were conducted at those intersections in late 2007 and early 2008. The counts are inflated at a rate of 2% per year (a typical growth rate factor which was discussed with both the City of Tacoma and the City of Fife) to derive the expected 2013 background traffic volumes. Known pipeline developments (listed in section 4.3) were added to the inflated traffic volumes to arrive at a baseline traffic condition.

Trip generation was estimated using information from the Port of Tacoma and the terminal designers and operators. The following assumptions utilized to estimate the trips are based on existing terminal operations in the Pacific Northwest, and reflect the best estimate of expected terminal operations.

- The TEU to container ratio is 1.80
- 70% of the containers travel via on-dock rail (30% by truck)
- The gates operate 5 days per week from 8AM-noon and from 1PM-5PM
- Truck volumes are increased by 110% to account for weekday peaks
- Truck volumes are increased by 120% to account for monthly peaks
- 20% of trucks would make double turns (arrive with a container and leave with a container)

The trip generation was validated against trip generation estimates for the "Port Terminals" land use from the Institute of Transportation Engineers (ITE) *Trip Generation 7th Edition.*

The terminal designers analyzed the arrivals and departures of truck trips throughout the day, based on expected operations of the terminal and typical arrival and departure rates identified for similar terminals in the Port of Tacoma – Tideflats Area Truck Volume and Route Study. Based on that analysis, it is estimated that 62 trucks will arrive and 138 trucks will depart the terminal during the PM peak hour.

The estimated number of employees expected to work at the YTTI terminal was provided by the terminal designers and is based on expected operation needs at the terminal. There is estimated to be 263 day shift (8:00 AM to 5:00 PM) and 216 night shift (6:00 PM to 3:00 AM) employees at the YTTI Terminal in 2013. It is expected that the day shift employees will arrive at the terminal between 7:30 AM and 8:00

AM and leave the terminal between 5:00 PM and 5:30 PM. The swing shift employees are expected to arrive at the terminal between 5:30 PM and 6:00 PM. Assuming, conservatively, that there are 2.25 trips per day per employee, the total daily employee trips would be 1,078 trips. The estimated PM peak employee trips are 132 occurring between 5:00 PM and 5:15 PM. The estimated PM Peak project trips are shown in Figure 12A and 12B.

Estimates of trips removed from the roadway system due to businesses displaced by the alternatives were based on the ITE *Trip Generation 7th Edition* in conjunction with employee information provided by the Port of Tacoma or building areas obtained from the Pierce County Assessor's website. Displaced trips for the No Action and Proposed Action are shown in Table 1.

Transportation Level of Service (LOS) was estimated using methodology in the 2000 *Highway Capacity Manual*. Input data for LOS analysis was obtained from the City of Tacoma, City of Fife and the Washington State Department of Transportation (WSDOT) records and field traffic counts.

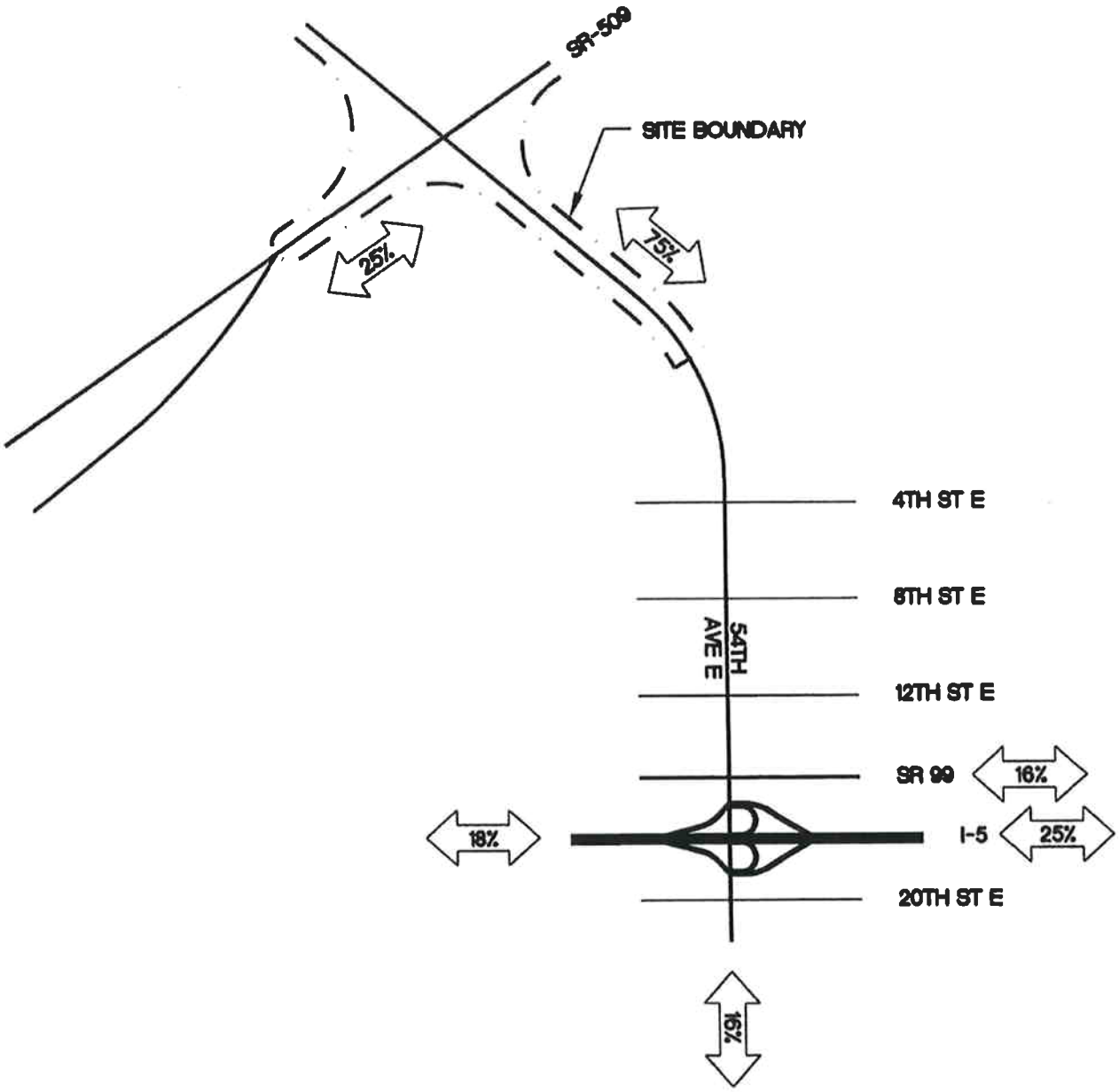
Trip distribution for trucks was derived from the Port of Tacoma – Tideflats Area Truck Volume and Route Study and the Traffic Analysis for the EB1 Terminal SEPA Checklist completed by the Port. Trip distribution for terminal employees was derived from Commute Trip Reduction survey data obtained from the City of Tacoma and was refined for this study based on comments from the Cities of Tacoma and Fife. The truck trip distribution is shown in Figure 6. The employee trip distribution is shown in Table 2.

LOS calculations for the PM Peak hour were performed using SYNCHRO 7 software employing *Highway Capacity Manual* methods. SYNCHRO7 provides intersection level analysis of traffic impacts at a detailed level not available in macro level modeling. The level of service along an arterial corridor is controlled by the individual intersections, since the intersections are the critical capacity constraints. The PM peak hour is the most concentrated, and thus the critical, period of the day. The PM peak hour for this analysis was determined to occur between 4:15 p.m. and 5:15 p.m.

Table 1: Displaced Trips				
Existing Business	Affected by No Action	Affected by Proposed Action	PM Peak Hour Trips	Average Daily Trips
Bob's Pier Tavern	Yes	Yes	67	670
Vance Lift Truck	Yes	Yes	7	50
Conastova Rovers	Yes	Yes	1	6
Trim Systems	Yes	Yes	2	11
Hercules Trucking	Yes	Yes	1	7
Willex	Yes	Yes	1	7
Atlas Foundry	Yes	Yes	1	2
Sand Lumber	Yes	Yes	1	2
Legacy Propane	Yes	Yes	5	32
Aleutian Yachts	Yes	Yes	25	149
Northcoast Yachts	Yes	Yes	11	64
Metalcraft Marine	Yes	Yes	5	32
Harris Rebar	Yes	Yes	18	107
Navy Reserve	Yes	Yes	30	75
American Fast Freight	Yes	Yes	33	412
Jesse Engineering	Yes	Yes	4	21
Total No Action			**212**	**1647**
One Reel		Yes	1	2
PQ Corporation		Yes	2	11
Seafarers Center		Yes	8	32
Rangar		Yes	3	35
City Delivery		Yes	1	7
BLC Trucking		Yes	1	7
Defiance Forest Products		Yes	1	4
Full Container Recovery		Yes	2	13
Glacier Packaging		Yes	3	17
Mapletex		Yes	2	11
Petroleum Reclaiming		Yes	4	26
EB1 Dray		Yes	43	750
Total Proposed Action			**283**	**2562**

Table 2: Employee Trip Distribution			
Route	SR 509 eastbound	SR 509 westbound	54th Ave E
Destination	NE Tacoma & Federal Way	I-5 SB, Kitsap peninsula, southwest Pierce County	I-5 NB, Fife, east Pierce County
Buffelen	0%	71%	29%
Port of Tacoma	4%	56%	40%
Recommended*	**5%**	**60%**	**35%**

*Based on recommendations from City of Tacoma and City of Fife



Blair-Hylebos Terminal Redevelopment Project

Figure 6: Truck Trip Distribution

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2.2 Agency Coordination

Consultations were conducted with the City of Tacoma, the City of Fife and WSDOT during early planning and analysis phases of the proposed project. A meeting was held with the City of Tacoma and the City of Fife on October 25, 2007, to present preliminary traffic modeling assumptions, intersections proposed to be analyzed and proposed roadway cross-sections. As a result of that meeting, additional intersections were identified to be analyzed (a total of 24 intersections are analyzed) and input was received from the cities regarding modeling and roadway design assumptions. A follow-up meeting was held on February 22, 2008, to present preliminary traffic modeling results and discuss more detailed roadway design issues. A meeting was held with WSDOT on January 24, 2008, to discuss potential roadway improvements related to the project.

2.3 Regulatory Context

2.3.1 Applicable Statutes and Regulations

Growth Management Act

The Washington State Legislature adopted growth management legislation in 1990 and 1991, and it has adopted subsequent amendments. The Growth Management Act (GMA) (RCW 36.70A.070) sets goals to guide planning in the larger, faster growing counties and cities. Pierce County and all the cities within Pierce County are subject to the full planning and regulatory requirements of GMA. The GMA requirements relevant to transportation include the following:

- Adopt local comprehensive plans, including a transportation element.
- Ensure that development regulations are consistent with comprehensive plans.
- Establish a process for siting essential public facilities, which cannot be precluded.

The GMA identifies the following goals to guide counties and cities in developing comprehensive plans and development regulations:

- Assure adequate public facilities and services at the time developments are completed (concurrency requirements).
- Provide economic development consistent with adopted comprehensive plans; encourage growth in areas of need.
- Provide efficient transportation systems based on regional priorities and coordinated county and city plans.
- Encourage development in urban areas where adequate public facilities and services exist or can be provided efficiently.

GMA-related Transportation Plans and Policies

Pierce County Planning Policies

To ensure cooperation between neighboring jurisdictions, each county planning under GMA is required to adopt countywide planning policies, formulated with and agreed upon by all of the cities in the county. These policies are the framework of the county's overall growth management strategy. Countywide planning policies are required to give direction for establishment of UGAs, preservation of natural resource plans and critical areas and siting of public capital facilities of a countywide or statewide nature, including transportation facilities and services of statewide significance. The following transportation services are considered countywide in nature (by Pierce County): state and federal highways; major arterials; public transit facilities and services; waterborne transportation; airports; and rail facilities. Countywide planning policies on transportation facilities and strategies relevant to the proposed project include the following as stated in the Pierce County Comprehensive Plan (Pierce County 2005):

9. The County, and each municipality in the County, shall address concurrency through the following methods:

    9.1 providing transportation facilities needed to accommodate new development within six years of development approval;

    9.2 limiting new development to a level that can be accommodated by existing facilities and facilities planned for completion over the next six years;

    9.3 encouraging new and existing development to implement measures to decrease congestion and enhance mobility through transportation demand and congestion management.

14. The County, and each municipality in the County, shall utilize the following transportation systems management measures to make the most efficient use of the existing roadway system.

    14.1 structural improvements;

    14.2 non-structural improvements.

Local Comprehensive Plans

Each county and city that plans fully under GMA must adopt a comprehensive plan consistent with countywide planning policies. Comprehensive plans designate urban and rural areas, natural resource lands, and critical areas. Local comprehensive plans including the cities of Tacoma and Fife are required to include the following elements: land use; housing; capital facilities; public utilities; rural areas (counties only); and transportation. Under the GMA, state agencies must comply with local comprehensive plans and development regulations. The City of Tacoma adopted its Comprehensive Plan in 2004 with amendments in 2007. The City of Fife adopted its current Comprehensive Plan in 2007.

Multi-county Planning Policies

Multi-county planning policies are required for King, Pierce, and Snohomish counties and their cities. Local governments in the multi-county region have agreed to use the Puget Sound Regional Council to develop and adopt regional planning policies and a subsequent regional transportation plan. This plan must be consistent with local comprehensive plans and countywide planning policies. The following

multi-county planning policies are relevant to the project and quoted from the Pierce County Comprehensive Plan (Pierce County 2007):

- Manufacturing Centers shall be designated based on consistency with specific criteria for Manufacturing Centers, consideration of the Center's location in the county and region, consideration of the total number of Manufacturing Centers in the county that are needed over the next 20 years, environmental analysis and adoption within the comprehensive plan of the Center's designation, and provisions to ensure that job growth targeted to the Manufacturing Center is achieved.
- Manufacturing Centers shall be characterized by clearly defined geographic boundaries; intensity of land uses sufficient to support alternatives to single-occupancy vehicle use; direct access to regional highway, rail, air and/or waterway systems for the movements of goods; provisions to prohibit housing; and identified transportation linkages to high density housing areas.
- Provisions to achieve targeted employment growth should include preservation and encouragement of the aggregation of vacant land parcels sized for manufacturing uses; prohibition of land uses which are not compatible with manufacturing, industrial, and advanced technology uses; limiting the size and number of offices and retail uses, and allowing only as an accessory use to serve the needs of employees within centers, and reuse and intensification of the land.
- Jurisdictions having a designated Manufacturing Center shall plan for and fund capital facility improvement projects which support the movement of goods, coordinate with utility providers to ensure that utility facilities are available to serve such centers, provide buffers around the Center to reduce conflicts with adjacent land uses, facilitate land assembly, and assist in recruiting appropriate businesses.

2.3.2 Transportation-related Permits and Approvals

State Permits and Approvals

Work on State Highways

Improvements necessary to mitigate impacts to state-owned transportation facilities (i.e., I-5, SR 509 and US 99) require design approval from WSDOT.

Local Permits and Approvals

City of Tacoma Municipal Code

Chapter 13.16 of the Tacoma Municipal Code (TMC) establishes the City's transportation concurrency requirements, including a concurrency test and associated resultant actions. LOS for roads and intersections are divided into three categories: (a) arterial connecting corridors; (b) port industrial area arterials; and (c) all other arterials and collectors on the transportation network not included in the first two categories.

Title 10 of the TMC establishes the City's authority to regulate public works design, construction and operation. This includes, but is not limited to, sidewalks and streets. Title 9 of the TMC establishes rules governing public rights-of-way, including streets, sidewalks, and railroads.

City of Fife Municipal Code

Chapter 20.25 of the Fife Municipal Code (FMC) establishes the process for calculating transportation impact fees, based upon the study entitled *Rate Study for Transportation Impact Fees* (DEA 2006). The payment of the impact fee is a condition of issuance of a building permit. Developments owned or operated by the City of Fife are exempt from the requirement for payment of impact fees.

Title 12 of the FMC includes standard specifications for road, bridge, and municipal construction, as well as right-of-way restrictions, street use standards, and street construction standards.

3.0 Affected Environment

3.1 Regional Setting

The project is located within the City of Tacoma in north Pierce County. The project site is located on Port of Tacoma property in between the Blair Waterway and Hylebos Waterway. The Port of Tacoma is the fifth largest container port in North America, serving local, regional, national, and international markets. Freight shipments into and out of the Port totaled nearly 1.74 million TEUs in 2003 (Tacoma 2007). This shipping activity generates a significant amount of truck traffic to and from Port facilities. I-5, which forms the spine of the regional transportation system and is the nation's major west coast highway, intersects the southern portion of the Transportation Study Area.

3.2 Project Setting

The majority of the project site, as shown in Figure 1, is occupied by industrial and light industrial facilities and some undeveloped parcels. Prior to development the peninsula was a tidal marsh crossed by tidal channels and tributary streams of the Puyallup River, Hylebos Creek and Wapato Creek. The peninsula was built and expanded to its present day elevation by filling the tideflats with material dredged to deepen and extend the waterways.

Portions of the site extend from the north[2] tip of the peninsula to SR 509 in the south, Hylebos Waterway in the east, and along Blair Waterway. The remainder of the site is between the Blair Waterway turning basin, SR 509 and PCT (at Alexander Avenue and SR 509) and also includes a portion of the WUT terminal on the west side of Blair Waterway.

The site encompasses most of the peninsula north of East 11th Street, the center portion of the peninsula between East 11th Street and Lincoln Avenue, and the eastern portion of the peninsula east of Taylor Way and south of Lincoln Avenue. The project also includes the area along the north side of SR 509 extending from Taylor Way to the PCT.

3.2.1 Existing Transportation Network and Conditions

Cities of Tacoma and Fife have established a hierarchy of arterial streets based upon three functional classifications.

1. Principal arterials are streets that move large volumes of traffic between major traffic generators and destinations.
2. Minor arterials are streets that move traffic from higher classification arterials to lesser arterials.
3. Collector arterials are streets that move traffic from arterials to local access streets.

[2] For the purposes of this project the north/south axis is assumed to be parallel to Blair Waterway.

Principal Arterials

Port of Tacoma Road

Port of Tacoma Road (POTR) consists of a five lane roadway with concrete curb and gutter on both sides. The channelization consists of two lanes of traffic in each direction with a center turn lane. The grade is relatively flat, with the exception of the overpasses at SR 509 and at I-5. There are intermittent cement concrete sidewalks on both sides of the roadway. There is no on-street parking. The speed limit is 40 miles per hour (mph) from East 11th Street to the south city limits.

Marine View Drive

Marine View Drive consists of a five lane roadway with concrete curb and gutter on both sides. The channelization consists of two lanes of traffic in each direction with a center turn lane. The grade is relatively flat. There are cement concrete sidewalks on both sides of the roadway. There is no on-street parking. The speed limit is 40 mph from East 11th Street to Taylor Way.

East 11th Street

East 11th Street consists of a five-lane roadway with concrete curb and gutter on both sides. The channelization consists of two lanes of traffic in each direction with a center turn lane. The grade is relatively flat, with the exception of the approach to the Hylebos Bridge. The Hylebos Bridge is currently closed to traffic, but is planned to reopen in 2010. There are no sidewalks. There is no on-street parking. The speed limit is 35 mph from Alexander Avenue to Marine View Drive.

SR 509

SR 509 is a divided highway from downtown Tacoma to approximately 530 feet west of Taylor Way. The channelization consists of two lanes of traffic in each direction, widening to accommodate turn lanes at the at-grade intersections. The grade is relatively flat east of Milwaukee Way. There are no sidewalks or on-street parking. There is a bike lane in each direction. The speed limit is 50 mph from Milwaukee Way to just west of Taylor Way and 40 mph from just west of Taylor Way to Marine View Drive.

Pacific Highway East (US Highway 99)

Pacific Highway East consists of a five-lane roadway with concrete curb and gutter on both sides. The channelization consists of two lanes of traffic in each direction with a center turn lane. The grade is relatively flat. There are cement concrete sidewalks on both sides of the roadway. There is no on-street parking. The speed limit is 35 mph.

54th Avenue East

54th Avenue East consists of a five-lane roadway with concrete curb and gutter on both sides. The channelization consists of two lanes of traffic in each direction with a center-turn lane. The grade is relatively flat, with the exception of the overpass at I-5. There are cement concrete sidewalks on both sides of the roadway. There is no on-street parking. The speed limit is 35 mph.

70th Avenue East

70th Avenue East consists of a two to three-lane roadway with gravel shoulders on both sides. The channelization consists of two lanes of traffic in each direction with a left turn lane at the intersections.

The grade is flat. There are no sidewalks on either side of the roadway. There is no on-street parking. The speed limit is 35 mph.

Minor Arterials

Taylor Way

Taylor Way consists of a three-lane roadway with concrete curb and gutter on both sides, south of Lincoln Avenue, widening to five lanes at its intersection with SR 509. The channelization consists of one lane of traffic in each direction with a center turn lane. The grade is relatively flat. There are no sidewalks or on-street parking. The speed limit is 40 mph.

North of Lincoln Avenue, Taylor Way is a two-lane roadway with concrete curb and gutter on both sides. The grade is relatively flat. There are cement concrete sidewalks on the west side. There is no on-street parking. The speed limit is 30 mph.

Collector Arterials

East Alexander Avenue south of Lincoln Avenue is a two-lane roadway with no curbs and no shoulders. The grade is relatively flat. There are no sidewalks. There is no on-street parking. The speed limit is 40 mph. A portion of Alexander Avenue was recently vacated and is gated at a point north of the Pierce County Terminal access. The gate can be opened in the case of emergency.

Alexander Avenue north of Lincoln Avenue consists of a two-lane roadway with no curbs and 10-foot paved shoulders. The grade is relatively flat. There are no sidewalks. The speed limit is 35 mph.

Lincoln Avenue

Lincoln Avenue, between Alexander Avenue and Taylor Way, consists of a two-lane roadway with concrete curb and gutter, widening to three lanes at its intersection with Taylor Way. The grade is relatively flat. There are no sidewalks and no on-street parking. The posted speed limit is 35 mph.

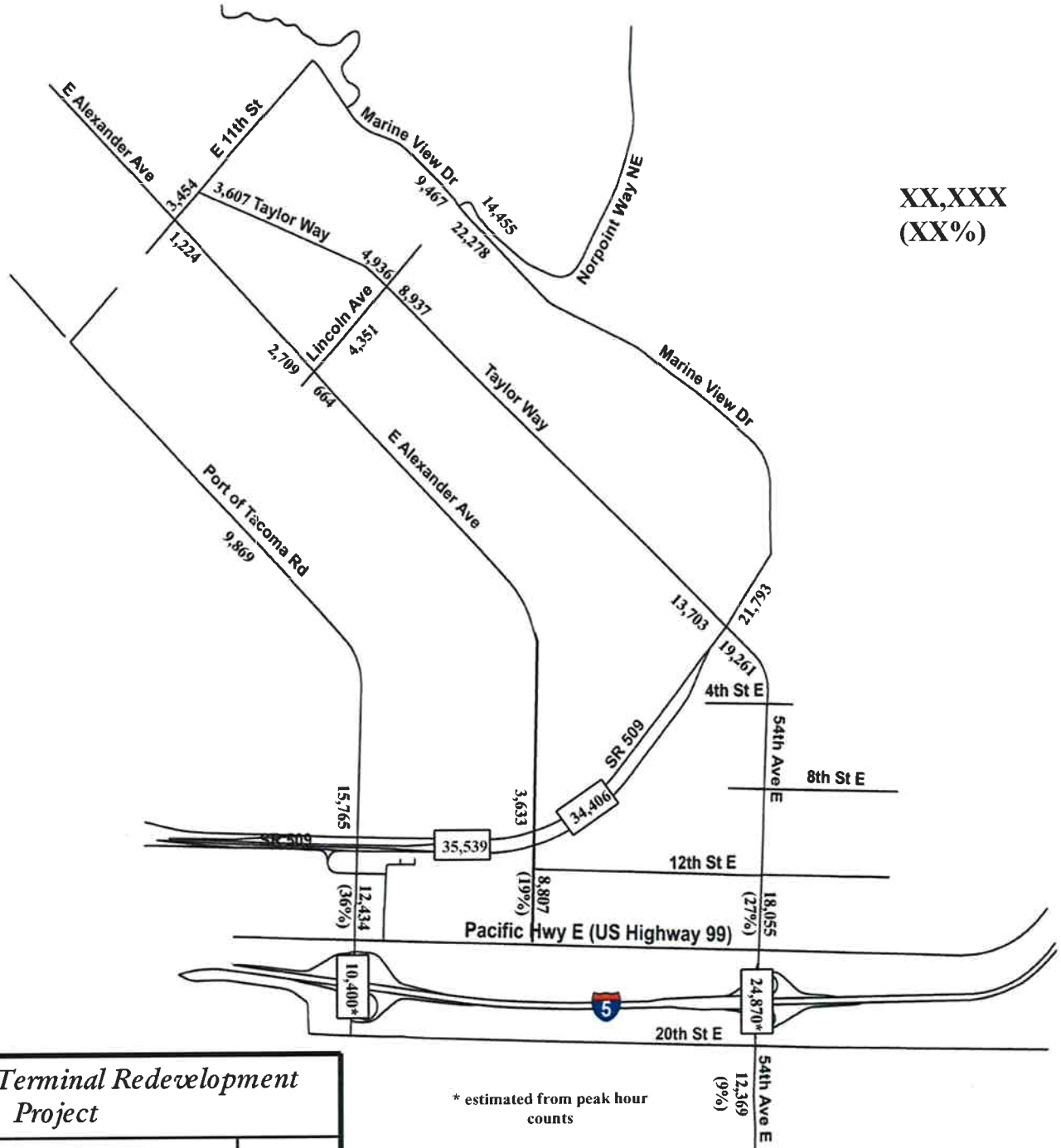
3.2.2 Existing Traffic Volumes

Figure 7 shows the average daily traffic for study area roadways. Daily traffic counts were obtained from City of Tacoma, City of Fife, and WSDOT records and from recent field studies. Where daily traffic data was not available from 2007 or 2008, the traffic volumes were estimated by applying a 2 percent per year growth factor to the earlier counts. Where available, truck percentages are shown.

PM peak hour traffic volumes were collected at the study area intersections in late 2007 and early 2008. The existing PM peak hour turning movement counts are shown in Figures 8A and 8B.

3.2.3 Existing Levels of Service

LOS is a qualitative measure used to characterize traffic operating conditions. The transportation LOS system uses the letters A through F, with A being best traffic operations and little or no delay to motorist; and F being worst with congestion and long traffic delays. Existing LOS for each key intersection in the study area is identified in Table 3.



XX,XXX Average Daily Traffic
(XX%) Percent Trucks

* estimated from peak hour counts

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Figure 7: Existing Average Daily Traffic

February 2009

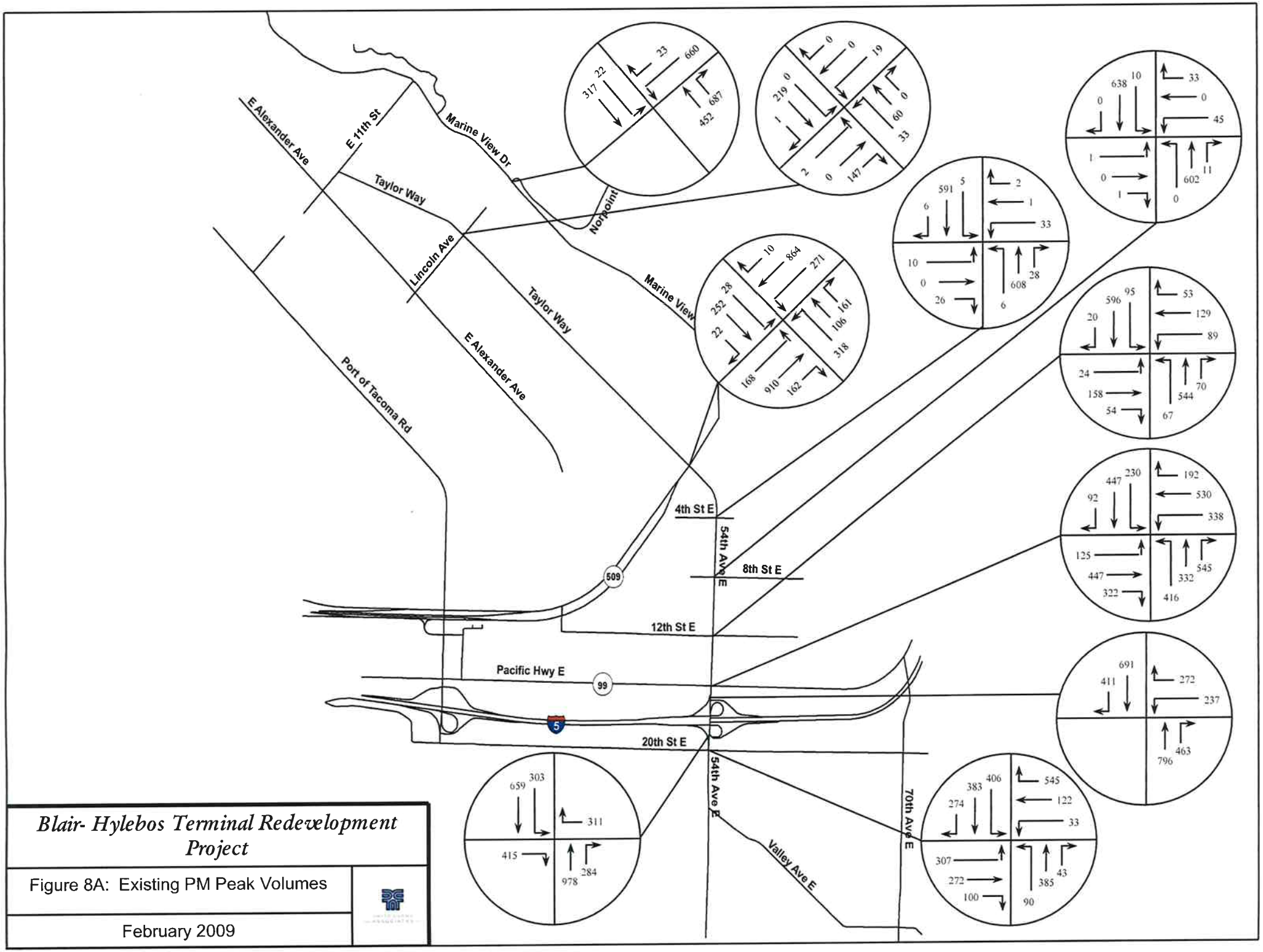

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Figure 8A: Existing PM Peak Volumes

February 2009

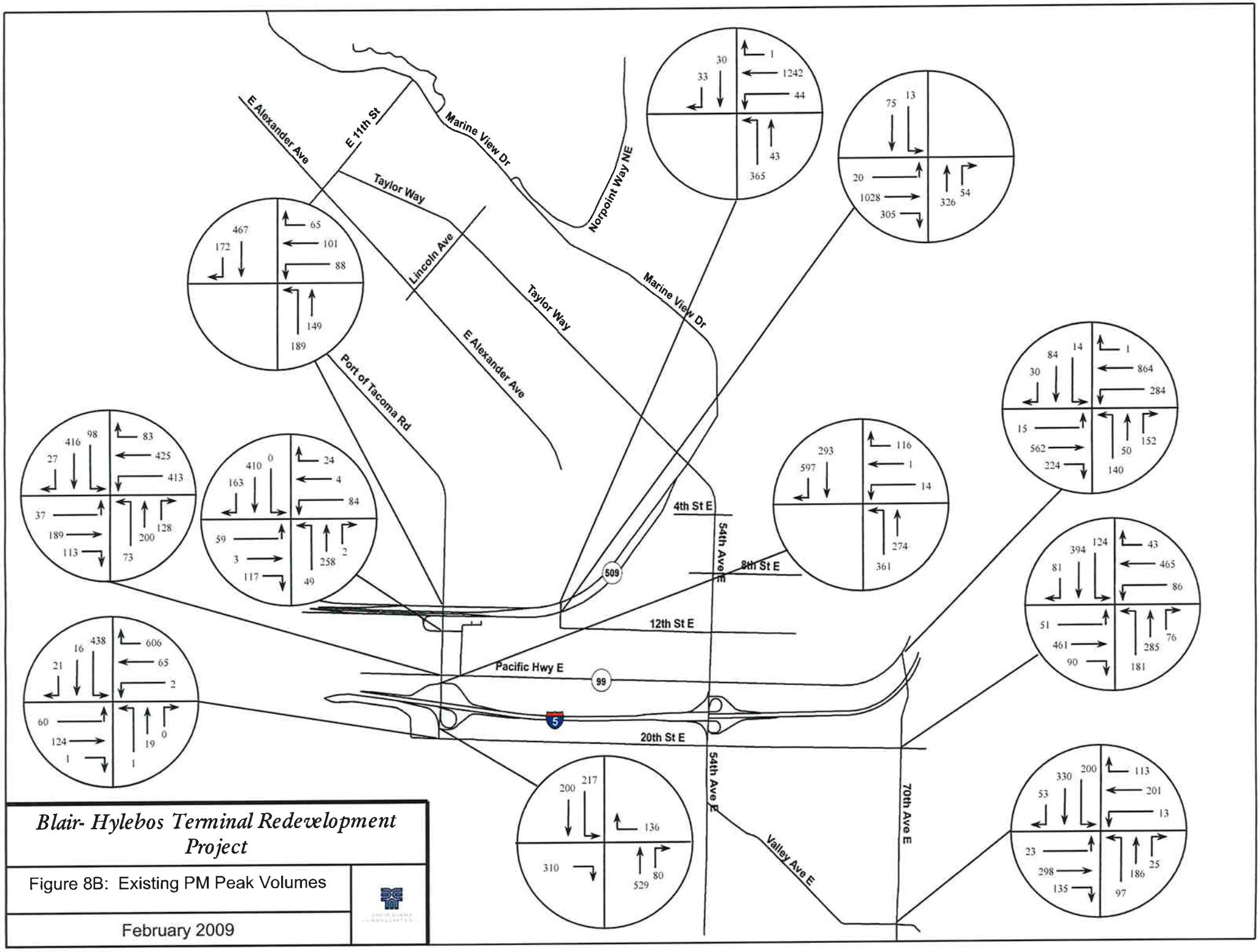

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Figure 8B: Existing PM Peak Volumes

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Table 3: 2008 LOS during PM Peak Period

Intersections	Traffic Control	LOS	Delay
SR 509/Taylor Way	Signal	E	71
54th Ave E/4th St	Stop	E-WB*	36
54th Ave E/8th St	Signal	A	7
54th Ave E/12th St	Signal	B	14
54th Ave E/SR 99	Signal	F*	125
54th Ave E/I-5 SB	Signal	B	15
54th Ave E/I-5 NB	Stop	F-EB*	111
54th Ave E/20th St	Signal	D	47
Alexander/North Frontage Rd	Signal	C	28
Alexander/South Frontage Rd	Signal	B	20
Marine View Dr/Norpoint	Signal	B	16
POTR/North Frontage Rd	Signal	C	35
POTR/12th St	Signal	D	47
POTR/SR 99	Signal	E*	67
POTR/I-5 SB	Signal	C	25
POTR/I-5 NB	Stop	B-EB	13
POTR/20th St	Stop	F-EB*	**
Lincoln Avenue/Taylor Way	Signal	B	10
E 11th St/Taylor Way	Stop	A	8
70TH Ave E/SR 99	Signal	D	50
70th Ave E/20th St E	Signal	E*	66
70th Ave E/Valley Ave E	Signal	E*	65

*intersection does not meet Fife LOS standard (LOS D)

** Synchro was unable to calculate the delay

The City of Tacoma LOS standard requires that 85% of the arterial lane-miles within the Port area must exhibit a LOS D or better.. The City of Fife has adopted an LOS standard of D for all local roadways.

3.2.4 Traffic Safety

Traffic collision data was obtained from the City of Tacoma, the City of Fife and WSDOT for the study area for 2005, 2006, and 2007. Table 4 shows the collision summary for the study area for intersection and non-intersection collisions.

Table 4: Collision Summary

	Total Collisions			Injury Collisions		
	2005	2006	2007	2005	2006	2007
Intersection Collisions						
Lincoln/Taylor Way	1	0	0	1	0	0
SR 509/Taylor Way	2	3	0	1	1	0
SR 509/Alexander	8	12	14	1	2	6
MVD Norpoint	6	4	3	1	0	0
54th Ave E/4th	0	2	0	0	2	0
54th Ave E/8th	0	0	0	0	0	0
54th Ave E/12th	0	3	3	0	2	1
54th Ave E/SR 99	7	10	7	1	4	1
54th Ave E/I-5 SB	0	3	2	0	1	1
54th Ave E/I-5 NB	0	1	0	0	0	0
54th and 20th	3	7	4	1	0	1
POTR/12th	0	0	1	0	0	0
POTR/SR 99	4	5	0	1	0	0
POTR/I-5 SB	1	1	0	1	0	0
POTR/I-5 NB	0	0	0	0	0	0
POTR and 20th	1	2	0	0	0	0
Non Intersection Collisions						
54th Ave E	20	28	25	1	3	3
POTR	15	16	13	4	3	2
Taylor Way	6	5	3	2	2	1
E Alexander Ave	2	0	2	1	0	0
Marine View Dr	20	30	9	6	11	2

There were no fatality accidents in the study area in 2005, 2006, or 2007. For those collisions where detailed information is available, approximately 55 percent involved drivers that were cited for such offenses as speeding, negligent driving, and improper lane travel. Approximately 20 percent involved single-vehicle collisions with fixed objects, and approximately 15 percent involved rear-end collisions. These collisions are most likely due to driver inattention or negligence and do not indicate the existence of a roadway design deficiency.

Emergency vehicles accessing the peninsula travel through the SR 509 and Taylor Way intersection to access the majority of the peninsula. In order to access parcels on the south end of Alexander Avenue, they need to follow the route along Taylor Way, Lincoln Avenue and Alexander Avenue. This adds over 3 miles and approximately 4 minutes to their trip. An alternative route is available, if necessary, via SR 509 and Alexander Avenue through an emergency gate which blocks Alexander Avenue just north of PCT.

3.2.5 Pipeline Transportation Projects

Expected by 2013

Hylebos Bridge

The Hylebos Bridge is one of two key transportation routes off the peninsula and connects East 11th Street with Marine View Drive. The Bridge was constructed in 1939 and is currently inoperable due to a mechanical failure in 2001. Funds have been dedicated to upgrade the existing mechanical and electrical equipment, replace existing approach ramps, repair structural components, and improve the existing stormwater drainage. Improvement plans do not include increasing bridge capacity. The proposed improvements are funded and are scheduled for completion in 2010. Therefore, this analysis assumes the Hylebos Bridge is operational by 2013.

70th Ave E/Valley Avenue E Intersection Improvement

The intersection of 70th Avenue East/Valley Avenue East will be widened in conjunction with a street improvement project in 2009 or 2010. The south and east leg will be widened to five lanes with left turn lanes. The north leg will be widened to six lanes with two left turn lanes. The west leg will remain in its current configuration.

Expected after 2013

34th Avenue East/12th Street East

The City of Fife, in conjunction with WSDOT, is considering improvement of 34th Avenue East and 12th Street East to ease traffic impacts at the intersection of POTR and SR 99. The proposed improvements include the installation of a traffic signal at the intersection of 34th Avenue East and SR 99. Also proposed is a modification of the SB Port of Tacoma Road off-ramp from I-5 to allow freeway traffic direct access to the proposed signal. The proposed improvements have not been included in this analysis because the design has not begun, the project is not fully funded, and the construction schedule has not been determined. Although the impacts of the proposed improvements are not yet known, it is expected that the project will eventually improve operation of the intersection of POTR and SR 99.

SR 167

WSDOT proposes to construct a limited access highway from SR 509 to the current southerly terminus of the limited access portion of SR 167 in Puyallup. A Tier II EIS has been completed for this project and preliminary design is currently underway. There is no construction funding identified for this project; therefore, this project is not considered in this traffic analysis for 2013. When SR 167 is constructed, it is expected that a significant portion of the Port of Tacoma's truck traffic will use the new facility, which is expected to improve traffic operations at many of the intersections analyzed in this report.

3.2.6 Freight

Truck Traffic and Routes

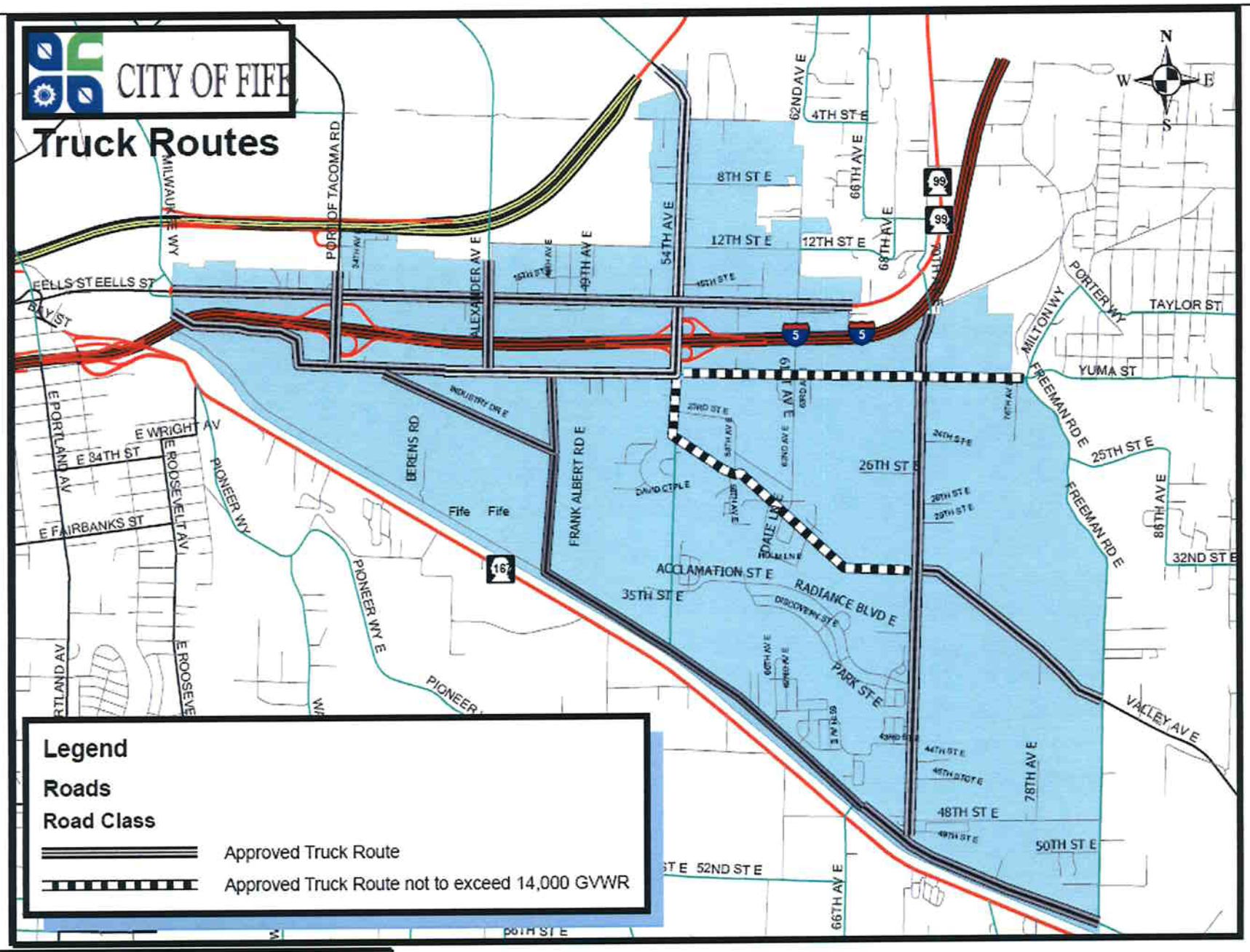
Within the city of Tacoma, a number of principal, minor, and collector arterials are designated as "heavy haul industrial corridors" (TMC 11.55). In the project study area, these include East 11th Street, Alexander Avenue north of East 11th Street, POTR, and Taylor Way. Each heavy haul corridor serves as

a key connection for truck traffic traveling internally between the Port's marine terminals and other industrial areas within the heavy haul zone.

Truck traffic accesses the peninsula via the intersection of Taylor Way and SR 509. A secondary access will be available via the Hylebos Bridge when it is reopened in 2010, although this bridge is only load rated for HS-15 vehicles. For purposes of this analysis, truck traffic from the peninsula is not expected to use the reopened Hylebos Bridge since that route is longer than using Taylor Way. Most trucks are destined for I-5; following the Hylebos Bridge access would result in a longer, more circuitous route to I-5 for trucks. Truck traffic accesses WUT via Port of Tacoma Road.

The City of Fife has identified truck routes within the city (Figure 9). The truck routes are classified according to allowable gross vehicle weight.

New truck counts and travel route data have been collected as part of the *Port of Tacoma - Tideflats Area Truck Volume and Route Study* (Heffron Transportation, Inc. 2007). Data was collected using video cameras at 13 stations (37 individual movements) surrounding the Port area. The camera recorded traffic flows from 6:00 a.m. to 6:00 p.m. from December 4 through 8, 2006. Seven types of trucks were observed: trucks with shipping containers; trucks with empty chassis; bobtails; auto carriers; logging trucks; non-container semi trucks; and other non-Port trucks (delivery vans, concrete trucks, etc.) Based on the data, both volume and percentage of trucks (between 8 to 12 percent of daily traffic) entering and leaving the Port is highest during the middle of the day (8:00 a.m. to 4:00 p.m.). The highest percentage of trucks (11.4 percent) occurs between 11:00 a.m. and noon. The percentage of trucks is approximately equal (6 percent) in the morning commute period (7:00 a.m. to 8:00 a.m.) and in the evening commute period (4:00 p.m. to 5:00 p.m.). During the study period, approximately 18 percent of the Port related truck trips originated from the south on I-5 and approximately 42 percent of the trips originated from the north on I-5. Approximately 32 percent of the trucks accessing the overall Port industrial area used Port of Tacoma Road and 15 percent used 54th Avenue East.



Blair- Hylebos Terminal Redevelopment Project

Figure 9: City of Fife Truck Routes

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3.2.7 Rail Facilities

Rail facilities on the peninsula consist of industrial rail lines serving a number of parcels. All rail line crossings of the existing roadways are at-grade crossings. None of the crossings are controlled by crossing signals. Tacoma Rail Tideflats Division operates all trains on the peninsula. Although some train activity is conducted at night, there are times during the day that trains occupy the at-grade crossings, resulting in vehicle delays that are typical of a port industrial area.

3.2.8 Transit

Pierce Transit provides transit service to the project vicinity. There is one regular route that circulates within the Port (Route 60) and several routes that pass near the Port on SR 509 or through Fife (Routes 61, 500, and 501). Route 60 originates in downtown Tacoma and makes four stops in the Port area. Route 61 serves Northeast Tacoma and Federal Way, Route 500 serves Fife and Federal Way, and Route 501 serves Fife, Milton, and Federal Way. Transit routes and stops near the study area are illustrated in Figure 10.

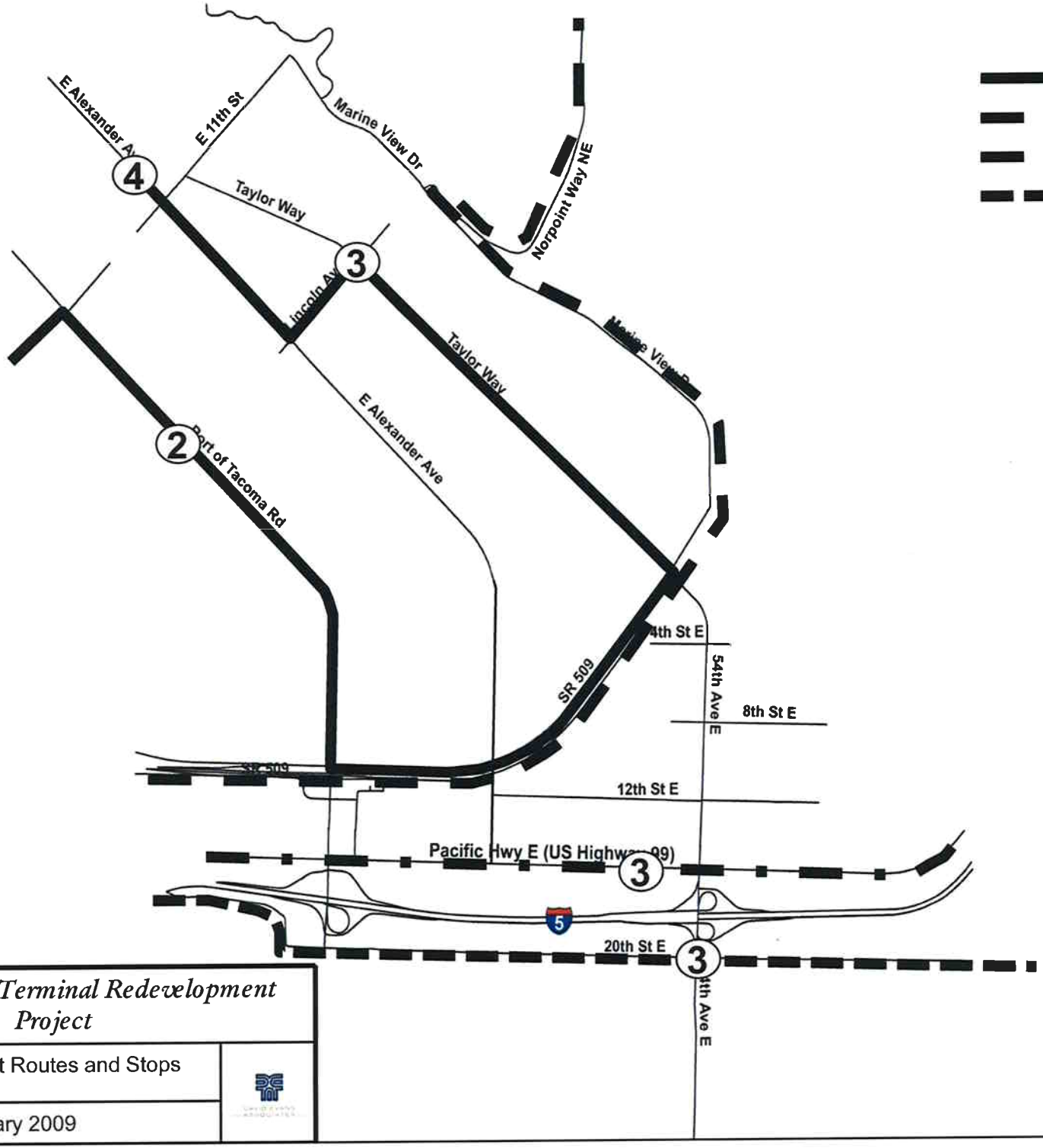
3.2.9 Non-motorized Facilities

There is very little pedestrian traffic and limited sidewalks existing on the peninsula. Where there are no sidewalks, pedestrians typically use the shoulder area of the public streets. There are currently no planned sidewalk improvements on the peninsula. Section 3.2.1 identifies existing sidewalks.

There is very little bicycle activity and no bicycle lanes on the peninsula. The City of Tacoma Comprehensive Plan identifies planned bicycle lanes on Alexander Avenue (including that portion previously vacated by the City of Tacoma) and East 11th Street. No funding is identified for construction of those bicycle lanes.

3.2.10 Parking

City of Tacoma Municipal Code requires parking and loading spaces typically based on gross floor area of improvements in the study area. Generally, there are adequate parking and loading spaces provided on site for most parcels in the study area. There are some industrial parcels, such as Schnitzer Steel and WUT terminal, which currently experience periods where vehicles awaiting access to the sites queue on city streets. In addition, there are streets and freeway ramps within the cities of Tacoma and Fife which experience unwanted truck parking. Some of the unwanted parking has been controlled by posting and enforcing no parking restrictions on certain streets.



Blair- Hylebos Terminal Redevelopment Project

Figure 10: Transit Routes and Stops

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4.0 Environmental Effect Assessment

4.1 Effects during Construction

Traffic volumes attributed to project construction will include contractor employee vehicles and construction vehicles typically associated with construction on an industrial site. In addition, the Proposed Action will require an estimated 1.1 million cubic yards of fill. Most of that fill will be brought in by barge or rail. It is assumed that up to 20% of the fill may be brought in by trucks. This will result in approximately 220,000 cubic yards of fill by truck, or 11,000 trucks (22,000 trip ends). It is anticipated that the majority of fill will be imported during the first construction season, resulting in an estimated 260 trucks per day, or 32 trucks per hour (assuming four months of hauling at 8 hours per weekday). This will be less than the 271 daily truck trips from peninsula businesses displaced by the Proposed Action, and will therefore have no negative impact on traffic operations. Construction sites will employ best management practices to minimize tracking of debris onto public roads.

Traffic impacts as a result of construction of the proposed road and rail transportation improvements may occur, such as lane reductions and periodic vehicle delays. The Port will work with the City of Tacoma during the permit process to identify and minimize those impacts. Any roadway closures or lane reductions will need to be approved by the City of Tacoma. Any access interruptions to occupied parcels during construction will be coordinated with the affected businesses to minimize impacts.

4.2 Effects during Operation

The Proposed Action, Straight Overpass and Lincoln Overpass alternatives include improvements to existing roadways as well as the construction of new roadway infrastructure.

The Proposed Action will create the following two new intersections:

- Taylor Way Overpass/Taylor Way
- Lincoln Bypass/Lincoln Avenue

The Straight Overpass Alternative will create the following two new intersections:

- Taylor Way /PCT Access Road
- Lincoln Bypass/Lincoln Avenue

The Lincoln Overpass Alternative will create the following new intersections:

- Lincoln Overpass/Taylor Way Bypass
- Lincoln Overpass/Lincoln Bypass
- Lincoln Bypass/Lincoln Avenue

The operational effects of each alternative, including the No Action Alternative, are discussed throughout the remainder of this section.

4.2.1 Level of Service

Table 5 provides a comparison of 2013 LOS between the three alternatives during the PM peak period. "2013 with current land uses" is the same as No Action, except that it assumes the existing land uses continue on the BHTRP site. This scenario is included to illustrate that the No Action is a more appropriate 2013 base condition, since the No Action alternative generates fewer trips than are displaced from the BHTRP site.

Table 5: Comparison of 2013 LOS during PM Peak Period

Intersection	2013 with current land uses		No Action		Proposed Action		Straight Overpass		Lincoln Overpass	
	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
SR 509/Taylor Way[1,3]	E	59	E	56	E	67	E	67	E	67
54th Ave E/4th St[2,4]	F-WB*	67	F-WB*	55	F-WB*	74	F-WB*	74	F-WB*	74
54th Ave E/8th St[2,3]	A	7	A	7	A	7	A	7	A	7
54th Ave E/12th St[2,3]	B	13	B	13	B	13	B	13	B	13
54th Ave E/SR 99[2,3]	F*	168	F*	163	F*	180	F*	180	F*	180
54th Ave E/I-5 SB[2,3]	C	27	C	27	C	26	C	26	C	26
54th Ave E/I-5 NB[2,3]	C	32	C	31	D	41	D	41	D	41
54th Ave E/20th St[2,3]	D	48	D	48	D	49	D	49	D	49
Alexander/North Frontage Rd[1,3]	C	33	C	33	C	21	C	21	C	21
Alexander/South Frontage Rd[1,3]	B	19	B	19	B	20	B	20	B	20
MVD and Norpoint[1,3]	C	22	C	22	C	22	C	22	C	22
POTR/North Frontage Rd[1,3]	C	33	C	33	C	33	C	33	C	33
POTR/12th St[1,3]	D	40	D	40	D	40	D	40	D	40
POTR/SR 99[2,3]	E*	69	E*	69	E*	69	E*	69	E*	69
POTR/I-5 SB[2,3]	C	22	C	22	C	22	C	22	C	22
POTR/I-5 NB[2,4]	B-EB	14	B-EB	14	B-EB	14	B-EB	14	B-EB	14
POTR/20th St[2,4]	F-EB*	**	F-EB*	**	F-EB*	**	F-EB*	**	F-EB*	**
Lincoln Ave/Taylor Way[1,3]	B	10	B	11	B	12	B	12	B	12
E 11th St/Taylor Way[1,4]	A	8	A	8	A	8	A	8	A	8
Lincoln Bypass/Lincoln Ave[1,4]	-	-	-	-	-	-	-	-	B	13
Lincoln Bypass/Lincoln Overpass[1,4]	-	-	-	-	-	-	-	-	C	16
Taylor Bypass/Lincoln Overpass[1,4]	-	-	-	-	-	-	-	-	C	18
Taylor Way/Taylor Overpass[1,4]	-	-	-	-	C	20	-	-	-	-
Taylor Way/PCT Access Road[1,4]	-	-	-	-	-	-	C	17	-	-
70th Ave E /SR 99[2,3]	F*	101	F*	98	F*	109	F*	109	F*	109
70th Ave E/20th St E[2,3]	E*	68	E*	69	E*	74	E*	74	E*	74
70th Ave E/Valley Ave E[2,3]	D	38	D	38	D	38	D	38	D	38

* Intersection does not meet Fife LOS standard (LOS D)
** Synchro was unable to calculate the delay
[1] Tacoma intersection
[2] Fife intersection
[3] Signal control
[4] Stop control

The No Action Alternative is expected to generate 481 new daily trips (296 trucks and 185 autos) and displace 1647 daily trips (247 trucks and 1,400 autos). This is a net increase of 49 trucks and a net decrease of 1,215 automobiles. The expected PM peak traffic with the No Action Alternative is shown in Figures 11A and 11B. The decreased LOS as compared to existing conditions for some intersections is due to expected growth of background traffic (2 percent per year from 2008 to 2013) and the addition of pipeline projects. The intersections of 54th Ave E/4th St E, 54th Ave E/SR 99, Port of Tacoma Road/SR 99, Port of Tacoma Road/20th Street E, 70th Avenue E/SR 99, and 70th Avenue E/20th Street E are below the City of Fife standard of LOS D for all future scenarios. The BHTRP project has no impact on the intersections of Port of Tacoma Road/SR 99 and Port of Tacoma Road/20th Street E. The BHTRP project increases delay at the other intersections.

The Proposed Action, Lincoln Overpass Alternative and Straight Overpass Alternative are expected to generate 3,902 new daily trips (2,824 trucks and 1,078 autos) and displace 2,562 daily trips (1,021 trucks and 1,541 autos). The displaced trucks include those trucks from displaced businesses as well as 750 trucks attributed to the elimination of the EB1 Terminal dray to off-peninsula intermodal yards (the Traffic Analysis for the EB1 Terminal SEPA Checklist completed by the Port identified truck trips associated with transportation of containers between the proposed EB1 Terminal and the existing intermodal yards on Port of Tacoma Road; these trips would be unnecessary with the construction of the rail tracks included in the Proposal and Lincoln Overpass Alternative, and are, therefore, eliminated from the net trip total). This is a net increase of 1,803 trucks and a net decrease of 463 automobiles. The expected PM peak traffic with the Proposed Action is shown in Figure 13A and 13B. The expected PM peak traffic with the Lincoln Overpass Alternative is shown in Figure 14A and 14B. The expected PM peak traffic with the Straight Overpass Alternative is shown in Figure 15A and 15B. There is no net reduction in LOS at any of the study intersections as compared to the No Action Alternative , except for 54th Ave E/I-5 NB which drops from LOS C to LOS D (see Table 5). The intersections of 54th Ave E/4th St E, 54th Ave E/SR 99, Port of Tacoma Road/SR 99, Port of Tacoma Road/20th Street E, 70th Avenue E/SR 99, and 70th Avenue E/20th Street E are below the City of Fife standard of LOS D for all future scenarios. The BHTRP project has no impact on the intersections of Port of Tacoma Road/SR 99 and Port of Tacoma Road/20th Street E. The BHTRP project increases delay at the other intersections.

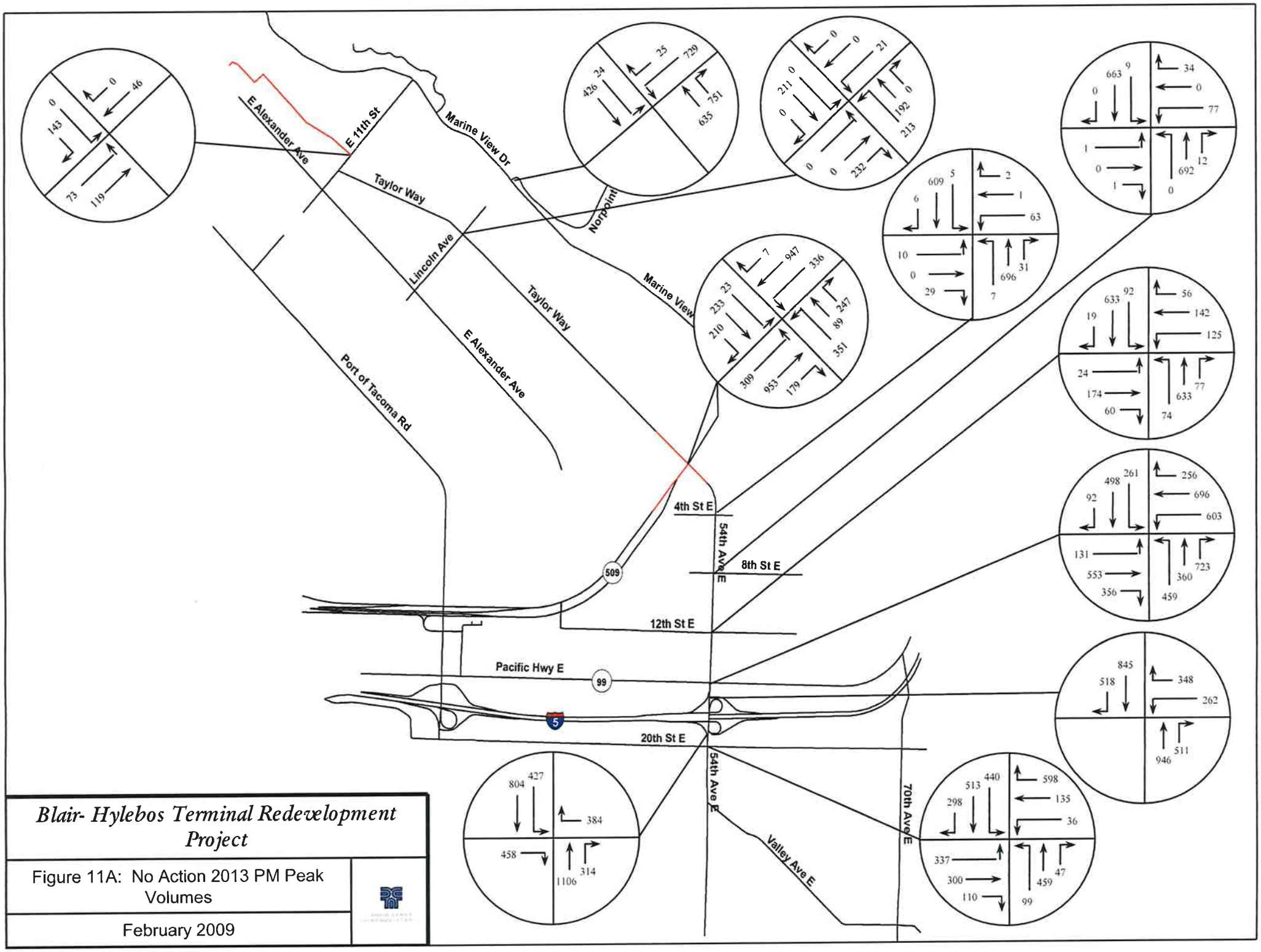

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Figure 11A: No Action 2013 PM Peak Volumes

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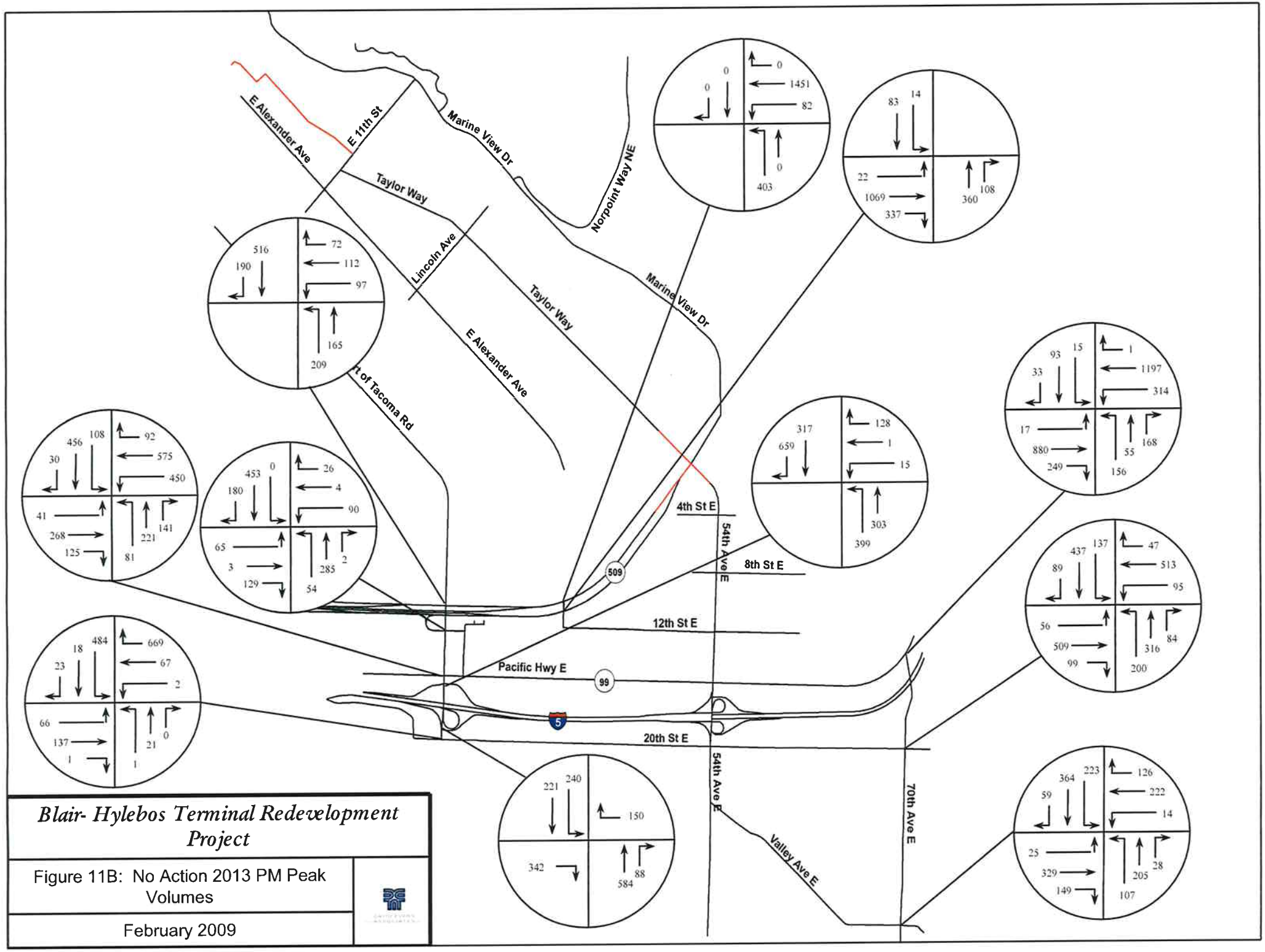

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Figure 11B: No Action 2013 PM Peak Volumes

February 2009

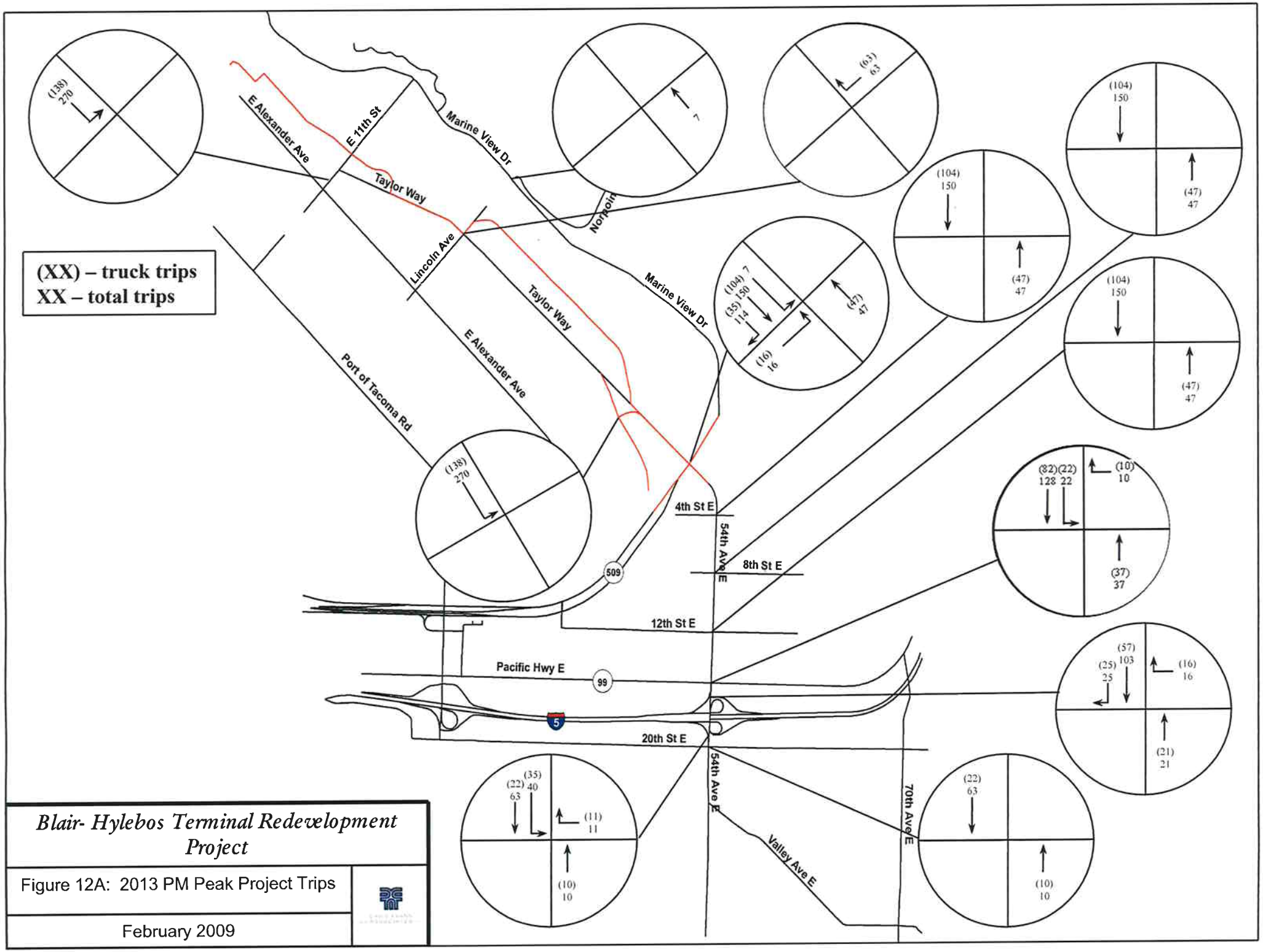

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Figure 12A: 2013 PM Peak Project Trips

February 2009

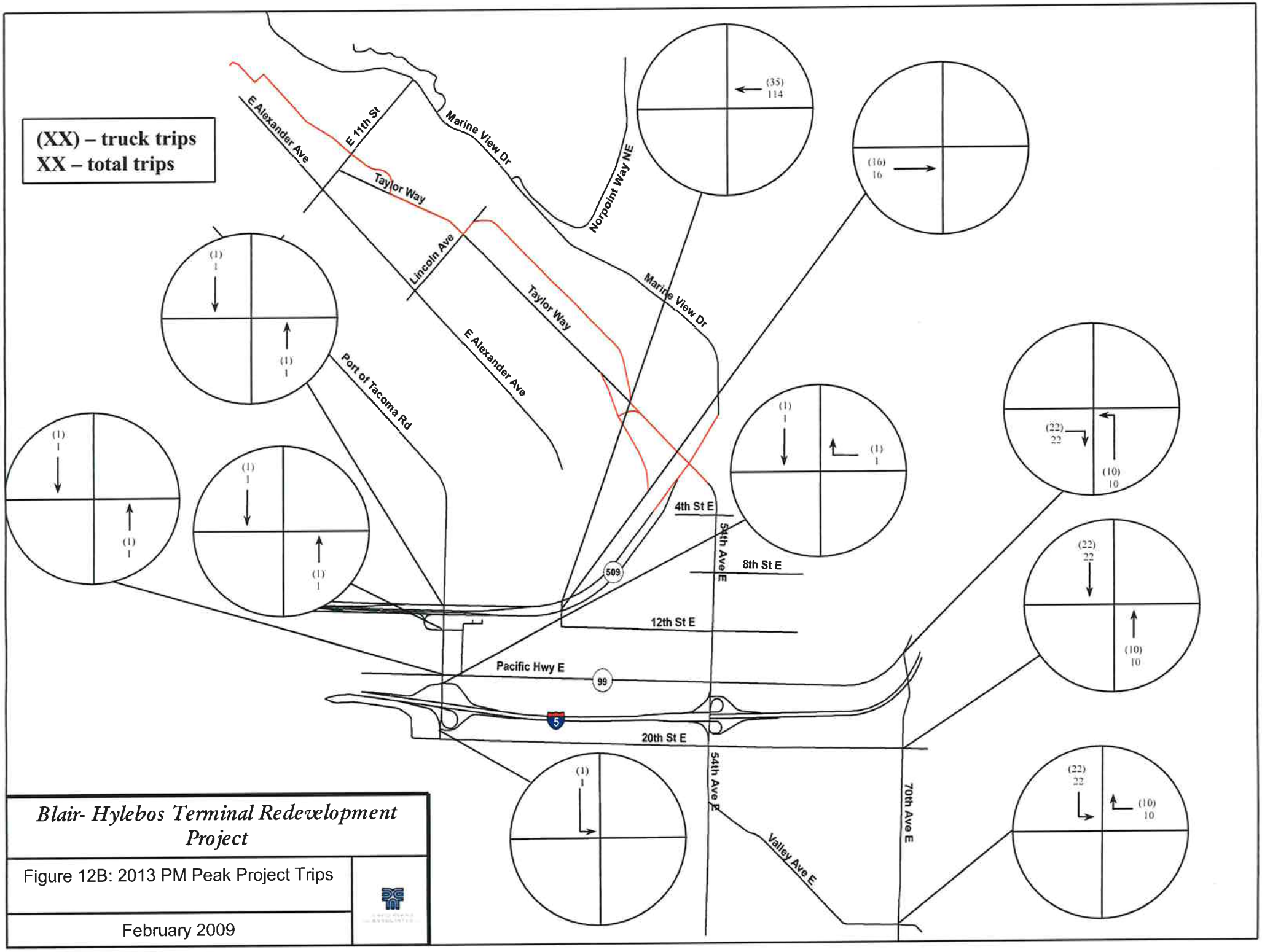

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Figure 12B: 2013 PM Peak Project Trips

February 2009

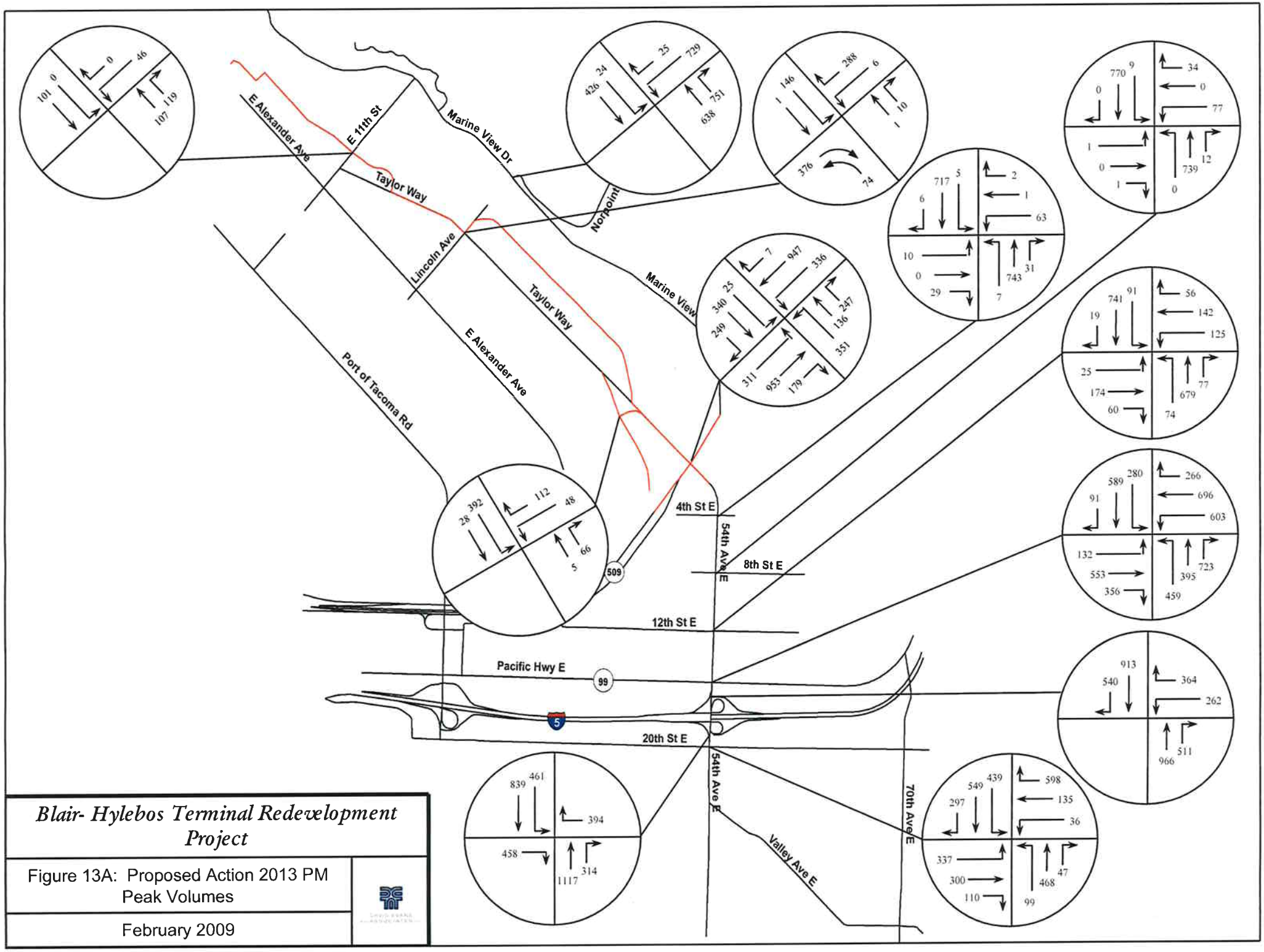

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Figure 13A: Proposed Action 2013 PM Peak Volumes

February 2009

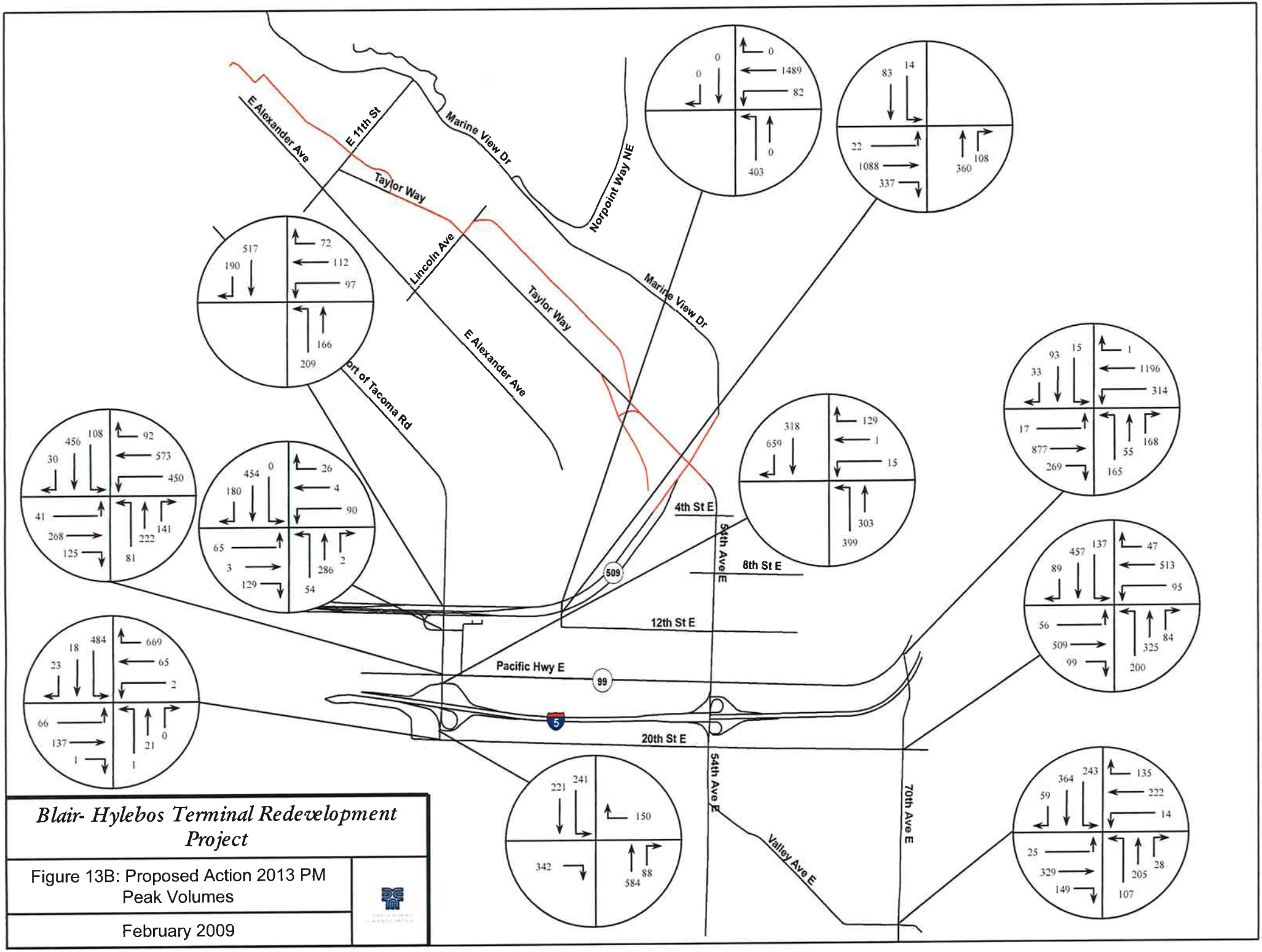

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Figure 13B: Proposed Action 2013 PM Peak Volumes

February 2009

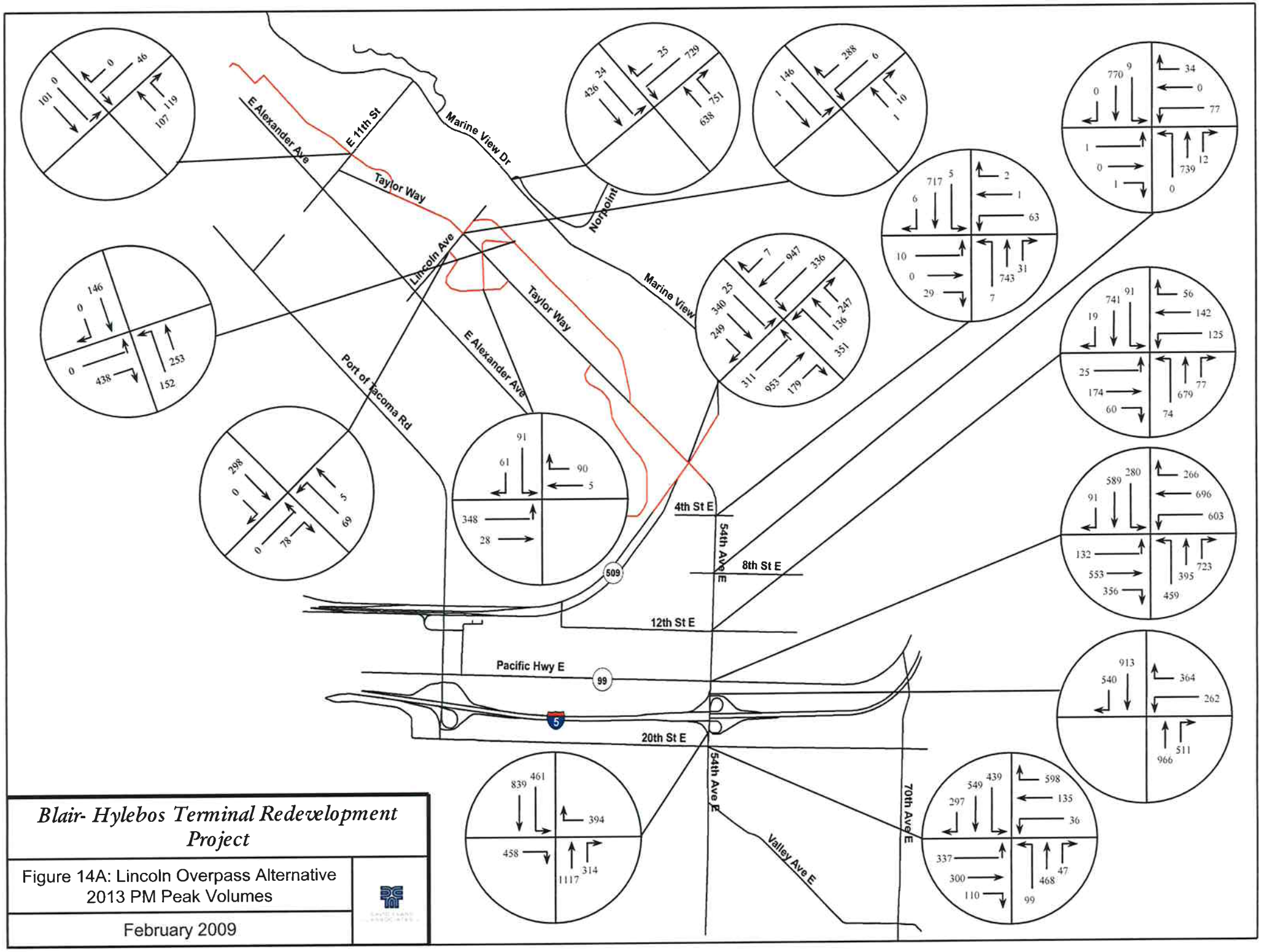

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Figure 14A: Lincoln Overpass Alternative
2013 PM Peak Volumes

February 2009

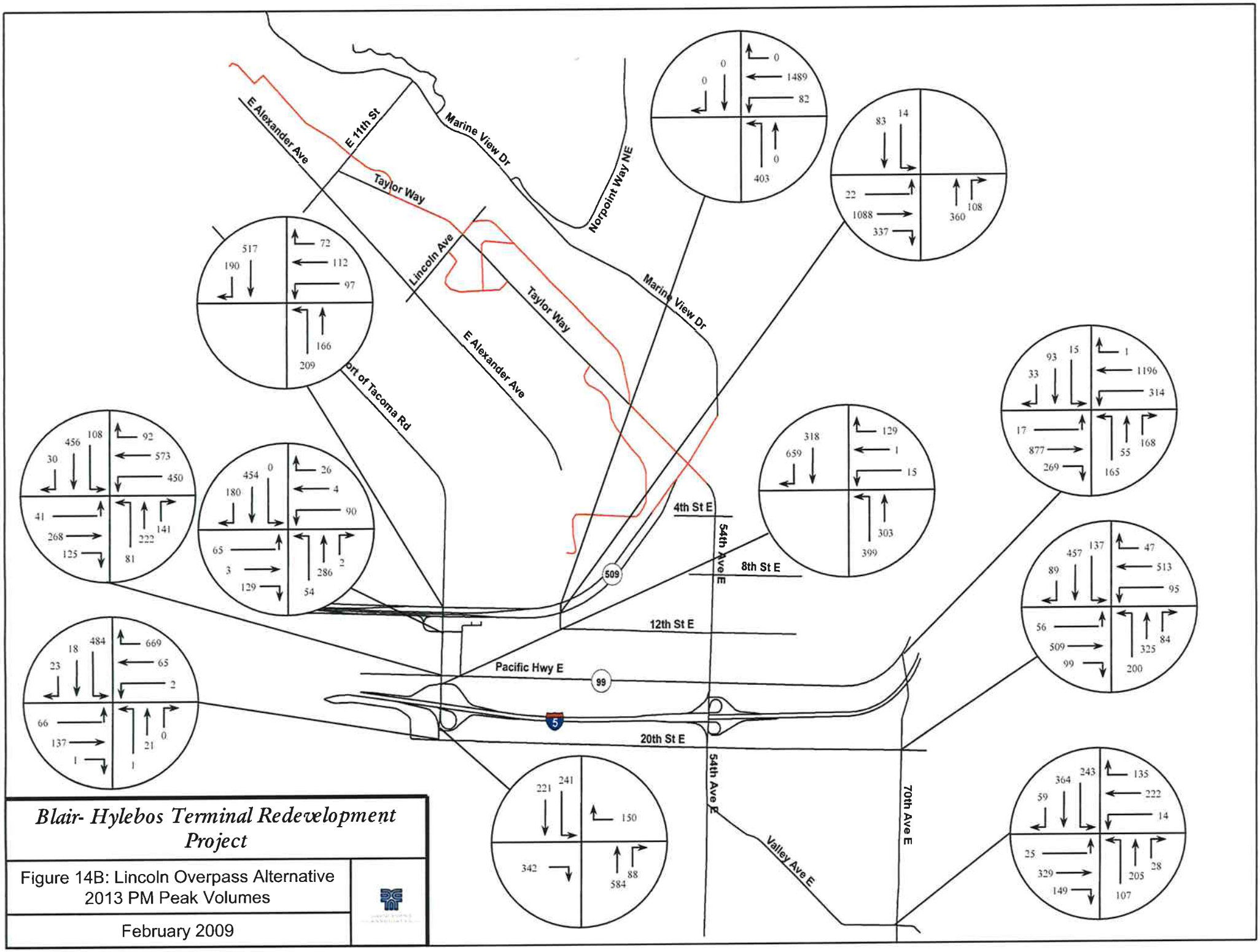

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Figure 14B: Lincoln Overpass Alternative
2013 PM Peak Volumes

February 2009

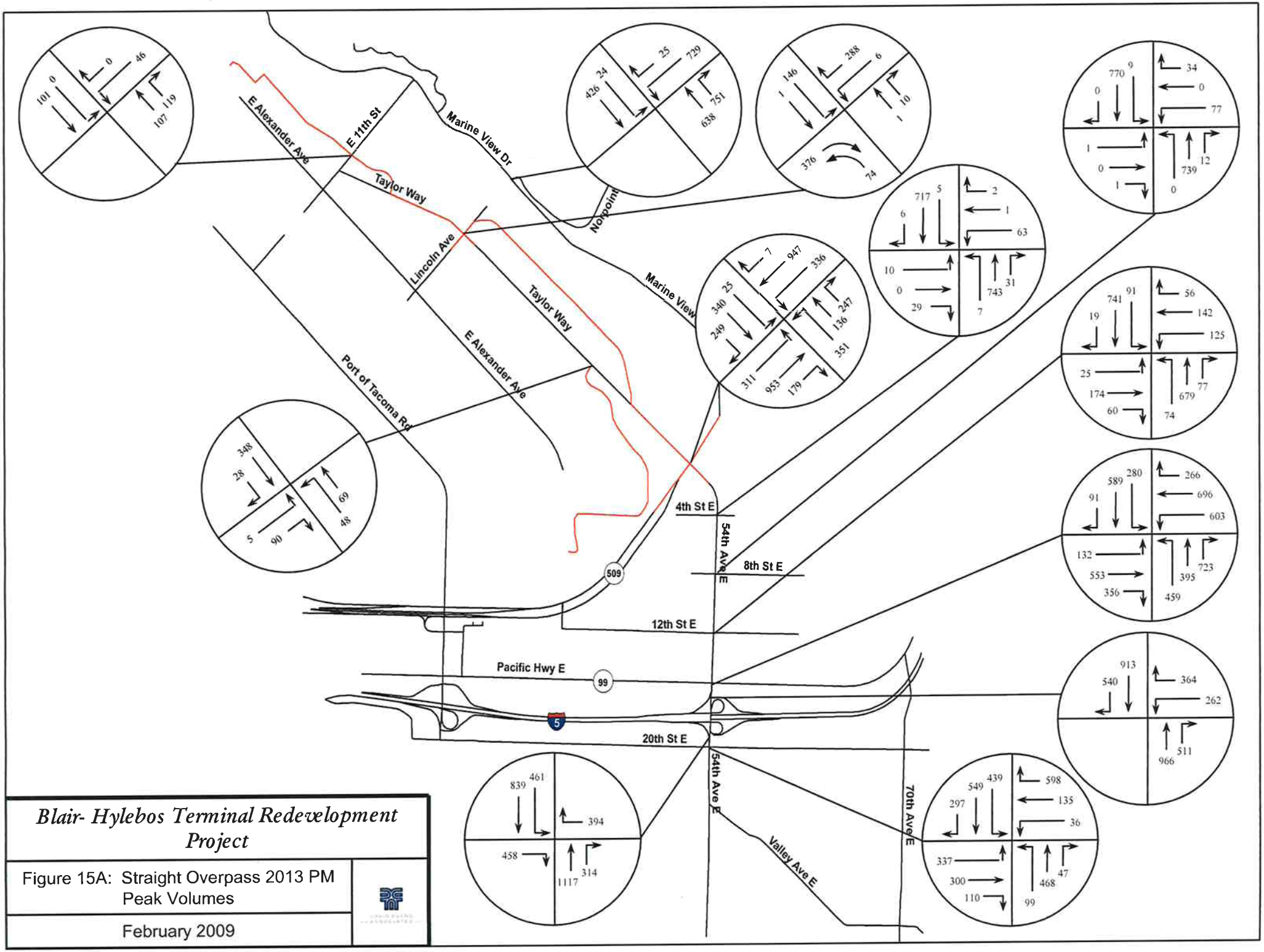

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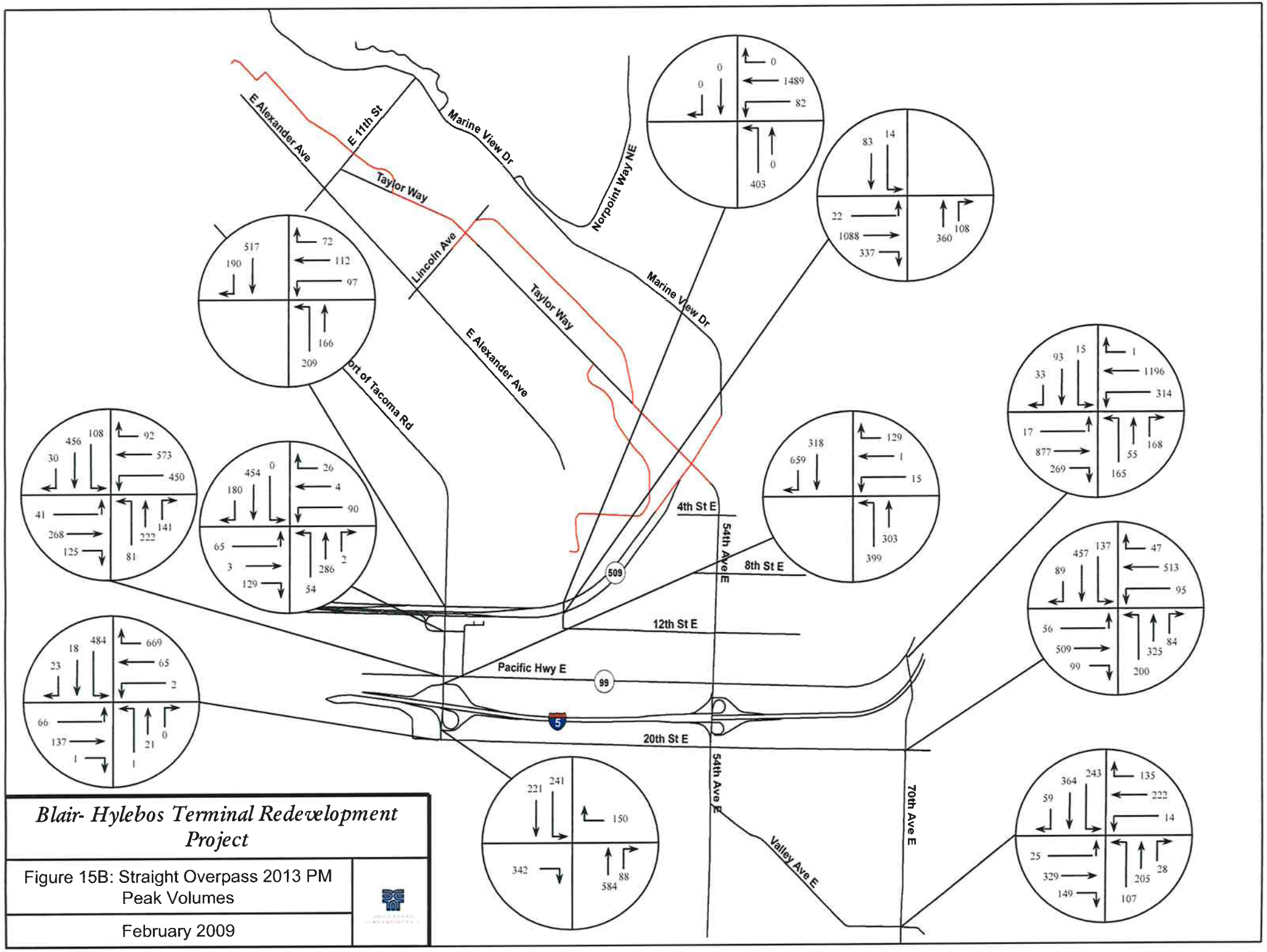
Figure 15A: Straight Overpass 2013 PM Peak Volumes

February 2009



Blair- Hylebos Terminal Redevelopment Project

Figure 15B: Straight Overpass 2013 PM Peak Volumes

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4.2.2 Safety

The repair and reopening of the Hylebos Bridge (by the City of Tacoma) under each alternative will allow the permanent closure of Alexander Avenue north of SR 509 in accordance with the conditions of the previously approved street vacation. Under the No Action and Lincoln Overpass Alternatives, this closure will require emergency vehicles accessing the PCT to travel through the SR 509 and Taylor Way intersection and follow the route along Taylor Way, Lincoln Avenue and Alexander Avenue. This will add approximately 3.15 miles to the trip. Emergency vehicle response to the PCT will be affected under the No Action and Lincoln Overpass Alternatives, resulting in an estimated 4 minutes added to their response times. The resulting response time will not meet the Tacoma Fire Department's level of service standard (pers. comm., Tacoma Fire Department 2008). Emergency vehicle response to the PCT and other properties along Alexander Avenue will be improved under the Proposed Action and Straight Overpass Alternative with the addition of the grade separation structures.

Sidewalks will be constructed on one side of all new roadways under the Lincoln Overpass, Straight Overpass and Proposed Actions. This will improve conditions for pedestrians as compared to the existing conditions and No Action Alternative.

Although difficult to predict, it is possible that on-peninsula collisions will increase due to the introduction of additional intersections under the Proposed Action, Straight Overpass and Lincoln Overpass alternatives. Proper design of the intersections and appropriate traffic control consistent with City of Tacoma standards will help minimize those potential increases.

Off the peninsula, the highest number of collisions occurs between intersections. The Proposed Action, Straight Overpass Alternative, Lincoln Overpass Alternative and No Action are not expected to alter traffic patterns off the peninsula; therefore, there should not be a significant increase in the type or rate of collisions. It could be expected to experience an increase in collisions consistent with the expected increase in traffic volumes from the alternatives. The proposed construction of a traffic signal at 54th Street East and I-5 NB ramps may result in a modest increase in rear-end collisions normally experienced at traffic signals.

4.2.3 Changes in Traffic Patterns

The repair of the Hylebos Bridge under each alternative will allow the permanent closure of Alexander Avenue north of SR 509 in accordance with the conditions of the previously approved street vacation. Under the No Action and Lincoln Overpass Alternatives, this closure will require traffic accessing the PCT to travel through the SR 509 and Taylor Way intersection and follow the route along Taylor Way, Lincoln Avenue, and Alexander Avenue. This will add approximately 3.15 miles to the trip. Under the Proposed Action and Straight Overpass Alternative, this closure will require traffic accessing the PCT to travel through the SR 509 and Taylor Way intersection and follow the route across the grade separation structure. There will be no significant change in distance over the existing route to the PCT.

Truck access for WUT will be unaffected by the project. The current access on POTR will remain in its existing configuration. Access for TOTE will be via Taylor Way north of East. 11th Street. Ingress for trucks for YTTI will be via Taylor Way between Lincoln Avenue and East. 11th Street. Egress for trucks and ingress and egress for autos will be via Lincoln Avenue and Taylor Way.

Access to other businesses on the peninsula will be maintained, although their current driveway locations may be modified. The Port of Tacoma will work with the affected businesses and the City of Tacoma during the final design and construction permit process to address any potential access issues.

4.2.4 Parking and Queuing

The Proposed Action, Straight Overpass, Lincoln Overpass Alternative and No Action alternatives include provisions on the terminal sites to handle parking for all new traffic and truck queuing needs. As a result of proposed improvements, there will be no expected parking or queuing impacts due to terminal operations. Some trucks which leave the terminal site may choose to park in the cities of Tacoma and Fife, similar to the type of truck parking which occurs under existing conditions in those cities. That parking is unrelated to terminal operations and beyond the control of the terminal operators or the Port of Tacoma.

4.2.5 Road and Rail Delays

Delays to rail operations under the No Action Alternative will be within acceptable levels with a delay ratio of expected train movement time to unimpeded time of 1.25. The normally acceptable delay ratio identified by the Port of Tacoma is 1.30. Delays to rail operations under the Lincoln Overpass, Straight Overpass and Proposed Actions will be slightly over acceptable levels with a delay ratio of expected train movement time to unimpeded time of 1.34. According to the Port of Tacoma, this delay ratio will not significantly impact rail operations in the Port (pers. comm., Port of Tacoma 2008) refer to Appendix.

Train blockages of roadways under the No Action alternative will be increased over current conditions. This will be due to an expected increase in rail traffic associated with the two new terminals Roadway blockages by trains under the Proposed Action and Straight Overpass Alternative could be considerable at the intersection of Lincoln Avenue and Taylor Way. However, the proposed road improvements will provide alternative routes to allow traffic to bypass the blockage. There would be no train blockages of roadways under the Lincoln Overpass Alternative, with the exception of occasional spur crossings expected in all alternatives.

The roadway improvements proposed as part of the Proposed Action are intended to mitigate the impacts of these blockages. The traffic modeling assumes that the Taylor Way/Lincoln Avenue crossing is blocked during the PM peak hour and analyzes impacts of traffic diverting around the crossing.

The proposed configuration of the Taylor Way grade separation under the Proposed Action and Straight Overpass Alternative will preclude vehicles from traveling directly from TOTE to PCT without crossing the tracks at Taylor Way/Lincoln Avenue. During those periods where trains are blocking the crossing, vehicles will need to travel off-peninsula and return back on the peninsula to make that movement. This is not expected to affect a significant number of vehicles, other than delivery vehicles visiting multiple terminals.

4.2.6 Consistency Analysis

Table 6 provides a consistency analysis for policies from the transportation elements of the Fife and Tacoma Comprehensive Plans. The Lincoln Overpass, Straight Overpass and Proposed Actions are consistent with all policies, with the exception of Fife Policy 2.3.1 on concurrency (all three alternatives

and the No Action alternative will result in three intersections that do not meet the City of Fife LOS standards.) The No Action Alternative is inconsistent with several policies because it fails to support local economic development and regional goods movement and resolve intermodal conflict since substantial road and rail improvements would not be undertaken.

Table 6: Consistency with Fife and Tacoma Comprehensive Plans

Policy #	Policy	Consistent?			
Tacoma Transportation Element (City of Tacoma 2004)		No Action	Lincoln Overpass	Straight Overpass	Proposed Action
T-LUT-4	Support Economic Base. Give high priority to those transportation facilities that provide the greatest opportunity to serve and support the existing economic bases and will aid the City in attracting new investments.	No	Yes	Yes	Yes
T-LUT-6	Concurrency. Ensure that the City's transportation network adequately serves the existing and projected land use developments. If adequate service levels are not maintained, pursue improvements to the transportation systems, mitigations of impacts, or modifications to the land use assumptions, where appropriate.	Yes	Yes	Yes	Yes
T-MS-3	Intermodal Conflict. Support programs, regulations, and design standards that separate at-grade crossing conflicts to increase safety and to increase the capacity and timeliness of both over-land and rail freight.	No	Yes	Yes	Yes
T-MS-6	Moving Freight. Maintain Tacoma as a primary hub for regional goods movement and as a gateway to national and overseas markets. Support the integrated development and operation of air, trucking, rail, and water terminal facilities to enhance the freight transportation system and strengthen the City's economic base.	No	Yes	Yes	Yes
Fife Transportation Element (City of Fife 2005)					
1.1.3	Work with the Union Pacific Railroad and others to ensure public safety at all rail crossings in the planning area, including grade separated rail crossing wherever possible.	N/A	Yes	Yes	Yes
2.3.1	Maintain a Concurrency Management System that provides a mechanism for assuring that transportation facilities are provided at the time of development or that such facilities will be provided within six years of the completion of development.	No	No	No	No
3.1.1	Work with WSDOT to promote the construction of appropriate highway improvements, including new highway construction to help relieve regional and local traffic congestion.	Yes	Yes	Yes	Yes

Indirect Effects

Increased vehicle traffic attributed to the action will impact some intersections outside of the study area. The project traffic traveling through those intersections is expected to result in a small percentage increase in traffic at those intersections. Since most project trips will access I-5, the project trips will decrease south of the freeway and are not expected to impact the level of service of those intersections.

4.3 Cumulative Effects

In order to determine cumulative impacts, the No Action, Straight Overpass, Lincoln Overpass, and Proposed Action analyses all consider, as background traffic, traffic volumes from the following known future developments:

4.3.1 The Point at Northshore

This proposed residential development in Northeast Tacoma includes a total of 864 residential units. The development is proposed to be located on the site of the current Northshore Golf Course. The project is anticipated to complete full build-out in 2012 and will contribute traffic to the study area intersections. Traffic volumes obtained from the traffic impact analysis for the project were inflated at 2 percent per year to year 2013 and included in this analysis.

4.3.2 Emerald Queen Casino Expansion

This casino expansion in Fife, located at the intersection of 59th Avenue East and SR 99, consists of construction of a parking structure (additional 1240 parking stalls) and improvements to the existing casino and hotel (235,300 square feet). All three phases of the project are anticipated to be complete by 2015 and will contribute traffic to the study area intersections. For purposes of the BHTR project, trips from full build-out were included in this analysis.

4.3.3 EB1 Terminal

This proposed terminal on the peninsula will contribute traffic to the study area intersections. Traffic volumes obtained from the EB1 traffic impact analysis for the project were inflated at 2 percent per year to 2013 and are included in this analysis.

This traffic analysis did not consider traffic volumes from a potential Stevedoring Services of America Terminal proposed for a Puyallup Tribe property on the peninsula. At the time of this traffic analysis, the potential traffic generation and trip distribution or the year of opening of the proposed terminal were unknown.

5.0 Mitigation

Mitigation is intended to address traffic impacts at intersections that fall below the level of service standard as a result of the proposed project. None of the intersections within the study area fall below the level of service standard or, for those intersections that are already below the level of service standard, the project related traffic impacts do not further reduce the level of service. Therefore, we have not identified any necessary mitigation measures beyond those already included as part of the Proposed Action.

Several roadway and rail improvements have been incorporated into the Proposed Action that mitigate potential impacts from the project. Some of these improvements have been identified in previous environmental processes involving other projects (including offsite improvements at the Taylor Way/SR 509 intersection and a new signal at 54th/I-5 NB ramps), but have not yet been built. Roadway and rail improvements proposed for the Proposed Action are as follows:

5.1 On-site Improvements

5.1.1 Taylor Way Overpass

This structure will provide a grade separation from the rail tracks serving the proposed rail yard. The roadway will consist of a minimum of three lanes on all approaches. Sidewalks will be constructed on one side of all approaches. The intersection of Taylor Way/Taylor Way Overpass will be controlled by an all-way stop.

5.1.2 Taylor Way Bypass

This new roadway will consist of three lanes of traffic and will have a sidewalk on the east side (opposite the proposed rail yard). The intersection of Lincoln Avenue/Taylor Way will be signalized.

5.1.3 Lincoln Avenue Connector/Taylor Way Intersection

This intersection would operate with several signals timed and coordinated to allow multiple movements at one time. During times when trains block the intersection, the new intersection configuration would allow the following movements: right-turns from eastbound Lincoln Avenue to southbound Taylor Way; left-turns from northbound Taylor Way to westbound Lincoln Avenue; right-turns from northbound Taylor Way Bypass to northbound Taylor Way; and, left-turns from southbound Taylor Way to eastbound (and ultimately southbound) Taylor Way Bypass. Appropriate signage would be provided to direct drivers from SR 509 to the most direct route when the intersection is blocked with a train.

5.1.4 Rail Improvements

The at-grade crossing at the intersection of Lincoln Avenue/Taylor Way will be signalized.

5.2 Off-site Improvements

5.2.1 SR 509 and Taylor Way Intersection Widening

Proposed improvements to the intersection include the addition of a left-turn lane from EB SR 509 to NB Taylor Way and a left-turn lane from WB SR 509 to SB 54th Avenue East. In addition, right turn pockets are proposed for the NB to EB movement and the EB to SB movement.

5.2.2 54th Avenue East and I-5 NB Ramp Signalization

A traffic signal is proposed at the intersection of 54th Avenue East and the I-5 NB ramps. Further analysis of the interaction between the proposed signal and the adjacent signals would need to be conducted during the signal design/permitting process in order to obtain support from WSDOT.

5.2.3 Other Potential Off-site Improvements

There may be strategies that could improve the LOS at the intersections that remain below the City of Fife LOS standard that could be implemented in the future. The Port of Tacoma will work with the City of Fife and WSDOT to identify potential improvements and cooperatively pursue funding. In addition to these potential improvements, the eventual construction of SR 167 should improve the LOS of all intersections along 54th Avenue East.

5.3 Mitigation to Alleviate Construction Impacts

The Port will work with the City of Tacoma during the permit process to identify and minimize road and rail impacts. Roadway closures or lane reductions will be approved by the City of Tacoma. Access interruptions to occupied parcels during construction will be coordinated with the affected businesses to minimize impacts.

5.4 Unavoidable Adverse Impacts

The intersections of 54th Ave E/4th St E, 54th Ave E/SR 99, Port of Tacoma Road/SR 99, Port of Tacoma Road/20th Street E, 70th Avenue E/SR 99, and 70th Avenue E/20th Street E are below the City of Fife standard of LOS D under the No Action, Lincoln Overpass, Straight Overpass and Proposed Actions. Even after implementation of the proposed mitigation, those intersections remain below the LOS standard, and will remain so until construction of SR 167 or other mitigation measures or both.

The intersection of Lincoln Avenue and Taylor Way will experience significant train delays. Although the proposed improvements will mitigate the impacts for the majority of traffic, a small number of motorists travelling between TOTE and PCT will experience delays or increased travel distance to avoid the train delays.

6.0 Benefits of the Project

The project will improve the intersection of Taylor Way and SR 509 as well as improving several roadways on the peninsula. The roadway improvements will include sidewalks, which will improve pedestrian access on the peninsula. In addition, the project proposes construction of a new traffic signal at 54th Avenue East and I-5 NB Ramps. The project will also construct several miles of new railroad tracks which will improve the ability to build and handle trains on the peninsula.

7.0 References

Documents and Publications

Institute of Transportation Engineers (ITE). 2003. *Trip Generation*. 7th Edition.

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Appendix A: Rail Study

Memorandum

PORT OF TACOMA
Planning and Regional Transportation

DATE: July 23, 2008

TO: Tony Warfield
cc: Brian Mannelly

FROM: Rob Collins

RE: Rail Simulation and Modeling in Support of EIS

Per your request, the following is a Memo that summarizes the results of the recent modeling and analysis effort undertaken by TranSystems, and can be used in support of the Port's Environmental Impact Statement for the Blair Hylebos Peninsula Terminal Redevelopment Program (BHPTRP). Note that the modeling effort summarized here, as with all rail modeling conducted by the Port, include not only intermodal (doublestack container) traffic, but auto and general cargo, or "industrial" traffic serving Port and non-Port industries on the Tideflats.

Rail Modeling

The Port of Tacoma has created a customized rail modeling application, the Transportation Modeling Studio (TMS) based on the Rockwell Software Arena® suite of simulation applications. The TMS includes the entire Tideflats rail network, including the BHPTR site. Note that actual intermodal working facilities, such as the North and South Intermodal yards are not "explicitly" modeled, i.e. they are not represented to the detail of each individual track. The TMS is intended to analyze how the entire network operates, as opposed to how an individual intermodal facility operates. Thus, this modeling effort did not analyze the operation of the proposed YTTI intermodal facility, but rather how that facility will integrate into the larger rail network and function as part of the network. The TMS runs a 10 day simulation of all rail traffic moving onto, around and off of the Tideflats. The simulation is based on an actual 10 day period of movements which were analyzed and recorded by Port staff and others; future forecast traffic is then added to that base data. This EIS modeling effort assumes that rail volumes will be as documented in the Port's Q3-2007 Long Range Cargo Forecast, which are the most current forecast currently available, and are consistent with the rail volumes assumed in the EIS .

The TMS is primarily a "policy" based tool in that it focuses more on whether a given rail network can accommodate different volumes of traffic adequately, as opposed to other application which focus on operations optimization.

Tacoma Rail, a Class III short line railroad that is a division of Tacoma Public Utilities performs all switching, movement, and positioning of rail cars, and disassembly and assembly of trains on

the Tideflats. Tacoma Rail receives and interchanges, or "hands off" trains from and to the BNSF Railway (BNSF) and Union Pacific Railroad (UP) at Bullfrog Junction. As with all On-Tideflats modeling conducted by the Port, the "boundary" for the model network is Bullfrog Junction. Bullfrog Junction is the connection point between the BNSF and UP mainlines, and the Tideflats rail network. Bullfrog Junction is located between Milwaukee Avenue and the Puyallup River directly beneath SR-509. Bullfrog Junction is not impacted by any at-grade crossings or vehicle traffic because of its isolated location.

The TMS model "creates" the rail traffic based on the traffic data files, and assumes that rail traffic "enters" the Tideflats rail network at the Bullfrog Junction area; rail traffic essentially "disappears" as it passes through the Junction on its way off the Tideflats. The model does not represent the main line rail system, so, no operational conclusions can be made about level of delay or congestion outside the Tideflats rail network.

Currently between 10 and 12 intermodal and/or auto trains arrive or depart the Tideflats complex through Bullfrog Junction a day. These trains range from 7,000 to 8,000 feet in length. Another five to six industrial cargo trains arrive or depart the complex; these trains however are typically much shorter than the intermodal and auto trains.

If for some reason one of the trains isn't present at the scheduled time for interchanges between Tacoma Rail and BNSF or UP, trains may sit idle awaiting locomotives and/or crews to arrive. This may create congestion if another train is blocked from making a movement through the area. This congestion could conceivably affect any type of train moving in either direction depending on the time of day and that day's train movement schedule.

BHTRP Project Impacts

The Port provided TranSystems with two track alternatives: 1) Proposed Action; 2) No Action. The Port also provided forecasts of volumes for the assumed first year of full operation, 2013 using the same assumptions and conversion factors used as part of the data for the BHPTRP EIS traffic study. All other components of the proposed Tideflats rail system were assumed to be identical to the 2013 rail configuration used for the December 2007 On-Tideflats modeling work done as part of the OTIS-M project.

The measurement generally used by the Port to gauge the effectiveness of infrastructure and operations is *delay ratio*. Delay ratio compares the total time all trains take to complete their assigned moves, including delays caused by movement conflicts and other congestion-related delays throughout the 10-day modeled period, to the total time all trains would take to complete their moves if there was no congestion at all on the network. The Port uses a figure of 1.30 as the upper end of acceptable delay ratio for operations on the Tideflats rail network.

Proposed Action

This alternative assumes a TEU forecast of 1,400,000 per year from the new YTTI terminal, resulting in 535,518 intermodal lifts. Based on this volume, assumptions regarding train length, slot utilization (the number of potential container "spaces"

available on a full-length train) and ratio of mixed to pure trains (mixed trains carry containers for multiple terminals, while pure trains carry containers for only one terminal destination) this will result in an average 18 trains per week arriving to the terminal, and 18 trains per week departing from the terminal, or between two and three trains per day each way, arriving and departing.Modeling results show that in year 2013 the Tideflats rail network including rail traffic from the Proposed Action will operate at a delay ratio of 1.34, which is slightly above the upper end of acceptable delay.

However, the ability to mitigate this slightly elevated congestion level will be highly likely by optimizing "return to staging" and "spot" movements. Return to staging movements are when rail cars that have been loaded in the terminal intermodal facility are taken to support rail yards in advance of being assembled into full departing trains. Spot movements are when rail cars are taken from support rail yards to the terminal intermodal facility to either be loaded with, or stripped of containers. This is typical of what Tacoma Rail does on an ongoing basis to maintain fluid and high velocity operations within the Tideflats rail network. So, the Port does not see this slight excess estimated by the model as cause for concern or a significant impact from the BHTRP project. It is very likely that the Tideflats rail network will operate acceptably with the Proposed Action in place.

Lincoln Overpass Alternative

A third option, the Lincoln Overpass Alternative was not included in the modeling effort as it is similar to the Proposed Action as far as the proposed rail network is concerned and thus would operate similarly for rail traffic.

Straight Overpass Alternative

A fourth option, the Straight Overpass Alternative was not included in the modeling effort as it is similar to the Proposed Action as far as the proposed rail network is concerned and thus would operate similarly for rail traffic.

No-Action Alternative

The No-Action Alternative assumes three terminals served by the existing rail line on the Blair-Hylebos peninsula: TOTE terminal reconfigured, a new 45 AC container terminal and a new 50 AC Auto/Breakbulk terminal. This alternative assumes a TEU forecast of 300,000 per year for the container terminal, and 78,000 auto units or 160,000 tons of break bulk per year. General cargo coming to the Auto/Breakbulk terminal and bound for rail will generate insignificant volumes of traffic. TOTE also generates little to no rail traffic. Total traffic will amount to about one full train departing from and one full train arriving onto the Blair-Hylebos peninsula per day.

Given the significantly lower volume of rail traffic generated from the two assumed terminals, even though the facilities are served by a single track, train movements will be spaced out enough that movements would not conflict with each other. Thus rail traffic on the peninsula will not be congested.

> Overall, modeling results show that in hear 2013 the Tideflats rail network including the No-Action Alternative design will operate at a 1.25 delay ratio, well below the Port's generally accepted threshold. The Tideflats rail network will operate acceptably with this Alternative in place.

It is not possible to predict if, when or what level of congestion could occur at Bullfrog Junction or other off-Tideflats area from increased rail traffic from the proposed BHRTP project. As the volume of traffic moving onto and off of the Tideflats increases over time, it can be statistically assumed that the potential for congestion would also increase. However, more rigorous adherence to scheduled operations by BNSF and UP will minimize that possibility. It is not expected that potential congestion increases from the project will be significant.

Appendix I-2: Supporting Transportation Data

TABLE I-1
Collision Summary (2011-2013)

		Total Number of Collisions			Number of Injury Collisions		
		2011	2012	2013	2011	2012	2013
Intersection Collisions							
1	Port of Tacoma Road/North Frontage Road	2	2	1	1	1	0
2	Port of Tacoma Road/12th Street	1	2	2	1	1	0
3	Port of Tacoma Road/Pacific Highway East	13	6	12	6	1	4
4	Port of Tacoma Road/I-5 Southbound	9	9	3	5	2	0
5	Port of Tacoma Road/I-5 Northbound	2	2	2	1	0	1
6	Port of Tacoma Road/20th Street	4	3	1	0	0	0
7	Alexander Avenue East/North Frontage Road	3	6	5	1	2	0
8	Alexander Avenue East/South Frontage Road	6	19	8	4	11	2
9	Taylor Way/East 11th Street	0	0	0	0	0	0
10	Taylor Way/Lincoln Avenue	0	0	1	0	0	0
11	Taylor Way/SR-509	8	4	2	2	2	0
12	54th Avenue East/4th Street	0	0	0	0	0	0
13	54th Avenue East/8th Street	1	0	1	1	0	0
14	54th Avenue East/12th Street	3	4	2	1	2	1
15	54th Avenue East/Pacific Highway East	20	19	18	8	6	7
16	54th Avenue East/I-5 Southbound	11	10	10	1	5	5
17	54th Avenue East/I-5 Northbound	17	16	11	4	1	3
18	54th Avenue East/20th Street	10	16	11	3	4	1
19	Marine View Drive/Norpoint Way NE	1	0	1	0	0	0
20	70th Avenue East/Pacific Highway East	0	0	0	0	0	0
21	70th Avenue East/20th Street East	5	5	1	4	2	0
22	70th Ave E/Valley Ave E	4	0	3	3	0	1
Nonintersection Collisions							
	Taylor Way	3	2	3	2	1	0
	54th Avenue E	14	17	26	5	6	7
	Port of Tacoma Road	1	7	5	1	3	1
	Alexander Avenue E	2	2	3	0	1	0
	70th Avenue E	10	4	8	5	2	4

Sources:

Washington State Department of Transportation. 2011. 2011 Annual Traffic Report. http://www.wsdot.wa.gov/mapsdata/travel/pdf/Annual_Traffic_Report_2011.pdf.

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TABLE I-2

Hylebos Waterway (Tacoma) Deep-Draft Vessel Arrivals (2010-2014)

Month	2010	2011	2012	2013	2014	AVERAGE Number of Arrivals
JAN	2	3	7	3	3	3.6
FEB	5	6	3	6	5	5
MAR	2	8	2	4	2	3.6
APR	7	6	5	1	4	4.6
MAY	5	6	5	6	3	5
JUN	5	5	3	2	3	3.6
JUL	6	7	4	2	NA	4.8
AUG	8	7	6	4	NA	6.3
SEP	2	3	3	2	NA	2.5
OCT	6	5	3	2	NA	4
NOV	5	3	3	3	NA	3.5
DEC	4	4	4	4	NA	4
TOTAL	57	63	48	39	20	
AVERAGE	4.8	5.3	4	3.3	3.3	4.1

*Does not include barges, tugs, fishing vessels, or pleasure craft.

NA = not available

Source: Personal communication with Neil Caldwell/Marine Exchange of Puget Sound. August 11, 2014.

TABLE I-3

Blair Waterway (Tacoma) Deep Draft Vessel Arrivals (2014)

Month	2014
JAN	52
FEB	56
MAR	76
APR	61
MAY	57
JUN	73
JUL	54
AUG	63
SEP	75
OCT	64
NOV	56
DEC	66
TOTAL	**753**
AVERAGE	**62.8**

*Does not include barges, tugs, fishing vessels, or pleasure craft.

Source: Personal communication with Tony Warfield/Port of Tacoma, regarding *Berthing Report by Date Range Arrival Dates: 01/01/14 – 02/01/15*. February 10, 2015.

TABLE I-4

Hylebos Waterway (Tacoma) Barge and Tug Traffic (2014)

Month	Barge	Tug	Total
JAN	36	41	77
FEB	17	22	39
MAR	20	21	41
APR	22	25	47
MAY	27	32	59
JUN	29	32	61
JUL	26	26	52
AUG	27	30	57
SEP	33	34	67
OCT	22	24	46
NOV	31	32	63
DEC	32	48	80
TOTAL	**322**	**367**	**689**
AVERAGE	**26.8**	**30.6**	**57.4**

Source: Personal communication with Chris Wolf/Foss Maritime. January 12, 2015.

TABLE I-5

Blair Waterway (Tacoma) Barge and Tug Traffic (2014)

Month	Barge	Tug	Total
JAN	35	35	70
FEB	32	34	66
MAR	35	36	71
APR	32	32	64
MAY	43	43	86
JUN	35	36	71
JUL	36	36	72
AUG	32	33	65
SEP	37	37	74
OCT	34	34	68
NOV	30	30	60
DEC	29	29	58
TOTAL	**410**	**415**	**825**
AVERAGE	**34.2**	**34.6**	**68.8**

Source: Personal communication with Chris Wolf/Foss Maritime. January 12, 2015.

Appendix J-1: ECONorthwest Economic Impact Analysis

Economic Impact Analysis of a Natural Gas Fuels Facility in Tacoma

October 30, 2014

Prepared for:

Puget Sound Energy

ECONorthwest
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ECONorthwest specializes in economics, planning, and finance. Founded in 1974, we're one of the oldest independent economic consulting firms in the Pacific Northwest. ECONorthwest has extensive experience applying rigorous analytical methods to examine the benefits, costs, and other economic effects of environmental and natural resource topics for a diverse array of public and private clients throughout the United States and across the globe.

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1 Introduction and Background

PUGET SOUND ENERGY

Headquartered in Bellevue, Washington, Puget Sound Energy serves over 1 million electricity customers and over 760,000 natural gas customers in 11 counties in northwest Washington. A subsidiary of Puget Energy, PSE is the state's oldest local energy company.

Puget Sound Energy's 2,800 employees are dedicated to providing high quality customer service and delivering safe, dependable and efficient energy.

Summary of Economic Impacts

Construction (annual average):

Output: $71.1 million

Labor Income: $27.5 million

Jobs: 401

Operations (annual):

Output: $78.9 million

Labor Income: $9.8 million

Jobs: 130

Puget Sound Energy (PSE) is an electric and natural gas utility serving a 6,000 square-mile area, primarily in the Puget Sound region of Washington State. In 2012, PSE delivered 112,934,400 dekatherms (Dth)[1] of energy to its natural gas customers. PSE is regulated by the Washington Utilities and Transportation Commission, which is charged with ensuring that utility services are fairly priced, available, reliable, and safe.[2]

PSE engaged ECONorthwest to estimate the economic impacts of building and operating a liquefied natural gas (LNG) storage plant at the Port of Tacoma. Like many such storage plants around the county, PSE's plant would provide standby supply reducing natural gas costs for its utility customers. In addition to serving utility customers, PSE's plant will also produce natural gas fuel for marine and truck transportation, which will cost less and pollute less than traditional fuel. The plant will also have vaporization capacity to inject natural gas back into the utility distribution system.

The plant will use a mixed refrigerant LNG cycle and have a liquefaction capacity of 250,000 gallons a day. ECONorthwest estimates annual LNG production of approximately 87 million gallons. Total LNG tank storage capacity is 8 million gallons. LNG will leave the facility by:

- Truck tanker via onsite truck loading racks;
- Marine bunker barge or vessel, which will be loaded over the pier facilities;
- Through a pipeline that delivers LNG directly to a Port of Tacoma marine customer;
- Through a pipeline as vaporized natural gas to support the Tacoma gas distribution system.

This study measures the impacts of construction from 2012 to 2018 and for an operating year at full production. ECONorthwest used an economic impact model for the Puget Sound Region based on the local spending patterns of businesses and workers. The model mathematically traces such spending as it flows through the local economy and measures the effects on other businesses and households. ECONorthwest also measured the social value to the region from reduced air emissions. Using LNG as a fuel is less detrimental to air quality than burning diesel or marine fuel oil.

[1] A dekatherm is ten therms or one million Btus. A Btu is a unit of measure for the heat content of a fuel and stands for British thermal unit.

[2] Washington Utilities and Transportation Commission website accessed March 15, 2013 at http://www.utc.wa.gov/aboutUs/Pages/overview.aspx

About Natural Gas Storage

Natural gas demand fluctuates predictably by the time of day and day of the week, and in less predictable ways, such as during cold weather snaps when heating demand surges. As a utility, PSE is obligated to meet peak demand. They do this by purchasing extra capacity on large interstate pipelines. However, this capacity is expensive, and prohibitively so if it is used infrequently to meet peak demand.

Developing the capacity to store natural gas is an alternative method of assuring reliable supply. Utilities buy natural gas when supplies are abundant and prices are low, store it locally, and then release it back into their delivery system when demand peaks. This reduces the utility's cost for purchasing gas from their suppliers, as well as the cost of transporting the gas to their system, and these savings are passed on to consumers.

Puget Sound Energy will design the plant to cost-effectively meet the region's peak energy demand, and at the same time, produce low-cost, low-emissions transportation fuel.

The project will create economic, environmental and social benefits for the Puget Sound and beyond.

PSE's Current Storage Methods

PSE currently uses two methods to store natural gas: underground reservoirs and peak shaving plants. Between the two, underground storage offers the highest capacity and lowest cost. The utility pumps natural gas into underground reservoirs, often in the summer when demand and prices for heating fuel are low, and withdraws it when demand is high. This method works well for addressing seasonal demand swings on the interstate pipeline system, but it can only be used in places with suitable geologic formations. PSE owns underground storage capacity at Jackson Prairie (Southwestern Washington) and contracts for capacity at Clay Basin (Utah).

To meet short-notice demand (on the order of several days, often due to cold weather events), utilities use LNG peak shaving plants that convert natural gas to its liquid form. Some plants use propane. The plants store the fuel on-site. When consumer demand peaks, plant operators convert the LNG or propane back into gas and add it to the distribution system. Utilities operate more than a hundred such plants in the United States, which are typically located in cities and towns close to their customers.

PSE operates one LNG peak shaving plant, in Gig Harbor. PSE uses this plant as standby supply for its local natural gas customers.

PSE has an inactive propane peak shaving plant in Renton, Washington. When operating, it also acts as a back-up supply for local utility customers.

About Liquefied Natural Gas

LNG is pipeline gas that has been cooled to -160° C or below, the temperature at which it transforms to its liquid state. Liquefying the gas reduces its volume by about 600-fold (one gallon of LNG contains over 80 cubic feet of natural gas), allowing it to be stored more affordably. When local demand rises, the utility can vaporize the LNG and add it to the customer distribution system.

Pipeline natural gas consists of 95 to 99 percent methane and one to five percent other compounds. As the temperature drops during the liquefaction process, the constituent compounds begin to liquefy or solidify. Solid compounds, such as water and carbon dioxide, are removed, along with sulfur and other harmful trace compounds. Hydrocarbons heavier than methane, such as propane, may be left in the LNG.

LNG as a Transportation Fuel

Recent developments in natural gas production technology have resulted in large reserves and lower prices. Because of this, LNG has become a more affordable transportation fuel and is expected to remain price-competitive with liquid fuels such as gasoline, diesel, and ethanol for the foreseeable future.

Like most industrial plants, larger-capacity peak shaving plants have lower unit production costs, so building a large peak shaving facility will allow PSE to reduce its unit costs for its customers. However, the utility only needs 6.3 million gallons of LNG for the winter season requiring 23,000 gallons per day of liquefaction over the non-winter months. In contrast, the planned liquefaction capacity for the transportation fuels market is greater by an order of magnitude.

By including capacity for transportation fuel customers, PSE is increasing economies of scale and reducing the unit cost for utility customers. By doing so, PSE could lower utility customers' costs even further. ECONorthwest estimates that the uniform equivalent cost savings for ratepayers is $3.0 million annually over the first 25 years of operations. That is the savings versus the higher cost of securing interstate pipeline capacity. The lower unit cost of the plant, resulting from increased plant capacity, would improve the price-competitiveness of LNG compared to other fuels.

As a fuel, LNG has a similar energy density (77,000 Btus per gallon) compared to ethanol (76,000 Btus per gallon), but less than more common transportation fuels.[3] Diesel fuel contains about 139,000 Btus per gallon. This means a truck using a gallon of LNG would get about 64 percent of the fuel mileage it would get using a gallon of diesel. Table 1 shows the approximate energy densities of common transportation fuels.

[3] LNG energy density estimate (lower heating value) provided by Chicago Bridge & Iron.

Table 1: Energy Content of LNG and Other Transportation Fuels

Fuel	Btus per Gallon
Ethanol	76,000
LNG	77,000
Propane	92,500
Biodiesel	120,000
Gasoline	125,000
Diesel	139,000
Marine HFO	149,700

Although LNG is less energy-dense, it has three advantages over other transportation fuels: it is relatively cheap, abundant in the U.S., and cleaner than petroleum-based fuels. At current market prices, a million Btus of crude oil costs $12.89, compared to $3.62 for natural gas.[4] Refining and liquefaction add additional costs to providing usable fuel for consumers.

PSE's planned facility will sell LNG as a replacement for marine heavy fuel oil (HFO) used in large marine vessels. HFO is also known as bunker or residual fuel. The company will also sell LNG as a replacement for truck and marine diesel.

While there is an emerging market for LNG for these purposes, it is still relatively small and its growth limited by high equipment costs. Over time, however, more companies will shift to LNG for the long-term benefits of lower fuel costs and the security of having a stable and abundant supply. Also, tougher environmental regulations will accelerate the adoption of LNG as companies look for cost-effective alternatives to more polluting diesel and HFO.

According to PSE's estimate their plant will produce 15.7 million gallons of LNG, which will replace 8.7 million gallons of common diesel fuel. Another 65.0 million gallons of LNG will replace 33.4 million gallons of marine HFO (Table 2).

Table 2: LNG Facility Annual Production

Annual LNG Production	Gallons of LNG	Dekatherms	Gallons of Petroleum Products Replaced
Peak shaving	6,300,000	485,100	none
Diesel fuel replacement	15,700,000	1,208,900	8,697,122
HFO marine fuel replacement	65,000,000	5,005,000	33,433,534
Total Annual Production	87,000,000	6,699,000	-

[4] Bloomberg, prices on October 24, 2014, WTI crude at $81.01 a Bbl and NYMEX natural gas at $3.62.

Marine Heavy Fuel Oil

ECONorthwest estimates that by using the facility's LNG instead of heavy fuel oil, marine shippers will spend about 27 percent less per Btu.

New regulations limiting emissions for marine vessels may hasten the transition from petroleum fuel to LNG. The United States, under federal regulation 40 CFR 1043, sets forth fuel sulfur limits for Emission Control Areas (ECAs). By 2015, marine vessels must use fuel with a maximum sulfur content of 0.1 percent in North American ECAs and by 2020 globally. The International Maritime Organization estimates that heavy fuel oil contains about 2.7 percent sulfur.[5] LNG has virtually no sulfur. Puget Sound is part of an ECA that extends 200 miles offshore along the entire West Coast of the US and Canada as well as much of Alaska.

Diesel Fuel

LNG is less costly than truck diesel—about 28 percent less per Btu, according to ECONorthwest's analysis—and it is less polluting.

Federal regulation 40 CFR 80 required the on-road trucking industry to phase in ultra-low-sulfur diesel (0.0015 percent sulfur) between 2006 and 2010. The EPA is still phasing in regulations for low-sulfur diesel some marine and port purposes. This creates an incentive to switch to LNG.

Environmental and Health Benefits

Emissions from burning fuels have environmental and health impacts. This section describes the impacts associated with carbon dioxide (CO_2,) nitrogen oxides (NOx), sulfur (SOx), and particulate (PM_{10}) emissions both generally and in the context of Pierce County and PSE's market area.

General Environmental Impacts of Emissions

Researchers have linked emissions to a number of negative environmental impacts, all of which are mitigated by reducing emissions:

- Climate change from greenhouse gasses, specifically CO_2;
- Increased ground-level ozone and smog from NOx and CO_2;
- Acidification of lakes and streams from the reaction of SO_2 and NOx emissions;
- Acid rain damage to forest ecosystems;
- Degraded coastal water quality from nitrogen deposits;
- Higher particulate levels from SOx and NOx emissions; and

[5] International Maritime Organization, 2009, Second IMO GHG Study, accessed March 20, 2013 at http://www.imo.org/blast/blastDataHelper.asp?data_id=27795&filename=GHGStudyFINAL.pdf.

- Haze and impaired visibility from particulate matter.[6]

By reducing emissions across the board, LNG can limit the harmful impacts described above. The precise value of the emissions reduction from LNG depends on several factors, including how customers use LNG, where the fuel is used, engine type, operating conditions, and what fuel it replaces.

Emissions Impacts in a Regional Context

In 2009, the Environmental Protection Agency (EPA) designated the Wapato Hills-Puyallup River Valley area as a Nonattainment Area for fine particulate matter ($PM_{2.5}$). This area is also known as the Tacoma-Pierce County Nonattainment Area. Since that time, the area has attained the EPA's standards, but the Washington State Department of Ecology must submit a maintenance plan to the EPA for how it will ensure ongoing compliance.

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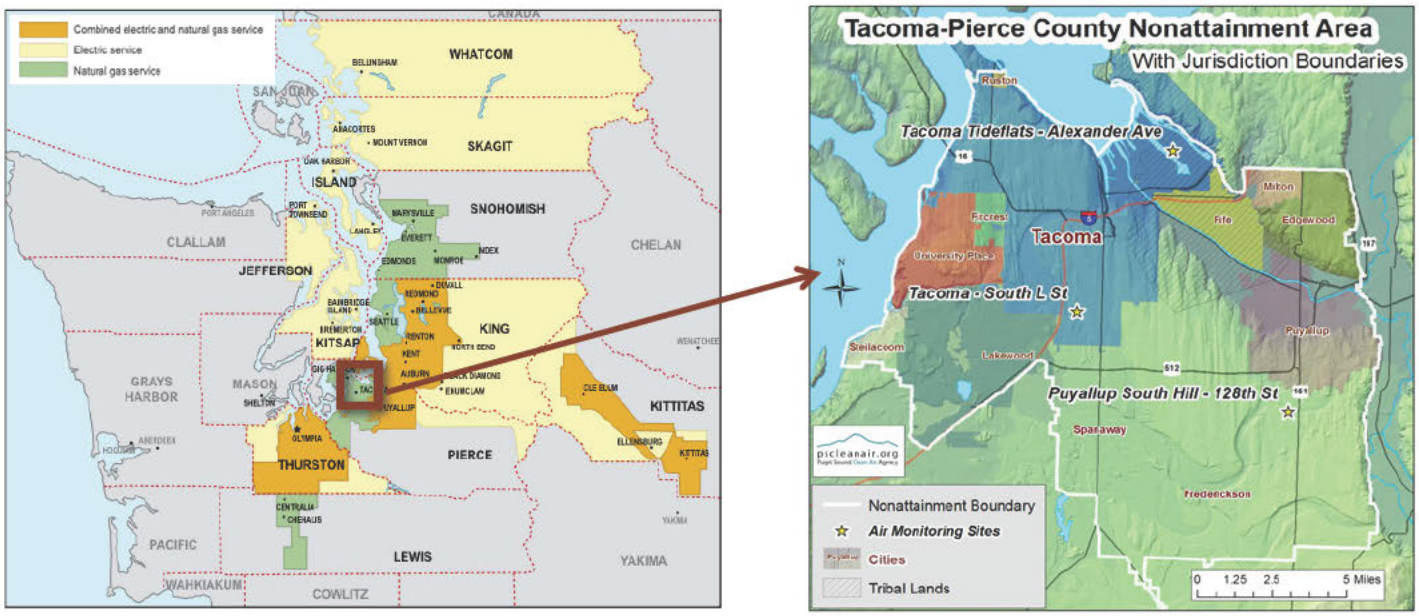
[6] ASME, 2009, ASME General Position Statement on Technology and Policy Recommendations and Goals for Reducing Carbon Dioxide Emissions in the Energy Sector, accessed March 27, 2013 at http://files.asme.org/asmeorg/NewsPublicPolicy/GovRelations/PositionStatements/17971.pdf; U.S. Environmental Protection Agency, Human Health and Environmental Effects of Emissions from Power Generation, accessed March 27, 2013 at http://www.epa.gov/captrade/documents/power.pdf.

Figure 1: Puget Sound Energy Service Area and the Tacoma-Pierce County Non-Attainment Area



(Source: PSE and the Washington State Department of Ecology)

Fine particulate pollution is highest in the winter months, when households burn wood for heating and the fine particles are trapped close to the ground by weather conditions. Based on monitoring between 2000 and 2010, about half of Pierce County's fall and wintertime fine particulates come from wood smoke, 20 percent comes from gasoline vehicles, five percent comes from diesel vehicles, and another four percent comes from ships[7].

In 2011, the Tacoma-Pierce County Clean Air Task Force made a set of recommendations to the Department of Ecology for reducing fine particulate matter in the area. The first two recommendations are for enhanced enforcement of air quality burn bans, and requiring the removal of uncertified wood stoves and inserts.

The Task Force recommends continued implementation of rules and support for programs and initiatives that target pollution reductions from transportation and industrial sources. Approximately one-quarter to one-third of the emission reductions needed will be accomplished from new federal regulations and local initiatives for more efficient engines, cleaner fuels, and improved industrial practices.[8]

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[7] Tacoma-Pierce County Clean Air Task Force. Report and Recommendations to Puget Sound Clean Air Agency. December 2011.
http://www.cleanairpiercecounty.org/taskforce/CleanAirTaskForceReport_FullReport.pdf

[8] Better Air in Tacoma and Pierce County: Recommendation of the Clean Air Task Force.
http://www.cleanairpiercecounty.org/taskforce/CleanAirTaskForceReport_RecOverview.pdf

Based on the emissions goals for the nonattainment area, the Clean Air Task Force estimates that reductions from gas, diesel, ship and industrial sources will make up 50 percent of the total reductions in emissions by 2014. The absolute amount of reductions in these sources will grow slightly by 2019, although their share of the total reductions will fall to about 27 percent as other recommendations are fully enacted.

The Tacoma-Pierce County Nonattainment Area falls in an area where Puget Sound Energy provides natural gas service, and because natural gas generates almost no particulate matter when it burns, PSE is poised to be a key player in maintaining the area's attainment status. PSE's plan to create a market for LNG transportation fuel is well aligned with the Task Force's call for cleaner fuels (Figure 1).

ECONorthwest calculated the changes in emissions from the transportation sector if shipping companies use the facility's LNG instead of heavy fuel oil and diesel (Table 3). We assume the plant will sell all its annual LNG production, other than the 6.3 million gallons needed for peak shaving. The first year in which PSE achieves such a sales level would depend on market conditions and how quickly shipping companies adopt the fuel. Actual emissions can vary widely depending on the specific types of engines used, operating conditions, and composition of fuel.

Table 3: Annual Emissions from Use of LNG as a Replacement for Diesel and Marine HFO, Metric Tonnes at Full Operations

		Air Emissions in Metric Tonnes per Year			
Source Added or (Removed)	Decatherms	CO2	SO2	Nitrogen Oxides	Particulates
LNG as a fuel	6,213,900	329,683	-	544	21
(Diesel replaced)	(1,208,900)	(88,248)	(1)	(79)	(8)
(Marine HFO replaced)	(5,005,000)	(394,295)	(235)	(713)	(146)
Net Change	-	(152,860)	(236)	(248)	(133)

The analysis shows that the LNG sold as fuel by PSE would reduce annual CO_2 emissions by 152,860 metric tonnes per year. Sulfur dioxide emissions would decrease by 236 metric tonnes, even assuming that LNG would displace only ultra-low-sulfur diesel and low-sulfur marine fuel. Reflecting the comparatively low carbon content of LNG, replacing diesel and HFO with LNG lowers particulates by 133 metric tonnes a year.

Substituting LNG for diesel and marine fuels will reduce emissions. Because trucks and vessels powered by LNG may travel outside the region, we do not have sufficient information to estimate the local and non-local shares of emissions reductions. Regardless, reduced emissions do result in lower social costs overall.

Economists use the "social cost of carbon" to estimate the value of changes in greenhouse gas emissions. The social cost of carbon represents "the full global cost today of emitting an incremental unit of carbon at some point of time in the future, and it includes the sum of the global cost of the damage it imposes on the entire time it is in the atmosphere."[9] There are currently over 200 different estimates of the social cost of carbon. One review of the literature found values ranging from about $7 to $60 per metric tonne of carbon.[10]

For our analysis, we apply a middle value of $42 per metric tonne of carbon (about $11.45 cents per tonne of CO_2) to estimate the social cost of emissions. Studies on the annual value of pollutant removal for PM_{10}, SO_2, and NOx also vary widely. For purposes of estimating the social benefits of emissions reductions at the Port of Tacoma and its environs, ECONorthwest used mid-point values developed for the City of Portland by Entrix.[11] The values per tonne of annual emissions are $6,593 for PM_{10}; $5,982 for SO_2; and $6,957 for NOx.

Based on the costs associated with these pollutants and the expected amount of reduction, ECONorthwest estimated the annual value of emissions reductions at approximately $5.8 million, as shown in Table 4.

Table 4: Annual Quantity and Value of Emissions Reductions from Use of LNG as a Replacement for Diesel and Marine HFO

Pollutant	Annual Value per Metric Tonne	Reduction from Using LNG, Tonnes	Change in Social Cost
CO2	$11.45	(152,904)	($1,750,746)
SO2	$5,982	(236)	($1,410,683)
Nox	$6,957	(248)	($1,724,365)
Particulates	$6,593	(133)	($874,363)
Total			($5,760,157)

[9] Shaw, M., L. Pendleton, et al. 2009. The Impact of Climate Change on California's Ecosystem Services. California Climate Change Center. CEC-500-2009-025-F.

[10] Shaw, R. et al, 2009. The Impact of Climate Change on California's Ecosystem Services. August.

[11] Entrix. 2010. "WHI Environmental Foundation Study." City of Portland Bureau of Planning and Sustainability. Portland, Oregon. July.

2 Economic Impacts

Upstream and Downstream Economic Impacts

This analysis distinguishes between direct, upstream, and downstream impacts. In this case, the terms refer to the economic relationships between the PSE LNG plant and the regional economy. Activities at the plant itself, including its construction and production, count as direct impacts. Using an input-output model, we can then follow the subsequent impacts going upstream and downstream. Figure 2 summarizes the types of impacts included in this analysis.

Economic Impacts

ECONorthwest estimates that the plant will create the following economic impacts:

Construction
(annual average over 7 years):

Output: $71.1 million

Labor Income: $27.5 million

Jobs: 401

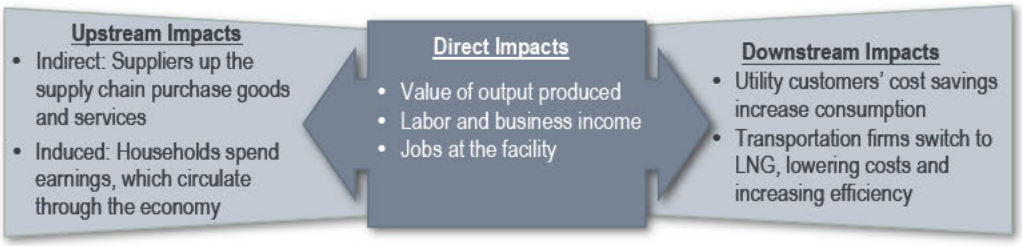
Annual Operations

Output: $78.9 million

Labor Income: $9.8 million

Jobs: 130

Figure 2: Types of Economic Impacts for Storage and Fuel Plant



Most commonly, economists follow the upstream impacts, which result from the plant's spending on all the goods and services it buys locally and on the payroll for its workers. Impacts continue moving upstream as suppliers and employee households spend money, triggering more spending and employment in the local economy.

LNG production at the facility could have many types of downstream impacts, and we consider two in this analysis. First, we estimate the economic impacts of the savings that accrue to local utility customers who will pay lower rates. These customers will spend their savings in other ways, causing a ripple effect of spending in the economy.

Second, we consider community-wide downstream impacts resulting from increased efficiency and reduced emissions. For example, the LNG produced by the facility will reduce natural gas utility bills throughout the region because it lowers natural gas supply costs. Sold as a transportation fuel, LNG is less expensive than marine HFO and diesel. These savings allow the local economy produce more with less, resulting in higher economic activity. Furthermore, lower CO_2 emissions lead to lower social costs, which is another downstream impact.

Economic impacts measure relationships between industry sectors, households and communities. While it may be tempting to sum the upstream, downstream, and direct impacts, and call it the "total impact", such an assertion would overstate the impacts and be misleading. Impacts are not necessarily additive; rather, they individually describe the relationships between economic activities.

Upstream Impacts

ECONorthwest used an input-output modeling software program called IMPLAN® to estimate the direct, indirect and induced impacts of the proposed peak shaving facility on the Puget Sound economy, including King, Snohomish, Pierce, Thurston, Kitsap, Mason, Skagit, and Island Counties.

Economic impacts are classified by their relationship to the activity in question. For this analysis, the three types of impacts are defined, with regard to the plant, as follows:

- **Direct impacts** of the plant include its production, the wages and benefits it pays, and the people it employs.
- **Indirect impacts** come from spending between businesses. They start with the plant's purchases from its suppliers and propagate throughout the economy *via* subsequent business-to-business spending.
- **Induced impacts,** also known as "consumption-driven" impacts, occur first when plant employees' households spend their earnings. The impacts continue to accrue as other households, whose incomes also rise, spend more money locally.

For this analysis, we measure and describe impacts in three ways:

- **Output** is the value of the plant's annual production. In measuring the economic impacts of construction, output is the cost of the construction project, including engineering, equipment purchases, and various fees. Business revenues are counted as indirect and induced output for other sectors. For retail and wholesale businesses, output is the value of sales minus their cost of goods sold.
- **Labor Income** equals employee payroll costs, including wages, benefits and employer-paid payroll taxes, plus the earnings of any self-employed persons.
- **Jobs** are the number full-year-equivalent jobs. IMPLAN uses the official definition of a job from the U.S. Bureau of Labor Statistics, which counts one job as 12 months of work, including payroll jobs, self-employment or farm work. For example, two jobs that each last six months count as one job in IMPLAN. A job is counted based on the number of months of employment, and not the number of hours worked; a job can be full or part time.

Upstream Construction Impacts

PSE provided estimates of the capital costs for building the facility. Construction costs include upgrades to PSE's existing distribution system and laying new pipe.[12] These estimates formed the basis of the construction impacts analysis.

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[12] Email from Mr. Charles Daitch of Puget Sound Energy to ECONorthwest. August 18, 2014.

PSE estimates that the entire cost of the plant, from pre-development through opening, will amount to $325 million. Pre-development activities, such as planning and engineering, began in 2012. On-site construction will take place from 2015 to 2018, and total expenditures over that four-year period will be $315 million.

Over the entire course of the contraction project (2012 through 2016), PSE expects to incur about $19.9 million in financing costs. According to convention in the field of economics, these are excluded from the economic impact analysis.

Table 5 shows the upstream impacts for the on-site construction phase (2014 through 2016.)

Table 5: Upstream Construction Impacts (2012 dollars)

Impact Measure	Type	2012	2013	2014	2015	2016	2017	2018	Average
Output	Direct	$1,327,115	$2,112,396	$6,808,185	$29,443,160	$86,183,760	$135,587,298	$50,498,510	$44,565,775
	Indirect	568,744	778,918	2,643,887	13,597,166	40,001,655	64,235,795	21,816,286	20,520,350
	Induced	250,858	386,011	1,370,565	4,316,331	11,467,736	18,067,325	6,515,385	6,053,459
	Total	$2,146,717	$3,277,325	$10,822,637	$47,356,657	$137,653,151	$217,890,418	$78,830,181	$71,139,584
Labor Income	Direct	$391,552	$748,545	$2,098,656	$8,957,352	$27,189,737	$41,683,220	$17,686,040	$14,107,872
	Indirect	207,218	283,116	962,833	4,887,062	14,341,864	23,019,485	7,830,151	7,361,676
	Induced	196,304	341,826	1,061,504	3,982,265	11,503,468	17,809,636	7,144,771	6,005,682
	Total	$795,073	$1,373,487	$4,122,992	$17,826,679	$53,035,068	$82,512,341	$32,660,962	$27,475,229
Jobs	Direct	4	7	21	101	309	481	192	159
	Indirect	3	5	16	78	229	368	125	118
	Induced	4	7	22	82	237	367	147	124
	Total	11	19	59	262	775	1,216	464	401

From 2014 to 2016, the project will produce an average of $71.1 million per year in direct output. It will also generate an average of $26.6 million in indirect and induced output each year. Total output will amount to an average of $71.1 million each year.

During construction, the project will support an average of 159 direct construction jobs per year, and another 118 indirect and 124 induced jobs, for an average of 401 total jobs per year.

Labor income paid to the project's workers will amount to an average of $14.1 million each year. Adding the indirect and induced effects, total labor income in the study area will average $24.5 million per year.

Upstream Operating Impacts

Puget Sound Energy expects to begin operations at the plant in 2019. PSE projected its fuel sales, the value of peak shaving to its utility operations, and the plant's operating costs for the first year of production. The plant will produce 250,000 gallons of LNG per day, operating about 360 days per year, for an average capacity utilization rate of 98 percent. At this level of production, the plant will employ 16 workers at an average annual cost of $137,412 per worker. This includes all benefits, payroll costs, and employment taxes.

After natural gas and electric power from local utilities, the plant's largest expenses are labor, consumables, wharfage, and land lease fees to the Port of Tacoma. This spending is included in the impact analysis, as are spending on regular maintenance and repairs.

ECONorthwest estimated the annual impacts of this spending on the regional economy (Table 6). The plant will produce $58.0 million in direct output per year, and another $20.9 million in indirect and induced output, for a total of $78.9 million in output per year. Operations at the plant will support 16 jobs that will pay $2.2 million in labor income. Adding the indirect and induced impacts, the plant will support a total of 130 jobs paying $9.8 million in labor income.

ECONorthwest assumes the market will absorb the LNG produced as fuel as forecast by PSE. It is possible the market will not demand all the production from the plant operating at 98 percent of capacity in 2019. It is also possible that demand could exceed PSE's forecast.

Table 6: Upstream Annual Operating Impacts (in 2019)

Impact Measure	Type	2019
Output	Direct	$57,963,198
	Indirect	15,028,977
	Induced	5,911,770
	Total	$78,903,945
Labor Income	Direct	$2,198,593
	Indirect	5,493,170
	Induced	2,104,258
	Total	$9,796,021
Jobs	Direct	16
	Indirect	72
	Induced	43
	Total	130

Downstream Impacts

Puget Sound Energy will sell LNG to marine and truck transportation companies, which will reduce their fuel costs. In addition, the low-cost peak shaving capacity from the plant will improve PSE's operational efficiency. ECONorthwest used IMPLAN to estimate the annual economic impacts of these downstream effects.

Each year, PSE expects to sell 65.0 million gallons of LNG directly to marine users. This will displace 33.4 million gallons of low-sulfur marine HFO, for a net savings of $28.9 million. PSE also expects to sell 15.7 million gallons of LNG each year for use in truck transportation. This will reduce the trucking industry's diesel consumption by almost 8.7 million gallons, amounting to $16.0 million in savings.

The reductions in marine HFO and diesel use would also have a negative downstream impact on fuel wholesalers. While some will likely sell LNG, in net terms they will lose some market share. Fuel wholesalers would see their output (the difference between sales and cost of goods sold) decline about $4.8 million. The loss is counted as a downstream impact in this analysis.

For regular gas utility customers, the new peak shaving capacity at the plant would generate savings in utility costs. ECONorthwest assumes those savings are distributed among PSE's residential, commercial, and industrial natural gas customers in proportion to their consumption. Over the first 25 years of operations, the net present value of savings to ratepayers would average $3.0 million annually.

Table 7: Savings from LNG Use (in 2019)

Savings Resulting from LNG Use	Amount
Savings From Peak Shaving	
Households	$2,045,312
Commercial Businesses	795,485
Industrial Businesses	192,716
Subtotal	$3,033,513
Savings From Using LNG as Fuel	
Marine Transportation	$28,884,158
Truck Transportation	15,993,089
Wholesaling	(4,818,902)
Subtotal	$40,058,345
Grand Total	$43,091,859

Table 7 shows the expected sources of downstream impacts for natural gas utility and LNG fuel consumers in the Puget Sound Area, and the savings (or costs) for each group. ECONorthwest estimated the economic impacts of these savings as they ripple through the local economy.

For this analysis, we assumed that households would use their savings to purchase other goods and services, rather than investing or saving them. We also assumed that businesses using natural gas would increase production by an amount equivalent to their savings, which would increase their spending on goods and services, raising incomes and employment downstream.

Although many transportation topics have been well researched, we found little information about the effect of lower fuel prices on Washington's transportation industries that is applicable to the emerging LNG market. The relevant questions for this analysis include whether transportation volumes would increase, and how the savings would be distributed between the transportation companies and their customers.

In lieu of this information, we relied on the following assumptions for calculating the economic impacts of the downstream effects in IMPLAN:

- Marine and truck transportation companies' LNG-related savings would be distributed evenly between the companies and their customers. Half of these companies and customers would be located outside the Puget Sound region, so those savings would not generate economic impacts inside the region.

- Half of the savings realized by local transportation companies would be either retained by companies to offset capital costs of acquiring or converting equipment for LNG fuel or distributed as profits. Our analysis does not consider potential

economic impacts resulting from these savings because we cannot accurately estimate where the recipients reside.

- All lost wholesaling revenues would occur within the study area.

- To convert vehicles and ships to LNG, companies must make capital investments in new engines and fuel tanks, and this will take time. Trucks that run on LNG are now available from manufacturers.[13] The changeover from petroleum-based fuels to LNG will spark economic activity. However, the degree that it does and how much of the spending on new equipment would occur in the Puget Sound area is uncertain. Thus, ECONorthwest did not include it in this analysis as a downstream impact. Further, we assume that the facility will have sufficient demand for the 87 million gallons of LNG it produces in 2019.

- The social value of reduced pollution, estimated at $5.7 million per year (see Table 4), is a type of downstream impact. However, this was not included in the economic impact analysis because we cannot determine the distribution of these values by economic sector and geography.

As shown in Table 7, the plant will save PSE's ratepayers and LNG consumers $43.1 million per year. Using IMPLAN, we estimate that the annual economic impact of those savings for the Puget Sound Region will total $14.9 million in output annually, supporting $3.8 million in labor income for 74 jobs (Table 8).

Table 8: Downstream Economic Impacts (in 2019)

Impact Measure	2019
Output	$14,892,642
Labor Income	$3,810,590
Jobs	74

[13] Cardwell, S and Krauss, "Trucking industry is set to expand use of natural gas." The New York Times. April 22, 2013.

Appendix J-2: Local Government Tax Analysis

APPENDIX J-2

Local Government Tax Analysis

April 20, 2015

Overview

This analysis outlines the estimated incremental taxes generated by the Tacoma LNG Project for local governments (Tacoma, Fife, Pierce County, and other local agencies). The taxes outlined below do not include any taxes for the state. This look at incremental tax revenues excludes a large portion of the total tax revenues the project will generate. For example, sales and fuel tax paid by marine and on road consumers is not counted because it is presumably already being collected today on the diesel or bunker fuel purchases these customers are making.

Taxes are broken out into sales tax paid during construction, taxes generated from operational expenses, property taxes and business and occupation (B&O) and Utility tax collected on project revenues. These taxes will come from multiple different sources (for example, Tacoma Public Utilities, Washington State Department of Revenue), and in some cases, will not be traceable directly back to the Tacoma LNG Facility.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Sales Tax Related to Construction														
Tacoma LNG Facility [1]	466,000	804,000	781,000	355,000										
Gas System Upgrades in Tacoma [2]		45,000	337,000											
Gas System Upgrades in Fife [3]		32,000	240,000											
Gas System Upgrades in Unincorporated Pierce [4]		25,000	190,000											
Agreement with City of Tacoma [5]			2,250,000	1,000,000	1,000,000									
Total Estimated Tax During Construction	466,000	906,000	3,798,000	1,355,000	1,000,000									
Taxes on Operating Costs														
Utility Tax (Plant Electricity) [6]					421,000	425,000	449,000	453,000	470,000	480,000	495,000	514,000	528,000	543,000
Sales tax on plant maintenance and consumables [7]					26,000	27,000	27,000	28,000	29,000	29,000	30,000	31,000	32,000	32,000
Total Estimated Taxes Paid on Operations					447,000	452,000	476,000	481,000	499,000	509,000	525,000	545,000	560,000	575,000
Property Tax*														
LNG Facility														
City of Tacoma [8]					688,000	688,000	688,000	688,000	688,000	688,000	688,000	688,000	688,000	688,000
Pierce County [9]					275,000	275,000	275,000	275,000	275,000	275,000	275,000	275,000	275,000	275,000
Other Local Jurisdictions [10]					1,813,000	1,813,000	1,813,000	1,813,000	1,813,000	1,813,000	1,813,000	1,813,000	1,813,000	1,813,000
Gas System Upgrades														
City of Tacoma [11]					44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000
City of Fife [12]					19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000
Pierce County [13]					44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000
Other Local Jurisdictions [14]					286,000	286,000	286,000	286,000	286,000	286,000	286,000	286,000	286,000	286,000
Total Estimated Property Tax Total [15]					3,169,000	3,169,000	3,169,000	3,169,000	3,169,000	3,169,000	3,169,000	3,169,000	3,169,000	3,169,000
Revenue Tax														
Business and Occupation (B&O) Tax [16]					73,000	73,000	72,000	72,000	74,000	74,000	76,000	83,000	81,000	81,000
Increased Utility Tax from Tacoma Ratepayers [17]					60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Total Estimated Taxes Paid on Sales of LNG					133,000	133,000	132,000	132,000	134,000	134,000	136,000	143,000	141,000	141,000
Total Estimated Taxes Generated for Local Government	466,000	906,000	3,798,000	1,355,000	4,749,000	3,754,000	3,777,000	3,782,000	3,802,000	3,812,000	3,830,000	3,857,000	3,870,000	3,885,000

***Note on Property Tax Estimates**

The estimate in this analysis represents an indicative calculation of what annual property tax revenues may look like. PSE is centrally assessed by the Washington State Department of Revenue (DOR) and has no control over how property tax revenues are assigned to the jurisdictions. The estimate contained herein is based on the total levy rate for the taxable areas, which include taxes for the county, city, and other public services, including schools and emergency management multiplied by adjustments made by the State DOR. The division of the levy rate between these jurisdictions or public services is publicly available from Pierce County. However, since PSE is centrally assessed, this breakout does not necessarily apply to PSE's property. Ultimately, property tax allocations are governed by the state DOR.

Notes:

[1] Assumes local tax rate of 3% on plant construction items that are not subject to the manufacturing exemption. City of Tacoma general fund receives 1% of sales (1/3 of listed amount), with the balance going to other local designated agencies.
[2] Local sales tax (at 3% of sales) for construction of gas system upgrades in the City of Tacoma.
[3] Local sales tax (at 2.9% of sales) for construction of gas system upgrades in the City of Fife
[4] Local sales tax (at 2.3% of sales) for construction of gas system upgrades in unincorporated Pierce County.
[5] Agreement with the City of Tacoma dated November 25, 2014.
[6] Utility tax paid on LNG Facility electricity consumption.
[7] Assumes 3% local tax rate paid on plant consumables and maintenance during operations.
[8] Property tax for Tacoma generated by the LNG plant at the rate of $3.21/$1,000 of assessed value plus $0.50/$1,000 of assessed value for EMS (see note above).
[9] Property tax related to the Tacoma LNG Facility for Pierce County based on a levy rate of $1.48/$1000 of assessed value (see note above).
[10] Other local agencies include the Port, Flood Control, Schools, and Parks.
[11] Property tax for Tacoma generated by the gas system upgrades considers the city rate of $3.21/$1,000 of assessed value plus $0.50/$1,000 of assessed value for EMS (see note above).
[12] Property tax for Fife related to the gas system upgrades considers the city rate of $1.6/$1,000 of assessed value plus $0.50/$1,000 of assessed value for EMS (see note above).
[13] Property tax related to the Tacoma LNG Facility for Pierce County based on a levy rate of $1.48/$1000 of assessed value.
[14] Other local agencies include the Port, Flood Control, Schools, Local Roads, EMS, Rural Libraries and Fire Departments.
[15] This total includes an estimate for all property taxes related to the project except for those levied by the state (approximately $604k/year).
[16] Local B&O taxes at the wholesale rate of .102% assessed on the entire projected revenues from LNG as fuel sales. Sales tax from TOTE and other downstream sales is not considered as it is not an incremental tax with this project.
[17] PSE's rates will increase as a result of this project. The rate increase will be spread across the service territory. The estimate is based on the projected rate increase applied to 2014 utility taxes paid by PSE in Tacoma.

1 Purpose, Need, and Alternatives Considered

This section presents the purpose of the Proposed Action set forth by the proponent, Puget Sound Energy (PSE), the need for the Proposed Action, and the various alternatives considered, consisting of the Proposed Action, the No Action Alternative, and alternatives eliminated from further consideration. Throughout this draft environmental impact statement (DEIS), the term "Proposed Action" refers to the construction, operation, and decommissioning of the Tacoma Liquefied Natural Gas (LNG) Project, referred to herein as the "Project."

1.1 Purpose and Need

The purpose of the Proposed Action is summarized as follows:

- Receive natural gas from PSE's distribution system, chill natural gas to produce approximately 250,000 to 500,000 gallons of LNG daily, and store up to 8 million gallons of LNG on site.
- Re-inject and divert approximately 85,000 decatherms (Dth) per day (995,000 gallons of LNG) of peak-day gas supply into PSE's distribution system.
- Dispense LNG for the following uses: maritime transportation fuel to be used by Totem Ocean Trailer Express (TOTE) at their Port of Tacoma facility (approximately 39 million gallons per year) and other future regional LNG marine vessel fuel customers, and loading to trucks or barges for other regional markets seeking a cleaner fuel.

The Proposed Action responds to the following needs:

- **Peak-day resource for natural gas customers**
- PSE plans for the peak-day needs of its retail natural gas customers in its biennial integrated resource plan (IRP) as mandated by the Washington Utilities and Transportation Commission (WUTC). Through the IRP process, PSE has identified long-term needs for new peak-day resources to serve retail natural gas customers using standard and WUTC-accepted load projection methodology. The IRP considered expected customer loads, including the effect of demand-side resource programs, based on long-term expected regional economic growth. The 2013 IRP demonstrated a need for peaking resources beginning in 2017 that is expected to grow to a deficit of approximately 150,000 Dth per day by 2022, and 200,000 Dth per day by 2026.
- PSE evaluated various resource alternatives available to reliably meet customer demand and determined which resource, or set of resources, would meet such customer demand most cost-effectively. The Tacoma LNG Facility was evaluated against long-haul interstate pipeline capacity, regional underground natural gas storage service combined with interstate pipeline storage redelivery service, and a stand-alone LNG peaking facility in other locations. In consideration of the company's resource needs and prudency requirements, PSE determined that the most cost effective way of meeting these needs would be a combination of additional regional underground storage, the Tacoma LNG Facility, and system refurbishment of an existing, on-system, peak-day resource. The Tacoma LNG Facility would fill approximately 50 percent of the anticipated deficit. PSE requires 6 to 7 million gallons of storage to adequately serve the storage requirements associated with such peak-shaving volumes (see definition of peak shaving in Section 1.2.1 [Proposed Action]); therefore, taking into account the needs of other customers, the proposed single 8-million-gallon, unpressurized, full-containment LNG storage tank best meets long-term customer storage needs.
- **Fuel for TOTE vessels and other maritime or terrestrial transportation**
- PSE has entered into a contract with TOTE to provide LNG to TOTE at its Port of Tacoma terminal. TOTE operates two Orca class vessels between the Port of Tacoma and Port of Anchorage and transports

approximately 30 percent of all consumer goods shipped to Alaska. In 2010, the International Maritime Organization approved the North American Emissions Control Area (ECA), establishing more stringent emissions standards within 200 nautical miles of the United States and Canadian coasts. The United States Environmental Protection Agency (EPA) is responsible for administering vessels operating within the ECA. Ships operating within the ECA were required to reduce the sulfur content of their fuel to 1 percent in August 2012 and must further reduce the sulfur content to 0.1 percent by 2015. TOTE chose to meet this requirement by converting to LNG as the fuel for its Tacoma-Alaska fleet and obtained a conditional ECA waiver from EPA in July 2012 that provides forbearance on enforcement until late 2016 to allow for procurement of the LNG engines and the development of LNG fuel supply infrastructure. TOTE would consume more than 39 million gallons of LNG annually, which is a significant portion of the LNG to be produced at the Tacoma LNG Facility. TOTE's vessels operate on a regimented schedule of sailings, arriving in Tacoma on Wednesdays and Fridays and departing approximately 12 hours later. The liquefaction and loading capacity of the Project must meet the requirements of the TOTE operation.

- Further implementation of fuel switching from petroleum products to LNG under ECA requirements is anticipated to result in the additional need for maritime LNG fuel in the Seattle and Tacoma areas. Siting a facility that can load LNG directly into bunker barges minimizes the costs and logistical challenges of transporting LNG by bulk to maritime end users.
- State and regional policies encourage the use of clean fuels to meet greenhouse gas (GHG) emission reduction objectives. Washington's 2012 Energy Strategy calls for the implementation of clean energy strategies in the transportation sector under Revised Code of Washington (RCW) 43.21F.088(1)(e) and the reduction of GHGs under RCW 70.235. Regionally, the *Pacific Coast Action Plan on Climate and Energy*, signed by the leaders of California, Oregon, Washington, and British Columbia on October 28, 2013 (Pacific Coast Collaborative 2013), calls for the transition of the West Coast to clean modes of transportation and the reduction of a large share of GHG emissions with actions that, among others, support emerging markets and innovation for alternative fuels in commercial truck, bus, rail, port, and marine transportation. Natural gas has been identified as a key resource to implement such reductions; see, for example, RCW 46.37.467(2), and the United States Department of Energy Alternative Fuels Data Center at http://www.afdc.energy.gov/vehicles/natural_gas_emissions.html. The Proposed Action would address the need for regional natural gas resources in the transportation industry and other industrial markets desiring to avail themselves of a cleaner fuel in support of GHG emissions reduction policies, and reduced operational cost.

1.2 Alternatives Considered

Under Washington Administrative Code 197-11-440(5)(d) regarding private projects proposed at a specific site, the lead agency must evaluate only the proposed action, the no action alternative, and other reasonable alternatives for achieving the proposal's objective on the same site. A reasonable alternative must be feasible and capable of meeting the proposal's objective at a lower environmental cost. In the case of the Proposed Action, PSE seeks to achieve the following objectives at the proposed site:

- Receive and chill natural gas to create approximately 250,000 to 500,000 gallons per day of LNG;
- Store up to 8 million gallons of LNG in an on-site storage tank;
- Deliver LNG via cryogenic pipeline to fuel vessels or load bunker barges on the Blair Waterway, including TOTE container vessels;
- Provide bulk LNG loading to bunker barges on the Hylebos Waterway; and
- Regasify the LNG and inject natural gas into PSE's distribution system as a peak day resource; the connected distribution system must have sufficient demand to consume the injected natural gas.

This DEIS evaluates the Proposed Action and the No Action Alternative described below. Additionally, it discusses alternatives that were considered but eliminated from further consideration as alternatives because they failed to meet the objectives stated above.

1.2.1 Proposed Action

The Proposed Action is to develop and operate the Project, as defined above. The Proposed Action would include construction and operation of a small-scale facility to produce LNG to fuel marine vessels and provide LNG fuel to various customers in the Puget Sound area via LNG bunkering barges and tanker trucks. The Project would also have the capability of vaporizing LNG back to its gaseous state for injection into the PSE Natural Gas Distribution System during periods of high demand, referred to as "peak shaving." The area of the Proposed Action is shown in Figure 1-1. The Project would consist of the following main components:

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System. This facility will be located in the Port of Tacoma within the city of Tacoma.
- **TOTE Marine Vessel LNG Fueling System:** Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 1-2.
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), a new limit station (Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. Pipeline Segment A would be located in the city of Tacoma and the city of Fife. Pipeline Segment B would be located in unincorporated Pierce County. In addition, the Golden Given Limit Station and Fredrickson Gate Station would be located in unincorporated Pierce County.

The two new pipeline segments on the Blair-Hylebos peninsula would be required to serve the Tacoma LNG Facility. The existing natural gas facilities in the area do not have the capacity to serve the new facility. Segment A would extend from the Tacoma LNG Facility to the existing PSE distribution system on the south side of Interstate 5 in the City of Fife.

Pipeline Segment B, a 1-mile-long distribution pipeline, would interconnect the north and south Tacoma distribution systems and would be designed to increase the capacity to the Port of Tacoma area. The Golden Given Limit Station would regulate the gas pressure as it moves from south to north. The Project would result in an increased flow of natural gas through the Fredrickson Gate Station beyond its present capacity, necessitating a rebuild of the station.

1.2.2 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. It is assumed that existing land uses would continue at the proposed Project site, which include various industrial and commercial uses.

LNG would not be produced or stored at the Tacoma LNG Facility site and would not be available to fuel marine vessels or other customers in the Puget Sound area. Additionally, natural gas would not be stored as LNG at the Tacoma LNG Facility site to regasify and inject into the PSE Natural Gas Distribution System and ensure that PSE customers receive natural gas supplies as needed during periods of peak demand.

Under the No Action Alternative, the economic and employment impacts of the Proposed Action would not be realized. Moreover, a new supply of fuel with fewer air emissions than traditional fuels would not be available to help improve air quality in the Puget Sound airshed and the ECA.

1.2.3 Alternatives Eliminated from Further Consideration

Before determining that the selected site was the only one that enabled the company to meet its objectives, this and other sites in the Puget Sound region were evaluated to assess whether they could meet each Proposed Action objective. Key attributes in this evaluative process included sufficient setbacks to comply with federal code 49 Code of Federal Regulations 193 (which require large parcels), proper industrial zoning, access to markets, access to PSE's distribution system, and waterfront siting to accommodate deliveries to TOTE and potential marine markets. All of these factors contribute to the development and economic viability of the Proposed Action.

Western Washington has a dearth of compatible sites. There is very little available heavy-industrial zoned acreage of sufficient parcel size to accommodate the necessary tank size. A variety of sites were examined for suitability, and the results of those investigations are described below. The sites are as follows:

- BP Cherry Point Refinery – Whatcom County
- Intalco site – Whatcom County
- Port of Everett Jeld-Wen site
- Port of Everett Shadow Development site
- Port of Tacoma Frederickson site
- Port of Tacoma Kaiser Aluminum site
- Port of Tacoma Earley development site
- Port of Tacoma Snail site (site of former snail infestation)
- Port of Tacoma Naval Reserve site

Whatcom County and Washington Department Fish and Wildlife regulations prevent the construction of additional piers at the Cherry Point and Intalco sites that are needed to meet the requirements for an LNG facility. In addition, the remote location makes service to TOTE and PSE's retail natural gas customers economically unfeasible. Neither of the Port of Everett sites was on the market for sale or a long-term industrial tenant lease at the time PSE was looking to procure a site for LNG development. While the sites may have worked for the purpose of peak shaving, neither site presented immediate proximity to the TOTE facility, where its newly commissioned LNG vessels would be fueled. TOTE's business model for serving the Tacoma-Anchorage route is based on round-trip speed and efficiency: fueling must occur at its Port of Tacoma terminal at the same time as its cargo loading/unloading operations. Fueling stops in the Port of Everett would make TOTE's Tacoma-Anchorage route economically inefficient. Additionally, the proximity to Naval Station Everett could considerably constrain the ability to move frequent and large barge shipments of LNG past the sensitive military installation. The Shadow Development site was only approximately 15 acres, too small to host an 8-million-gallon storage tank. Tidal effects and shallow river depth precluded further investigation into this site. The Jeld-Wen site owners preferred to use the site for residential development. Ultimately, their distance from TOTE and other siting constraints rendered each of these four sites physically and economically incompatible with PSE's proposed LNG development.

The Port of Tacoma's various sites each presented an improved case for proximity to TOTE and workable solution for the purpose of peak shaving. Despite its adequate size, the Fredrickson site presented limited product mobility because of its inland location. The only way to move LNG from the site to TOTE was either by rail through suburban and city neighborhoods, or by truck. Railcars to transport LNG are presently not authorized by the federal government. Both solutions require tankage at the Blair-Hylebos peninsula. The 4-hour fueling window for each vessel is inadequate for the delivery of 450,000 gallons of LNG arriving by truck in 10,000-gallon increments. These numbers are not limited to TOTE vessels alone; barging infrastructure, tank storage, and additional LNG trucks would still be necessary at the Port of Tacoma to accommodate other marine customers. The cost of infrastructure and transportation constraints at the Fredrickson site rendered the development of the project there infeasible.

The Port of Tacoma presented two other sites for early consideration. One (the “Snail site”) was constrained by both a stormwater pond and extensive wetlands on the site. At the time that PSE was asked to consider it, the site was also subject to a federal lawsuit related to the removal of forested wetlands. Even pending a satisfactory resolution of the litigation, the site was too small for the Proposed Action. The other site is the former Kaiser Aluminum site at the base of the Blair-Hylebos peninsula. This site was far too large for the proposal, and the lease costs alone would have rendered the development of the facility and associated infrastructure uneconomical. Further, it was economically infeasible to develop a cryogenic line to serve the TOTE site from this distance.

PSE examined a third site at the tip of the Blair-Hylebos peninsula known as the Earley Business Center. The Port of Tacoma has designated this site as an incubator site for small businesses and declined to make it available to PSE.

The remaining site (the Naval Reserve site) is the proposed site for development of Tacoma LNG. This site meets the objectives set forth for the successful development of the Proposed Action. Chapter 2 provides further description.

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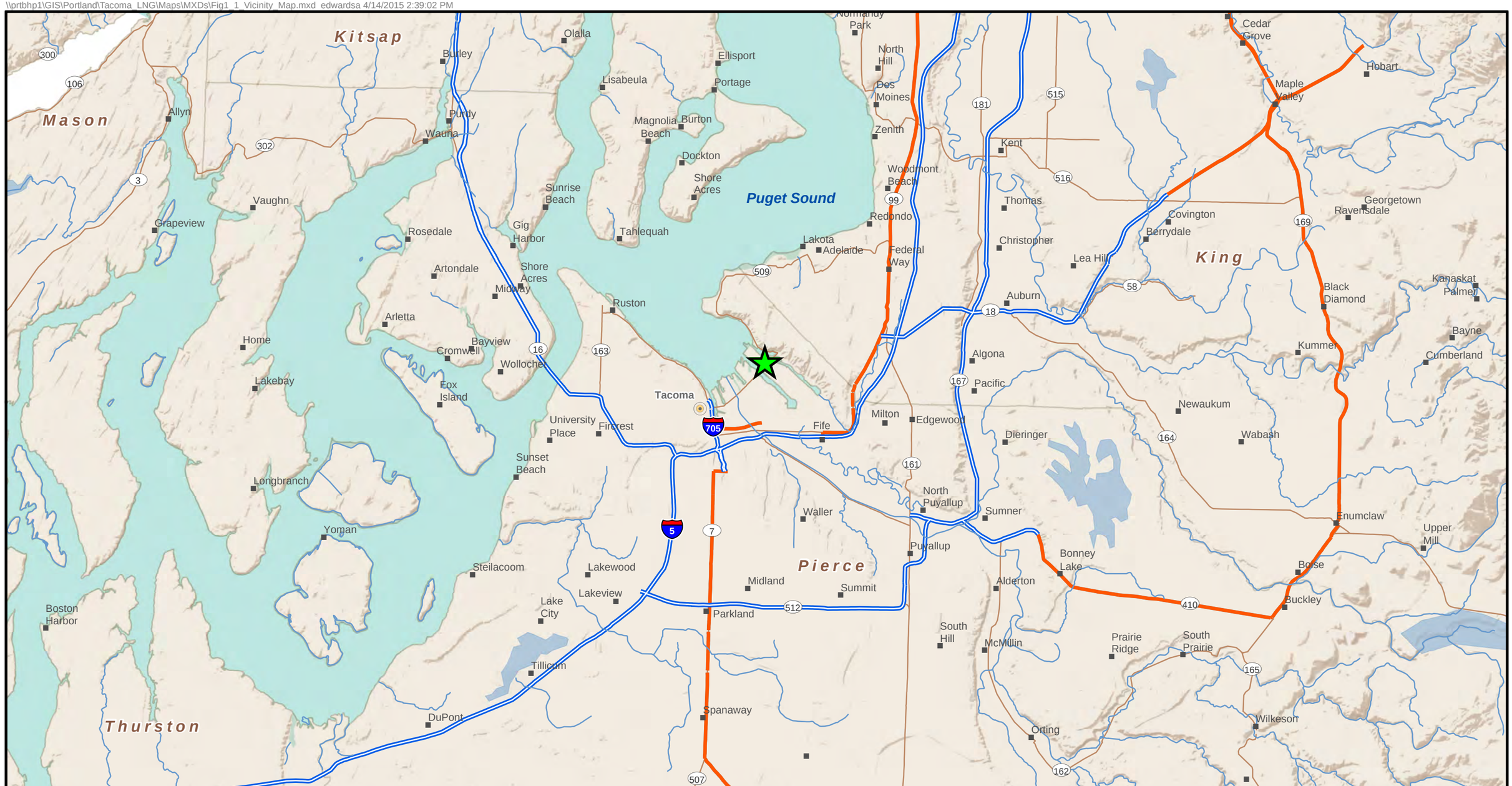


Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Tacoma LNG Facility
- County Seat
- City
- Interstate
- Highway
- Major Road
- River
- Water

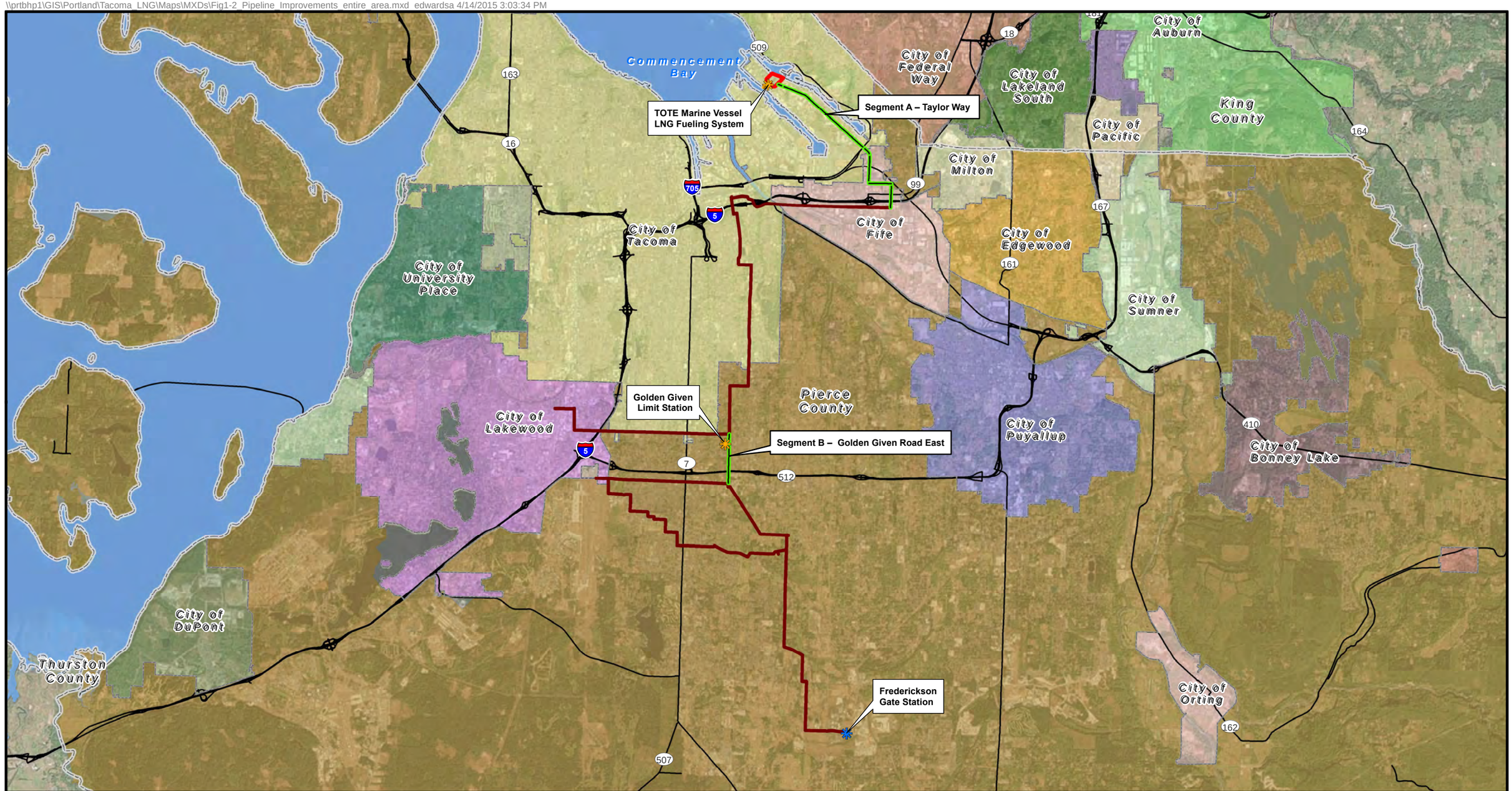
N W E S

0 1.5 3 Miles

City of Tacoma

Figure 1-1
Vicinity Map

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Frederickson Gate Station
- Proposed Action Components
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

N W E S

0 5,000 10,000 Feet

Tacoma

City of Tacoma

Figure 1-2
Proposed Action Main Component Locations

Tacoma LNG Project

Cover Letter
Final Environmental Impact Statement (FEIS)
Puget Sound Energy Tideflats LNG Facility

Lead Agency:

September 30, 2015

City of Tacoma
Planning and Development Services
747 Market Street, Room 345

Description of Proposal: PSE Proposed Tideflats LNG Facility EIS
The Project would consist of the following main components:

- Tacoma LNG Facility: Liquefies natural gas (LNG), stores LNG, and includes facilities to transfer LNG to the adjacent TOTE Marine Vessel LNG Fueling System, bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to re-gasify stored LNG and inject natural gas into the Puget Sound Energy (PSE) Natural Gas Distribution System.

- TOTE Marine Vessel LNG Fueling System: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges.

- PSE Natural Gas Distribution System: Conveys natural gas to and from the Tacoma LNG Facility. This system will require upgrades, including two new distribution pipeline segments with a total length of 5.0 miles, a new limit station (Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station.

Location of the Proposal
LNG: 901 and 1001 Alexander Avenue East; 3533 E. 11th Street, Tacoma WA 98421. Pipeline: the Cities of Tacoma, Fife, and Pierce County. (See www.cityoftacoma.org/planning, "PSE Proposed Tideflats LNG Facility.")

Key Environmental Issues
Key environmental issues addressed in the Final Environmental Impact Statement (FEIS) for the siting, construction, and operation of an LNG liquefaction and storage facility at the Port of Tacoma included the following:

- Potential impacts to contaminated upland and shoreland areas from construction of the facility.
- Increased public health and safety risk.
- Emergency response capability.

Mitigation
The FEIS has identified mitigation measures, including re-opening of Fire Station 15, re-construction of Taylor Way to heavy haul standards, and implementation of Phase 1 of an Intelligent Transportation System.

Agency Decisions and Options
This FEIS evaluates the construction and operation of an LNG liquefaction and marine bunkering facility within the City of Tacoma on land leased from the Port of Tacoma, and construction of segments of a natural gas pipeline in the City of Fife and unincorporated areas of Pierce County. City of Tacoma actions include approval of the FEIS for the Tacoma LNG Project as a document that is

adequate for SEPA compliance and permit and approval decision making, including proposed mitigation and adoption of the Emergency Response/Intelligent Transportation System Study. Additional City of Tacoma, City of Fife and Pierce County approvals, licenses, and permits are listed in the SEPA Fact Sheet.

Availability of the Final EIS and Background Materials

The complete PSE – Tideflats LNG Project FEIS and Appendices can be downloaded from the project website at www.cityoftacoma.org/planning by clicking on "PSE Proposed Tideflats LNG Facility." The document may also be acquired on CD from Planning and Development Department at no charge.

Contact

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747 Market Street, Room 345, Tacoma, WA 98402
Phone #: 253.591.5121 Fax #: 253.591.5433
E-mail Address: shirley.schultz@cityoftacoma.org

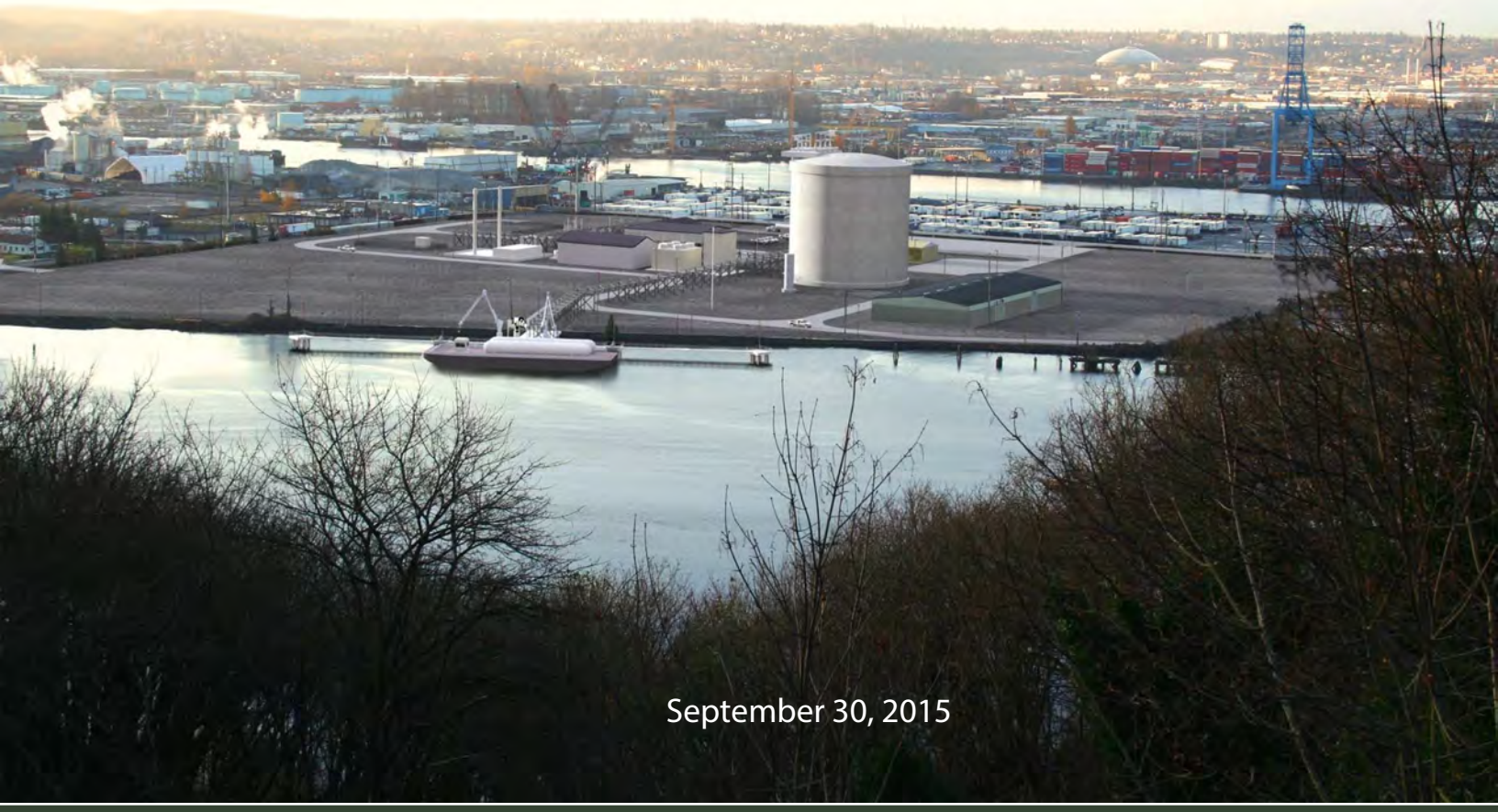
Issued this 30th Day of September, 2015.

Peter Huffman, Director
Planning and Development Services, City of Tacoma

Puget Sound Energy
Proposed Tacoma Liquefied Natural Gas Project
Final Environmental Impact Statement

Prepared for:

Tacoma



September 30, 2015

Prepared by:

ecology and environment, inc.
Global Environmental Specialists

Puget Sound Energy

Proposed Tacoma Liquefied Natural Gas Project

Final Environmental Impact Statement

September 30, 2015

Prepared for:

City of Tacoma
Planning and Development Services Department
747 Market St., Room 345
Tacoma, WA 98402

Prepared by:

ECOLOGY AND ENVIRONMENT, INC.
333 SW 5th Ave.
Portland, OR 14086

SEPA Fact Sheet

Name of Proposal	Tacoma LNG
Proponent	Puget Sound Energy 10885 NE 4TH Street PSE-095 Bellevue, WA 98009-9734
Location	The proposed Tacoma Liquefied Natural Gas (LNG) Facility would be located in the Port of Tacoma with access to Puget Sound. The project site is generally located north of East 11th Street, east of Alexander Avenue, south of Commencement Bay, and on the west shoreline of the Hylebos Waterway. The Tacoma LNG facility site is in an area zoned as Port Maritime Industrial. It is primarily developed for industrial maritime use and has been in industrial use for at least 75 years. The site is composed of four separate parcels owned by the Port of Tacoma: Pierce County tax parcels 2275200502, 2275200532, 5000350021, and 5000350040. The boundaries for these parcels include both in-water and upland areas, reflecting a total area of approximately 33 acres. The upland portion of the site is approximately 30 acres, and the aquatic area is approximately 3 acres.
Proposed Action	The Proposed Action is to construct and operate an LNG liquefaction, storage, and marine bunkering facility, referred to herein as the Project. The Proposed Action would include construction and operation of a small-scale LNG facility to fuel marine vessels and provide LNG fuel to various customers in the Puget Sound area via LNG bunkering barges and tanker trucks. The liquefaction facility would cool natural gas into a liquid state at -280° Fahrenheit (cryogenic) for on-site storage. The facility would also have the capability to vaporize LNG back to its gaseous state from a storage tank for injection into the Puget Sound Energy (PSE) Natural Gas Distribution System during periods of high demand (referred to as peak shaving). The Project would consist of the following main components: • *Tacoma LNG Facility*: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the adjacent TOTE Marine Vessel LNG Fueling System, bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to re-gasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System. • *TOTE Marine Vessel LNG Fueling System*: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities, and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. • *PSE Natural Gas Distribution System*: Conveys natural gas to and from the Tacoma LNG Facility. However, this system will require upgrades, including two new distribution pipeline segments with a total length of 5.0 miles, a new limit station (Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. The Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the City of Tacoma. Two new distribution pipeline

segments would be constructed in the City of Tacoma, and the City of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). The new pipeline segments would be constructed within the dedicated road rights-of-way currently used for vehicular traffic. In addition, the Golden Given Limit Station would be constructed on a developed parcel owned by PSE in unincorporated Pierce County, and modifications to the Frederickson Gate Station would be also located in unincorporated Pierce County.

EIS Alternatives

The *No Action Alternative* and the *Proposed Action Alternative* are evaluated in this Final Environmental Impact Statement (FEIS). Key elements of each alternative include the following:

No Action Alternative: Construction of the Project, including upgrading of the PSE natural gas distribution system, would not occur.

Proposed Action Alternative: The Tacoma LNG Facility would be constructed and produce between approximately 250,000 and 500,000 gallons of LNG per day, for use by marine customers, including TOTE, as well as regasification into the PSE natural gas distribution system for peak-shaving purposes. Additional uses would include providing LNG to other industries or merchants, such as fuel for high-horsepower trucks used in long-haul trucking or other marine transportation uses. The Tacoma LNG Facility would operate and be staffed with approximately 16 to 18 full-time employees 24 hours per day, 365 days a year.

The *Proposed Action* also includes the construction of segments of the PSE natural gas system in the City of Tacoma, the City of Fife, and unincorporated Pierce County. This includes the installation of new pipe, a new limit station, and modifications to the Fredrickson Gate Station.

SEPA Lead Agency

City of Tacoma, Planning and Development Services Department.

SEPA Responsible Official[1]

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[1] The Responsible Official is the designated person within the City of Tacoma's Planning and Development Services Department that is responsible for compliance with the SEPA lead agency procedural responsibilities.

ER/ITS Study

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City of Tacoma Final Actions

- Approval of the FEIS for the Tacoma LNG Project as a document that is adequate for SEPA compliance and permit and approval decision making, including proposed mitigation;
- Determination of whether the Action Alternative or the No Action Alternative is the preferred alternative;
- Adoption of the Emergency Response/Intelligent Transportation System Study (ER/ITS)

Phased Environmental Review

No additional SEPA review will be required for site specific development that is proposed within the scope of the Proposed Action described in this FEIS.

Required Approvals and/or Permits

This FEIS evaluates the construction and operation of an LNG liquefaction and marine bunkering facility within the City of Tacoma on land leased from the Port of Tacoma, and construction of segments of a natural gas pipeline in the City of Fife and unincorporated areas of Pierce County. While Final Actions by the City are noted above, the following approvals, licenses, and permits may also be required.

AGENCIES	APPROVAL, LICENSE, or PERMIT
FEDERAL	
U.S. Department of Transportation/Pipeline and Hazardous Materials Safety Administration	Delegated to Washington Utilities and Transportation Commission for approval of design elements consistent with Federal standards
U.S. Department of the Army Corps of Engineers, Seattle District (USACE)	Section 10 Permit (Rivers and Harbors Act)
	Section 404 Permit (Clean Water Act - CWA)
	Section 106 Consultation (National Historic Preservation Act) with applicable tribes (Puyallup Tribe of Indians and the Muckleshoot Tribe).
U.S. Coast Guard (USCG)	Waterway Suitability Analysis Addresses requirements of 33 CFR Part 127: Coast Guard assessment of LNG Marine Operations
	Permission to establish Aids to Navigation required under 33 CFR Part 66
	Letter of Intent (33 CFR Part 127) recommendation to operator and develops operation plans (OPLAN) at sea ports.

AGENCIES	APPROVAL, LICENSE, or PERMIT
National Marine Fisheries Service (NMFS)	Section 7 of Endangered Species Act
	Essential Fish Habitat (EFH), Magnuson-Stevens Fishery Management and Conservation Act
	Marine Mammal Protection Act Level B harassment authorization
STATE	
Department of Ecology (WDOE)	National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit (separate permits for LNG facility and pipeline system).
	NPDES Industrial Stormwater General Permit
	Coastal Zone Consistency Determination
	401 Water Quality Certification (CWA)
	Spill Prevention and Spill Response Plan (CWA)
	Hazardous Chemical Inventory Reporting Requirements
Department of Fish and Wildlife (WDFW)	Hydraulic Project Approval
Department of Transportation (WSDOT)	State Highway Crossing Permit
Department of Archaeology and Historic Preservation (DAHP)	Section 106 Consultation (NHPA) in coordination with lead federal agency (USACE)
LOCAL JURISDICTIONS	
City of Tacoma	SEPA Lead Agency
	Shoreline Substantial Development Permit
	Wetland/Stream/Fish and Wildlife Habitat Area Permit
	Floodplain Development Permit
	Clear and Grade Permit/Demolition Permit
	Building Permit
	Street Use or Right-of-Way Use Permit
	Demolition Permit
Pierce County	Street use or Right-of-Way Use Permit Conditional Use Permit
	Construction (Clear & Grade) Permit
	Building Permit
	Critical Areas Review
City of Fife	Right of Way permit Utility permit
	Flood permit
	Critical Areas Review
Port of Tacoma	Tenant Improvement Procedure

AGENCIES	APPROVAL, LICENSE, or PERMIT
TRIBAL	
Puyallup Tribe of Indians	Section 106 Consultation in coordination with USACE
Muckleshoot Tribe	Section 106 Consultation in coordination with USACE
REGIONAL AGENCIES	
Puget Sound Clean Air Agency	Notice of Construction Application
	Air Operating Permit

Authors and Principal Contributors

This Tacoma LNG Project Environmental Impact Statement (EIS) has been prepared under the direction of the Tacoma. Planning and Development Services Department. Research and analysis associated with this EIS were provided by the following consulting firms:

- **Ecology and Environment, Inc.** – EIS research, analysis, and document preparation
- **Braemar Engineering, Inc.** – Review of the LNG facility design, engineering and risk analysis

For a complete list of individual contributors, see Appendix A.

Location of Background Data

Ecology and Environment, Inc.
720 Third Avenue, Suite 1700
Seattle WA 98104
Telephone: (206) 624-9537

Draft EIS Comment Period

July 7, 2015 to August 17, 2015 (extended by request of the Puyallup Tribe).

Draft EIS Comment Meetings

- Agency meeting held July 9, 2015
- Public meeting held July 16, 2015

The purpose of the meetings is to provide an opportunity for agencies, organizations and individuals to learn more about the proposed Tacoma LNG project and to present comments regarding the Draft Environmental Impact Statement (DEIS) – in addition to submittal of written comments.

Date of Issuance of this FEIS

- September 30, 2015

Availability of this FEIS

Copies of the FEIS and Emergency Response/Intelligent Transportation System (ER/ITS) study will be made available on CD to agencies, organizations, and individuals noted on the Distribution List (Appendix B to this document). Hard copies of the FEIS, the ER/ITS study, and environmental impact statements incorporated by reference can be reviewed at the following locations:

- City of Tacoma Planning and Development Services Dept.; 747 Market St., Room 345;
- Tacoma Public Library; 1102 Tacoma Avenue S.
- City of Fife -5411 23rd Street East, Fife, WA 98424

- City of Fife Public Library - 6622 20th St. E., Fife, WA 98424
- Pierce County - County-City Building, 930 Tacoma Ave. S., Room 737 Tacoma, WA 98402
- Port of Tacoma - One Sitcum Plaza, Tacoma, WA 98421

The FEIS can also be reviewed online at: www.cityoftacoma.org/planning. In addition, a limited number of complimentary hardcopies or CDs of the FEIS and ER/ITS report will be made available (while the supply lasts) from the City of Tacoma Planning and Development Services Department.

Additional copies may be purchased at the Planning and Development Services Dept. for the cost of reproduction. The Planning and Development Services Dept. is open 8 AM to 4:30 PM Monday through Friday.

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Acronyms and Abbreviations

Term	Definition
°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
ACQR	Air Quality Control Region
ADT	average daily traffic
AHJ	Authority Having Jurisdiction
APE	area of potential effect
ASCE	American Society of Civil Engineers
bgs	below ground surface
BLEVE	boiling liquid expanding vapor explosion
BMP	best management practice
BOG	boil off gas
BPA	Bonneville Power Administration
CB&I	Chicago Bridge & Iron
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFD	Computational Fluid Dynamic
CFR	Code of Federal Regulations
CH_4	methane
CMMP	contaminated media management plan
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
Coast Guard	United States Coast Guard
CSA	combined statistical area
CWA	Clean Water Act
DAHP	Washington Department of Archaeology and Historic Preservation
dB	decibels
dBA	A-weighted decibels
DDT	Dichlorodiphenyltrichloroethane
DEA	David Evans and Associates
DEIS	Draft Environmental Impact Statement
DOH	Washington State Department of Health
DOR	Washington Department of Revenue
Dth	dekatherms
ECA	North American Emissions Control Area

Ecology	Washington State Department of Ecology
EDNA	environmental designation for noise abatement
EFH	Essential Fish Habitat
EIS	environmental impact statement
EMS	emergency medical services
EMT	emergency medical technician
EPA	United States Environmental Protection Agency
ER	Emergency Response
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FMC	City of Fife Municipal Code
ft^2	square feet
GDP	gross domestic product
GHG	greenhouse gas
gpm	gallons per minute
GWP	global warming potential
HAP	hazardous air pollutant
HDD	horizontal directional drill
HOV	high-occupancy vehicle
HPA	Hydraulic Project Approval
I-5	Interstate 5
IBC	International Building Code
ICS	Incident Command System
IRP	integrated resource plan
ITS	Intelligent Transportation System
KMMEF	Kalama Methanol Manufacturing and Export Facility
KOP	key observation point
kV	kilovolt
L&I	Washington State Department of Labor and Industries
L_{10}	noise level that is exceeded during 10 percent of the measurement period
L_{90}	noise level that is exceeded during 90 percent of the measurement period
L_{eq}	equivalent sound pressure level
LNG	liquefied natural gas
LOS	level of service
MAOP	maximum allowable operating pressure
MDNS	Mitigated Determination of Nonsignificance
MIC	manufacturing industrial center
MLLW	Mean Lower Low Water
MMPA	Marine Mammal Protection Act
MS4	NPDES Phase I Municipal Stormwater Permit
MSA	Magnuson-Stevens Fishery Conservation and Management Act of 1996

MTCA	Model Toxics Control Act
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NESHAP	National emissions standard for hazardous air pollutants
NFPA	National Fire Protection Association
NIMS	National Incident Management System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOC	Notice of Construction
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NRHP	National Register of Historic Places
NSR	new source review
NTU	nephelometric turbidity units
NWIW	Northwest Innovation Work
O&M	operation and maintenance
OBE	Operational Basis Earthquake
OD	outside diameter
OFM	Washington Office of Financial Management
OPS	Office of Pipeline Safety
OSHA	Occupation Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyls
PCC	Pierce County Code
PDC	Power Distribution Center
PEWS	Port Emergency Warning System
PFMC	Pacific Fishery Management Council
PHMSA	Pipeline Hazardous Materials Safety Administration
PHS	Priority Habitats and Species
PL&WCo	Parkland Light & Water Cooperative
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in diameter
PMI	Port Maritime Industrial
Port	Port of Tacoma
Project	Tacoma Liquefied Natural Gas Project
Proposed Action	Construction, operation, and decommissioning of the Tacoma LNG Project
PSCAA	Puget Sound Clean Air Authority
PSD	Prevention of Significant Deterioration
PSE	Puget Sound Energy
psi	pounds per square inch
psig	pounds per square inch gauge
PSRC	Puget Sound Regional Council

PTT	Puyallup Tribal Terminal
RCW	Revised Code of Washington
RMP	Risk Management Program
ROW	right-of-way
RPT	rapid-phase transition
SDWA	Safe Water Drinking Act
SEPA	Washington State Environmental Policy Act
SIP	State Implementation Plan
SPCC	Spill Prevention, Containment, and Countermeasure
SR	State Route
SSE	Safe Shutdown Earthquake
SWPPP	Stormwater Pollution Prevention Plan
TAP	toxic air pollutant
TIP	Transportation Improvement Program
TMC	Tacoma Municipal Code
TOTE	Totem Ocean Trailer Express
TPCHD	Tacoma-Pierce County Health Department
TWIC	Transportation Worker Identification Credentials
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
UST	underground storage tank
VOC	volatile organic compounds
WA-99	Washington State Highway 99; Pacific Highway East
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WHPA	Wellhead Protection Areas
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WISHA	Washington Industrial Safety and Health Act
WPG	water/propylene glycol
WRIA	Water Resources Inventory Areas
WSA	waterway suitability assessment
WSDOT	Washington State Department of Transportation
WUTC	Washington Utilities and Transportation Commission

Executive Summary

ES.1 Introduction and Background

In September 2014, the City of Tacoma initiated an environmental review of the Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) proposed by Puget Sound Energy (PSE). The Project would be one of the nation's first marine vessel bunkering facilities, with on-site LNG liquefaction and storage (bunkering) at the Port of Tacoma. To meet natural gas demand for the LNG facility, the Project would also include the construction of two new segments of pipeline connecting the LNG facility to PSE's existing natural gas distribution system. The construction, operation, and decommissioning of the proposed Project is referred to herein as the Proposed Action.

This environmental review process, performed under the authority of Revised Code of Washington chapter 43.21C (State Environmental Policy Act [SEPA]), was triggered when PSE formally applied for a Shoreline Substantial Development Permit with the City of Tacoma (SHR2015-40000246123). Public notice of that permit application was issued on May 12, 2015, with a comment period extending through June 11, 2015.

On September 12, 2014, the City of Tacoma issued a SEPA Determination of Significance, indicating the City's intention to require an Environmental Impact Statement (EIS) to assess the environmental impacts of the Project at the Port of Tacoma and the surrounding area.

On September 12, 2014, the City of Tacoma also began a scoping process to solicit input from the public on the issues that should be addressed in the environmental review. The City accepted comments through October 13, 2014. Eight letters were received and considered, in addition to the comments of attendees of a public scoping meeting on September 24, 2014. The City of Tacoma is issuing this Final EIS (FEIS) after consideration of comments on the DEIS and making appropriate changes.

An EIS is an informational and evaluative tool. It does not mandate approval or disapproval of a project, but informs the public and decision-makers of a project's potential substantial and minor adverse impacts, along with its beneficial effects to both the built and natural environment and suggests to decision-makers the means by which those impacts could be avoided or reduced through mitigation.

This FEIS is organized as follows.

Chapter 1 describes the purpose and need of the Project in the context of the analyses conducted by the City of Tacoma to comply with SEPA.

Chapter 2 describes the Project and construction procedures.

Chapter 3 evaluates the Project's potential impacts on the surrounding region and on specific elements of the environment. It also offers mitigation measures to reduce or eliminate identified environmental impacts.

Chapter 4 provides the comments received on the DEIS and responses to comments.

Chapter 5 provides a list of sources used to develop the analyses presented in this FEIS.

ES.2 Project Objectives, Purpose, and Need

The purpose of the Proposed Action is to receive natural gas from PSE's distribution system, chill natural gas to produce approximately 250,000 to 500,000 gallons LNG daily, and store up to 8 million gallons of LNG on site. Eighty-five thousand decatherms of peak-day gas supply would also be re-injected and diverted into PSE's distribution system when needed to supply consumers. Finally, LNG would be distributed for use as maritime transportation fuel by Totem Ocean Trailer Express (TOTE) at its Port of Tacoma facility, along with other potential future regional LNG marine vessel customers. LNG would also be loaded onto trucks or barges for use by other regional markets seeking a cleaner fuel source.

The Proposed Action would address a long-term need for new peak-day resources as identified through PSE's 2013 biennial integrated resource plan. The Project was evaluated against long-haul interstate pipeline capacity, regional underground natural gas storage service combined with interstate pipeline storage redelivery service, and a stand-alone LNG peaking facility in other locations. PSE determined that the most cost effective way of meeting its resource needs would be the combination of additional regional underground storage, the Tacoma LNG facility, and refurbishment of an existing, on-system, peak-day resource. The Tacoma LNG facility would fill approximately 50 percent of the anticipated deficit.

In addition to meeting long-term resource needs, the Proposed Action would enable TOTE to meet new fuel standards for maritime vessels in response to the North American Emission Control Area (ECA), which established more stringent emission standards within 200 miles of the United States and Canadian coasts. A significant portion of the LNG to be produced at the Tacoma LNG Facility will be consumed by TOTE. However, additional fuel switching by other companies from petroleum products to LNG in response to ECA will provide further demand for LNG in the region.

ES.3 Project Alternatives and Review

This document evaluates two alternatives: the Preferred Alternative (the Project) and the No Action Alternative. Several potential alternatives were considered during the development of the DEIS, but were not analyzed in detail because they were not deemed reasonable or they did not meet the Project objectives.

This FEIS addresses direct and indirect Project impacts, as well as the cumulative impacts of other reasonably foreseeable projects in the Project vicinity. It also evaluates potential impacts of the Project that would result from its construction, operation and maintenance, and decommissioning at the end of its design life.

One result of the environmental review is the development of potential mitigation measures whose implementation may avoid or reduce impacts to the built and natural environment, as well as help identify significant unavoidable impacts that cannot be mitigated.

Mitigation measures recommended in this FEIS are actions PSE would undertake to reduce the impacts of the Project or they are measures that would be incorporated as conditions in permits issued by the City and other state and local jurisdictions.

ES.4 Significant Areas of Interest and Issues Considered in the Analysis

This FEIS considered the following significant issues to be resolved through environmental and permit review:

- Changes to emergency service needs at the Port of Tacoma manufacturing/industrial center;
- Potential spill of LNG and impacts on human health and safety;
- Disruption of traffic during new pipeline construction, particularly on Taylor Way;
- Effects of the Project related to seismic and other geologic hazards;
- Management of on-site subsurface contamination during construction;
- Effects of the Project on regional air quality, including greenhouse gas emissions; and
- Visual and aesthetic impact of the facility, particularly the LNG storage tank.

ES.5 Major Conclusions

Based on the analyses presented in this FEIS, the following major conclusions have been drawn:

- The Project would allow PSE to provide new peak-day resources to its retail natural gas customers, the demand for which is expected to grow to a deficit over the next two decades. The Project would also enable TOTE vessels to meet new emissions standards detailed in the ECA. Natural gas has been identified as a key resource to implement greenhouse gas emission reductions for commercial truck, bus, rail, and marine transportation. The Proposed Action would address this need as the transportation industry and other industrial markets seek to comply with updated emissions policies and reduce operational costs.
- The Proposed Action as mitigated would have nominal adverse effects on water resources, soils and geology, vegetation, climate and air quality, health and safety, socioeconomics, and cultural resources. Impacts to these resources would be minimized because the Project footprint would be contained in previously developed areas and paved road rights-of-way and would be mitigated as described herein.
- The Proposed Action would have an unavoidable adverse impact to visual resources due to the size of the LNG storage tank. However, proposed mitigation measures would reduce the visual impacts such that they are less than significant.

The preliminary LNG design, construction, and integrity testing are compliant to 49CFR Part 193, NFPA 59A, and USCG regulations. However, the design should be reviewed when complete to confirm all conditions for the installation have been met.

Preliminary siting studies were performed for Tacoma LNG using basic modeling tools, Degadis for vapor dispersion, and LNG FireIII for thermal radiation. More advanced modeling is required later in detailed engineering when the design is further defined using Computational Fluid Dynamic (CFD) software. The updated CFD models should be reviewed when they are complete to confirm that all vapor dispersion and thermal radiation conditions for the installation have been met and accepted by PHMSA.

The Project does introduce a major new risk factor into an area with one of the City's lowest emergency response times. The City and other stakeholders have prepared a draft Emergency Response/Intelligent Transportation Systems Study (ER/ITS Study) that seeks to address area-wide ER/ITS improvements needed to support projects such as PSE's. The FEIS proposes mitigation measures that would provide additional resources for the Tacoma Fire Department in the vicinity of the Project and improve response times along Taylor Way.

ES.6 Mitigation and Minimization Measures

Table ES-1 summarizes all recommended mitigation measures to address the Project's potential impacts. This table will be revised and updated to reflect any additional mitigation measures needed to address concerns raised in public comments. Major mitigation measures discussed here are reasonably calculated to reduce, at times eliminate, and, in several instances, enhance the beneficial impacts of the Project to the built and natural environment. The mitigation measures listed in Table ES-1 are both those inherent in the Project design and those developed separately from the Project design to reduce potential impacts.

Avoidance will continue to be utilized to prevent many types of impacts from occurring in the first instance, and best management practices (BMPs) will be applied to minimize impacts where appropriate. Application of all of these measures, especially during construction, would limit and, in most instances, eliminate adverse impacts that could result from the Project.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
Section 3.1: Earth			
	• Impacts associated with seismic effects and volcanic activity • Potential for Project to contribute to slope instability, topographic alterations, and erosion • Potential for subsurface contamination to migrate from nearby sites (see also Section 3.3: Water)	• Project facilities would be sited to avoid potential geologic hazard areas, to the maximum extent practicable. • Due to the area's seismic activity and high liquefaction potential, ground improvements would be required throughout the Project, particularly beneath the LNG storage tank. • All elements of the Project would be designed to withstand an Operational Basis Earthquake and continue functioning in its aftermath. • The facility would be designed to prevent catastrophic failure in the case of a Safe Shutdown Earthquake, but would not be required to remain operational in its aftermath. • Engineering controls would be employed to stabilize the slopes along the Hylebos and Blair shorelines, which would be unstable during a seismic event. • During construction and operation, the Project would maintain strict emergency response protocol to prepare for tsunami or volcanic hazards/lahar. • Consistent sampling of soil and groundwater throughout construction, especially near known contamination sites, would determine measures for removal of contaminated material. • Properly designed and constructed shoring systems would be used to prevent caving of excavation faces from temporary construction excavations. • Appropriate methods to remove, contain, and discharge groundwater accumulated would be used in excavations to mitigate dewatering impacts. Extracted groundwater would be handled and discharged using BMPs to prevent erosion and degradation of surface water. Groundwater extracted from known areas of contamination would be analyzed to determine treatment and disposal options. • Excavated soils would be used on site, to the extent practical, to reduce the volume of material exported from the site and requirements for importing material. • Criteria would be developed for controlling the quality of fill materials imported to the site. • A work plan would be prepared for actions to be taken if soil contamination is found during construction. • During construction, contractors would employ temporary erosion and sedimentation control measures and BMPs.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
Section 3.2: Air Quality			
	• Construction and operational impacts on air quality (i.e., particulates/fugitive dust and vehicle emissions) • Hazardous and toxic air pollutants • Greenhouse gas emissions	• Standard dust control measures would be applied throughout the course of construction. • To reduce air emissions, PSE would require contractors to implement measures to reduce emissions from vehicles and construction equipment during construction. • Construction equipment would be regularly maintained in accordance with manufacturer's specification or standard practices. • Carpooling by construction workers would be encouraged. • Ultra-low sulfur diesel would be used for the emergency generator during Project operations. • PSE would implement a leak detection and repair program for fugitive volatile organic compound emissions.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.
Section 3.3: Water			
	• Stormwater runoff effects on water quality • Spread of existing contamination through groundwater during construction • Water quality impacts from spills during construction and operation • Water consumption for Project construction and operation • Sedimentation and erosional effects on water quality	• Wet or uncured concrete would not be allowed to enter waters of the state. • Excess or waste materials generated during construction would not be disposed of or allowed to enter waters of the state. • Land-based staging areas for activities such as storage of machinery, equipment, materials, and stockpiled soils in shoreline areas or waterward of shoreline areas would be prohibited. A silt fence would be installed around the perimeter of the upland locations where machinery, materials, and stockpiled soils are situated. • Any temporary soil stockpiles would be covered when not in use. • Work barges would not be allowed to ground on the shoreline during construction. • All equipment that would operate over water or below the mean high higher water mark would be cleaned of accumulated grease, oil, or mud. All leaks would be repaired prior to arriving on site. Equipment would be inspected daily for leaks, accumulations of grease, etc., and any identified problems would be fixed before operating over water or below the mean high higher water mark. • Vessels, construction equipment, fuel hoses, oil drums, oil or fuel transfer valves and fittings, and other equipment components would be checked regularly for drips or leaks and would be maintained and stored properly to prevent spills; • The contractor would have a spill kit with oil-absorbent materials on site to be used in the event of a spill or in the event that any petroleum product is	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		observed in the water. • Fueling of upland and land-based construction equipment would not occur within 100 feet of surface water. • The following mitigation measures would be implemented to minimize potential impacts to the Hylebos and Blair waterways: - Visible turbidity anywhere at or beyond the 150-foot point of compliance from activity would be considered an exceedance of the standard. - During demolition, including removal of existing piles in both the Hylebos and Blair waterways, containment booms would be used to surround the work areas. All accumulated debris would be collected daily and disposed of at an approved upland site. - A silt curtain may be installed around the pile removal area to prevent sediment from migrating beyond the existing project footprint. - Existing piles would either be fully extracted in a single slow and continuous motion using a vibratory hammer or cut 2 feet below the mud line should the piling break during extraction. If cut 2 feet below the mud line, the resulting holes would be filled with clean sand or other habitat mix approved by the Washington Department of Fish and Wildlife. - All creosote-treated wood would be contained during and after removal to preclude the entrance of sediments and any contaminated materials to the aquatic environment. - The work surface on the uplands or barge would include a containment basin for piles and any liquid or sediment removed during pulling of the piling. - Creosote-treated wood and piles from demolition of existing structures would be disposed of at an appropriate upland facility. - Sediments spilled on work surfaces would be contained and disposed of with the pile debris at an approved upland disposal site. - Hydraulic water jets would not be used to remove or place piles. - Spill impoundments for collection of spilled LNG, mixed-refrigerant, heavy hydrocarbons, WPG, amine, and equipment lubrication system and transformer oil design features would minimize impacts to surface water during operations. - Promptly remove motor oil and hydraulic fluids as a good housekeeping practice.	

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		- Vehicle washing and maintenance would occur offsite. - Contaminated groundwater encountered during construction would be contained and disposed of at an appropriate facility. - Regular spill prevention measures would be implemented during construction, including regular equipment inspection and maintenance. Workers would refuel vehicles and machinery 100 feet upland of surface waterbodies. - Marine turbidity minimization measures would be implemented during construction. The water column would be continuously monitored for turbidity discharges during and immediately after construction. - BMPs would be implemented during construction to manage sedimentation and erosional effects on water quality. - During replacement of a creosote-treated bulkhead structure with a new steel sheet pile bulkhead, the existing structure would remain in place to provide erosion and sediment control.	
Section 3.4: Plants and Animals			
	• Impacts to aquatic habitat • Impacts to marine mammals • Pile driving • Disturbance of bird species during construction • Loss of habitat • Wildlife mortality • Coastal and stream bank disturbances • Loss of riparian vegetation	• To limit the amount of noise and vibratory impacts of pile driving, pilings would be installed initially with a vibratory hammer to 90 percent-plus of their design depth (within 10 feet of design tip elevation). Impact hammering would then be employed until load-bearing or pile-tip elevation specifications have been met. • One or more other noise attenuation methods (e.g., wood blocks, nylon blocks) would be used during impact installation or proofing of all steel pilings. • Intertidal pilings would be installed during dry or shallow water tide stages to the extent practicable. • Trenchless technology would be used to install pipeline along existing culverts, thereby avoiding impacts to stream habitat along pipelines. • 532 creosote-treated timber piles would be removed from the Blair-Hylebos waterways to be replaced with 142 steel piles, improving water quality as a result. • Intertidal pilings would be installed during dry or shallow water tide stages, to the extent practicable. • Pile removal and installation would be restricted to the in-water work window for Commencement Bay (July 16 to February 14) • Project-associated tugs and bunkering barges would maintain slow speeds (less than 5 miles per hour) to avoid striking marine mammals.	• No significant, permanent, unavoidable impacts to animals are anticipated because the majority of the Project footprint would be contained in existing developed areas, largely port-industrial sites and paved road rights-of-way. Potential impacts to aquatic/marine habitat would be mitigated with proposed avoidance and minimization measures.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		• During pile-driving, a qualified observer would monitor humpback and killer whale activity. Observers would have authority to halt pile driving if humpback or killer whales are observed within distances in which behavior disturbance may occur.	
Section 3.5: Health and Safety			
	• Fire/explosion risk due to construction and/or operation of the Project • Risks to workers from existing on-site contamination • Spill potential during Project construction • Increased traffic accidents as a result of construction	• The LNG facility design would incorporate mitigation measures to ensure that thermal radiation and vapor dispersion does not extend beyond the land portions of the PSE and TOTE property lines. • During LNG fueling in the Blair Waterway or barge loading activities on the Hybelos Waterway PSE should consider establishing public exclusion zones around the operating area. • A Contaminated Media Management Plan would be developed, outlining the proper protocol that would be implemented should contaminated media be encountered during installation of the distribution system. • Hazardous materials would be stored, handled, and used in accordance with best practices for storage and management of hazardous materials. • A construction worker health and safety plan would be implemented to address health and safety during construction. • A Joint Emergency Response Plan would be prepared by local first responders and facility owners/operators that would detail emergency response command system and procedures. • Fueling and maintenance of construction-related equipment would occur within dedicated areas equipped with spill kits. • PSE would strictly adhere to local jurisdictional traffic control requirements to minimize traffic impacts, which may include night-time work or reduced-duration daytime schedules to avoid rush-hour traffic. • The facility and equipment would be laid in such a way as to separate the public from hazardous material dispersion. • Fire and gas monitoring and protection systems would be installed throughout the facility. • The facility would be provided with an emergency shutdown system designed to leave the facility in a safe state in case of an incident.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
Section 3.6: Noise			
	• Noise impacts from the construction and operation of the Project	• In-water and air noise during pile driving would be minimized using a vibratory hammer, followed by limited impact hammering. • Sound-reducing design measures would be implemented during construction and operation • Haul trucks and other engine-powered equipment would be equipped with adequate mufflers. • PSE would establish a phone number or other effective means for the public to report significant undesirable noise conditions associated with construction and operation of the Tacoma LNG Facility. • Throughout Project construction and operation, PSE would document, investigate, evaluate, and attempt to resolve noise complaints related to the Project.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.
Section 3.7: Land Use and Recreation			
	• Construction-related impacts to recreational resources • Project's consistency with existing zoning regulations	• Temporary limitations on active recreational waterway uses within the Project Area would not be significant enough to require mitigation • Facilities would be landscaped to be reasonably compatible with existing development. To this end, existing vegetation bordering the site of the proposed Golden Given Limit Station should be maintained, or new, densely planted row vegetation should be placed along edges of proposed fence.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.
Section 3.8: Aesthetics/Light, and Glare			
	• Permanently changed views from residential, recreational and roadway viewpoints • Light and glare impacts	• During construction, lighting for safety and security will be shielded and oriented downward, bare bulbs will be fully screened from view from sensitive viewing receptors such as residences, and on-demand lighting and/or timers will be used to minimize visual impacts of lighting. • It is recommended that the LNG storage tank be a non-reflective concrete finish and dark gray color. • To minimize visual impacts and add texture and structure around the LNG storage tank, PSE would include a combination of gravel, larger boulders, and intermittent stands of drought resistant trees and shrubs. PSE would also keep this area free of invasive and noxious plants. • To minimize impacts from street views along 11th Street and Alexander Way, to the degree possible, existing trees should be retained and additional landscaping provided.	• Due to the size of the LNG storage tank, overall visual impact of the Project would be unavoidable, but not significant. Minimization measures in the form of aesthetic alterations would greatly reduce its visual impact. • With implementation of design and other measures, the impacts of light and glare would not be significant or

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		• PSE would maintain the appearance of all construction and operation sites and would ensure that vehicles are located as inconspicuously as possible. • To minimize nighttime visibility of lights associated with the Tacoma LNG Facility site, PSE would use minimum lighting necessary for security at construction areas, and orient lighting in a way to minimize the effects of increased light pollution. • Exterior lighting fixtures would be attached to 30-foot-tall poles, which would be similar in height, or shorter than, most poles used for lighting in the area. • Exterior nonpole (attached to buildings and other facilities) lighting would point downward and be shielded. • Lighting would be located and oriented to minimize horizontal radiation or light spillover. • Lighting would be provided with switches or automatic controls that would turn off lights when not required for operations.	unavoidable.
Section 3.9: Cultural Resources			
	• Impacts of construction on existing historic and cultural resources or potential resources.	• PSE will prepare an Unanticipated Discovery Plan that will outline procedures in the event of an unanticipated discovery of cultural resources and human skeletal remains. This would help minimize the potential for, and degree of, impacts. • Pipeline construction in areas near the base of the Blair-Hylebos peninsula at or near the natural shoreline that are deemed likely to have cultural importance would be monitored by a trained and experienced cultural resource expert. • PSE will provide training in identifying cultural artifacts according to a training protocol developed by PSE and approved by the City after consultation with the Puyallup Tribe. • If suspected cultural artifacts are found, construction will be halted in the vicinity of the find until the status of the artifact can be determined. • In addition, PSE will notify a contact person provided by the Puyallup Tribe prior to commencement of ground breaking and the expected duration of any excavation.	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.
Section 3.10: Transportation			
	• Impacts related to additional traffic trips generated by Project • Impacts on roadways related to construction and delivery of oversized loads	• A construction traffic management plan would be developed. • Applicable governmental permits or approvals would be obtained. • Public involvement and outreach efforts would be undertaken prior to construction to help minimize access disruptions	• With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
	• Impacts related to road maintenance and public access • Damage to roadways	• Carpooling among construction workers and personnel would be encouraged to reduce traffic volume to and from the Tacoma LNG Facility site. • Pipeline Segment A would be constructed without disturbing rail tracks by using a horizontal drill or bore construction technique. • All roads and other transportation infrastructure impacted by construction would be videotaped prior to construction to document pre-construction conditions. • Following installation of the pipeline, roads would be restored by repaving the travel lane impacted by the pipeline construction pursuant to the appropriate plans and specifications adopted by Tacoma Public Works, City of Fife Public Works, and Pierce County Public Works. • To improve driving conditions on Taylor Way, from SR 509 to the project site an approach that results in rebuilding of Taylor Way to "heavy haul" standards has been agreed upon by PSE, the Port of Tacoma, and The City of Tacoma. • Construction of Phase I of the planned ITS Infrastructure is needed for basic information sharing among stakeholders, as defined in the ER/ITS study.	unavoidable adverse impacts. • Construction and operation of the Project would not significantly impact maritime activity in either the Hylebos or Blair waterways.
Section 3.11: Public Services			
	• Increase in demand for public services (police, emergency services, medical services, education) • Increased response time for emergency services • Impacts to the distribution of regional fire protection services. • Impacts related to wastewater and solid waste generation	• A new unit of the Tacoma Fire Department with fire response and EMS response capabilities and hazardous materials awareness could be stationed in proximity to the site of the Tacoma LNG Facility for the duration of construction. • PSE would provide emergency response agencies with regularly updated maps of the facilities and current access points, relevant contact information, and site procedures for fire protection and rescue operations. • The emergency preparedness, emergency access, and construction health and safety measures proposed by PSE and described in Section 3.5 (Health and Safety) would reduce potential impacts to fire protection and EMS throughout the construction period for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. • Security would be provided throughout the construction period for each separate component of the Project. • Temporary security fencing would be erected around the construction sites to prevent trespassing and vandalism. • PSE or its selected contractor would notify the relevant fire department or district prior to initiating work within that department or district's service area. • PSE would obtain permits before hydrostatic testing of Pipeline Segment A and Segment B begins, in accordance with the provisions of local codes for the use	• The Proposed Action could have significant impact on local fire protection services. However, this would be mitigated by reintroducing a staffed fire station in advance of the Project's opening in late 2017. • With mitigation measures identified in the EIS, and mitigation measures inherent in Project design, the Project would have no significant unavoidable adverse impacts.

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
		of fire hydrants. • During post-construction hydrostatic testing, the contractor would communicate with fire protection services prior to drawing water from any fire hydrant. • A new unit of the Tacoma Fire Department with fire response, EMS, and hazardous materials operations capabilities would be stationed in proximity to the site of the Tacoma LNG Facility. • PSE would provide regular orientation to the site to relevant responders at the Tacoma Fire Department, and operations personnel and the Fire Department would consult to develop and implement an ongoing training regime that integrates best practices for responding to fire and emergencies at the Tacoma LNG Facility. • The Tacoma LNG Facility would contain fire and hazardous gas detectors, fire-extinguishing systems, and an extensive firewater system, as well as new pier and access trestles that would provide firetruck access to the loading platform. • The intrusion detection system would monitor the perimeter for the facility and alarm when the perimeter is disturbed. • Security cameras would be installed along the perimeter and other select locations for maximum viewing coverage. • Closed-circuit television system components would be powered by an uninterruptible power system. • The perimeter of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be enclosed by a chain-link security fence to ensure public safety, welfare, and site security. • Phase I of the Intelligent Transportation System study would be implemented. • PSE would implement measures to plan for and minimize emergencies, such as LNG and facility-specific safety and emergency response training to raise the level of preparedness in case of an emergency. • Security measures would be implemented during construction and operation, including policies for security procedures, protective enclosures, security communications, security monitoring, and warning signs. • New firefighting, emergency medical services, and hazardous material capacity would be added in the vicinity of the Project.	

Table ES-1 Mitigation Measures Addressing the Potential Impacts of the Tacoma LNG Project

Resource	Important Topics Addressed	Summary of Mitigation and Minimization Measures	Significant and Unavoidable Adverse Impacts
Section 3.12: Socioeconomics			
	• Increases in population growth • Increases in employment opportunities and wage/payroll impacts • Long-term positive revenue growth with some potential for short-term reduction in state equality payment for schools	• No mitigation measures are required or proposed because there are no negative socioeconomic impacts associated with the proposed Action.	• The Project would have no significant or unavoidable adverse impacts.

1 Purpose, Need, and Alternatives Considered

This section presents the purpose of the Proposed Action set forth by the proponent, Puget Sound Energy (PSE), the need for the Proposed Action, and the various alternatives considered, consisting of the Proposed Action, the No Action Alternative, and alternatives eliminated from further consideration. Throughout this draft environmental impact statement (DEIS), the term "Proposed Action" refers to the construction, operation, and decommissioning of the Tacoma Liquefied Natural Gas (LNG) Project, referred to herein as the "Project."

1.1 Purpose and Need

The purpose of the Proposed Action is summarized as follows:

- Receive natural gas from PSE's distribution system, chill natural gas to produce approximately 250,000 to 500,000 gallons of LNG daily, and store up to 8 million gallons of LNG on site.
- Re-inject and divert approximately 85,000 decatherms (Dth) per day (995,000 gallons of LNG) of peak-day gas supply into PSE's distribution system.
- Dispense LNG for the following uses: maritime transportation fuel to be used by Totem Ocean Trailer Express (TOTE) at their Port of Tacoma facility (approximately 39 million gallons per year) and other future regional LNG marine vessel fuel customers, and loading to trucks or barges for other regional markets seeking a cleaner fuel.

The Proposed Action responds to the following needs:

- **Peak-day resource for natural gas customers**
- PSE plans for the peak-day needs of its retail natural gas customers in its biennial integrated resource plan (IRP) as mandated by the Washington Utilities and Transportation Commission (WUTC). Through the IRP process, PSE has identified long-term needs for new peak-day resources to serve retail natural gas customers using standard and WUTC-accepted load projection methodology. The IRP considered expected customer loads, including the effect of demand-side resource programs, based on long-term expected regional economic growth. The 2013 IRP demonstrated a need for peaking resources beginning in 2017 that is expected to grow to a deficit of approximately 150,000 Dth per day by 2022, and 200,000 Dth per day by 2026.
- PSE evaluated various resource alternatives available to reliably meet customer demand and determined which resource, or set of resources, would meet such customer demand most cost-effectively. The Tacoma LNG Facility was evaluated against long-haul interstate pipeline capacity, regional underground natural gas storage service combined with interstate pipeline storage redelivery service, and a stand-alone LNG peaking facility in other locations. In consideration of the company's resource needs and prudency requirements, PSE determined that the most cost effective way of meeting these needs would be a combination of additional regional underground storage, the Tacoma LNG Facility, and system refurbishment of an existing, on-system, peak-day resource. The Tacoma LNG Facility would fill approximately 50 percent of the anticipated deficit. PSE requires 6 to 7 million gallons of storage to adequately serve the storage requirements associated with such peak-shaving volumes (see definition of peak shaving in Section 1.2.1 [Proposed Action]); therefore, taking into account the needs of other customers, the proposed single 8-million-gallon, unpressurized, full-containment LNG storage tank best meets long-term customer storage needs.
- **Fuel for TOTE vessels and other maritime or terrestrial transportation**
- PSE has entered into a contract with TOTE to provide LNG to TOTE at its Port of Tacoma terminal. TOTE operates two Orca class vessels between the Port of Tacoma and Port of Anchorage and transports

approximately 30 percent of all consumer goods shipped to Alaska. In 2010, the International Maritime Organization approved the North American Emissions Control Area (ECA), establishing more stringent emissions standards within 200 nautical miles of the United States and Canadian coasts. The United States Environmental Protection Agency (EPA) is responsible for administering vessels operating within the ECA. Ships operating within the ECA were required to reduce the sulfur content of their fuel to 1 percent in August 2012 and must further reduce the sulfur content to 0.1 percent by 2015. TOTE chose to meet this requirement by converting to LNG as the fuel for its Tacoma-Alaska fleet and obtained a conditional ECA waiver from EPA in July 2012 that provides forbearance on enforcement until late 2016 to allow for procurement of the LNG engines and the development of LNG fuel supply infrastructure. TOTE would consume more than 39 million gallons of LNG annually, which is a significant portion of the LNG to be produced at the Tacoma LNG Facility. TOTE's vessels operate on a regimented schedule of sailings, arriving in Tacoma on Wednesdays and Fridays and departing approximately 12 hours later. The liquefaction and loading capacity of the Project must meet the requirements of the TOTE operation.

- Further implementation of fuel switching from petroleum products to LNG under ECA requirements is anticipated to result in the additional need for maritime LNG fuel in the Seattle and Tacoma areas. Siting a facility that can load LNG directly into bunker barges minimizes the costs and logistical challenges of transporting LNG by bulk to maritime end users.
- State and regional policies encourage the use of clean fuels to meet greenhouse gas (GHG) emission reduction objectives. Washington's 2012 Energy Strategy calls for the implementation of clean energy strategies in the transportation sector under Revised Code of Washington (RCW) 43.21F.088(1)(e) and the reduction of GHGs under RCW 70.235. Regionally, the *Pacific Coast Action Plan on Climate and Energy*, signed by the leaders of California, Oregon, Washington, and British Columbia on October 28, 2013 (Pacific Coast Collaborative 2013), calls for the transition of the West Coast to clean modes of transportation and the reduction of a large share of GHG emissions with actions that, among others, support emerging markets and innovation for alternative fuels in commercial truck, bus, rail, port, and marine transportation. Natural gas has been identified as a key resource to implement such reductions; see, for example, RCW 46.37.467(2), and the United States Department of Energy Alternative Fuels Data Center at http://www.afdc.energy.gov/vehicles/natural_gas_emissions.html. The Proposed Action would address the need for regional natural gas resources in the transportation industry and other industrial markets desiring to avail themselves of a cleaner fuel in support of GHG emissions reduction policies, and reduced operational cost.

1.2 Alternatives Considered

Under Washington Administrative Code 197-11-440(5)(d) regarding private projects proposed at a specific site, the lead agency must evaluate only the proposed action, the no action alternative, and other reasonable alternatives for achieving the proposal's objective on the same site. A reasonable alternative must be feasible and capable of meeting the proposal's objective at a lower environmental cost. In the case of the Proposed Action, PSE seeks to achieve the following objectives at the proposed site:

- Receive and chill natural gas to create approximately 250,000 to 500,000 gallons per day of LNG;
- Store up to 8 million gallons of LNG in an on-site storage tank;
- Deliver LNG via cryogenic pipeline to fuel vessels or load bunker barges on the Blair Waterway, including TOTE container vessels;
- Provide bulk LNG loading to bunker barges on the Hylebos Waterway; and
- Regasify the LNG and inject natural gas into PSE's distribution system as a peak day resource; the connected distribution system must have sufficient demand to consume the injected natural gas.

This DEIS evaluates the Proposed Action and the No Action Alternative described below. Additionally, it discusses alternatives that were considered but eliminated from further consideration as alternatives because they failed to meet the objectives stated above.

1.2.1 Proposed Action

The Proposed Action is to develop and operate the Project, as defined above. The Proposed Action would include construction and operation of a small-scale facility to produce LNG to fuel marine vessels and provide LNG fuel to various customers in the Puget Sound area via LNG bunkering barges and tanker trucks. The Project would also have the capability of vaporizing LNG back to its gaseous state for injection into the PSE Natural Gas Distribution System during periods of high demand, referred to as "peak shaving." The area of the Proposed Action is shown in Figure 1-1. The Project would consist of the following main components:

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System. This facility will be located in the Port of Tacoma within the city of Tacoma.
- **TOTE Marine Vessel LNG Fueling System:** Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 1-2.
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), a new limit station (Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. Pipeline Segment A would be located in the city of Tacoma and the city of Fife. Pipeline Segment B would be located in unincorporated Pierce County. In addition, the Golden Given Limit Station and Fredrickson Gate Station would be located in unincorporated Pierce County.

The two new pipeline segments on the Blair-Hylebos peninsula would be required to serve the Tacoma LNG Facility. The existing natural gas facilities in the area do not have the capacity to serve the new facility. Segment A would extend from the Tacoma LNG Facility to the existing PSE distribution system on the south side of Interstate 5 in the City of Fife.

Pipeline Segment B, a 1-mile-long distribution pipeline, would interconnect the north and south Tacoma distribution systems and would be designed to increase the capacity to the Port of Tacoma area. The Golden Given Limit Station would regulate the gas pressure as it moves from south to north. The Project would result in an increased flow of natural gas through the Fredrickson Gate Station beyond its present capacity, necessitating a rebuild of the station.

1.2.2 No Action Alternative

Under the No Action Alternative, the Proposed Action would not be implemented. It is assumed that existing land uses would continue at the proposed Project site, which include various industrial and commercial uses.

LNG would not be produced or stored at the Tacoma LNG Facility site and would not be available to fuel marine vessels or other customers in the Puget Sound area. Additionally, natural gas would not be stored as LNG at the Tacoma LNG Facility site to regasify and inject into the PSE Natural Gas Distribution System and ensure that PSE customers receive natural gas supplies as needed during periods of peak demand.

Under the No Action Alternative, the economic and employment impacts of the Proposed Action would not be realized. Moreover, a new supply of fuel with fewer air emissions than traditional fuels would not be available to help improve air quality in the Puget Sound airshed and the ECA.

1.2.3 Alternatives Eliminated from Further Consideration

Before determining that the selected site was the only one that enabled the company to meet its objectives, this and other sites in the Puget Sound region were evaluated to assess whether they could meet each Proposed Action objective. Key attributes in this evaluative process included sufficient setbacks to comply with federal code 49 Code of Federal Regulations 193 (which require large parcels), proper industrial zoning, access to markets, access to PSE's distribution system, and waterfront siting to accommodate deliveries to TOTE and potential marine markets. All of these factors contribute to the development and economic viability of the Proposed Action.

Western Washington has a dearth of compatible sites. There is very little available heavy-industrial zoned acreage of sufficient parcel size to accommodate the necessary tank size. A variety of sites were examined for suitability, and the results of those investigations are described below. The sites are as follows:

- BP Cherry Point Refinery – Whatcom County
- Intalco site – Whatcom County
- Port of Everett Jeld-Wen site
- Port of Everett Shadow Development site
- Port of Tacoma Frederickson site
- Port of Tacoma Kaiser Aluminum site
- Port of Tacoma Earley development site
- Port of Tacoma Snail site (site of former snail infestation)
- Port of Tacoma Naval Reserve site

Whatcom County and Washington Department Fish and Wildlife regulations prevent the construction of additional piers at the Cherry Point and Intalco sites that are needed to meet the requirements for an LNG facility. In addition, the remote location makes service to TOTE and PSE's retail natural gas customers economically unfeasible. Neither of the Port of Everett sites was on the market for sale or a long-term industrial tenant lease at the time PSE was looking to procure a site for LNG development. While the sites may have worked for the purpose of peak shaving, neither site presented immediate proximity to the TOTE facility, where its newly commissioned LNG vessels would be fueled. TOTE's business model for serving the Tacoma-Anchorage route is based on round-trip speed and efficiency: fueling must occur at its Port of Tacoma terminal at the same time as its cargo loading/unloading operations. Fueling stops in the Port of Everett would make TOTE's Tacoma-Anchorage route economically inefficient. Additionally, the proximity to Naval Station Everett could considerably constrain the ability to move frequent and large barge shipments of LNG past the sensitive military installation. The Shadow Development site was only approximately 15 acres, too small to host an 8-million-gallon storage tank. Tidal effects and shallow river depth precluded further investigation into this site. The Jeld-Wen site owners preferred to use the site for residential development. Ultimately, their distance from TOTE and other siting constraints rendered each of these four sites physically and economically incompatible with PSE's proposed LNG development.

The Port of Tacoma's various sites each presented an improved case for proximity to TOTE and workable solution for the purpose of peak shaving. Despite its adequate size, the Fredrickson site presented limited product mobility because of its inland location. The only way to move LNG from the site to TOTE was either by rail through suburban and city neighborhoods, or by truck. Railcars to transport LNG are presently not authorized by the federal government. Both solutions require tankage at the Blair-Hylebos peninsula. The 4-hour fueling window for each vessel is inadequate for the delivery of 450,000 gallons of LNG arriving by truck in 10,000-gallon increments. These numbers are not limited to TOTE vessels alone; barging infrastructure, tank storage, and additional LNG trucks would still be necessary at the Port of Tacoma to accommodate other marine customers. The cost of infrastructure and transportation constraints at the Fredrickson site rendered the development of the project there infeasible.

The Port of Tacoma presented two other sites for early consideration. One (the “Snail site”) was constrained by both a stormwater pond and extensive wetlands on the site. At the time that PSE was asked to consider it, the site was also subject to a federal lawsuit related to the removal of forested wetlands. Even pending a satisfactory resolution of the litigation, the site was too small for the Proposed Action. The other site is the former Kaiser Aluminum site at the base of the Blair-Hylebos peninsula. This site was far too large for the proposal, and the lease costs alone would have rendered the development of the facility and associated infrastructure uneconomical. Further, it was economically infeasible to develop a cryogenic line to serve the TOTE site from this distance.

PSE examined a third site at the tip of the Blair-Hylebos peninsula known as the Earley Business Center. The Port of Tacoma has designated this site as an incubator site for small businesses and declined to make it available to PSE.

The remaining site (the Naval Reserve site) is the proposed site for development of Tacoma LNG. This site meets the objectives set forth for the successful development of the Proposed Action. Chapter 2 provides further description.

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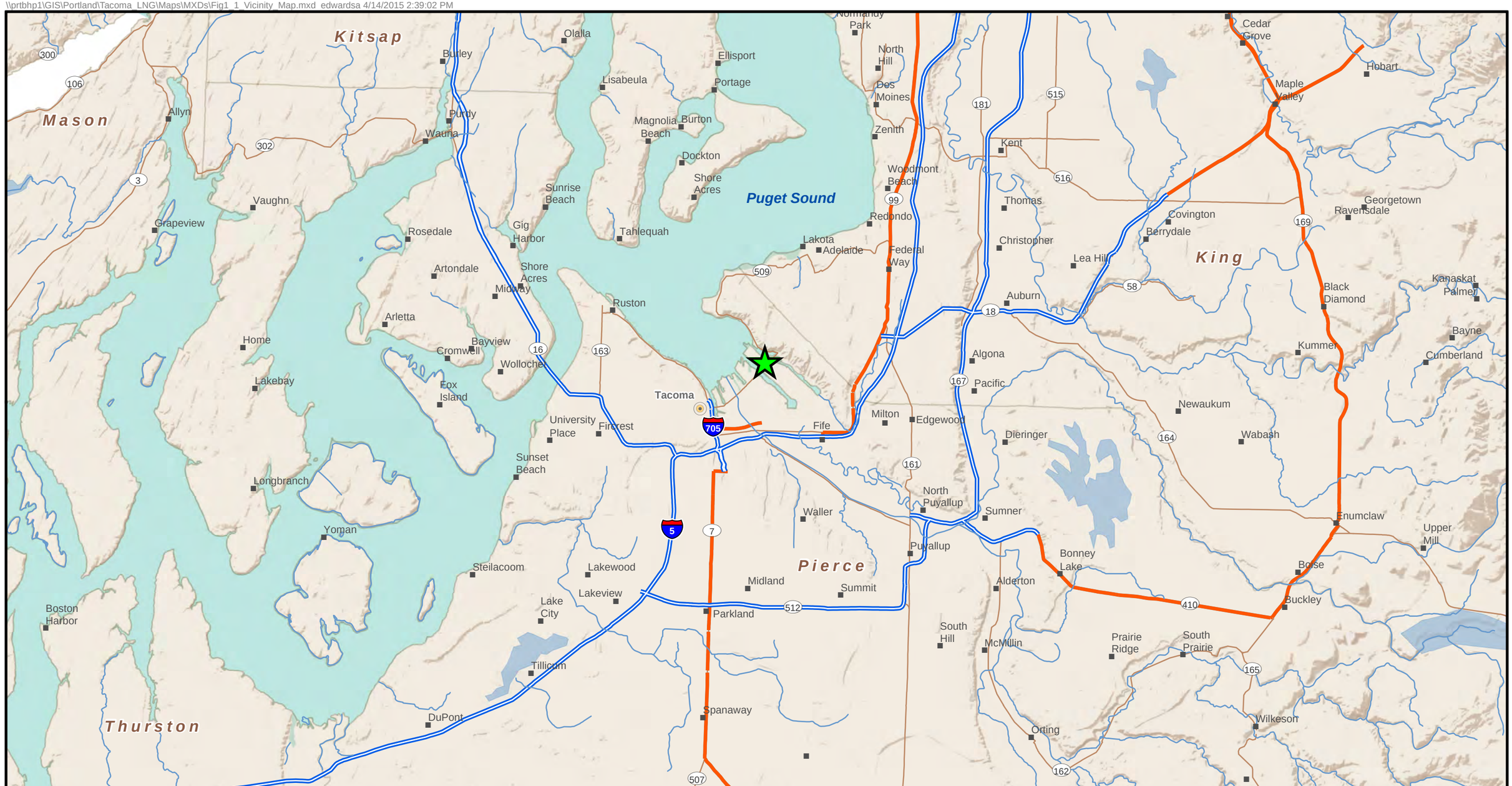


Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Tacoma LNG Facility
- County Seat
- City
- Interstate
- Highway
- Major Road
- River
- Water

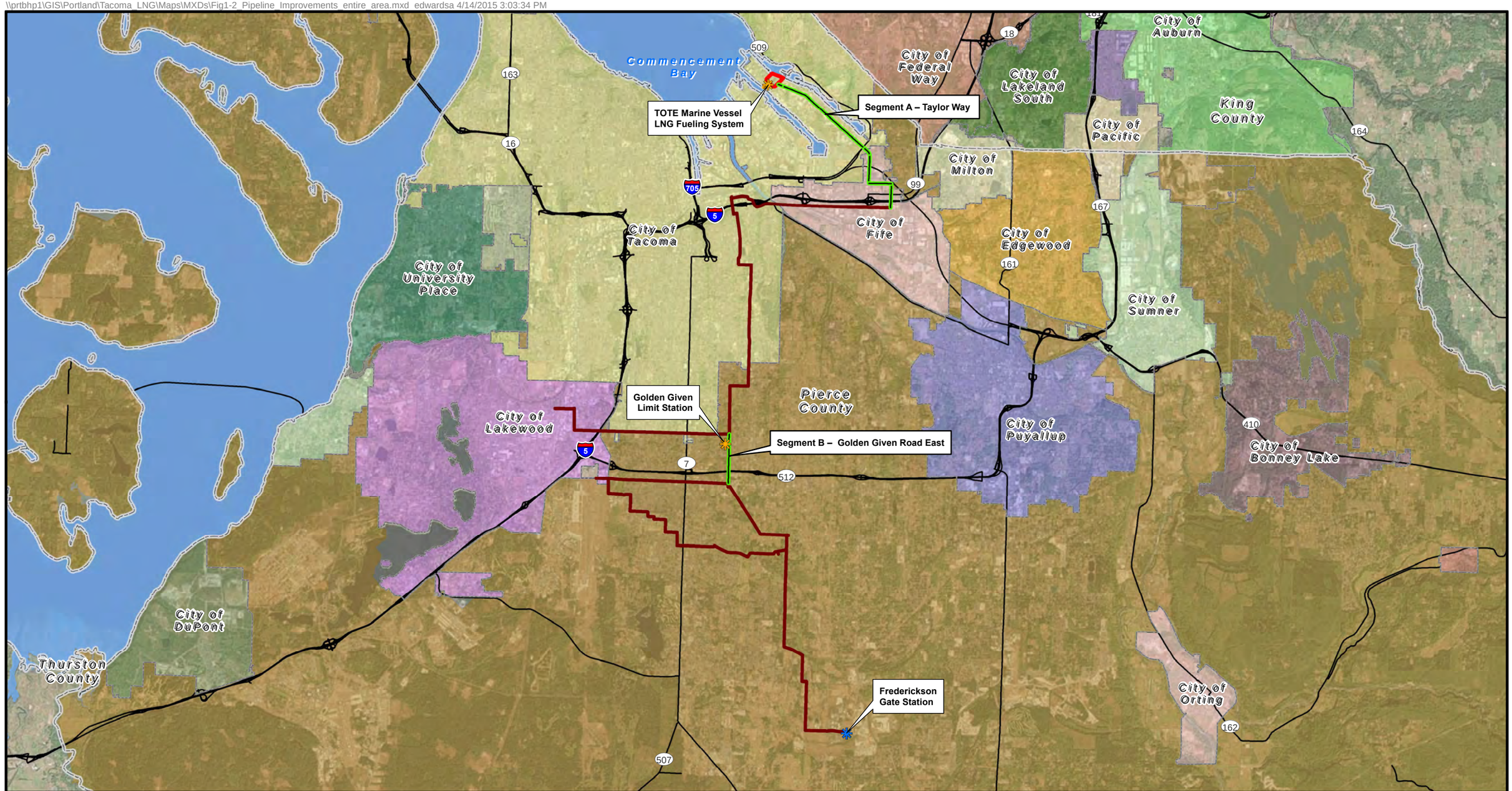
N W E S

0 1.5 3 Miles

City of Tacoma

Figure 1-1
Vicinity Map

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Frederickson Gate Station
- Proposed Action Components
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

N W E S

0 5,000 10,000 Feet

Tacoma

City of Tacoma

Figure 1-2
Proposed Action Main Component Locations

Tacoma LNG Project

2 Description of Proposed Action

2.1 Introduction

Puget Sound Energy (PSE) is the proponent of the Proposed Action, which consists of the construction, operation, and decommissioning of the Tacoma Liquefied Natural Gas (LNG) Project (Project). PSE is a corporation organized under the laws of the State of Washington. The company is a Washington-regulated utility serving 1.1 million electric customers and over 800,000 natural gas customers in 11 counties across the state. This chapter describes the Proposed Action, including the components, construction procedures, and operations of the Proposed Action.

2.2 Proposed Action Components

The proposed Project would consist of three main components: (1) Tacoma LNG Facility, (2) Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System, and (3) associated improvements to the existing PSE Natural Gas Distribution System. All components are subject to numerous applicable regulations. The main components of the Project are described below.

2.2.1 Tacoma LNG Facility

2.2.1.1 Overview

The Tacoma LNG Facility would produce between 250,000 to 500,000 gallons of LNG per day. This LNG volume is less than typical LNG import-export facilities that serve world markets. The LNG would be distributed to marine customers, including TOTE, who would use the LNG as a cleaner-burning vessel fuel, as well as re-gasifying the LNG for reinjection into the PSE natural gas distribution system for peak-shaving purposes. An additional use would be providing LNG to other industries or merchants, such as fuel for high-horsepower trucks used in long-haul trucking.

The LNG would be stored in the Tacoma LNG Facility LNG storage tank before being transferred to TOTE's ships via either cryogenic pipeline as part of the TOTE Marine Vessel LNG Fueling System or bunkering barge originating at the Hylebos Waterway pier.

Other industry merchants could transport LNG from the Tacoma LNG Facility by tanker trucks or, most likely, by barge that could be filled at either the TOTE Marine Vessel LNG Fueling System or the Hylebos pier.

The Tacoma LNG Facility would operate and be staffed with approximately 16 to 18 full-time employees 24 hours per day, 365 days a year. PSE staff would also be responsible for operating and maintaining the LNG pipeline and fuel loading equipment that would be located on TOTE's property. Maintenance and operating protocols would be developed taking into account federal and state regulations, PSE policies and practices, and best industry practices. Additionally, PSE would contract for security service as required to meet regulatory requirements and for stevedoring services to bunker TOTE's ships and load other marine vessels.

LNG Properties

LNG is natural gas in its liquid state. To reach the liquid state, natural gas is cooled to -260 degrees Fahrenheit (°F). Similar to natural gas in its vapor state, LNG is odorless, colorless, non-corrosive, and nontoxic. LNG has a density of approximately 26.5 pounds per cubic foot and is neither flammable nor explosive. Upon conversion to its liquid form, natural gas condenses to occupy a volume that is 1/600 the original volume in its gaseous form. In its liquid form, natural gas is stored at or near atmospheric pressure.

LNG vaporizes rapidly on contact with a temperature warmer than the LNG itself. At -259°F, LNG becomes a dense vapor. Between -259°F and -160°F, the LNG vapor is heavier than air and pools at the ground level in

collection pools or sumps. Vapor captured in the sumps continues to warm, and, at -160°F, the LNG vapor becomes buoyant, rises, and rapidly disperses into the atmosphere.

Location

The Tacoma LNG Facility would be located in the industrial Port of Tacoma with access to Puget Sound (see Figure 1-1 in Chapter 1 [Purpose, Need, and Alternatives Considered]). The general location of the site is north of East 11th Street, east of Alexander Avenue, south of Commencement Bay, and on the west shoreline of the Hylebos Waterway (see Figure 2-1). The Tacoma LNG Facility site is in an area zoned as Port Maritime Industrial. It is primarily developed for industrial maritime use and has been in industrial use for at least 75 years. The site is composed of four separate parcels (see Figure 2-1) owned by the Port of Tacoma. These are Pierce County tax Parcels 2275200502, 2275200532, 5000350021, and 5000350040.

The boundaries for these parcels include both in-water and upland areas, reflecting a total area of approximately 33 acres. The upland portion of the site is approximately 30 acres, and the aquatic area is approximately 3 acres.

There are several buildings currently located on the proposed Tacoma LNG Facility site, including a warehouse, two office buildings, and dispersed storage facilities. The Hylebos Waterway shoreline in this area is covered with slope protection materials, including a timber bulkhead and riprap. Two piers extend from the site into the Hylebos Waterway. One of the piers is approximately 40 by 15 feet, with a walkway approximately 90 feet long, located on the northeast corner of Parcel 2275200532. This creosote-treated timber pier is abandoned and in disrepair. The second pier is a creosote-treated timber structure measuring roughly 600 by 25 feet, located on Parcel 2275200502.

The general character of the Tacoma LNG Facility site reflects previous and ongoing industrial activity. The upland portion of the site is developed, paved, or graveled. Undeveloped areas total less than 1 percent of the entire site.

Environmental Health and Safety Considerations

Design, construction, and operation of the Tacoma LNG Facility would meet the safety requirements of the Pipeline and Hazardous Materials Safety Administration and the United States Coast Guard. The Washington Utilities and Transportation Commission is responsible for application and enforcement of 49 Code of Federal Regulations [CFR] 193 (Liquefied Natural Gas Facilities: Federal Safety Standards). The United States Coast Guard is responsible for application and enforcement of 33 CFR 127 (Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas). These requirements include, but are not limited to, the following:

- Establishment of thermal radiation and flammable vapor-gas dispersion protection exclusion zones and design of facilities to withstand wind forces;
- Emergency shutdown system requirements;
- Site preparation for retention of spilled LNG, flammable refrigerants, liquids, and surface water drainage within limits of the plant and spacing requirements for LNG facilities;
- Design criteria for process equipment and vaporization facilities;
- Design criteria for stationary LNG concrete tanks, relief devices, piping systems and components, and welded pipe tests and inspection;
- Seismic design criteria for stationary LNG storage containers;
- Corrosion control requirements for underground and submerged piping;
- Design criteria for storage tanks of refrigerant and process fluids, pressure and vacuum gauges of containers, and temperature monitoring for field-erected containers, inlets, and outlets of vaporizers;

- Design criteria for electrical equipment, grounding, and bonding;
- Design criteria for transfer of LNG and refrigerants;
- Fire protection provisions; and
- Personnel qualifications and training.

Key Components

The Project would include a variety of components further described in this section. All components of the Project are included in an Integrated Safety and Control System. The proposed site plan is shown in Figure 2-2. Additional details about the layout of the various components proposed at the Tacoma LNG Facility are shown in Figure 2-3.

2.2.1.2 Natural Gas Delivery and Pretreatment Systems

Natural gas would be delivered by a distribution pipeline and metered before it enters the Tacoma LNG Facility. Natural gas, upon delivery and prior to conversion to LNG, must be conditioned. This entails the removal of any constituents other than pure methane. These constituents could include ethane, propane, butane, and other heavy-end hydrocarbons, as well as minor quantities of nitrogen, carbon dioxide, sulfur compounds, and water. The pretreatment system would consist of amine gas treating and regeneration, a gas dehydration system, outlet gas filtration, and an intermediate heat transfer fluid system.

As part of the pretreatment process, carbon dioxide and sulfur compounds removed from the natural gas would be flared through a ground flare system described in Section 2.2.1.7 (Other Process Facilities). Heavy hydrocarbons are used as fuel gas to the maximum extent possible, also described in Section 2.2.1.7. When operating conditions are such that all of the heavy hydrocarbons are not used as fuel gas, the components are sent to a holding tank. Periodically, this holding tank would be emptied and its contents transferred to a truck and taken off site for disposal or sale to a third party for use as fuel.

2.2.1.3 Liquefaction

LNG would be produced using a mixed refrigerant design process. This closed loop system uses a specific, but adjustable, mixture of methane, ethylene, propane, isopentane, and nitrogen as refrigerant. These constituents would be stored on site. The refrigerant would pass through heat exchangers to cool the gas to a liquid (cryogenic) temperature. Refrigerant storage tanks would be above ground with the following capacities:

- Propane Storage Vessel - 4,500 gallons
- Isopentane Storage Vessel - 4,500 gallons
- Ethylene Storage Vessel - 4,500 gallons

These storage tanks would be situated in a concrete containment area filled with sand for fire protection purposes (see Figure 2-3).

2.2.1.4 LNG Storage

A single LNG storage tank (see Figure 2-4) would be constructed on site to store LNG at cryogenic temperatures with a working capacity of 8 million gallons. The temperature of the LNG must be consistent in order for it to remain in its liquid state. LNG is a boiling cryogen, meaning that it is a very cold liquid at the pressure it is being stored. The LNG vapor released by the boiling liquid helps to maintain the temperature of the LNG within the storage tank. Even with increased heat, the temperature of the fluid itself does not change because it is cooled by evaporation, or the creation of vapor. These vapors are collected, placed back into the liquefaction processor, and sent back to the tank. The LNG storage tank would be a full containment structure consisting of a steel inner tank and a prestressed concrete outer tank. An aluminum suspended deck would sit atop the LNG surface in the inner tank. The storage tank would rest upon a seismic

stabilization system. Insulation materials would be installed between the inner and outer tanks to minimize heat gain from the atmosphere to the inner tank contents. The tank would be approximately 130 feet in diameter and 140 feet in height.

Every element in the inner tank would be composed of material that can perform at a temperature of -270°F. This includes internal piping systems. All storage tank piping connections would be located at the top of the tank to avoid any structural penetrations through either the sidewall or bottom of both the inner and outer tanks, thereby mitigating the potential for leaks.

The tank would have redundant pumps of sufficient capacity to pump LNG at design loading rates. Instrumentation and safety systems would be included for proper long-term safe operation and control.

2.2.1.5 LNG Vaporization for Peak Shaving

The LNG vaporization system would consist of a pump and vaporizer. The vaporization pump would be external to the LNG storage tank and would boost the pressure to a sufficient level for vaporization and reinjection into the PSE Natural Gas Distribution System pipeline. The vaporizer would consist of a warm water bath that heats the LNG to a gaseous state suitable for use in the pipeline. The vaporization system would have the capacity to deliver 66 million standard cubic feet per day of natural gas at the standard distribution pipeline pressure. The gas sent out to the natural gas pipeline would be metered and odorized. Only one pipeline would convey natural gas to and from the Tacoma LNG Facility. Thus, when the vaporization and reinjection system is operating, the LNG liquefaction system would be shut down.

2.2.1.6 LNG Transfer Facilities

The Tacoma LNG Facility would have three ways to deliver LNG for use as fuel. The facility would include infrastructure for: (1) loading bunkering barges at the Hylebos Waterway pier for fueling marine vessels, (2) conveying LNG by underground pipeline to the TOTE Marine Vessel LNG Fueling System to directly fuel TOTE ships in the Blair Waterway, and (3) loading tanker trucks for further distribution.

Hylebos Pier

To accommodate LNG bunkering operations at the Project site, a new concrete pier would replace an existing timber pier in the Hylebos Waterway, as shown in Figures 2-5 and 2-6. The proposed location for the new pier is shown in Figure 2-2. Preliminary details of the pier are shown in Figures 2-7 through 2-10. Information about the piles that would be used to construct the new pier and associated dolphins is summarized in Table 2-1 and discussed below.

Table 2-1 Tacoma LNG Facility Pier and Dolphin Piles

Component	Number	Construction Material and Dimensions
Trestle and loading Platform	26	30-inch-diameter steel pipe piles
Fender system	16[a]	18-inch-diameter steel pipe piles
Breasting dolphins	40[b]	18-inch-diameter steel pipe piles
Catwalks	4	18-inch-diameter steel pipe piles
Bulkhead	1	600-foot-long steel sheet pile
Total	86[c]	Steel pipe piles; dimensions various

[a]Two groups of four on the platform, four on each of two breasting dolphins.

[b]Four dolphins, each consisting of 10 piles (not including fender piles).

[c]Does not include the steel sheet pile.

The new concrete pier would have less surface area than the wood pier to be removed. The concrete pier is proposed to be 60 feet long by 25 feet wide (1,500 square feet [ft^2]) and would include a 68-foot-long by 33-

foot-wide (2,244 ft^2) concrete access trestle extending from the upland portion of the site. In addition to a 20-foot-wide access lane for fire vehicles, the access trestle would have an 8-foot-wide combination spill channel and pipe support area. The pier and access trestle would be constructed of precast concrete panels or poured-in-place concrete that meets the requirements of 49 CFR Part 193 (Liquefied Natural Gas Facilities) and National Fire Protection Association Standard 59A (Standard for the Production, Storage, and Handling of Liquefied Natural Gas; NFPA 2013).

The new pier and trestle would be constructed with 26 steel pipe piles 30 inches in diameter. The fender system at the face of the pier would consist of two groups of four 18-inch-diameter steel pipe piles with an ultra-high molecular weight polyethylene rub strip on the breasting face of each fender pile. Rubber fender elements would help absorb berthing energy from docking vessels.

The berthing system would also include four 15- by 15-foot (225 ft^2 each) dolphins, positioned at either end of the pier. The dolphins would each be supported by up to 10 steel pipe piles 18 inches in diameter. The two inner dolphins would be used for both breasting and mooring and would each have four 18-inch-diameter steel pipe fender piles with an ultra-high molecular weight polyethylene rub strip on the breasting face of each fender pile. The outer dolphins would be for mooring only and would not have fenders. Access to the dolphins would be provided by aluminum or steel-grated catwalks with a total surface area of 1,450 ft^2.

Shoreline Improvement

The existing shoreline along the Hylebos Waterway at the Project site is constructed of gravel and soil fill material supported by a timber bulkhead, which is located at about 11.8 feet above mean lower low water (MLLW) (see Figure 2-11). A new steel sheet pile bulkhead approximately 600 feet in length would be installed approximately 9 feet shoreward of the existing bulkhead, as shown in Figure 2-11. The existing bulkhead and supported fill material would be removed and replaced with light, loose riprap varying in size from 3 inches to ½ cubic yard, constructed at a 2:1 slope similar to the existing shoreline slope below elevation 11.8 feet above MLLW.

Loading Bunkering Barges at Hylebos Pier

LNG from the storage tank would be loaded onto the bunkering barges within the Hylebos Waterway using in-tank LNG loading pumps by way of a loading pipeline. The aboveground pipeline would extend approximately 600 feet from the LNG storage tank to the Hylebos shoreline, where it would transition to a pipeline extending down the trestle to the loading platform at the end of the pier.

The LNG pipeline would end at a loading arm or hose on the loading platform, which would transfer LNG to the barge. The loading arm or hose would have full-bore emergency release couplings at the outboard of the arm or hose.

A concrete spillway installed down the trestle below the transfer pipeline would provide for conveyance of any released LNG to a purpose-built containment basin located onshore, in the event of a liquid release.

The bunkering barge would be specially designed to transport LNG and to make ship-to-ship LNG transfers. The bunkering barge would be moored at the new Hylebos pier, where it would be loaded with LNG upon demand. To make deliveries, the LNG bunkering barge would travel up the Hylebos Waterway and toward Commencement Bay and then to the vessel that would receive the LNG fuel.

The LNG bunkering barge would be moved by tug-boats between the new Hylebos pier and its fueling destination. The LNG bunkering barge and tug-boats would be owned and operated by independent third parties. These vessels would not be committed to or under the control of Tacoma LNG Facility. The specific features of the bunkering barges would depend on the owner and operator of the barges.

Loading Tanker Trucks

The tanker truck loading system would consist of two loading bays located on the west side of the facility and would be accessed by a dedicated gate accessible from the facility parking area. As elsewhere on the site, the loading area would be paved and graded to a spill trough designed to safely direct any spills in the area to a spill containment sump at a location remote from the truck loading area. An emergency shutdown valve would be installed at a location remote from the truck station and would be operable both remotely and manually.

2.2.1.7 Other Process Facilities

The process facilities would include other specific components, such as a meter station, boil off gas (BOG) recovery system, and flare system. These components are described in more detail below.

Meter Station

The meter station would measure gas flows from the incoming natural gas pipeline, as well as natural gas flows from the LNG vaporizer back into the pipeline.

Odorizer

The odorizer would add odorant to the natural gas flowing from the LNG vaporizer back into the pipeline.

Boil Off/Flash Gas Recovery System

The BOG recovery system would handle BOG, flash gas, or displacement vapor from the LNG storage tank and truck and marine loading systems. The BOG recovery system would warm this gas and boost its pressure sufficient for re-liquefaction or discharge to the PSE Natural Gas Distribution System pipeline. The BOG recovery system would maintain the LNG storage tank within its operating pressure by handling BOG and flash vapor, which may cause the pressure inside the tank to increase. This would avoid the need to vent or flare excess BOG from the tank.

Facility Cooling Water System

Cooling water consisting of 60/40 weight percent water/propylene glycol would be utilized in a closed loop to provide heat rejection for various users within the facility.

Flare System

The flare system would consist of an enclosed ground flare to be used for flaring of normal discharges. The ground flare system would be designed for high efficiency and smokeless operation. The ground flare would be approximately 40 feet in overall height and 10 feet in diameter. The flare system would also include an open flare, but it would be used only in non-normal situations; i.e., in the event that the refrigerant or process piping needed to be rapidly evacuated. Typically, this would only happen if a fire occurred in the process area. The open flare would produce a visible flame, but only during non-normal situations. It would be approximately 2 feet in diameter and 85 feet tall.

Heavy Hydrocarbon Collection and Storage System

Heavy hydrocarbons in the feed gas that may freeze within the liquefaction process would be removed, as discussed in the liquefaction section above. The storage tanks for heavy hydrocarbons would have secondary containment. Spill prevention and controls would be addressed in the facility Spill Prevention, Containment, and Countermeasure plan. The heavy hydrocarbons would be collected, stored, and subsequently trucked to appropriate and licensed disposal facilities.

Integrated Control and Safety System

The Tacoma LNG Facility would be equipped with an Integrated Control and Safety System. This system would allow for monitoring and control of all systems in the plant. In addition to being used for manual operation of the plant, it would also control automatic emergency shutdown functions in the event of a non-normal event. Furthermore, the plant could also be shut down manually in an emergency via emergency

shutdown buttons located throughout the facility. The system's redundancy would include duplicate control signals and backup power sources.

Buildings

The Tacoma LNG Facility would include the following buildings:

- Control Building: An existing two-story office/shop building approximately 11,000 square feet in size would be re-purposed to serve administrative, maintenance, and control room purposes. In addition, the building would house the fire water boost pump, firewater jockey pump, water demineralization system, and instrument/process air compressor system.
- Storage Building: An existing 24,000-ft^2 sheet metal building in the northeast portion of the site would be kept and used to store materials.
- Compressor Building: A new, single-story pre-engineered building would be built to accommodate the feed gas compressor, refrigerant compressor, BOG compressor, and ancillary equipment. This building is expected to be approximately 6,000 square feet.
- Power Distribution Center (PDC): The PDC would be an approximately 1,500-ft^2 prefabricated building shipped with electrical internals.

Access and Parking

The Tacoma LNG Facility site would include two main points of access off of Alexander Avenue East serving the truck rack and plant operations.

Two existing rail sidings are present at the site, one of which would be maintained. This proposal would not impact existing rail service elsewhere in the Port of Tacoma.

Electrical Systems

Electrical service is provided to the Tacoma LNG Facility site by Tacoma Power. Transmission lines are located throughout the Blair-Hylebos peninsula.

The Tacoma LNG Facility would require approximately 15 megawatts while operating at peak load. The facility would be served through existing Tacoma Power transmission lines. A new substation is proposed within the Tacoma LNG Facility. This substation would include two 115-kilovolt (kV)/13.8-kV power transformers.

The power distribution system within the Tacoma LNG Facility would be centrally located. Three main three-phase voltages would be utilized: 13.8 kV, 4160 volts alternating current, and 480 volts alternating current.

Standby power would be provided from a diesel engine, capable of running all essential loads within the facility. Critical facility control system, security, lighting, and hazard detection loads would be powered by an uninterruptible power supply.

Demineralized Water

Makeup water for the pretreatment system would be provided by a demineralized water system located in the control building. Prefiltered potable water would be routed to a reverse osmosis system that removes water contaminants and total dissolved solids to a required level.

Fuel Gas

Natural gas would fuel uses within the facility, including but not limited to, the pretreatment system, enclosed ground flare, and vaporization system.

LNG Spill Impoundment

In the event of LNG spills, LNG would be directed to various spill containments consisting of below grade open top concrete sumps. LNG spills emanating on the loading platform at the end of the pier would be

collected in a concrete curbed area under the loading arms or hoses and piping, which would gravity drain to a concrete trench that runs the length of the pier back ashore. Sumps would be sized for a maximum design spill pursuant to federal regulations.

Other Spill Impoundments

All other process liquids on site, such as lubricant oil or refrigerant components, would be captured within containment curbs.

Fire Protection System

Fire Suppression System

A fire suppression system would be installed at the facility. This system would include fire water, dry chemical extinguishers, and sprinklers within the control building. Water is not used to extinguish flame on an LNG pool. Fire on an LNG pool is typically extinguished by smothering the flame with a dry chemical extinguishing agent or left to burn itself out if it presents no risk to life or property. Initial and ongoing training and familiarization would be provided to City of Tacoma fire department personnel to ensure they have a strong understanding of behavioral properties of LNG and to inform them of appropriate response tactics at the facility.

Mixed refrigerant components would be stored in tanks encased in a sand-filled containment area to prevent fire impingement from a plant or tank fire. The control building would be fully sprinklered, and numerous portable dry chemical extinguishers would be located throughout the plant. Sprinkler connections would be compatible with local municipal fire department equipment. The PDC (switchgear/motor control center room) would be equipped with fire suppressant systems.

A fire water system would be installed at the plant for use in cooling exposed buildings and equipment in the event of a prolonged natural gas fire resulting from an ignited LNG spill or for any other general fire-fighting use. The firewater system would be an underground looped system that allows flow from more than one direction to most hydrants and monitors. Hydrant and monitor connections would be compatible with City of Tacoma Fire Department equipment. The underground firewater piping would be made of high-density polyethylene. The aboveground firewater piping to the Hylebos pier would be carbon steel and would be heat traced and insulated. The firewater source for the facility would be from two tie-ins to the municipal firewater main: one inner connection on the south side of the facility along Alexander Avenue and one connection on the east side of the facility along East 11th Street. Hydrants and monitors would be placed around the facility. Specific placement would be selected in compliance with building code and in consultation with the Tacoma Fire Department. Elevated monitors on the pier would deliver firewater to the marine vessel's manifold connections, and a ship-to-shore firewater connection would be provided for vessel connection.

The firewater supply pressure and flow rate from the municipal firewater main would be sufficient for firefighting and equipment/structural cooling within the process areas of the facility. A firewater boost pump would be provided to meet the requirements of 33 CFR 127 (Waterfront Facilities Handling LNG) to provide firewater at the marine transfer area. The pump would be sized to provide the entire facility firewater demand rate and would be capable of providing 2,000 gallons of water per minute of water to fight a fire or protect adjacent equipment from the heat of a fire. The firewater pump would be automatically activated in the event of pressure loss in the firewater header system. The firewater system would be kept pressurized by a small electric-motor-driven jockey firewater pump. The two pumps would be located in the control building. The firewater boost and jockey pumps would take suction from the East 11th Street firewater tie-in. Each of the municipal firewater tie-in connections would be equipped with a backflow preventer to isolate the municipal firewater system from the elevated LNG facility firewater main pressure. A bypass with check valve around the firewater boost pumps would permit the municipal supply to feed the facility in the event of pump failure or maintenance.

Fire and Hazardous Gas Detectors

Fire and hazardous gas detectors would be distributed throughout the facility. The system would include, but not be limited to, the following hazardous detection equipment:

- Combustible gas detection system,
- Ultraviolet/infrared (flame) detection system,
- Low temperature (spill) detection system,
- Smoke detection system, and
- High temperature detection system.

Fire and hazardous gas detectors would be routed to the fire and hazardous gas control panel in the main control room. Alarms and beacons would be sounded as appropriate.

Dry Chemical Extinguishing Systems

Dry chemical extinguishing units (of varying sizes and types) would be located throughout the facility to provide adequate dry chemical firefighting capability in areas deemed to have a risk of controllable fires. Uncontrollable fires have been accounted for through the use of passive firefighting (for instance, a tank impoundment fire is expected to just burn out over time with no failure of the concrete secondary containment wall).

The following area in the facility would be provided with a large skidded (1,500-pound) dry chemical extinguishing unit mounted on concrete slabs:

- Refrigeration Area

This skid would be equipped with two 150-foot-long hoses and long range nozzles extending their reach to 190 feet. This reach allows the two skids to cover the entire process area.

The following areas would be provided with 300-pound wheeled dry chemical units:

- Marine loading area,
- Truck loading area,
- LNG ex-tank pump and vaporizer area,
- Process area sump, and
- Hot oil heater and storage area.

These units are intended for movement to fight fires in the areas where needed. These units have a 100-foot-long hose and would be provided with potassium bicarbonate (Purple-K).

2.2.2 TOTE Marine Vessel LNG Fueling System

The TOTE Marine Vessel LNG Fueling System would consist of a cryogenic pipeline from the Tacoma LNG Facility to the TOTE Terminal and transfer facilities to an access trestle and LNG loading platform. The loading platform would be used to fuel ships. The LNG pipeline would end at a loading arm or hose on the loading platform, which would transfer LNG to the TOTE vessel, or other barges and bunker ships. The loading arm or hose would have full-bore emergency release couplings at the outboard of the arm or hose.

The TOTE Marine Vessel LNG Fueling System would be located on the TOTE site on the Blair Waterway. See Figure 2-1. The TOTE site is primarily a paved parking area for trailers, other vehicles, and equipment and includes some small buildings and structures.

The shoreline along the Blair Waterway is developed with wharves, piers, and armored slopes containing riprap, concrete and asphalt pieces, and various debris. The slope and armoring of this section of shoreline would remain unchanged. In-water structures in the Blair Waterway associated with existing TOTE operations include a timber T-pier, three concrete piers, and one concrete breasting dolphin.

The cryogenic pipeline corridor would exit the storage tank and extend 1,200 feet west, traveling below the Alexander Avenue right-of-way (ROW) to the transition point near the TOTE pier. A separate aboveground pipeline would extend along the trestle to the loading arm on a platform in Blair Waterway.

A concrete, steel pile-supported access trestle would extend from shore to the LNG loading platform. This 81-foot-long by 33-foot-wide (2,673-ft^2) trestle would be constructed adjacent to the existing aft loading platform for the TOTE vessels. It would provide a roadway section for fire truck access to the loading platform, pipeway, and utility corridor for all required piping and utilities, and a walkway for personnel. Twelve 30-inch-diameter steel pipe piles would support the trestle. The proposed in-water infrastructure is shown in Figures 2-12 through 2-17. Information about the piles that would be used to construct the new access trestle, LNG loading platform, and associated dolphins is summarized in Table 2-2 and discussed below.

Table 2-2 TOTE Marine Vessel LNG Fueling System Access Trestle and LNG Loading Platform Piles

Component	Number	Construction Material and Dimensions
Trestle	12	30-inch-diameter steel pipe piles
Loading platform	20	30-inch-diameter steel pipe piles (includes 5 extra just in case)
Catwalk	2	Two 18-inch-diameter piles at intermediate support
Fender system	10	14-inch-diameter steel pipe piles
TOTE vessel breasting dolphin	4	30-inch-diameter, load-bearing, steel pipe piles
Free-standing breasting dolphins	8*	20-inch-diameter, load-bearing, steel pipe piles
Total	56	Steel pipe; dimensions various

*Two breasting dolphins, each has four pilings; TOTE is permitting the breasting dolphins (required for the interim fuel supply).

A concrete spillway installed along the trestle below the transfer LNG pipeline would provide for conveyance of any accidental release of LNG into a purpose-built containment basin located onshore.

The steel pile-supported loading platform at the end of the trestle would be 69 feet long by 32 feet wide (2,208 square feet). Twenty 30-inch-diameter steel pipe piles would be installed to support the platform. The fender system may include up to ten 14-inch-diameter steel pipe piles with an ultra-high molecular weight polyethylene rub strip on the breasting face of each fender pile. Rubber fender elements may be placed between the loading platform and each fender pile to absorb berthing energy.

The pier and access trestle would be constructed of precast concrete panels or poured-in-place concrete that meets the requirements of 49 CFR 193 (Liquefied Natural Gas Facilities) and National Fire Protection Association Standard 59A (Standard for the Production, Storage, and Handling of Liquefied Natural Gas).

A steel pipe pile-supported catwalk would provide line-handlers access to the onshore mooring point and capstan from the aft loading ramp. This open steel-grated catwalk with pipe hand railing would connect the loading platform to the onshore mooring point and capstan. Two 18-inch-diameter pipe piles would be used at the intermediate support to support the catwalk.

One breasting dolphin would be installed. The breasting dolphin would be installed just to the north of the existing aft loading pier to protect that pier and the LNG platform from impact by the TOTE vessel. Four 30-inch-diameter steel pipe piles would be used for this dolphin.

PSE's extent of the LNG delivery system would terminate at the loading flange on TOTE's ship.

2.2.3 PSE Natural Gas Distribution System

The Proposed Action would include improvements to the existing PSE Natural Gas Distribution System. These improvements would include the construction of new pipeline segments and modifications to associated limit and gate stations. Figure 1-2 and Figures 2-18 through 2-20 show the distribution system improvements proposed in separate locations within the Port, City of Tacoma, City of Fife, and unincorporated Pierce County. The new pipeline segments are described below, followed by a description of construction of the new Golden Given Limit Station and proposed improvements to the existing Frederickson Gate Station.

2.2.3.1 New Pipeline Segments

The distribution system improvements would include construction and installation of two new pipeline segments with a combined total implemented length of 5.0 miles. The new pipeline segments would range from 12 to 16 inches in outside diameter (OD). The maximum allowable operating pressure (MAOP) in the new pipeline segments would range from 250 to 500 pounds per square inch gauge (psig). The new pipeline segments are proposed within the dedicated road ROWs that are currently used for vehicular traffic. Figure 1-2 in Chapter 1 (Purpose, Need, and Alternatives Considered) Figures 2-18, and 2-19 provide an overview of where the new pipeline segments are proposed.

The approximate lengths of the pipeline segments and the jurisdictions they would cross are as follows:

- Pipeline Segment A: Approximately 4.0 miles long; would cross the City of Tacoma and City of Fife
- Pipeline Segment B: Approximately 1.0 mile long; would cross unincorporated Pierce County

More detailed descriptions of the new pipeline segments are provided separately below.

Pipeline Segment A – Taylor Way

Pipeline Segment A – Taylor Way would extend generally northwest to southeast from the Tacoma LNG Facility to 20th Street East in the City of Fife, just south of Interstate-5 (I-5). Pipeline Segment A would be a total of approximately 4.0 miles in length and would consist of 16-inch-OD pipeline and be designed with an MAOP of 250 psig. The initial approximately 2.2 miles extending southeast from the Tacoma LNG Facility would be within the city of Tacoma, and the remaining approximately 1.8 miles would be within the City of Fife.

Pipeline Segment A would extend southeast from the Tacoma LNG Facility within Taylor Way for approximately 2.5 miles before turning south for approximately 0.6 mile within 54th Avenue. Pipeline Segment A would then extend east within 12th Street East for approximately 0.5 mile before turning south within 62nd Avenue East. The pipeline would extend south for approximately 0.5 mile to the south side of I-5 before ending at the intersection of 62nd Avenue East and 20th Street East.

Pipeline Segment B – Golden Given Road East

Pipeline Segment B—Golden Given Road East would connect an existing north-south pipeline extending from north of I-5 in the City of Tacoma to an existing pipeline extending generally east-west. Pipeline Segment B would extend north to south within Golden Given Road East between 96th Street East (north) and 112th Street East (south) in unincorporated Pierce County and connect to the Golden Given Limit Station via 99th Street East. Pipeline Segment B would be approximately 1.0 mile long and would consist of 12-inch-OD pipeline and be designed with an MAOP of up to 500 psig. The entire segment would be within unincorporated Pierce County.

2.2.3.2 Limit and Gate Stations

The PSE Natural Gas Distribution System improvements would include one new limit station and modifications to one existing gate station. The limit and gate stations would reduce pressure in the pipelines; the gate station would also transfer the natural gas from the transmission system to the local distribution system. The construction of a new limit station and improvements to an existing gate station are

necessary to support the new pipeline segments. The new Golden Given Limit Station and improvements to the Frederickson Gate Station are described below.

The approximate acreages of the parcels where these facilities would be located are as follows:

- Golden Given Limit Station: Parcel 0319032025: 0.32 acre
- Frederickson Gate Station: Parcel 0318011007: 21.9 acres

Golden Given Limit Station

The new Golden Given Limit Station would be built south of the intersection of East 99th Street and East 10th Avenue, and west of Golden Given Road East (see Figure 2-19). The limit station would be located on a parcel with an existing structure and paved parking lot owned by PSE. The new limit station would require a fenced area built in compliance with applicable Pierce County development standards. The Golden Given Limit Station would include pressure regulation equipment, associated piping, over-pressure protection, and gas heating facilities, also to be developed in compliance with applicable development standards.

Upgrade Existing Fredrickson Gate Station

PSE would upgrade the station regulation and heater at the Fredrickson Gate Station. These upgrades would ensure gas supply to the Tacoma LNG Facility while maintaining the operational reliability of the existing distribution system into Pierce County. The upgrades would include pressure regulation equipment, associated piping, over-pressure protection, and gas heating facilities at the meter station.

2.3 Construction Procedures

2.3.1 Tacoma LNG Facility

2.3.1.1 Upland Construction

Demolition of Upland Buildings and Structures

Construction of the Tacoma LNG Facility would begin with demolition and removal of the various existing structures on the Tacoma LNG site, as shown in Figure 2-21. Two of the existing structures would be left intact. Any hazardous materials would be removed and disposed of in accordance with applicable regulations.

Site Preparation

As described in Chapter 3, Section 3.1.1.4 (Earth: Environmental Conditions), soil and groundwater contamination associated with the historical industrial uses in the surrounding area may extend to locations within the construction footprint proposed for the Tacoma LNG Facility and portions of the proposed natural gas distribution pipelines on the Blair-Hylebos peninsula. PSE has solicited the United States Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology) for information about contaminated sites in the vicinity of the LNG facility and a portion of the natural gas pipeline. Both of the agencies were provided with the site assessment sampling and analysis plan for the Tacoma LNG Facility site (GeoEngineers 2014), and it is anticipated that they would also review future PSE project plans associated with work in areas of known or suspected contamination. PSE is currently conducting sampling along the pipeline alignment to document any potential contamination that could be encountered during site preparation.

Specific procedures would be identified for the proper handling, transport, and disposal and/or on-site reuse of contaminated media, if present. The Tacoma LNG Facility would not preclude future remedial actions, if needed, within the facility footprint. Future remedial actions, if needed, would be conducted by other parties in collaboration with EPA and/or Ecology.

Site preparation for the land-based LNG storage, process, and support facilities would require clearing and grading activities. It is anticipated that some combination of ground improvements would then be installed to improve seismic performance and provide support for structures.

Following ground improvements, ground elevation would be reestablished for the various aboveground structures. The large existing warehouse building in the center of the Tacoma LNG Facility site sits on a raised foundation approximately 3 to 5 feet of fill soil. The preliminary plan for site preparation following demolition of the warehouse involves spreading this soil to the south.

Stormwater Management

Before construction, best management practices (BMPs) would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the Project's National Pollutant Discharge Elimination (NPDES) General Construction Stormwater Permit. The NPDES permit guides construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

Ground Improvements and Foundations

Ground improvements are required to meet the seismic design criteria in 49 CFR 193. These ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in a design earthquake.

The LNG tank would be the largest component of the facility, and ground improvement efforts would be concentrated at this location. A seismic base isolation system would be added under the LNG tank to address potential seismic events. Other portions of the facility such as the LNG process area and land adjacent to the Hylebos pier would also require ground improvement.

Based on geotechnical analyses, the ground improvement methods would involve injection of grout columns under the tank and other areas. These injected grout columns would range between 80 and 100 feet in depth and compress the soil around them, which would avoid creation of preferential pathways for groundwater migration. The number of columns would vary depending on the method selected, but could range from 4,000 to 6,000 columns.

LNG Storage Tank Construction

Construction of the storage tank and its associated foundation would include the following key activities:

- Prepare and level the location for the LNG storage tank and foundation.
- Install requisite ground improvements, and then construct the tank concrete foundation. The foundation would consist of a base concrete slab, a set of seismic isolators, and an elevated upper concrete slab.
- Construct the outer-tank carbon steel liner, install the outer-tank carbon-steel bottom liner on the foundation, erect the outer-tank carbon-steel roof liner on the outer-tank bottom, and erect the inner-tank suspended deck and connect this to the steel roof.
- Raise the outer-tank steel roof and suspended deck, and weld it to the top compression bar at the top of the tank shell.
- Install the outer concrete wall against the outer-tank steel shell. While this concrete work is progressing on the outside, the construction of the inner tank takes place.
- Install the tank bottom insulation and inner-tank foundation.
- Install the inner-tank bottom.

- Erect the inner-tank shell.
- Install the outer-tank concrete roof.
- Install and tension concrete wall pre-stress tendons.
- Install tank internal accessories such as pump columns, bottom and top fill pipework, instrument wells, and purge and cool-down pipework.
- Install tank external accessories, such as tank instrumentation, electrical equipment, pipework, roof platforms, and access stairways.
- Hydrotest the inner tank.
- Install the tank internal and annual space instrumentation.
- Install tank perlite insulation in the annulus space between the inner and outer tank.
- Conduct the final tank cleaning.
- Install in-tank LNG pumps.
- Purge the tank with nitrogen.
- When the facility is ready for commissioning, cool down the tank to prepare to fill it with LNG.

Testing of the LNG Storage Tank

The primary inner container of the LNG storage tank would be filled and hydrostatically tested in accordance with the requirements of American Petroleum Institute Standard 620. Approximately 5.0 million gallons of water would be required to perform the test. The hydrostatic test water would be supplied by the Tacoma potable water system, and the used test water would be discharged to the municipal stormwater system. At the proposed intake pumping rate of 1,000 gallons per minute, it would take approximately four days to fill the tank to the required level for testing.

Tank settlement monitoring would be performed during the water filling, testing, and emptying activities. Detailed procedures would be developed for final cleaning and drying out of the tank after hydrotesting.

Testing of Pipework

Piping within the LNG Fueling Facility would be tested using hydrostatic or pneumatic methods. In general, cryogenic piping for transfer of LNG and water sensitive products would be pneumatically tested with dry air or nitrogen at 1.1 times design pressure. Noncryogenic piping (that is, piping for transfer of warm products) would be hydrotested using clean water at 1.5 times design pressure.

Support Facilities

Construction of foundations for buildings and installation of major mechanical equipment would occur once the LNG storage tank construction is underway. Large equipment items would be set on their foundations upon delivery. After the pipe racks are completed, work would commence on the installation of the process and utility piping. The installation of mechanical equipment would be followed by electrical and instrumentation installation. Once the piping is completed and tested, piping insulation would be installed. As the construction of the process portion of the Tacoma LNG Facility progresses, work would commence on the precommissioning activities, so that these activities would be completed concurrent with the completion of the LNG storage tank and be ready for nitrogen purging.

Site Access and Traffic

Construction of the Project would require trips associated with construction workers, as well as equipment and materials delivery. The primary truck access route to the Tacoma LNG Facility site would be via the 54th Avenue East exit from I-5 in the City of Fife. Trucks would proceed north on 54th Avenue East and then onto

Taylor Avenue. Trucks may enter the Tacoma LNG Facility site from either East 11th Street or Alexander Avenue East.

Restoration

The existing ground surface within the construction footprint of the Tacoma LNG Facility site is either paved or covered with gravel. Existing concrete, asphalt, and gravel located outside the proposed footprint would remain in place. Equipment at the Tacoma LNG Facility would be mounted to new concrete pads. The associated LNG piping would be installed above ground. Areas outside concrete pads, but near equipment and piping would be covered in crushed rock or gravel.

2.3.1.2 Hylebos In-water Construction

Demolition and construction activities to occur below elevation 11.8 feet above MLLW (pile removal and installation) in the Hylebos Waterway would occur during the in-water work window for Commencement Bay. No dredging would be required during construction. In-water construction would consist of the following main phases: demolition and removal of existing in-water structures, construction of proposed in-water and above-water structures, and installation of shoreline improvements.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the Project's NPDES General Construction Stormwater Permit. The NPDES permit guides construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

Demolition of In-water Structures

The existing 13,300-ft^2 creosote-treated timber main pier in the Hylebos Waterway adjacent to the Tacoma LNG Facility site would be demolished by water-borne equipment and transported offsite. The existing 1,274-ft^2 dock off the northwest corner of the site would also be removed. Following mobilization and staging, the main steps in demolition and removal of the two existing in-water structures would include removal of fender system, utilities, and other appurtenances; removal of the decking, including creosote-treated timbers and pavement; and removal of the creosote-treated timber piles.

Creosote-treated wood and piles would be disposed of at an appropriate upland facility that meets the liner and leachate standards of the Minimum Functional Standards, Chapter 173-304 Washington Administrative Code (WAC). Five hundred and eight creosote-treated timber piles would be removed from the Hylebos Waterway associated with the two existing structures. These piles would be removed with a vibratory hammer. Based on the type of sediment and results from other pile removal projects along the Hylebos and Blair waterways, it is anticipated that the majority of holes would immediately fill themselves upon pile extraction. However, holes remaining from vibratory removal would be filled with clean sand or other habitat mix approved by the Washington Department of Fish and Wildlife (WDFW). It is conservatively estimated that 25 percent of the piles to be removed in the Hylebos Waterway would have a hole partially remaining following extraction (127 holes). It is estimated that the total quantity of clean sand or other habitat mix needed to fill pile holes for the Project in both the Hylebos and Blair waterways would be no more than 360 cubic yards, including up to 340 cubic yards in the Hylebos Waterway and the remaining balance in the Blair Waterway.

It is also assumed that up to 10 percent of the existing piles in the Hylebos Waterway (up to 51 piles total) would break during extraction with the vibratory hammer. Piles that break would be cut off 2 feet below the mud line and capped with clean sand or other habitat mix approved by the WDFW to an elevation flush with the existing mud line. PSE would consult with EPA and the Port of Tacoma to confirm appropriate steps addressing management of broken piles during demolition activities. Under the assumption that up to 51 piles would need to be cut off in the Hylebos Waterway, this would result in up to 4.3 cubic yards of clean

sand added to the waterway to fill the various 2-foot holes, which is included in the 340 total cubic yards in the Hylebos Waterway.

Construction of In-water Structures

All support and fender piles would be installed by a barge-mounted crane (derrick), using a vibratory and hydraulic or diesel impact hammer. Before installation, the piles would be transported to the site and staged on a support barge. Installation of the 86 piles would require approximately 16 to 24 working days. The pile-driving sequence would be as follows: first, vibratory drive the piles to 90 percent or more of their design depth (within 10 feet of design tip elevation); second, proof the installation with an impact hammer until load-bearing or pile-tip elevation specifications are reached. It is anticipated that up to 60 blows per foot may be required for proofing. No temporary piling would be used for construction purposes. Once pile installation is complete, all other pier construction would be above the mean higher-high water elevation. This subsequent construction includes cast-in-place concrete pile caps, installation of concrete decking , and construction of a cast-in-place concrete topping slab, including curbs, and bull rails. Cast-in-place concrete would be delivered to the site by ready-mix trucks and pumped from land into watertight forms. Over-water construction equipment would include a barge-mounted crane (derrick), a support barge, a diesel or hydraulic impact hammer, and various small work boats. A tug-boat may also be used to position the barges.

Once the concrete decking is in place, the requisite equipment would be installed on top of the decking to include LNG transfer pipeline and articulated loading arm or hose.

Shoreline Improvements

The existing creosote-treated timber bulkhead structure (fabricated with used timber piles) would be demolished by land-based equipment, which would remain above elevation 11.8 feet MLLW and the ordinary high water mark when conducting the work. Waste would be disposed of at an appropriate upland facility. Shoreline work quantities below the elevation of 11.8 feet MLLW would be as follows:

- Excavation: 1,900 cubic yards;
- Backfill: 690 cubic yards (light, loose riprap varying in size from 3 inches to ½ cubic yard); and
- Disturbance area: 5,440 ft^2.

The existing bulkhead would remain in place while the work behind it is completed (see sequencing notes provided in Figure 2-10). The existing bulkhead would provide a measure of erosion and sediment control during construction of the new cleaner bulkhead and regrading of the resulting shoreline. Care would be taken when removing materials above the existing bulkhead, and work would be conducted during low tides.

A new steel sheet pile bulkhead approximately 600 feet in length would be installed above elevation 11.8 feet MLLW to support the existing pavement. Installation of the steel sheet piles would occur 9 feet landward of the existing creosote bulkhead to minimize impacts to the shoreline area. Existing debris or industrial fill would be removed as necessary prior to placing new backfill behind this new bulkhead

No other specific disturbances to the existing shoreline are planned. In addition to the new bulkhead, improvements would also be made to the existing stormwater outfalls. For further information on the stormwater outfall improvements see City of Tacoma Shoreline Substantial Development Permit Application No. SHR2015-40000246123.

Any disturbed areas resulting from removal of the timber bulkhead or pier demolition and construction would be repaired with riprap similar to what currently exists along the shoreline. The slope of the shoreline would be improved to and maintained at 2:1.

2.3.2 TOTE Marine Vessel LNG Fueling System

2.3.2.1 Upland Construction

Before the start of construction on the upland improvements, the exterior limits of the approved construction ROW would be civil surveyed and clearly staked or marked. Vegetation clearing would not be required for construction of the cryogenic pipeline or pipe rack preceding the LNG loading platform as the TOTE site is fully developed and currently has paved ground surface. This work would occur entirely above elevation 11.8 feet MLLW and above the ordinary high water mark. The cryogenic pipeline would be horizontally drilled or bored underground without trenching or constructed below grade in a concrete trench with a steel grate over the top. Any excess or spoil material would not be stockpiled. These materials would be hauled from the workspace areas and disposed of at approved sites. Following construction, any disturbed surfaces would be restored to preexisting conditions. Groundwater encountered during construction would be placed into a tank and then discharged into a sanitary sewer system or decant facility consistent with applicable regulations.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the Project's NPDES General Construction Stormwater Permit. The NPDES permit guides construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

2.3.2.2 In-water Construction

This section describes the various procedures for construction of the in-water components of the TOTE Marine Vessel LNG Fueling System. Demolition and construction activities to occur below elevation 11.8 feet MLLW (pile removal and installation) in the Blair Waterway would occur during the in-water work window for Commencement Bay. The fueling operations and delivering-vessel berthing facilities would be configured to avoid dredging. In-water construction would consist of the following main phases: demolition and removal of existing in-water structures and construction of proposed in-water and above-water structures. The onshore end of the trestle to the new LNG loading platform would land on an abutment and wing-wall system constructed with land-based equipment and would not require any in-water work.

Demolition of In-water Structures

Demolition would include removal of the creosote-treated timber pile supported catwalk from the existing Aft Loading Ramp Platform to the onshore mooring point and capstan. See Figure 2-17.

The existing creosote-treated timber structure would be demolished by water-born equipment and transported off site. Creosote-treated timber and piling would be disposed of at an appropriate upland facility meeting the liner and leachate standards of the Minimum Functional Standards, Chapter 173-304 WAC. Twenty-four creosote-treated timber pilings would be removed from the Blair Waterway. These piles would be removed with a vibratory hammer. Based on the type of sediment and results from other pile removal projects along the Hylebos and Blair waterways, it is anticipated that the majority of holes would immediately fill themselves upon pile extraction. However, holes remaining from vibratory removal would be filled with clean sand or other habitat mix approved by the WDFW. It is conservatively estimated that 25 percent of the piles to be removed in the Blair Waterway would have some portion of a hole remaining following extraction (up to six holes). It is estimated that the total quantity of clean sand or other habitat mix needed to fill pile holes for the Project in both the Hylebos and Blair waterways would be no more than 360 cubic yards, including up to 20 cubic yards in the Blair Waterway and the balance in the Hylebos Waterway.

It is assumed that up to 10 percent of the existing piles in the Blair Waterway (up to two piles total) would break during extraction with the vibratory hammer. Piles that break would be cut off 2 feet below the mud line and capped with clean sand or other habitat mix approved by the WDFW to an elevation flush with the

existing mud line. Under the assumption that one pile would need to be cut off in the Blair Waterway, this would result in up to 0.2 cubic yard of clean sand added to the waterway to fill the 2-foot hole, which is included in the 20 total cubic yards in the Blair Waterway.

Construction of In-water Structures

Support and fender piles would be installed by a barge-mounted crane (derrick), using a vibratory and hydraulic or diesel impact hammer. Before installation, the piles would be transported to the site and staged on a support barge. Installation of the estimated 56 piles would require approximately 10 to 15 working days. The pile-driving sequence would be as follows: first, vibratory drive the piles to 90 percent plus of their design depth (within 10 feet of design tip elevation); second, proof the installation with an impact hammer until load-bearing or pile-tip elevation specifications are reached. It is anticipated that up to 60 blows per foot may be required for proofing. No temporary piling would be used for construction purposes. Once pile installation is complete, all other pier construction would be above the mean higher-high water elevation. This subsequent construction would include cast-in-place concrete pile caps, installation of concrete decking, and construction of a cast-in-place concrete topping slab, including curbs, and bull rails. Over-water construction equipment would include a barge-mounted crane (derrick), a support barge, a diesel or hydraulic impact hammer, and various small work boats. A tug-boat may also be used to position the barges.

Shoreline Improvements

No fill, excavation, or other alterations to the existing shoreline are proposed.

2.3.3 PSE Natural Gas Distribution System

The PSE Natural Gas Distribution System pipeline segments would be installed under road ROWs consistent with existing utility planning goals established for the various jurisdictions crossed (see Section 3.7.1.3 [Land Use and Zoning Designations]). No existing buildings or structures are present in these areas and the pipeline segments would not cross any un-culverted waterbodies or regulated shoreline areas.

A typical construction zone layout would use the traffic lane that the pipeline is being installed beneath and an adjacent lane or, if appropriate, the shoulder area. Minimizing traffic impacts is a high priority, and public and worker safety are of the utmost importance. Work zones would be minimized and tightly controlled since portions of this route include congested traffic with load transfers to and from the Port of Tacoma. Traffic Control Plans would be developed and approved by the applicable local jurisdictions. Emergency vehicle access would be addressed as a primary component of the Traffic Control Plan. Signs and other warning devices would be in accordance with the Federal Highway Administration's *Manual on Uniform Traffic Control Devices* (FHWA 2009) and the WAC as well as conform to the applicable city's and county's requirements or street use permits.

2.3.3.1 General Pipeline Construction Techniques

The pipeline alignment is based on a number of criteria, chief among which are constructability, existing utilities, and surface/subsurface conditions. Standard trench or horizontal directional drill (HDD) installation would be determined during the pipeline design process. Alignment location and construction methods would be finalized and discussed in detail with the City of Tacoma, City of Fife, Washington State Department of Transportation, and Pierce County Public Works. Details would be approved through the street use permitting process with these jurisdictions.

Clearing and Trenching

Standard trench pipeline construction is expected to occur in one travel lane or road shoulder and would include temporary construction closure of up to two lanes during construction (for a typical cross section for trench pipeline construction, see Figure 2-22). Standard trench depth would be 6 feet, and width nominally 3 feet.

Clearing of vegetation would not be required for construction of the pipeline segments within the developed road ROWs. Trenching, which involves excavating ditches for a pipeline, would occur once the existing road surface has been cut and removed. The trenching would then be accomplished with a trenching machine or backhoe-type equipment. Excavated spoils would be loaded directly onto haul trucks for appropriate disposal. The trench would be backfilled with appropriate pipeline bedding materials. Pipe laydown, stringing, welding, and x-raying of welds would occur within the construction zone adjacent to the trench. Side boom tractors would lift and move the pipeline into the trench. Additional pipeline bedding and lifts of road base material would be compacted until the road surface is reached. At the end of each workday, the open trench would be covered with steel plates to allow for roadway use by the public. If trench dewatering is required during construction, the dewatering would be conducted in a manner that does not cause sediment to leave the site and would not result in exceedances of water quality standards. Groundwater encountered during construction would be placed into a tank and then discharged into a sanitary sewer system or decant facility in coordination with the applicable local jurisdiction.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the Project's NPDES General Construction Stormwater Permit. The NPDES permit would guide construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

Restoration

Construction areas where earth has been moved, equipment has operated, or material was stored would be restored as close to their original profile and condition as practical. Surplus excavated material, debris, or construction material would be removed from the workspace. Any utilities or infrastructure temporarily removed during construction would be permanently repaired, returned to their preconstruction condition, or replaced, and then the surface of roads and streets would be restored.

Hydrostatic Testing and Commissioning

After construction of each pipeline segment and before the new pipeline segments are placed in service, the entire lengths would be hydrostatically tested to ensure structural integrity. Hydrostatic testing would be conducted in accordance with the requirements of pipeline safety regulations in 49 CFR 192 (Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards, Subpart J, "Test Requirements"). PSE would obtain the requisite approvals for use of hydrants and discharge to sanitary sewer systems, before initiation of construction.

2.3.3.2 Special Construction Techniques

Waterbody Crossings

Four streams/drainages are within culverts, where they would be crossed by the proposed pipeline segments within existing road ROWs. Typically, the pipeline would be installed under these existing culverts by using an HDD/bore or open trench with suspension of culvert without disturbing the streams. If the culvert is very deep, then the pipeline could be located over the culvert. Pipeline crossings under the existing culverts would maintain at least 12 inches from the bottom of the culverts to prevent damage during the installation.

Highway Crossings

The section of Pipeline Segment A that would cross under I-5 and Highway 99E may be installed via a single HDD to cross under both highways. The HDD could extend from a point within the 62nd Avenue East ROW for a distance of approximately 0.2 mile (1,000 feet) to the south side of I-5 before ending at the intersection of 62nd Avenue East and 20th Street East. A final HDD plan would be prepared during final design.

Railroad Crossings

Various railroad tracks are present on the Blair-Hylebos peninsula in the Taylor Way ROW. Some of these tracks will be removed and others reconstructed as part of the approach that results in rebuilding of Taylor Way to "heavy haul" standards that has been agreed upon by PSE, the Port of Tacoma, and the City of Tacoma.

Contaminated Soils

Contamination associated with the historical industrial uses in the surrounding area may extend to locations within the construction footprint proposed for distribution Pipeline Segment A on the Blair-Hylebos peninsula. One pipeline construction option is to horizontally drill or bore a portion of this segment to allow more comprehensive management of potential contaminated soils present in the Taylor Way ROW. The use of drilling or boring would preclude the need to expose soils in potentially contaminated areas.

2.3.3.3 New Limit Station and Upgraded Existing Gate Station

Construct New Golden Given Limit Station

The new Golden Given Limit Station would be constructed entirely within one previously developed parcel. No previously undisturbed area would be developed, and no additional construction workspace would be required outside of this parcel. The existing building and pavement would be removed as needed for construction of the proposed improvements. The specific improvements and components of the limit station would then be completed, including some trenching for underground piping. Two small buildings would be constructed to mitigate potential noise associated with the proposed equipment.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMP controls would be inspected and maintained until the end of construction.

Upgrade Existing Fredrickson Gate Station

The upgrades to the existing Fredrickson Gate Station would occur entirely within the existing developed footprint on Parcel 0318011007. The existing gate station components would be modified as needed and new components would then be completed including some trenching for underground piping.

Before construction, BMPs would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMP controls would be inspected and maintained until the end of construction.

2.4 Operations

2.4.1 Tacoma LNG Facility

PSE will be responsible for staffing and operating the facility. PSE has extensive experience and capabilities in operating large energy infrastructure. In addition to its extensive natural gas and electric distribution systems, PSE also operates an LNG facility in Gig Harbor, Washington, a large underground storage facility in Chehalis, Washington, nine natural gas fired power plants, three wind farms, and two hydroelectric facilities. In total, PSE is responsible for over $10.5 billion of assets that are either directly or indirectly related to operating energy infrastructure.

PSE took delivery of its mobile LNG tanker and vaporizer in 2000 and has been operating the Gig Harbor LNG facility since 2004. LNG customers and the surrounding community will benefit from PSE's impeccable history of safe and efficient operations.

Further, the Tacoma LNG Project will be operated by trained and qualified staff 24 hours per day, seven days per week. Operation of the facilities will comply with prescriptive federal and state regulations for LNG facilities. Worker and public safety are paramount in the operation of the Tacoma LNG facilities. Training of staff and requalification will continue during the lifetime operation of these facilities.

2.4.2 Natural Gas Pipeline

PSE will also be responsible for operating the dedicated natural gas pipeline from the Fredrickson Gate Station to the LNG facility. Natural gas flow and pipeline pressure would be monitored by PSE through its standard operational procedures.

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

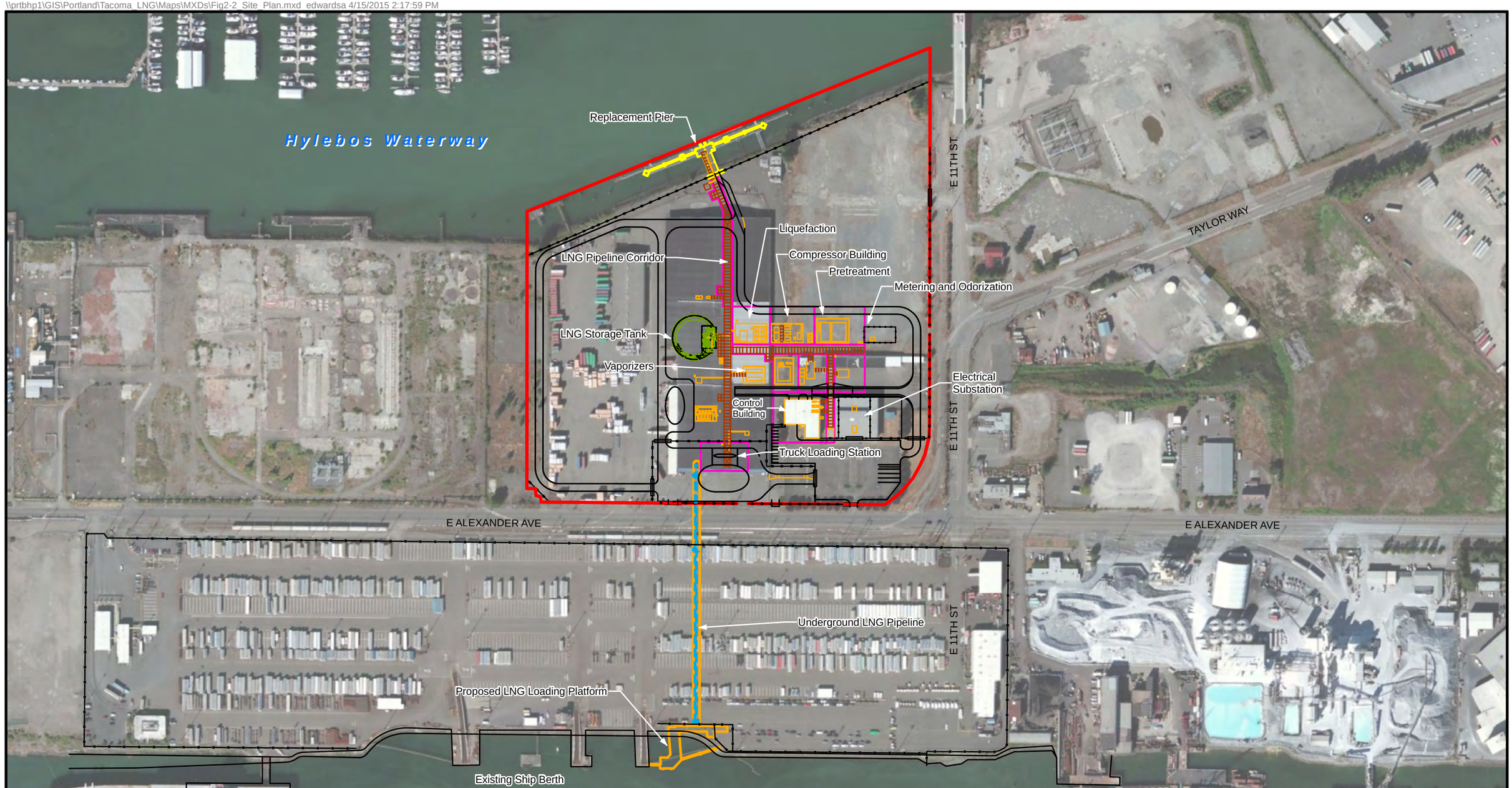
- Proposed New Pipeline
- Proposed Tacoma LNG Facility Site
- Proposed TOTE Marine Vessel LNG Fueling System Site
- Proposed Loading Platform
- Proposed Pier
- City Limit Boundary
- Parcel Boundary

0 350 700 Feet

City of Tacoma

Figure 2-1
Existing Conditions at Proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System Sites
Tacoma LNG Project

\\prtbhp1\GIS\Portland\Tacoma_LNG\Maps\MXDs\Fig2-2_Site_Plan.mxd edwardsa 4/15/2015 2:17:59 PM



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

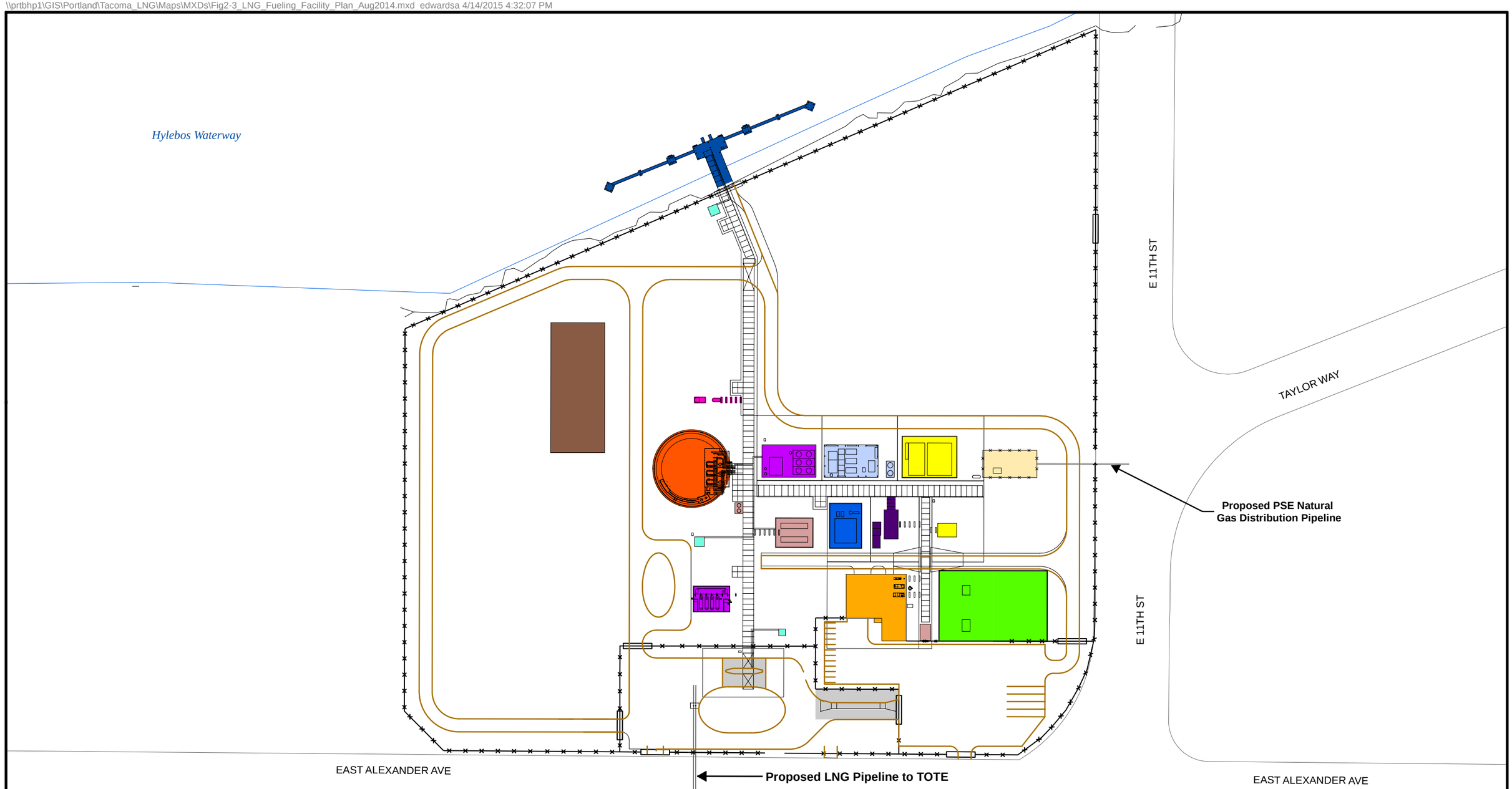
- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Pipeline - TOTE
- LNG Tank
- Racks
- Equipment
- Fence

0 300 Feet

City of Tacoma

Figure 2-2
Tacoma LNG
Facility Site Plan

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Metering and Odorization
- Pretreatment
- Compressor Building
- Liquefaction
- LNG Storage Tank
- In-Water Components
- Truck Loading Station
- Vaporization
- Sumps
- Enclosed Ground Flare System
- Facility Cooling Water System
- Power Distribution Center
- Electrical Substation
- Control Building
- Storage Building
- Equipment
- Roads
- Fence
- Hylebos Waterway
- Pipe Rack

N W E S

0 200 Feet

City of Tacoma

Figure 2-3
Tacoma LNG Facility Layout

Tacoma LNG Project

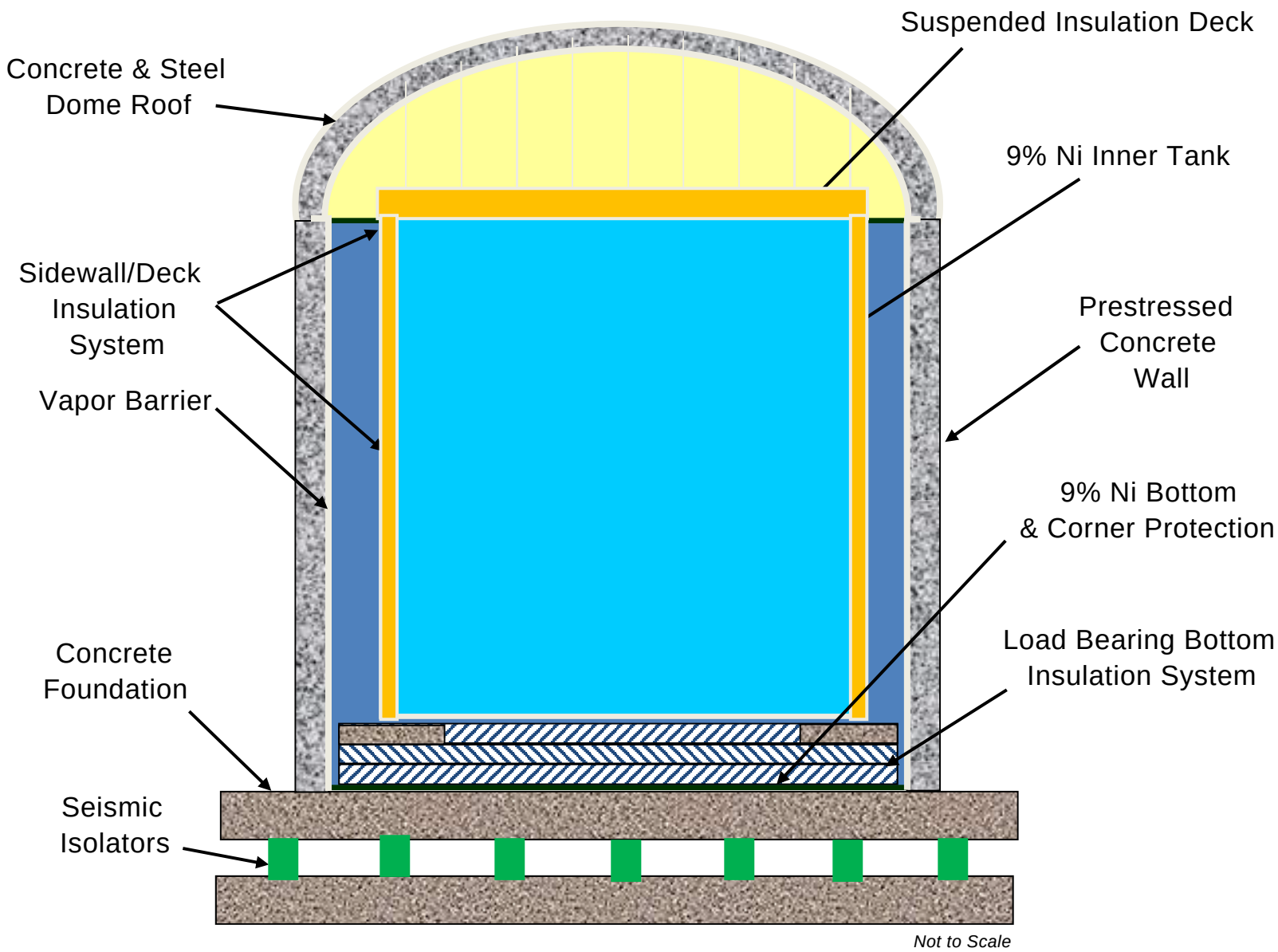
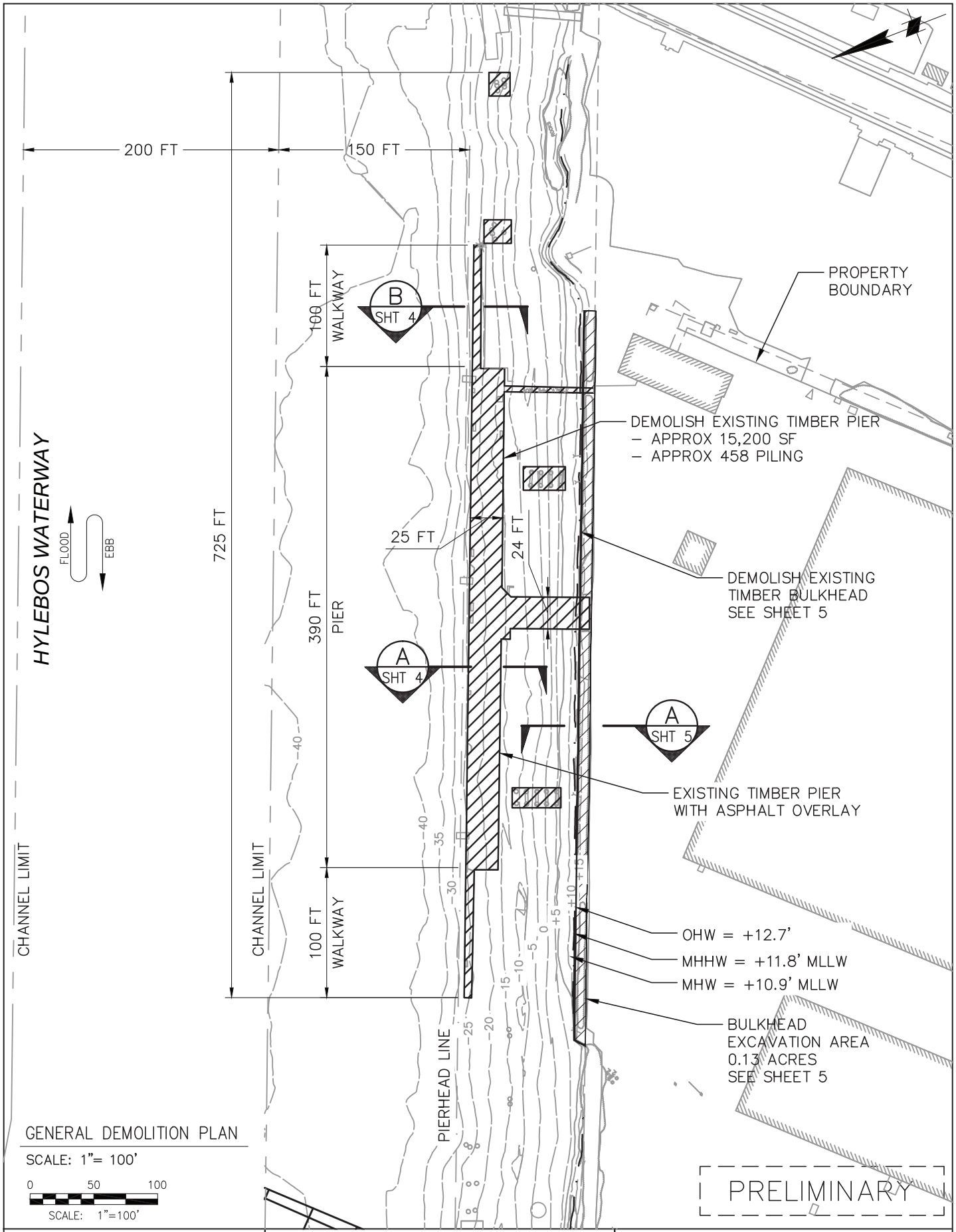


Figure 2-4
Full Containment (Concrete Roof) LNG Tank
Tacoma LNG Project



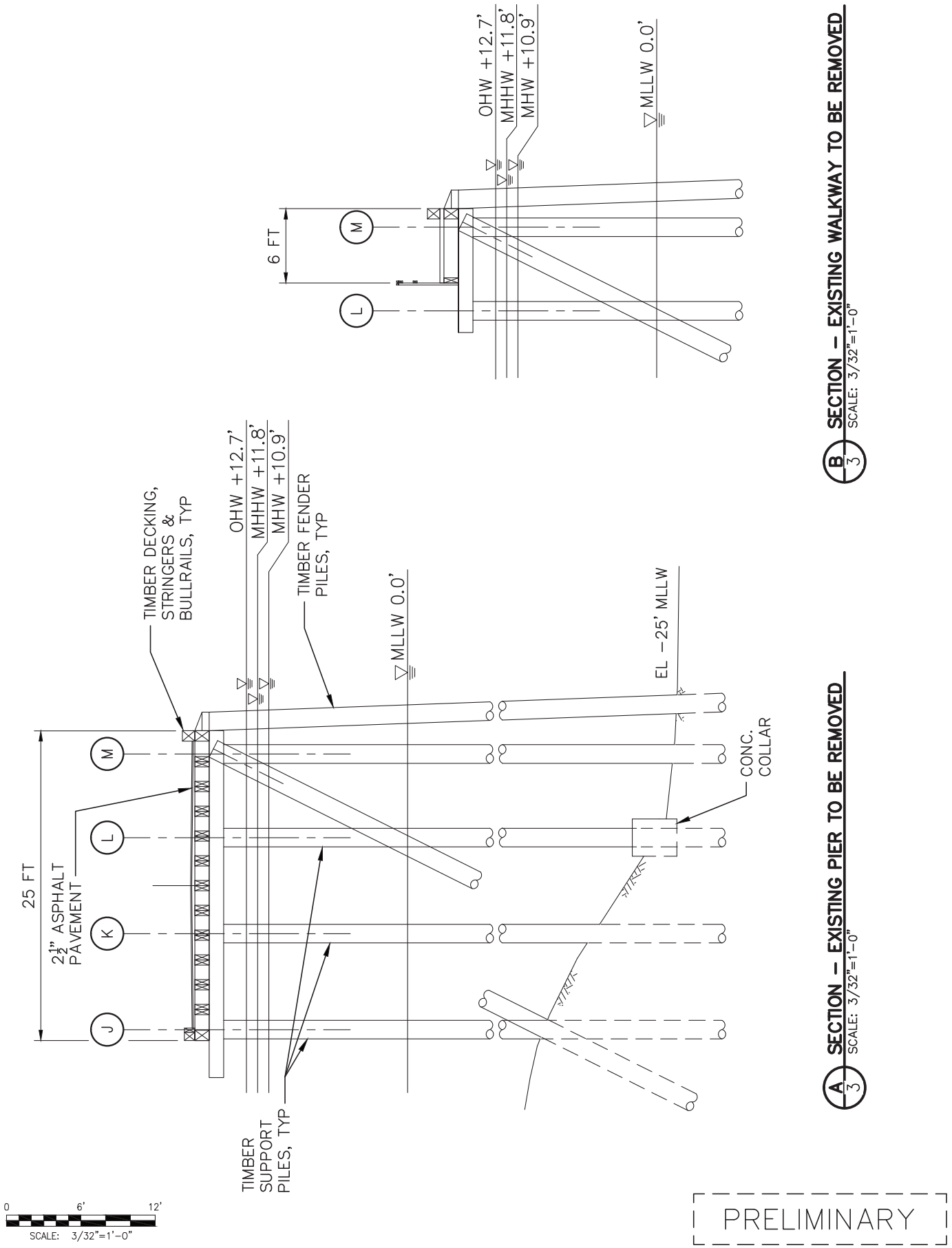
File: P:\7940 PSE LNG Barge\500 CADD_Active_Hylebos Permit Set\7940_PSE LNG – Hylebos Permit Figures; Plotted: 1/6/2015 7:03 AM

PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-5
Existing Pier Plan at Tacoma LNG Facility Site
Tacoma LNG Project



PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY

IN: PORT OF TACOMA DATUM: MLLW = 0.0'
SEC: 35 T: 21 N R: 3 E
COUNTY: PIERCE STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-6
Existing Pier Elevation at Tacoma LNG Facility Site
Tacoma LNG Project

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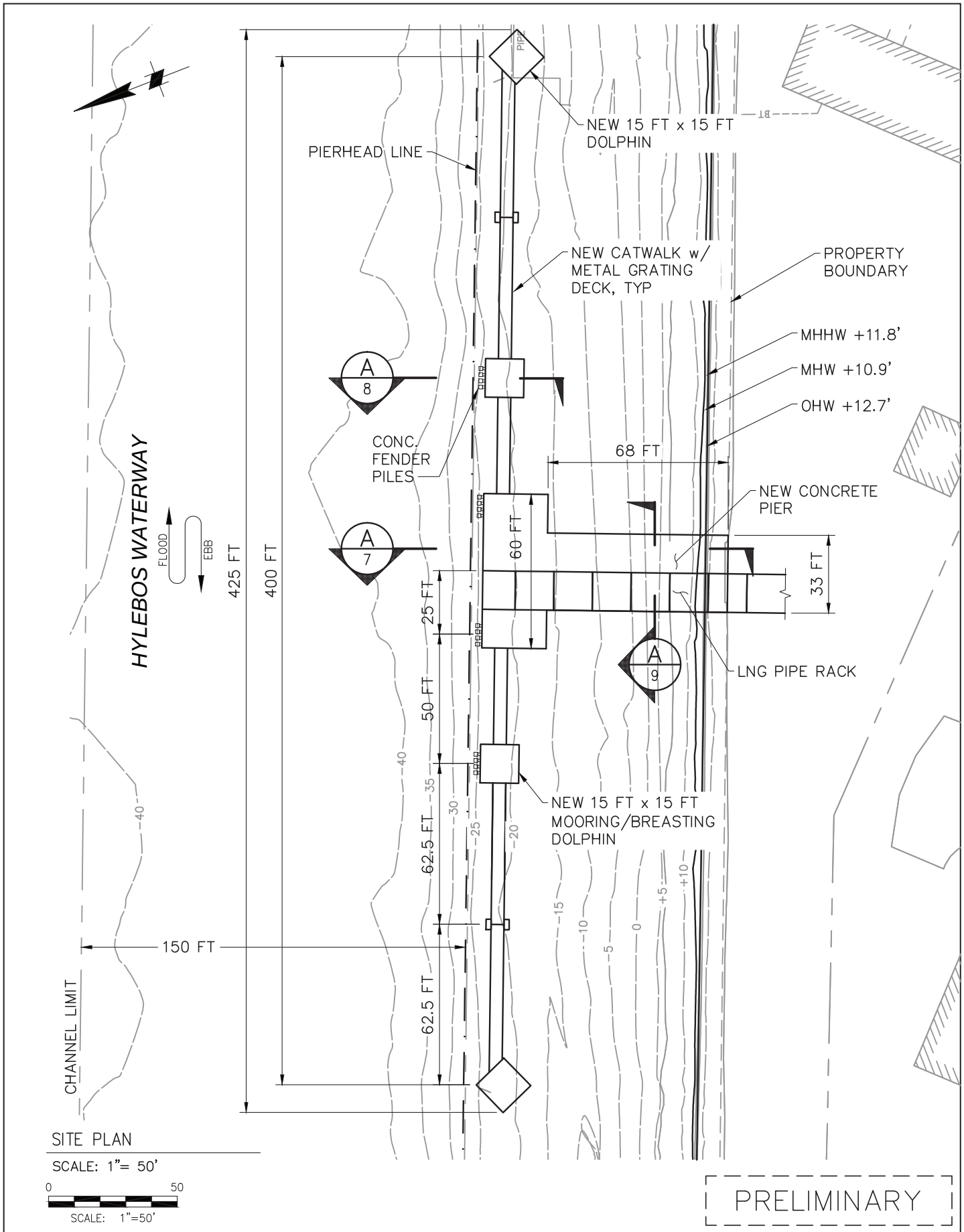

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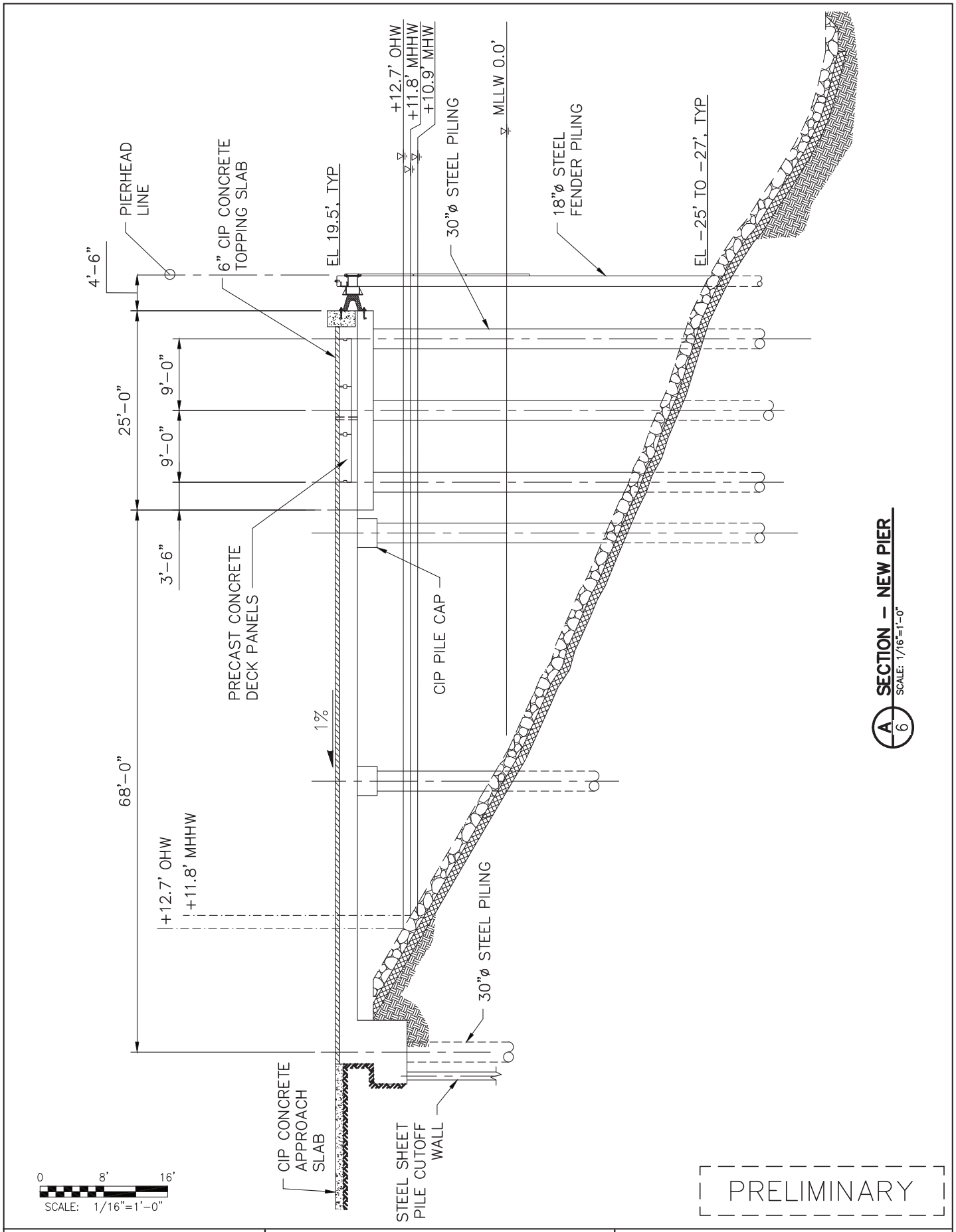
PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-7
Proposed Pier and Dolphins Plan at Tacoma LNG Facility Site
Tacoma LNG Project



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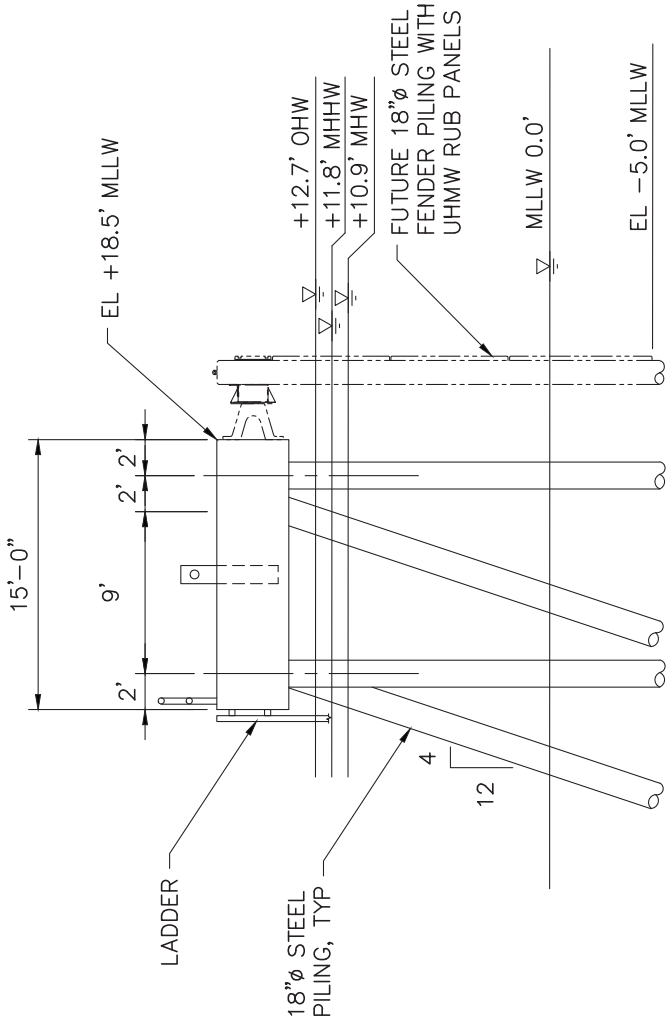
PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-8
Proposed Pier and Dolphins Elevation at Tacoma LNG Facility Site—1 of 3
Tacoma LNG Project



A/6 **ELEVATION – MOORING/BREASTING DOLPHIN**
SCALE: 3/32"=1'-0"

0 6' 12'
SCALE: 3/32"=1'-0"

PRELIMINARY

PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY
IN: PORT OF TACOMA DATUM: MLLW = 0.0'
SEC: 35 T: 21 N R: 3 E
COUNTY: PIERCE STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-9
Proposed Pier and Dolphins Elevation at Tacoma LNG Facility Site—2 of 3
Tacoma LNG Project

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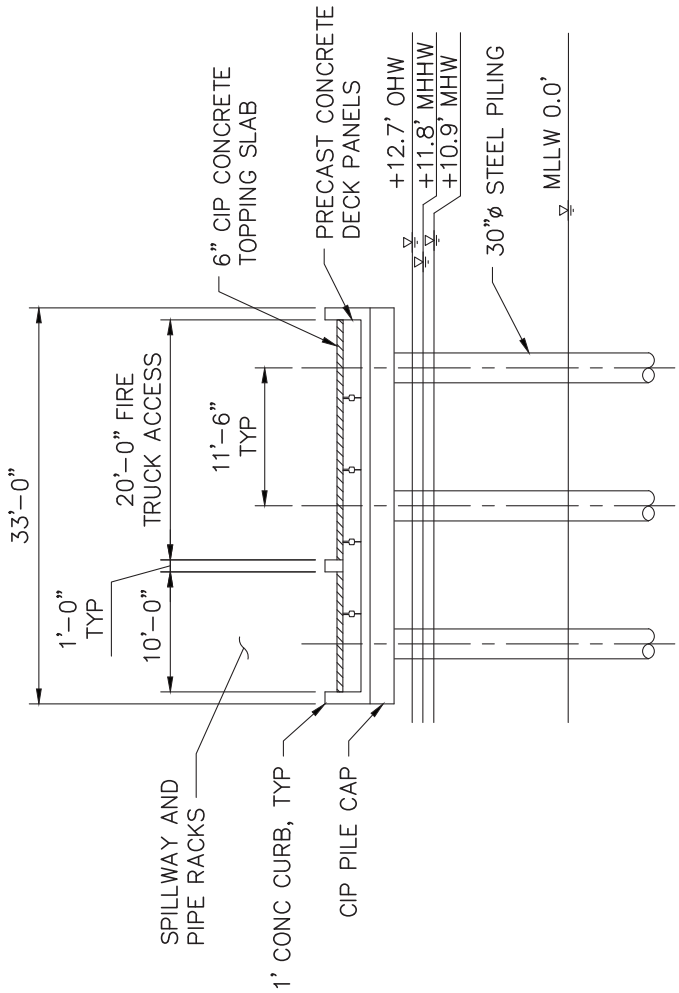

A/6 ELEVATION – ACCESS TRESTLE
SCALE: 1/16"=1'–0"

0 8' 16'
SCALE: 1/16"=1'–0"

PRELIMINARY

PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY
IN: PORT OF TACOMA DATUM: MLLW = 0.0'
SEC: 35 T: 21 N R: 3 E
COUNTY: PIERCE STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-10
Proposed Pier and Dolphins Elevation at Tacoma LNG Facility Site—3 of 3
Tacoma LNG Project

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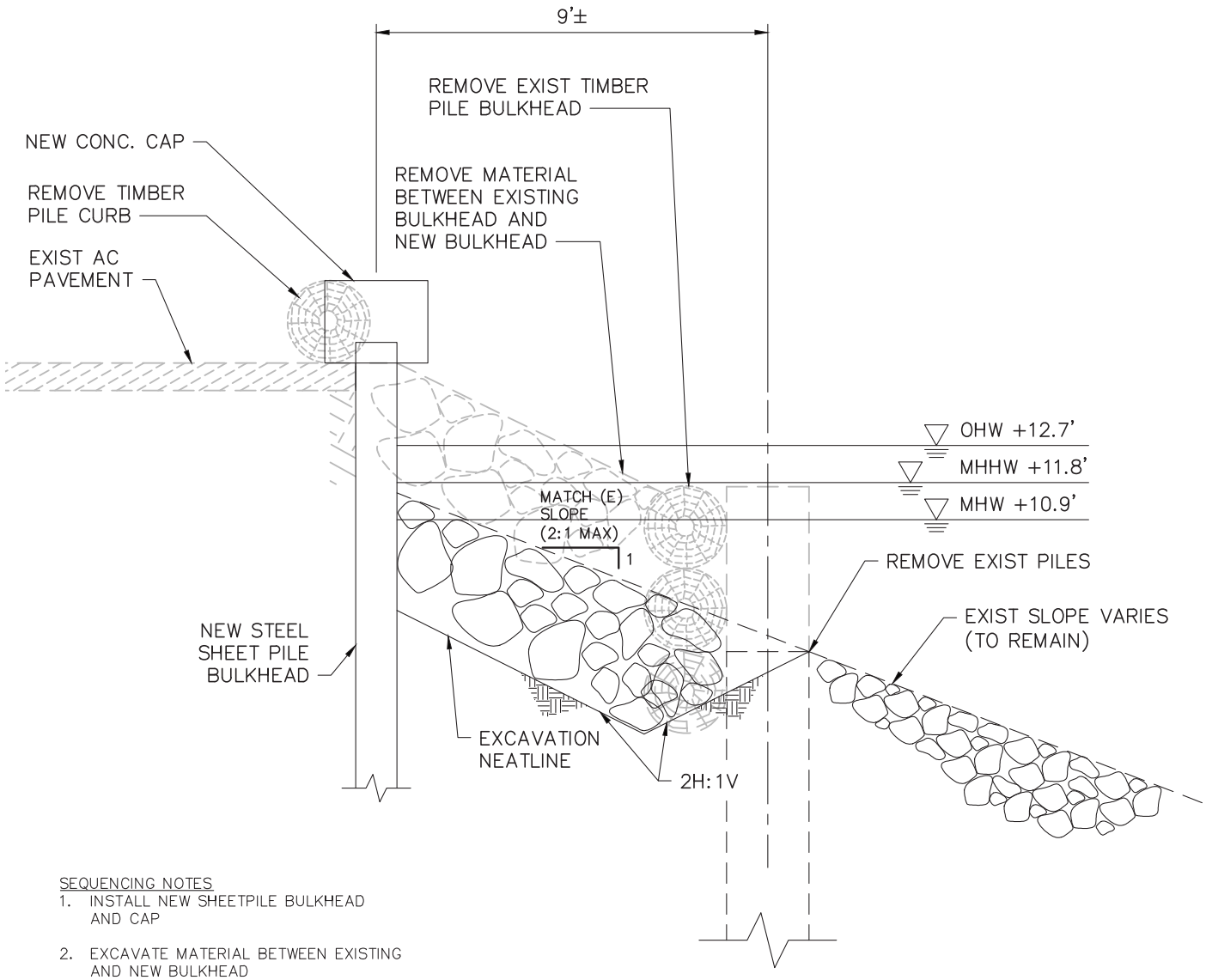

SEQUENCING NOTES

1. INSTALL NEW SHEETPILE BULKHEAD AND CAP
2. EXCAVATE MATERIAL BETWEEN EXISTING AND NEW BULKHEAD
3. PLACE BACKFILL BEHIND EXISTING BULKHEAD
4. REMOVE EXISTING TIMBER BULKHEAD

A/3 **SECTION – TIMBER BULKHEAD DEMOLITION & SLOPE RECONSTRUCTION**
SCALE: 1/4"=1'-0"

0 2' 4'
SCALE: 1/4"=1'-0"

PRELIMINARY

PROPOSED: REPLACEMENT OF TIMBER PIER & BULKHEAD IN HYLEBOS WATERWAY
IN: PORT OF TACOMA DATUM: MLLW = 0.0'
SEC: 35 T: 21 N R: 3 E
COUNTY: PIERCE STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-11
Existing Shoreline Elevation at Tacoma LNG Facility Site
Tacoma LNG Project

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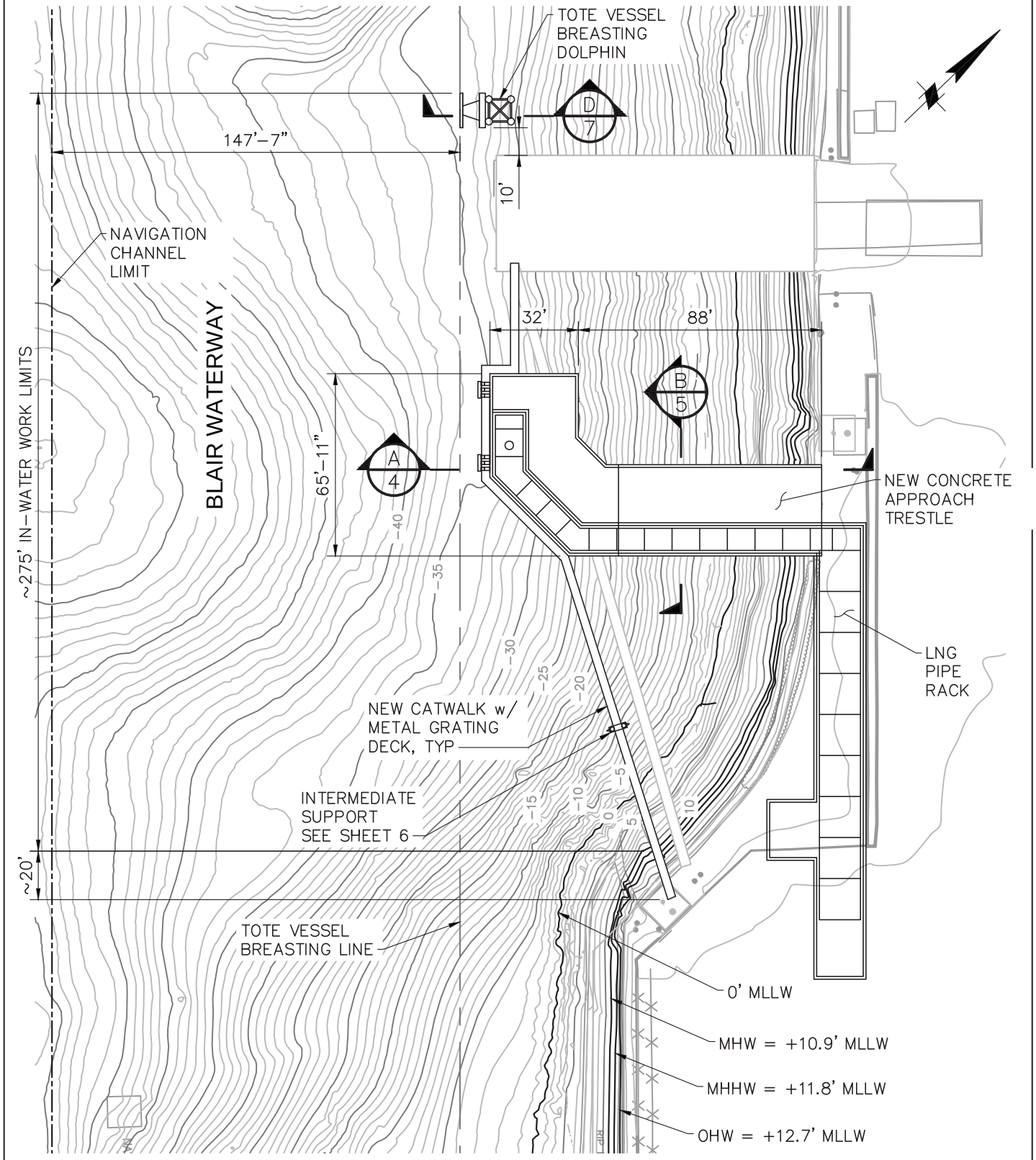


SITE PLAN – PROPOSED CONSTRUCTION

SCALE: 1"= 50'

25' 0 25' 50'

SCALE: 1" = 50'

PRELIMINARY

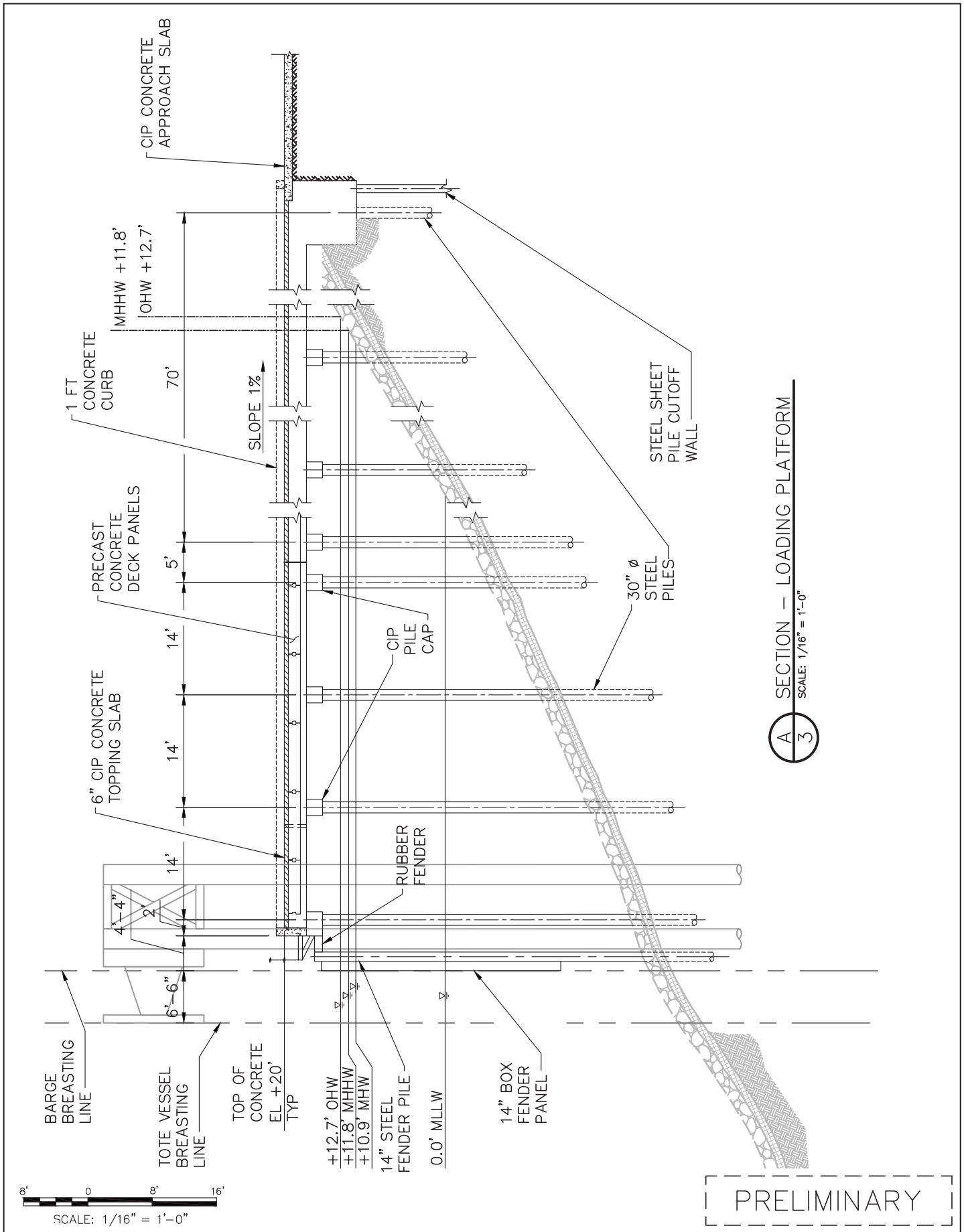
PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-12
Proposed Pier and Dolphins Plan at TOTE Marine Vessel LNG Fueling System Site
Tacoma LNG Project

File: P:\7940 PSE LNG Barge\500 CADD_Active_Blair Permit Set\7940_PSE LNG – Blair Permit Figures; Plotted: 1/6/2015 6:46 AM



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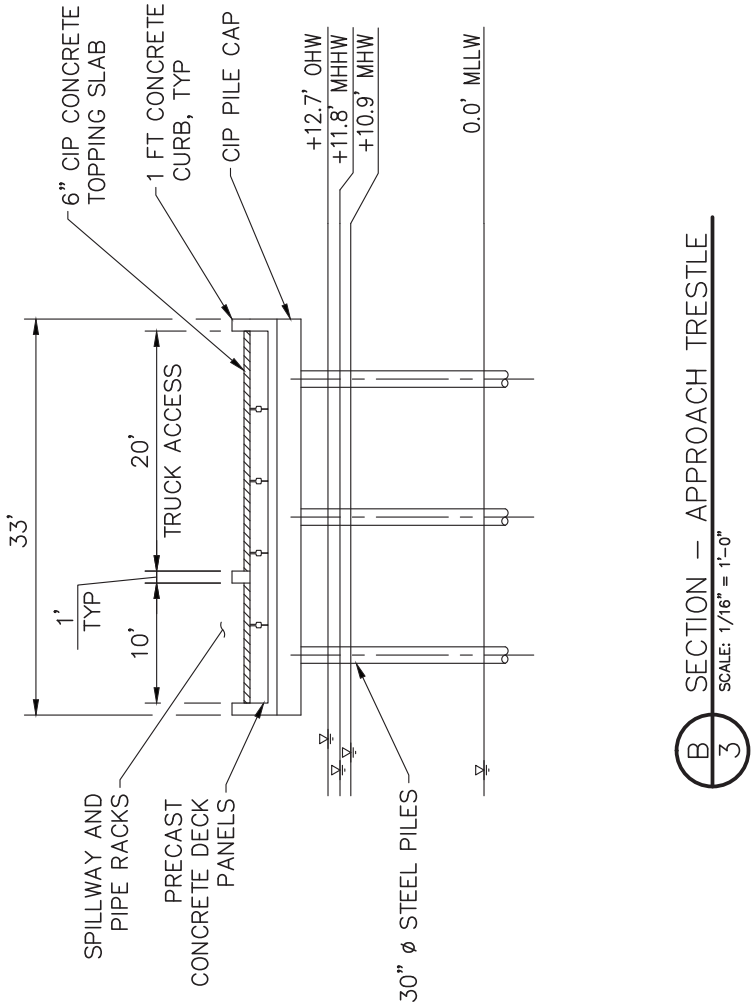
PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-13
Proposed Pier Elevation at TOTE Marine Vessel LNG Fueling System Site—1 of 2
Tacoma LNG Project



3' 0 8' 16'

SCALE: 1/16" = 1'-0"

PRELIMINARY

PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-14
Proposed Pier Elevation at TOTE Marine Vessel LNG Fueling System Site—2 of 2
Tacoma LNG Project

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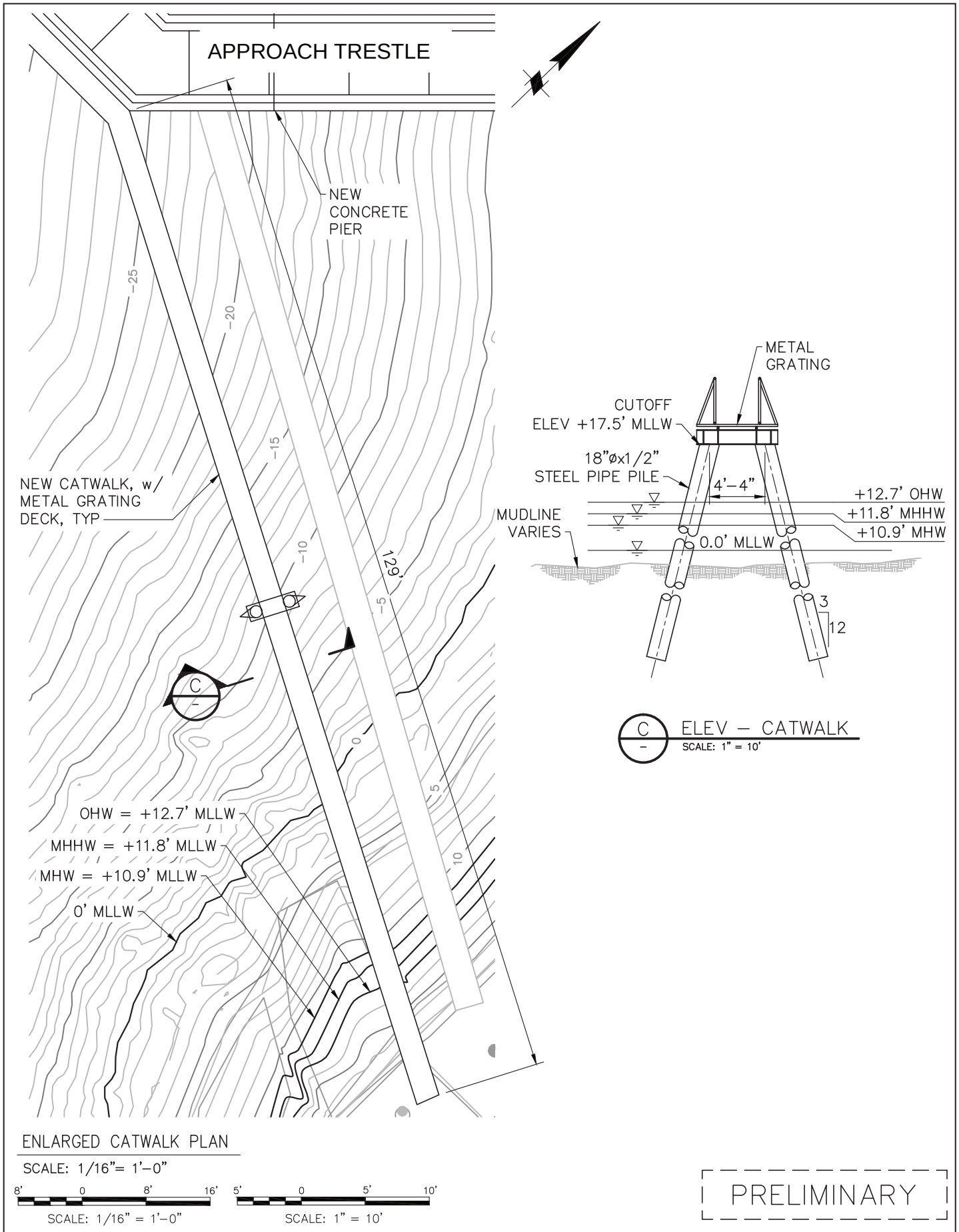

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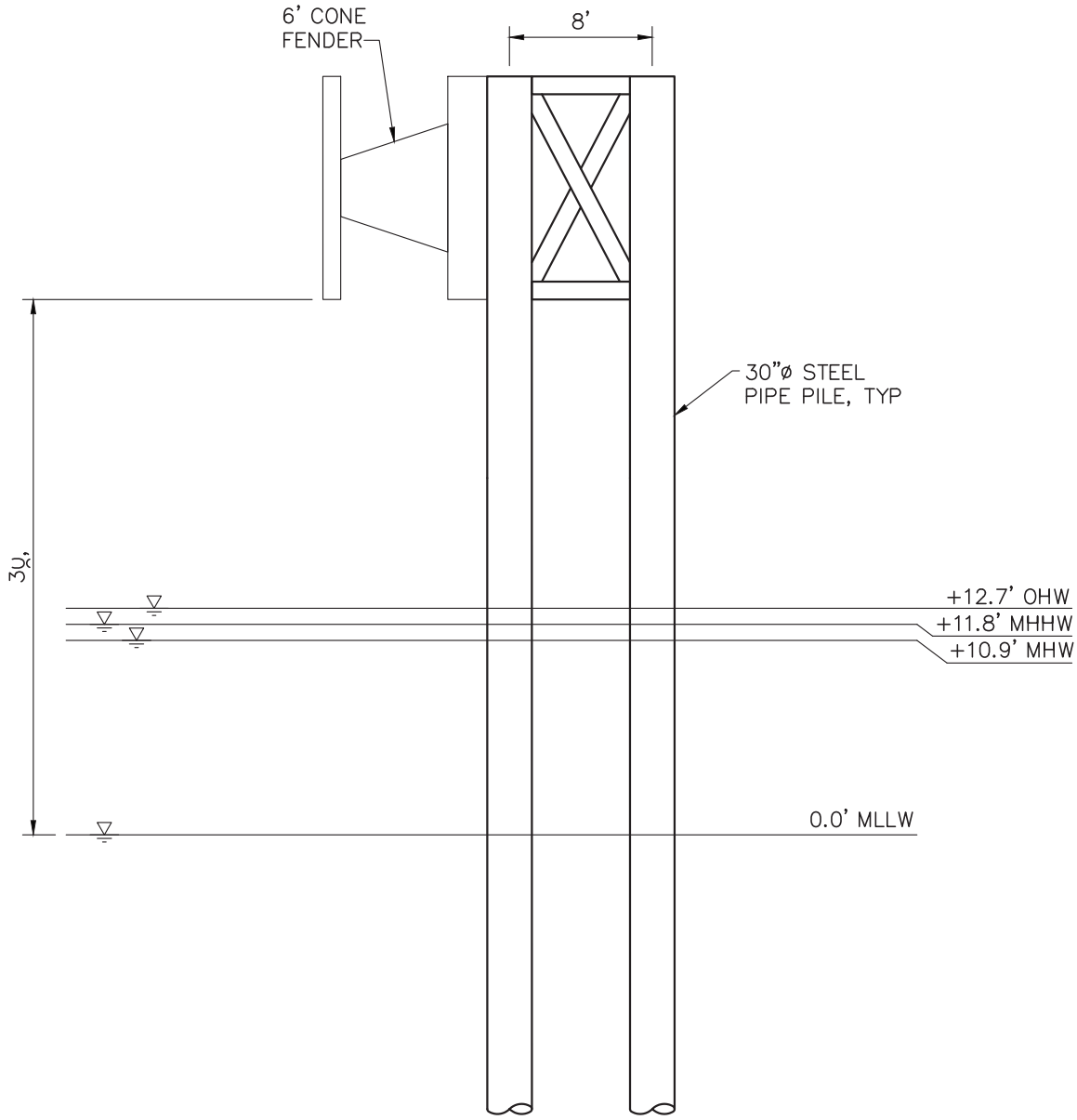
PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-15
Proposed Catwalk Plan and Elevation at TOTE Marine Vessel LNG Fueling System Site
Tacoma LNG Project



D/3 ELEV – TOTE VESSEL BREASTING DOLPHIN
SCALE: 1" = 10'

5' 0 5' 10'
SCALE: 1" = 10'

PRELIMINARY

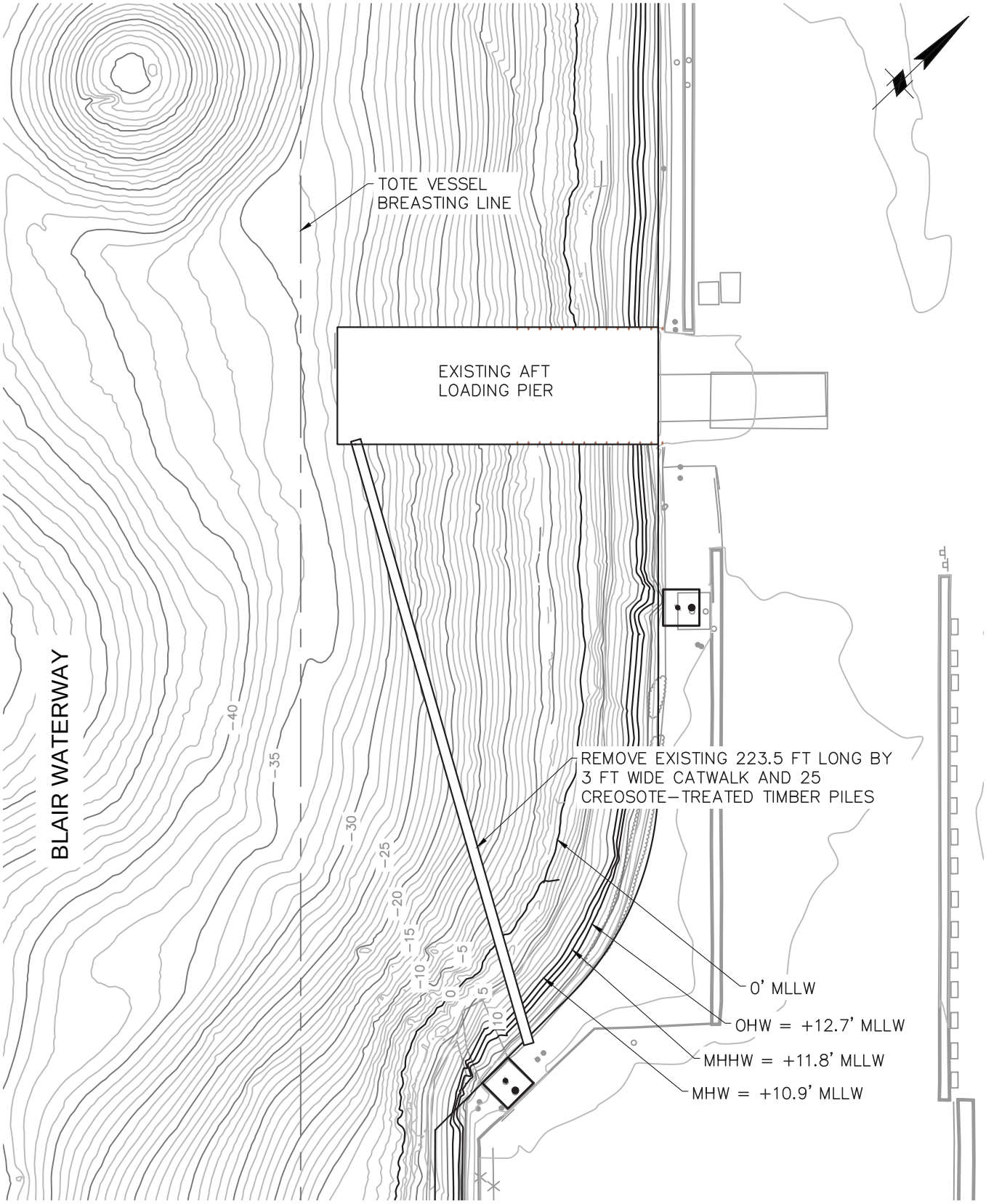
PROPOSED: BLAIR WATERWAY LOADING PLATFORM

IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-16
Proposed Breasting Dolphin Elevation at TOTE Marine Vessel LNG Fueling System Site
Tacoma LNG Project

File: P:\7940 PSE LNG Barge\500 CADD_Active_Blair Permit Set\7940_PSE LNG – Blair Permit Figures; Plotted: 1/6/2015 6:47 AM



SITE PLAN – EXISTING CONDITIONS & REMOVAL PLAN

SCALE: 1"= 50'

25' 0 25' 50'

SCALE: 1" = 50'

PRELIMINARY

PROPOSED: BLAIR WATERWAY LOADING PLATFORM

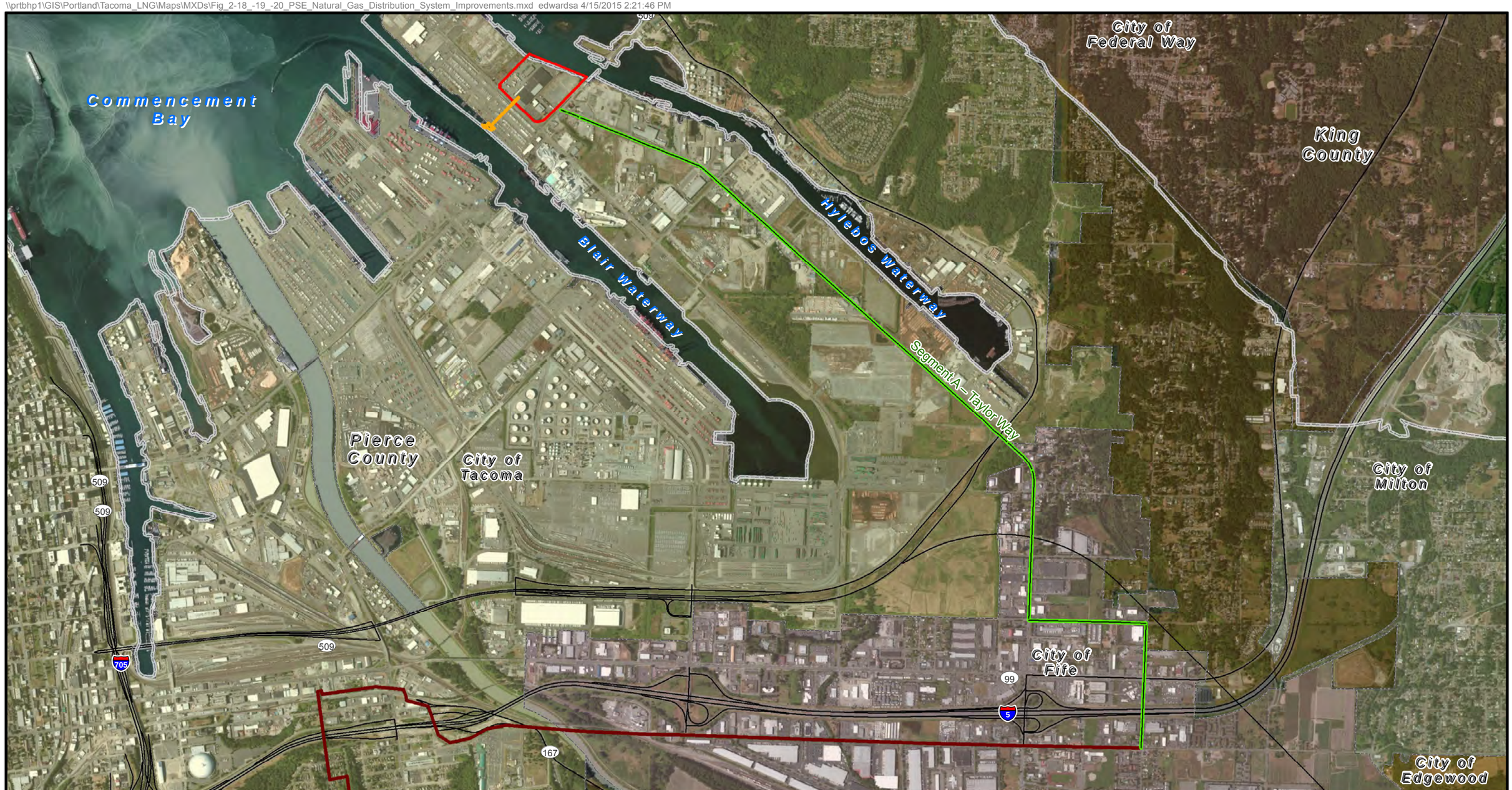
IN: PORT OF TACOMA
SEC: 35 T: 21 N
COUNTY: PIERCE

DATUM: MLLW = 0.0'
R: 3 E
STATE: WA
DATE: DECEMBER 24, 2014

Figure 2-17
Proposed Removal of Existing Catwalk at TOTE Marine Vessel LNG Fueling System Site
Tacoma LNG Project

File: P:\7940 PSE LNG Barge\500 CADD_Active_Blair Permit Set\7940_PSE LNG - Blair Permit Figures; Plotted: 1/6/2015 6:45 AM

\\prtbhp1\GIS\Portland\Tacoma_LNG\Maps\MXDs\Fig_2-18_-19_-20_PSE_Natural_Gas_Distribution_System_Improvements.mxd edwardsa 4/15/2015 2:21:46 PM



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- TOTE Marine Vessel LNG Fueling System
- Frederickson Gate Station
- Golden Given Limit Station
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

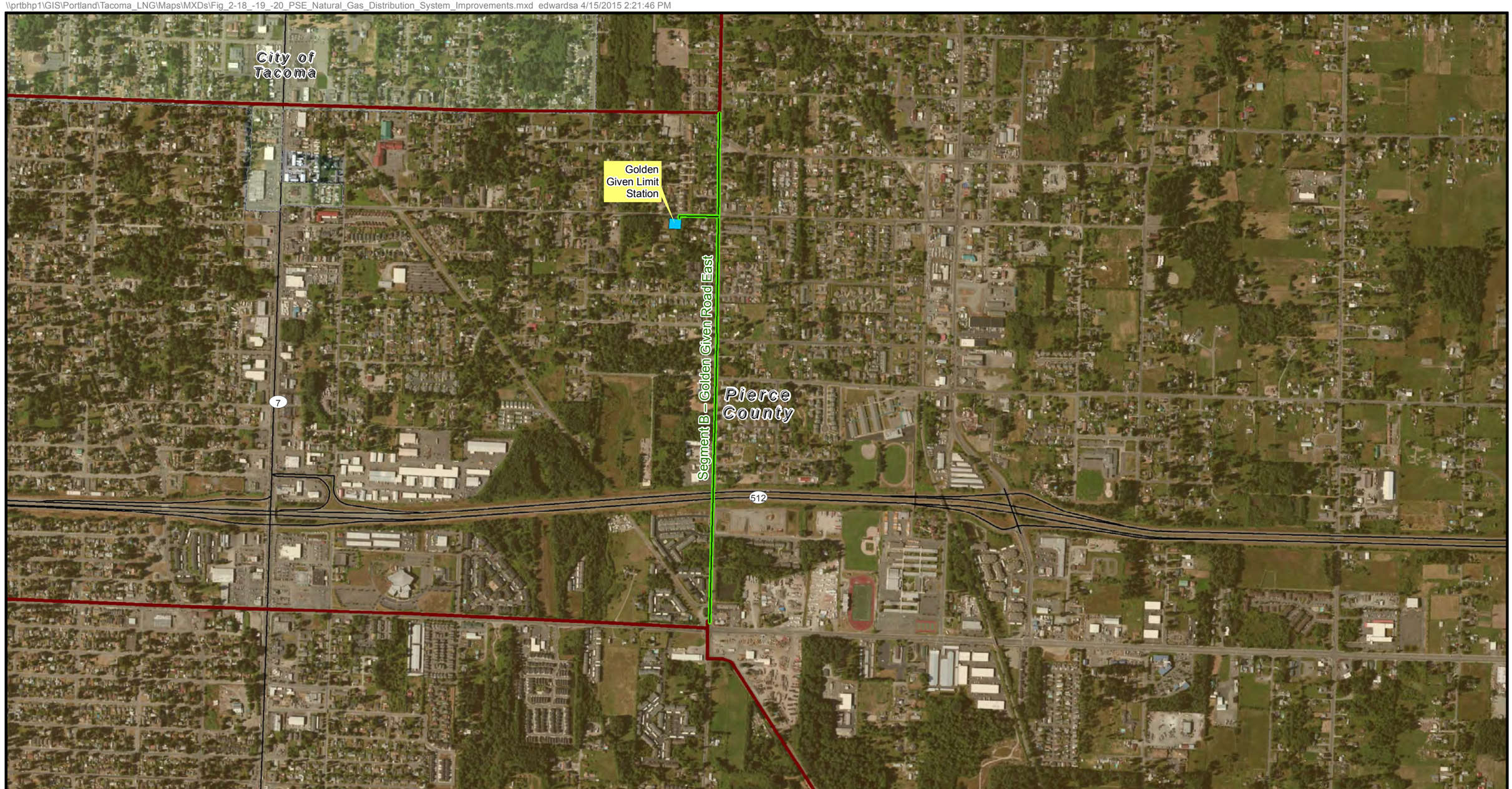
N W E S

0 1,500 Feet

City of Tacoma

Figure 2-18
PSE Natural Gas Distribution System Improvements: Pipeline Segment A

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- TOTE Marine Vessel LNG Fueling System
- Frederickson Gate Station
- Golden Given Limit Station
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

N W E S

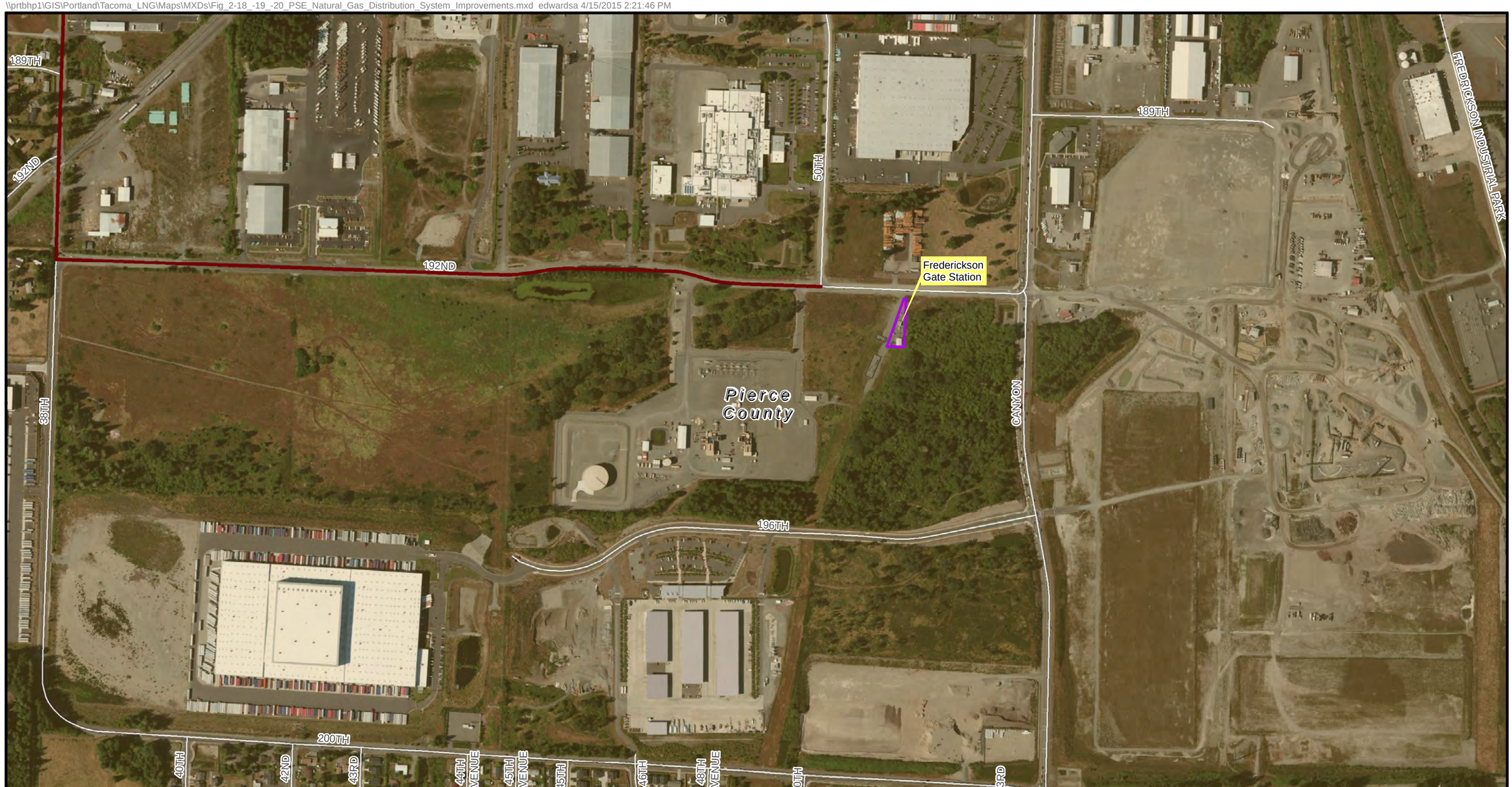
0 1,200 Feet

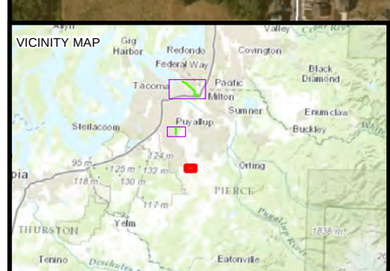
Tacoma

City of Tacoma

Figure 2-19
PSE Natural Gas Distribution System Improvements: Pipeline Segment B

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- TOTE Marine Vessel LNG Fueling System
- Frederickson Gate Station
- Golden Given Limit Station
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

N W E S

0 610 Feet

City of Tacoma

Figure 2-20
PSE Natural Gas Distribution System Improvements: Frederickson Gate Station

Tacoma LNG Project

Proposed
Control
Building

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed New Pipeline
- Proposed Tacoma LNG Facility Site Boundary
- City Limit Boundary
- Structures to be Demolished

0 100 200 Feet

City of Tacoma

Figure 2-21
Tacoma LNG Facility
Demolition Plan

Tacoma LNG Project

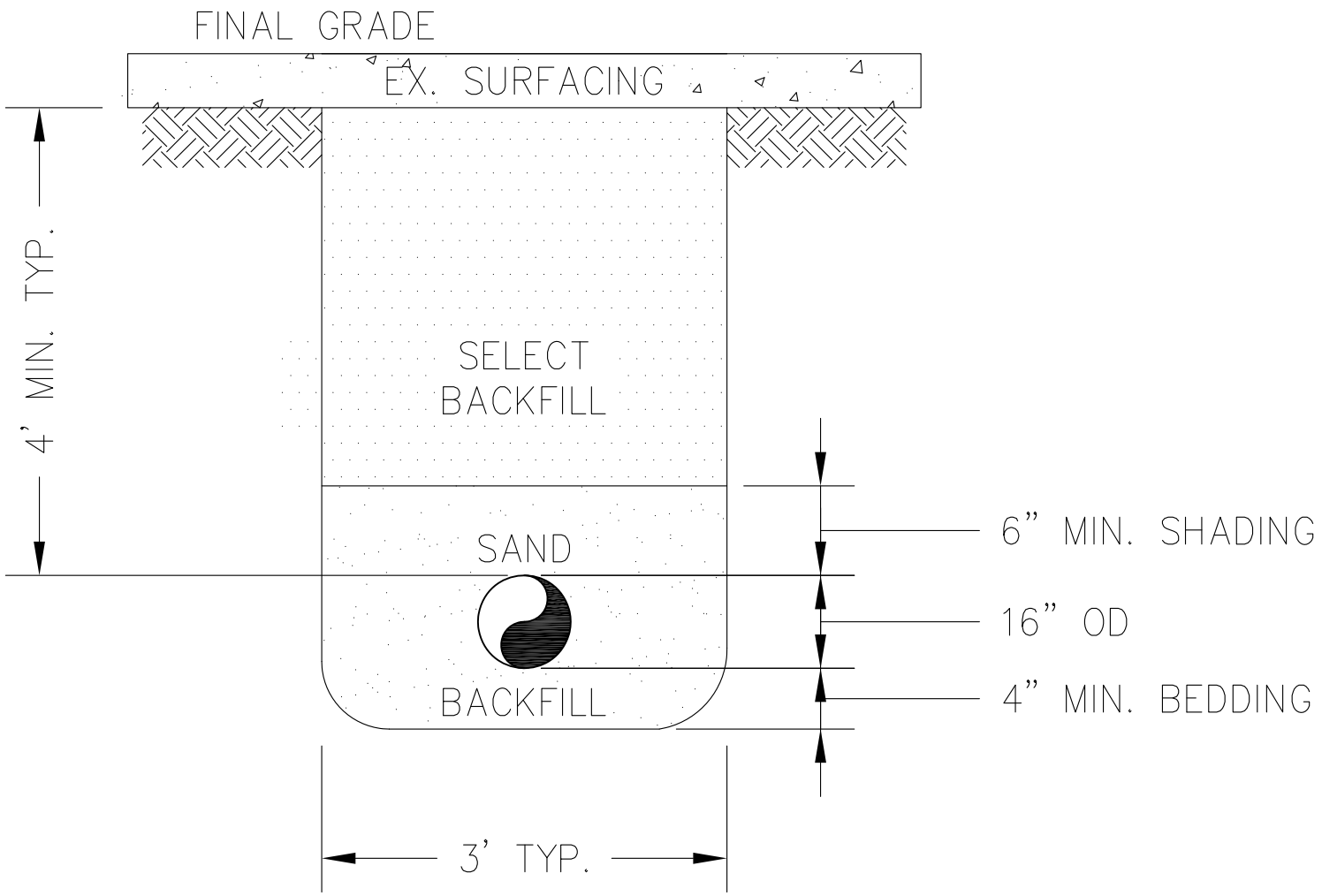


Figure 2-22
Typical Cross Section for Trench Pipeline Construction
Tacoma LNG Project

3 Affected Environment, Environmental Consequences, and Mitigation

3.1 Earth

This section describes the existing geologic, groundwater, and environmental contamination conditions in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on these conditions that could result from construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). Where appropriate, mitigation measures are identified to reduce or avoid these potential impacts.

3.1.1 Study Methodology

The methodology for the earth analysis consisted of a review of the Proposed Action site conditions as documented in geotechnical borehole logs and subsurface investigation reports, including the geotechnical report titled *Geotechnical Engineering Services, Tacoma LNG Project* (GeoEngineers 2015); published sensitive area and surficial geologic maps; United States Geological Survey maps; the *Coastal Zone Atlas of Washington* (Ecology 1979); Washington State Department of Natural Resources Division of Geology data; City of Tacoma and Pierce County critical areas ordinance maps; Pierce County Soil Survey information; and Project-specific planning and technical reports.

Existing information on site conditions and the status of existing contaminated site remedial actions in the vicinity of the Proposed Action, including the *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* (Port of Tacoma 2009) and the *Fourth Five-Year Review Report for Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington* (EPA 2014), were also reviewed as part of the evaluation presented in this section. Information on contamination and the status of remedial actions within the Proposed Action area was supplemented by initial discussions with the Port of Tacoma (Port), U.S. Environmental Protection Agency (EPA), and Washington Department of Ecology (Ecology), as well as an environmental site assessment conducted for the Project as documented in the data summary memorandum titled *Soil and Groundwater Data Summary – Limited Environmental Site Assessment, PSE Tacoma LNG Project* (GeoEngineers 2014), provided in Appendix C.

3.1.2 Regulatory Framework

This discussion of the regulatory framework is divided between: (1) geology and geologic hazards, and (2) environmental contamination and remediation.

3.1.2.1 Geology and Geologic Hazards

Federal regulations stated in 49 *Code of Federal Regulations* (CFR) 193, via their adoption of National Fire Protection Association*59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)* (as adopted by 49 CFR 193), establish requirements for seismic protection design of LNG facilities (NFPA 2013). Additionally, local jurisdictions' adoption of critical areas ordinances also establishes regulatory requirements regarding structures in and near geologic hazard areas. Within the Project area, these local entities are the City of Tacoma, the City of Fife, and Pierce County. The specific regulatory codes for these jurisdictions are listed below:

- City of Tacoma: Title 13, Land Use Regulatory Code, of the City of Tacoma Municipal Code (revised November 2014); Section 13.11.700, Geologically Hazardous Areas;
- City of Fife: Title 17, Environmental Protection of the Fife Municipal Code; Section 17.11, Geologically Hazardous Areas; and

- Pierce County: Title 18E, Development Regulations, Critical Areas of the County Code; Sections 18E.60 Volcanic Hazard Areas, 18E.80 Landslide Hazard Areas, 18E.90 Seismic (Earthquake) Hazard Areas, 18E.100 Mine Hazard Areas, and 18E.110 Erosion Hazard Areas

Geologic hazards within the proposed Project elements were evaluated with respect to the strictest criteria, found in federal regulation 49 CFR part 193 and in the critical areas provisions identified above.

3.1.2.2 Environmental Contamination and Remediation

The investigation, characterization, and cleanup of identified hazardous media (groundwater, subsurface soil, or sediment) are activities regulated by federal, state, and local regulatory programs. The principal regulatory programs applicable to the Project are summarized below.

Comprehensive Environmental Response, Compensation, and Liability Act

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly referred to as Superfund, is a federal law administered by EPA governing the cleanup of hazardous substance contaminated sites. CERCLA enabled modifications to the National Contingency Plan to include guidelines and procedures for responding to releases of hazardous substances, and to establish a National Priority List (NPL). The NPL is a management tool used by EPA to prioritize sites with known or threatened releases of hazardous substances, pollutants, or contaminants. Ongoing CERCLA remedial actions, and remedial action effectiveness monitoring, are being conducted under the direction of EPA within the Commencement Bay Nearshore/Tideflats, including the Hylebos Waterway (EPA 2011).

Model Toxics Control Act

The Model Toxics Control Act (MTCA) (*Revised Code of Washington* [RCW] Chapter 70.105D) is the Washington State cleanup law that funds and regulates the cleanup of sites contaminated with hazardous waste through a tax on the sale of hazardous substances (Ecology 2013). Ecology implements cleanup actions as dictated by the MTCA regulations (MTCA Cleanup Regulation, Chapter 173-340 Washington Administrative Code). The MTCA is intended to be a streamlined cleanup program with strict cleanup standards to protect human health and the environment, but provide greater flexibility for site-specific cleanup compared to federal programs (Ecology 2013). Sites requiring further action following an initial investigation by Ecology are added to either the Integrated Site Information System database or the Leaking Underground Storage Tank database and are tracked through cleanup completion. Sites not cleaned up voluntarily are added to the Hazardous Sites List, and Ecology strives to work cooperatively with potentially liable persons to achieve prompt and effective cleanup (Ecology 2013). Ecology may use formal agreements (consent decrees or agreed orders) or allow potentially liable persons to clean up their sites independently through a Voluntary Cleanup Program. While the Voluntary Cleanup Program is conducted without oversight from Ecology, Ecology can request review of cleanup completion reports to obtain a letter of "No Further Action." If cleanup actions are necessary, they ideally would be conducted before or during development of the Proposed Action and in accordance with MTCA regulations. In the event that cleanup actions extend to locations within the footprint of the Proposed Action, Puget Sound Energy (PSE) and the Port will work with the regulatory agencies to ensure continued coordination between development and cleanup actions.

Tacoma-Pierce County Health Department Underground Storage Tank Removal

The Tacoma-Pierce County Health Department (TPCHD) administers the underground storage tank (UST) removal program for properties within Pierce County under Chapter 4 of the Environmental Health Code, Underground Storage Tanks, Board of Health Resolution 2010-4225. Before removal of a UST, a UST Decommissioning Permit must be obtained from TPCHD (TPCHD 2014). If the UST is found to be leaking, the TPCHD requires the property or tank owner to undertake cleanup. The TPCHD works with Ecology on cleanup actions associated with contaminated groundwater and subsurface soil. Should a UST be discovered during implementation of the Proposed Action, PSE and the Port would work with the regulatory agencies to ensure continued coordination between development and UST decommissioning.

3.1.3 Affected Environment

The study area for the earth analysis encompasses the main components of the Project and areas directly adjacent to the components as needed to characterize potential environmental contamination and remedial actions. The main components are described in Chapter 2 (Description of Proposed Action).

Site-specific explorations and geotechnical and environmental studies have been completed for the site associated with the Project. An environmental site assessment data summary is provided in Appendix C. Figures 3.1-1a and 3.1-2a provide an overview of the Proposed Action area with respect to surface geology and liquefaction potential, respectively. Figures 3.1-1b and 3.1-1c provide more detail regarding surface geology and specific areas of the Project elements. Similarly, Figures 3.1-2b and 3.1-2c provide more detail regarding liquefaction potential and specific Proposed Action elements.

The ground surface at the proposed site of the LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System is generally level. Side slopes of the Hylebos and Blair waterways are mapped at less than 25 percent, 25 to 40 percent, and greater than 40 percent.

Topography along most of the pipeline segments and the surface of the Golden Given Limit Station and Fredrickson Gate Station is generally level or flat to less than 5 percent, without steep slopes.

3.1.3.1 Geology

As discussed in greater detail in Section 3.1.1.2 of the *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* (Port of Tacoma 2009), the geologic setting of the vicinity of the entire Project area is glacial till resulting from advancing and retreating ice sheets along with more recent mudflows originating from Mount Rainier. The Blair-Hylebos peninsula was created though dredging and deposition of those dredge spoils onto tidelands, nearshore areas, and upland areas to create the peninsula as it exists today (Port of Tacoma 2009).

The following geologic maps that cover the various components of the Proposed Action were reviewed:

- Geologic Map of the Tacoma North 7.5-minute Quadrangle, Washington (Troost and Booth, in review);
- Geologic Map of the Poverty Bay 7.5-minute Quadrangle, King and Pierce Counties, Washington (Booth, Waldron, and Troost 2004);
- Geologic Map of the Tacoma South 7.5-minute Quadrangle, Washington (Troost, in review);
- Geologic Map of the Puyallup 7.5-minute Quadrangle, Washington (Troost, in review);
- Geologic Map of the South Half of the Tacoma Quadrangle, Washington, (Walsh 1987);
- **Groundwater occurrence and stratigraphy of unconsolidated deposits, Central Pierce County, Washington,** *Water Supply Bulletin* 22 (Walters and Kimmel 1968);
- Map showing depth to bedrock of the Tacoma and Part of the Centralia 30’ X 60’ quadrangles, Washington, Miscellaneous Field Studies, Map MF-2265 (Buchanan-Banks and Collins 1994); and
- Volcanic Hazard Areas Map (Pierce County 2002).

These maps show that the proposed Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, pipeline segments, Golden Given Limit Station, Frederickson Gate Station, and surrounding areas are underlain by artificial fill, alluvial sediments, and glacial deposits.

Artificial fill at the Tacoma LNG Facility site, at the TOTE Marine Vessel LNG Fueling System site, and along portions of Pipeline Segment A consists of various grain sizes from silt to gravel and miscellaneous debris, which may include concrete rubble, garbage, and smelter slag, with relative density varying between loose and dense.

Alluvial sediments along the south portion of Pipeline Segment A are identified as alluvium (Qal), which is sand, silt, gravel, and cobbles, with some peat and organic silt, generally very loose to loose and dense in areas. Peat consists of predominantly organic matter, commonly interbedded with silt and clay, and very soft to soft.

Glacial deposits are mapped along Pipeline Segment B, and the Golden Given Limit Station would be located entirely within a mapped area of glacial till (Qgt), which is a silty sand matrix supporting gravel and lesser amounts of cobbles and boulders. The matrix varies locally in relative proportions of silt and sand, from dense to very dense.

The Fredrickson Gate Station site is underlain by Undifferentiated Glacial Drift (Qgd).

3.1.3.2 Geologic Hazards

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Because of their proximity, the geologic hazards in the vicinity of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are discussed together in this section.

Seismic Hazards

The Project would be located in an area considered seismically active due primarily to the interaction between the Pacific, Juan de Fuca, and North American plates. Subduction of the Juan de Fuca plate beneath the North American plate at the Cascadia Subduction Zone (CSZ) produces both intercrustal (between plates) and intracrustal (within a plate) earthquakes. Physical evidence suggests that several large-magnitude earthquakes (magnitude 8 to 9) have occurred along the CSZ in the last 1,500 years, the most recent of which occurred in January 1700 (Atwater 2005). The Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System sites are underlain by thick alluvial soils (primarily sand and silt deposits), which could amplify earthquake ground motions at various frequencies.

The facility would be designed to withstand two levels of earthquakes—an Operational Basis Earthquake (OBE) and a Safe Shutdown Earthquake (SSE). An OBE is an earthquake to which a facility could be subjected during its design lifetime. It is defined as a ground motion having a 10 percent probability of exceedance in 50 years (475-year recurrence interval). All elements of the Project would be designed to withstand this OBE, and the Project is expected to remain in operation following the event.

An SSE is the maximum considered earthquake ground motion per the definition in American Society of Civil Engineers (ASCE) 7 Code and the International Building Code (IBC). An SSE event is defined as a ground motion having a 2 percent probability of exceedance in 50 years (2,475-year recurrence interval). The design objective for an SSE event is to prevent catastrophic failure of critical facilities. A facility with an SSE design is not required to remain operational following the event.

Ground improvements are required to meet the seismic design criteria in 49 CFR Part 193. The ground improvements associated with the Project would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in an OBE OR SSE. The LNG tank is the largest component of the proposed Project, and ground improvement efforts would be concentrated at this location. A seismic base isolation system would be added under the LNG tank to address potential seismic events. Other portions of the Project such as the process area and land adjacent to the Hylebos pier and TOTE Marine Vessel Fueling System would also require ground improvement.

The consequences of a seismic event can include landslides, liquefaction and lateral spreading, and tsunami. The facility design standards and engineering design of LNG facilities take these events into account.

Landslide Hazards

The ground surface of the Proposed Action area does not meet the City of Tacoma's criteria for landslide hazard because the site is sloped at less than 5 percent. Slopes along the shoreline of the Hylebos and Blair

waterways do meet the City of Tacoma's technical criteria for landslide hazards. These shoreline slopes are stable under static conditions but would not be stable during an earthquake event at the OBE or SSE level. Slope stability engineering controls, including ground improvement and foundation design that would stabilize the slopes, are discussed further below in Section 3.1.6 (Avoidance, Minimization, and Mitigation).

Liquefaction and Lateral Spreading

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are located in an area identified as having a high potential for liquefaction on the City of Tacoma Seismic Hazard Area Map. Liquefaction refers to the condition by which vibration or shaking of the ground, usually from seismic forces, results in the development of excess pore pressures in saturated soils with subsequent reduction in soil sheer strength. This can result in potential liquefaction-induced settlement and lateral spreading. Ground stabilization and foundation design measures that account for these risks are included below in Section 3.1.6.1 (Construction) and further detailed in the geotechnical report (Geoengineers 2015).

Tsunami

Tsunami hazard areas are defined by the City of Tacoma as coastal areas and large lake shoreline areas susceptible to flooding and inundation as the result of excessive wave action derived from seismic or other landslide events, both described above. The Tsunami Hazard Map of Tacoma, Washington (Walsh et al. 2009) indicates that tsunami wave inundation is likely at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. A seismic tsunami coinciding with low tide would not affect the Tacoma LNG Facility. Only a seismic tsunami coinciding with normal high tides would encroach on this facility. The predicted maximum water depth is about 4.5 feet with a current of about 0.9 mile per hour (Walsh et al. 2009). Facility foundations and components close to grade would be designed to resist forces generated by the listed currents. Accordingly, Tacoma LNG Facility components would be located at their normal height above grade.

The City of Tacoma Fire Department's Emergency Management Division coordinates with the Port to operate the Port Emergency Warning System (PEWS) from the City of Tacoma Fire and Emergency Communication Center (City of Tacoma 2014). The PEWS is a system of five pole-mounted sirens linked to a central control point at the City of Tacoma Fire and Emergency Communication Center. The PEWS sirens warn of natural hazards such as tsunami in the immediate Port area and broadcast specific instructions and evacuation routes according to specific inundation zones (City of Tacoma 2014). Sirens are located throughout the Port area, including one location at the northwest end of the Blair-Hylebos peninsula where the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located (Port of Tacoma 2011). The *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013) ensures that emergency operation and evacuation efforts in response to a tsunami will follow the Federal Emergency Management Agency's (FEMA's) Incident Command System (ICS) of the National Incident Management System (NIMS), as required by RCW 38.52 and City of Tacoma Municipal Code (TMC) Chapter 1.10. The *Port of Tacoma Evacuation Map* outlines primary and secondary evacuation routes from the Port for use in the event that a tsunami requires the evacuation of the Port area (City of Tacoma 2009).

Volcanic Hazards and Lahars

The City of Tacoma and Pierce County define volcanic and lahar hazards as areas subject to pyroclastic flows, lava flows, debris avalanche, and inundation by debris flows, lahars, mud flows, or flooding resulting from volcanic activity. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are located within volcanic and lahar hazard areas. The volcanic hazards most likely to occur in the site area are mudflows, lahars, and flooding. Lahars can travel long distances. The likelihood of a large lahar, such as one travelling from area volcanoes, is at its greatest during periods of active volcanic activity. Signs of volcanic activity include earthquakes, ground deformation, gas emissions, and others, all of which provide objective indications of the need to monitor for precursory activity and provide alert-level notifications when merited.

As described above, the City of Tacoma Fire Department's Emergency Management Division coordinates with the Port to operate the PEWS from the City of Tacoma Fire and Emergency Communication Center (City of Tacoma 2014). As noted above, the PEWS includes sirens that warn of natural hazards in the immediate Port area, such as lahars resulting from the eruption of Mt. Rainier, and broadcast specific instructions and evacuation routes according to specific inundation zones (City of Tacoma 2014). (Port of Tacoma 2011). The system is also compatible with the Pierce County Department of Emergency Management's Lahar Warning System, which is a larger network of 24 sirens located throughout the Puyallup River valley and includes portions of unincorporated Pierce County and the City of Fife, Washington (Pierce County 2010). Furthermore, the *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013) ensures that emergency operation and evacuation efforts in response to the path of a lahar will follow FEMA's ICS/NIMS, as required by RCW 38.52 and TMC Chapter 1.10. The *Port of Tacoma Evacuation Map* outlines primary and secondary evacuation routes from the Port for use in the event that a lahar requires the evacuation of the Port area (City of Tacoma 2009).

Erosion Hazards

Susceptibility to erosion is generally a function of soil type, slope, groundwater seepage, or surface runoff. The City of Tacoma generally defines erosion hazard areas as a combination of specific geologic units (such as artificial fill and alluvial soils) on ground sloping greater than 15 percent or any slope 25 percent or higher with a vertical relief of 10 or more feet. The proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are not classified as erosion hazard areas, primarily because they are relatively flat.

Sea Level Rise

The potential impacts of climate change on mean sea level elevation in Commencement Bay and the Port area are difficult to accurately predict. A study issued by Ecology (2012) and the University of Washington suggests that there could be an average global sea level rise ranging from 3 to 55 inches by 2050 as a result of rising temperatures and melting glaciers. Sea level rise also can be diminished or magnified by areas of land uplift and subsidence (discussed below). The City of Tacoma identifies the Blair-Hylebos shoreline and additional uplands as being within floodplains or floodways.

Subsidence

Subsidence of the ground surface can occur from natural (karst terrain) and human-made (underground mines, tunnels) features. The City of Tacoma's maps show the nearest underground tunnel or mine as located 3 miles from the site, which poses no hazard to the Project. Geology that typically forms karst topography does not exist at or near the ground surface at the proposed Project site.

<u>Puget Sound Energy Natural Gas Distribution System</u>

General

The proposed pipeline segments within the city of Tacoma would be exempt from City of Tacoma geologic hazard provisions, based on City of Tacoma ordinance 13.09.090.F, Pipeline Facilities. Construction, maintenance, and repair of Pipeline Segment B and activities at the Fredrickson Gate Station, which would both take place in Pierce County, are exempt from provisions in the Pierce County Critical Areas ordinance, as stated in 18E.20.030.E. Similar exemptions are not defined in the City of Fife codes, where a portion of Pipeline Segment A would be located. The following sections address geologic hazards in each area.

Landslide Hazards

Pipeline Segment A, which would be located within the cities of Tacoma and Fife, would not be sited in an area that meets the criteria for landslide hazard areas. The pipeline would traverse relatively flat ground.

Pipeline Segment B and the proposed Golden Given Limit Station would be located within an upland area of Pierce County. Pipeline Segment B and the limit station would be located within a relatively flat area that does not meet the Pierce County criteria for landslide hazards.

The pipeline segments, Golden Given Limit Station, and Fredrickson Gate Station would not be located in or near steep slope areas shown on the 2003 Pierce County Steep Slope map.

Seismic Hazards

The pipeline segments, Golden Given Limit Station, and Fredrickson Gate Station would be located in western Washington, which is seismically active. Seismicity is discussed above in Section 3.1.3.2. Seismic hazards in this area are summarized as follows:

- **Ground Shaking and Ground Motion Amplification.** Some soil types can amplify the effects of earthquake ground motions at various frequencies. Pipeline Segment A is underlain by thick alluvial soils (primarily sand and silt deposits), which could amplify earthquake ground motions. Pipeline Segment B and the Golden Given Limit Station would be underlain by compact glacially consolidated soils, which are less likely to amplify ground shaking. The Fredrickson Gate Station is underlain by granular Steilacoom Gravel soils that are partially saturated. However, these deposits are typically dominated by gravel and cobbles, which are not likely to liquefy or amplify ground motions.
- **Liquefaction.** Pipeline Segment A would be located in a valley bottom that is identified as having a high potential for liquefaction during an IBC design level seismic event. Seismic activity at the Segment A locations could result in liquefaction, liquefaction-induced settlement, and lateral spreading. Pipeline Segment B, the Golden Given Limit Station, and the Frederickson Gate Station would be located in an upland area. Based on the liquefaction susceptibility map of Pierce County, Washington (Palmer et al. 2004), the liquefaction potential in this area is low.
- **Tsunami.** The Tsunami Hazard Map of Tacoma, Washington (Walsh et al. 2009) indicates that tsunami wave inundation is possible in the Port area, where portions of Pipeline Segment A would be located. There is little to no potential for a tsunami at the sites of Pipeline Segment B, the Golden Given Limit Station, or the Frederickson Gate Station. As described above in Section 3.1.3.2, the City of Tacoma Fire Department's Emergency Management Division coordinates with the Port to operate the PEWS sirens in the event a tsunami threatens the Port (City of Tacoma 2014). One of the PEWS sirens is located in the upland area of the Blair-Hylebos peninsula, where Pipeline Segment A would be located (Port of Tacoma 2011). The *Port of Tacoma Evacuation Map* outlines primary and secondary evacuation routes from the Port for use in the event that a tsunami requires the evacuation of the Port area (City of Tacoma 2009). The *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013) ensures that emergency operation and evacuation efforts in response to a tsunami will follow FEMA ICS/NIMS, as required by RCW 38.52 and TMC Chapter 1.10.

Erosion Hazards

Susceptibility to erosion is described above in Section 3.1.3.2. The proposed pipeline segments, Golden Given Limit Station, and Fredrickson Gate Station would all be located in areas of relatively flat topography and are not classified as erosion hazard areas.

Volcanic Hazards and Lahars

Volcanic hazards are described above in Section 3.1.3.2. Pipeline Segment A would be located within a Class II Inundation zone, which is an area where the recurrence interval for a lahar/mudflow is 100 to 500 years. Pipeline Segment B, the Golden Given Limit Station, and the Frederickson Gate Station would all be located in an upland area that is not within a volcanic hazard area.

The Pierce County Department of Emergency Management coordinates with the United States Geological Survey and Washington Emergency Management Division to operate and maintain the Puyallup Valley Lahar Warning System (Pierce County 2008) for areas in the potential path of a lahar. The Lahar Warning System is a network of 24 sirens located throughout the Puyallup River valley that includes portions of the city of Fife where the Project's new pipeline Segment A would be located (Pierce County 2010). The Lahar Warning

System is wired to Pierce County's Emergency Alert System, which issues emergency warnings through local broadcasters and is linked to the National Oceanic and Atmospheric Administration's all-hazards radio system designed to disseminate specific emergency warning information (Pierce County 2010). The Lahar Warning System is also compatible with the PEWS sirens described in Section 3.1.3.2. One of the PEWS sirens is located in the upland area of the Blair-Hylebos peninsula where new pipeline Segment A would be located (Port of Tacoma 2011). The *Mount Rainier Volcanic Hazards Mitigation Plan* (Pierce County 2008) ensures that emergency operation and evacuation efforts in response to the path of a lahar will follow FEMA's ICS/NIMS, as required by RCW 38.52.

Sea Level Rise

The potential impacts of climate change on mean sea level elevation are discussed in Section 3.1.3.2. Sea level rise would not inundate either the pipeline segment areas or the limit and gate station areas.

Subsidence

As described above, subsidence of the ground surface can occur from natural (karst terrain) and human-made (underground mines, tunnels) features. The City of Fife critical areas ordinance does not identify potential subsidence features such as karst topography or underground mines/tunnels, as these features are not known to exist within Fife. Karst topography does not occur within the pipeline routes or the Golden Given Limit Station site due to the substantial thickness of glacial and interglacially deposited soil material in these areas.

The Pierce County critical areas ordinance contains a Mine Hazard section to regulate development in and near known underground coal mines. The proposed pipeline routes, Golden Given Limit Station, and Frederickson Gate Station are located at least 15 miles northwest of areas where abandoned underground coal mines are known to exist within Pierce County. The pipeline routes and limit station would also located in areas that are underlain by at least 1,500 feet of glacially and interglacially deposited soil. Bedrock does not occur at or near the ground surface in these areas.

Aquifer Recharge

The pipeline segments, Golden Given Limit Station, and Frederickson Gate Station would all be located within areas that may be classified as aquifer recharge areas, based on the Pierce County January 2013 Aquifer Recharge area map.

The potential for groundwater recharge is likely low in the Pipeline Segment A site, based on the anticipated soil conditions and the fact that the pipeline would be located in roadway areas already covered with asphalt concrete pavement. Similarly, the potential for groundwater recharge is likely low at the Pipeline Segment B and Golden Given Limit Station sites since the underlying soil is relatively impermeable glacial till and the pipeline areas are already covered in impermeable asphalt concrete.

The potential for groundwater recharge is likely moderate to high at the existing Fredrickson Gate Station because the underlying soil is permeable to very permeable Steilacoom Gravel. However, the proposed activity comprises a very small area with respect to the overall extent of the Steilacoom Gravel deposit in this area.

3.1.3.3 Groundwater

This section provides general information regarding groundwater based on professional experience, explorations completed at the proposed LNG facility site, and a preliminary review of water well logs. The groundwater conditions were grouped into two general categories: lowlands (Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, and Pipeline Segment A) and uplands (Pipeline Segment B, Golden Given Limit Station, and Fredrickson Gate Station).

In the lowlands, groundwater is typically encountered at a shallow depth. In the vicinity of the Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, and Pipeline Segment A site, groundwater is typically present at depths between approximately 5 and 10 feet below ground surface. Additionally, the groundwater levels in the vicinity of the Tacoma LNG Facility site and the TOTE Marine Vessel LNG Fueling System site are moderately tidally influenced, mainly within 400 feet of the shoreline (CRA 2008).

A preliminary review was performed of well logs in the vicinity of proposed Pipeline Segment B and the Golden Given Limit Station. Based on this review and experience in the area, in the uplands areas other than the Fredrickson Gate Station, groundwater levels appear to be approximately 5 to 15 feet below ground surface. Shallow groundwater in the site area is likely perched on the impermeable glacial till soils.

A review of reports and geologic data performed in the area of the Fredrickson Gate Station shows that groundwater within the Steilacoom Gravel deposit at and near the site flows from southeast to northwest. Groundwater flooding occurred northwest of the site area in the late 1990s, based on a review of *Groundwater Flooding Evaluation, Fredrickson, Pierce County, Washington* (URS 2001). Groundwater is likely quite shallow at the site and can fluctuate by several feet in this area over a typical year.

3.1.3.4 Existing Contaminated Sites and Remedial Actions

Commencement Bay was added to the national interim list of highest priority hazardous waste sites in October 1981. In September 1983, about 10 to 12 square miles of what is named the Commencement Bay, Near Shore/Tideflats were added to the NPL as an EPA Superfund Site.

The deepwater portion of Commencement Bay was removed from the interim list in 1983 because studies showed minimal contamination in the area (EPA 2004). The entire Blair Waterway shipping channel was dredged as part of the Sitcum Waterway Remediation Project from 1993 and 1995. After completion of this dredging, the Blair Waterway was removed from the NPL.

The Hylebos Waterway is the northeastern-most waterbody associated with the Commencement Bay Nearshore/Tideflats Superfund site. EPA, in conjunction with the potentially responsible parties, formed the Hylebos Cleanup Committee, which investigated, designed, and performed remedial actions to clean up Hylebos Waterway sediment and upland source areas. Institutional controls have been placed within the waterway and upland source areas where contaminated media was left in place.

Prior to construction, PSE would obtain a Construction Stormwater General Permit and prepare a Stormwater Pollution Prevention Plan and a Materials Handling Plan to mitigate potential off-site discharges. The Tacoma LNG Facility's operations would be conducted under the Port of Tacoma's MS4 permit, or PSE would apply for an Industrial Stormwater General Permit, both of which contain best management practices (BMPs) that establish institutional controls for Hylebos Waterway sediments and upland source areas.

Tacoma LNG Facility

Hazardous substances may be present as a result of historical industrial activities on the property making up the Tacoma LNG Facility site and on nearby properties located farther northwest. Environmental cleanups or investigations have been completed on portions of these properties. The Tacoma LNG Facility site includes two areas where cleanup activities have been conducted: the Naval Reserve Center Tacoma (parcel number 2275200502; Ecology Facility Site Identification Number (FSID) 93581722) and Port Parcel 4 (parcel number 5000350040; FSID 3831). Investigation and cleanup activities are ongoing at one on-site property (Port Parcel 2, parcel number 5000350021; FSID 1377) and two properties located northwest of the site (Occidental Chemical, parcel number 2275200560; FSID 212, and Former PRI, parcel number 2275200510; FSID 1246). The formal parcel numbers (e.g., 5000350040) are shown on Figure 2-1 in Chapter 2 (Description of Proposed Action). This section describes generally these existing contaminated sites and remedial actions based on previous studies and specific information from an environmental site assessment conducted for the Project (GeoEngineers 2014).

Ongoing Investigation and Cleanup Actions

Subsurface contamination is known to be present immediately northwest of the proposed Project site as a result of hazardous material releases at the Occidental Chemical site and former bulk petroleum storage facilities on the former PRI site and in the northwest portion of Port Parcel 2. The latter two sites have been combined by Ecology and are now referred to as the Alexander Avenue Petroleum Tank Facilities (FSID 1377). Cleanup actions on properties adjacent to the Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System are summarized as follows:

- **Occidental Chemical** (approximately 1,000 feet to the northwest of the proposed Tacoma LNG Facility site): Contamination of this site resulted from historical industrial operations, including manufacturing operations for a variety of chemicals. Impacts to soil, groundwater, and nearshore sediments occur on this property and extend to the neighboring former PRI site, as well as Port Parcel 2. Some investigation activities extend to the Naval Reserve Center Tacoma property. Numerous site investigations and interim cleanup actions have been conducted. The three principal contamination issues at the site are nearshore sediments impacted by site-associated organic and inorganic contaminants; groundwater solvent plumes, which extend to the former PRI site and Port Parcel 2; and a high-pH groundwater plume that also extends off site (Port of Tacoma 2009). Remediation at the site is subject to the terms of an existing Administrative Settlement Agreement and Order on Consent (Port of Tacoma 2009).
- **Former PRI Site** (approximately 500 feet to the northwest of the Tacoma LNG Facility site): Historically, this site was primarily used for bulk fueling and related activities. However, additional historical operations also included plants for crude oil distillation or fuel blending (Port of Tacoma 2009). Impacts from Occidental Chemical include soil, groundwater, and sediment contamination associated with Occidental embankment areas (Port of Tacoma 2009). Additional petroleum impacts in soil and groundwater are associated with activities that took place at the former PRI site.
- **Port Parcel 2** (adjacent to the northwest of the Tacoma LNG Facility site): The northwest portion of this property is located adjacent to the former PRI site. The property historically was used for bulk petroleum storage. It is impacted by migration of groundwater-containing solvents and elevated pH from the Occidental Chemical site, and potentially by migration of petroleum contamination from the adjacent former PRI site (Port of Tacoma 2009). Petroleum contamination has been documented in soils and groundwater on the Port Parcel 2 property. Parcel 2 and the former PRI site are being investigated under an Agreed Order between Ecology, Marianna Properties (Occidental Chemical Corporation) and the Port.

Completed Cleanup Actions

Cleanup actions have been completed on two of the four properties proposed for the Tacoma LNG Facility site, as follows:

- **Former Naval Reserve**: This was a joint facility for the Naval and Marine Reserves that was transferred to the Port in 2011 (CRA 2012). Six USTs were removed from three locations on the property in 1993 (N.W. Construction General Contracting 1993). Four of the USTs were located near the eastern corner of the existing warehouse, and the remaining two were located southeast of the warehouse. Petroleum-contaminated soil was discovered beneath only two of the USTs (one near the eastern corner of the warehouse, and one southeast of the warehouse). This soil was removed and disposed of off site at a permitted facility. Analysis of verification soil samples obtained from the final limits of the UST excavations indicated that remaining petroleum hydrocarbon concentrations in soil were below analytical method reporting limits or MTCA Method A Cleanup Levels. Groundwater and sediment offshore of the site are subject to ongoing monitored natural recovery under the terms of the EPA Consent Decree as part of the overall Commencement Bay Nearshore/Tideflats Superfund site.

However, this property was not identified as an ongoing upland source of contamination within the Superfund site (Navy 2010).

Port Parcel 4: This property is a storage yard. The cleanup activities associated with the site were a result of areas of slag fill identified along the Hylebos Waterway. These areas were identified and addressed by a combination of removal and capping in accordance with an EPA Consent Decree (Port of Tacoma 2009).

Preliminary Environmental Assessment

As described above, known subsurface contamination is present immediately northwest of the Tacoma LNG Facility footprint as a result of hazardous substance releases at the Occidental Chemical site, the former bulk petroleum storage facilities on the former PRI site, and in the northwestern portion of Port Parcel 2. As part of an environmental assessment, PSE prepared an upland site assessment sampling and analysis plan (GeoEngineers 2014) and solicited input from EPA and Ecology. PSE would continue to work with EPA and Ecology on PSE's future project plans in areas of known or suspected contamination.

PSE conducted an environmental site assessment in May and June of 2014 (Appendix C) to evaluate whether contamination from these historical facilities has migrated to locations beneath the footprint of the Tacoma LNG Facility site. This investigation also evaluated other areas of historical industrial activity within the proposed footprint of the facility that had not previously been investigated. A preliminary review of the soil and groundwater analytical results from the site assessment suggests that groundwater contamination related to the former bulk petroleum storage facilities is present beneath the northern portion of the Tacoma LNG Facility site. Information from this investigation would be used to coordinate redevelopment plans in accordance with existing orders, restrictive covenants, or other requirements associated with such remedial actions.

TOTE Marine Vessel LNG Fueling System

Environmental investigations and cleanup actions have been performed on the proposed TOTE Marine Vessel LNG Fueling System site. Petroleum-impacted soil and four USTs were removed from the northwestern portion of the site. Two additional USTs were either abandoned in place or removed from the site; it is not known whether petroleum was released from these USTs. All of these former USTs were located approximately 500 to 1,000 feet from the proposed alignment of the cryogenic pipeline that would extend from the Tacoma LNG facility to the Blair Waterway.

In addition to the UST-related actions, a limited soil investigation was conducted adjacent to the Blair Waterway in 2007–2008. Petroleum-related contamination was identified in some soil samples at concentrations less than regulatory criteria levels. Most recently, investigations associated with the PRI and Port Parcel 2 sites (see "Tacoma LNG Facility," above) identified a delineated plume of dissolved benzene in groundwater that extends onto the TOTE Marine Vessel LNG Fueling System site, approximately 300 feet northwest of the proposed cryogenic pipeline.

Pipeline Segments

Contaminated media may be present along portions of the proposed pipeline segments. The potential for encountering contaminated media is greatest in the pipeline segment along Taylor Way (Pipeline Segment A) on the Blair-Hylebos peninsula. Past and present industrial activities adjacent to Taylor Way may have impacted soil and groundwater. There are no known cleanup sites associated with Pipeline Segment B.

Golden Given Limit Station

A Phase I Environmental Site Assessment (ESA) has been performed on the Golden Given Limit Station site and has shown that contaminated media are not likely present. A print and graphics shop was constructed on the property in the 1980s and remains on site. The building is a single-story, wood-frame structure with

an asphalt parking lot. Hazardous substances have been stored and used in association with the print and graphics business; however, no evidence of possible releases was identified.

Hazardous substances were released on a property located immediately north of the proposed limit station site. This adjacent property was used for equipment storage, maintenance and auto repair. Contaminated soil resulting from these activities was removed from the site and Ecology granted "no further action" status in 2002, indicating that the cleanup was successful. Based on the Phase I ESA research, it appears that there is a low potential that contaminants from this property migrated onto the proposed limit station site.

Fredrickson Gate Station

There is no known information on contamination at the Fredrickson Gate Station.

3.1.4 Impacts of the Proposed Action

3.1.4.1 Construction Impacts

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potential impacts associated with the presence of existing hazardous substances in the soil and groundwater could occur from the activities described in the following subsections.

Grading/Earthwork Activities

It is likely that some grading and earthwork activities would be required after demolition is complete in order to facilitate stormwater conveyance and to establish new utility corridors. Potential impacts from grading activities include soil erosion and sediment transport into adjacent waterbodies during storm events and temporary impacts to air quality from fugitive dust emissions. Whether raising or lowering grades is planned, construction staging and stockpiling of soils would likely occur. Stockpiles would be properly protected against erosion and to ensure no sediment would be transported off site. If grades were to be raised, truck haul routes would need to be established. If grades were to be lowered, soil transported off site would require proper disposal.

Following ground improvement described below, elevation would be reestablished for the various aboveground structures and would remain relatively unchanged from preexisting conditions. The large existing warehouse building situated on Parcel 5000350021 in the center of the proposed Tacoma LNG Facility site sits on a raised foundation consisting of approximately 3 to 5 feet of fill soil. The preliminary plan for site preparation following demolition of the warehouse involves spreading this soil to the south over the part of the Project footprint area that would be under the LNG storage tank and liquefaction system (which would all be covered with concrete and yard rock at completion) and the undisturbed open area in the southeast portion of the site. This preliminary plan assumes that the soil under the existing warehouse is not contaminated; a preliminary review of the results of limited sampling of this soil in May 2014 supports this assumption. If the soil were contaminated, then it would be transported off site and disposed of at an authorized facility.

The preliminary plan involves no earthwork north or east of the large warehouse. The various other areas north of the large warehouse are under asphalt, which would remain in place. Therefore, any contaminated soils present north of the large warehouse would not be disturbed.

Ground Improvements for Seismic and Geotechnical Considerations

Ground improvements are required to meet the seismic design criteria in 49 CFR 193. These ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in an OBE or SSE. Based on geotechnical analyses, the ground improvement method would likely involve installation of grout columns under the LNG storage tank and in other process-related areas. The number of columns would vary depending on the method selected but could range from about 4,000 to 6,000 columns. These grout columns would range between 80 and 100 feet in depth and compress the soil around them, which would avoid creating preferential pathways for groundwater migration. The ground

improvement method would likely involve displacement or densification of existing soils, which would reduce the amount of spoils generated and minimize the potential for generation of contaminated spoils. Any contaminated spoils encountered during ground improvements would be transported off site and disposed of at an authorized facility.

Slope Stability

Excavations could result in disturbance and adverse impacts to immediately adjacent areas or structures, utilities, and other improvements if excavation slopes are not properly retained. Standard construction measures, such as use of properly designed and installed temporary shoring systems or trench boxes, would reduce the potential for failure of excavation faces that may cause adverse impacts.

Construction of the Tacoma LNG Facility would involve modifications adjacent to the top of the sloped shoreline parallel to the Hylebos, and possibly Blair, waterway. Appropriate erosion and sedimentation control measures would be employed during construction to prevent discharge or surface water on the slopes. Other construction techniques such as limiting construction duration, re-establishing topography and drainage, and re-vegetating where appropriate could also be employed to reduce the risk of slope instability.

Settlement

Structural fill and backfill material placed during site construction would need to be compacted, which could cause vibrations and potential settlement of buildings, utilities, roads, and other structures. The potential lateral extent of influence from vibration and settlement resulting from fill placement could be up to 50 feet from the work. Placement of more than 4 feet of fill could cause some ground consolidation subsidence that would impact existing or future structures in the immediate area of the fill.

New buildings and structures could also be impacted by settlement resulting from loading of compressible soils. Buildings recently constructed at Port facilities that are constructed on shallow spread footings or mat foundations typically have been preloaded to induce settlement prior to construction. Portions of the Tacoma LNG Facility site, including the LNG tank and the process area, would be supported on a zone of improved ground to reduce the risk of settlement.

Groundwater

Excavation depths are anticipated to be shallower than groundwater during construction of the Tacoma LNG Facility; however, it is possible that groundwater could be encountered. Construction dewatering could be required in the event that groundwater is encountered during excavations. Extracted groundwater would be handled and discharged using BMPs to prevent erosion and impacts to surface water. In addition, appropriate analytical testing would be conducted to evaluate treatment and/or disposal options for any groundwater removed from known areas of contamination.

Pipeline Segments, Golden Given Limit Station, and Frederickson Gate Station

Grading/Earthwork Activities

Grading and earthwork activity associated with construction of the new distribution pipeline segments includes trenching for conventional installation of the pipeline. Grading and earthwork for construction of the Golden Given Limit Station and upgrades at the Frederickson Gate Station include trenching as needed for utility installation and removal of existing ground cover such as the asphalt at the limit station. Permanent grade changes are not anticipated during placement of the proposed new pipeline segments or the limit and gate stations. Additionally, construction staging and stockpiling of soils would likely occur. Potential Impacts from grading activities include erosion and sediment transport during storm events and temporary impacts to air quality from wind erosion (dust). Stockpiles would be properly protected against erosion and sediment transport off site.

Slope Stability

Proper shoring of shallow excavations for pipeline and station foundations would not result in slope instability. Standard construction measures, such as use of properly designed and installed temporary shoring systems or trench boxes, would reduce the potential for failure of excavation faces that may cause adverse impacts.

Settlement

Structural backfill is compacted to prevent settlement at the ground surface for the pipeline segments, Golden Given Limit Station, and Frederickson Gate Station. Structural fill and backfill material placed for the limit station (if any) would need to be compacted to limit the potential for settlement.

Groundwater

Shallow, tidally influenced groundwater could be encountered in excavations along Pipeline Segment A.

Shallow, perched groundwater could be encountered in excavations along Segment B and at the Golden Given Limit Station. Shallow groundwater also could be encountered in excavations at the Fredrickson Gate Station, particularly if subsurface pipeline work is completed during the normally wet winter season when groundwater levels are often higher. Because of the coarse grained nature of the Steilacoom Gravel deposits, dewatering in this area may be difficult, particularly during the wet winter months.

Groundwater removed from excavations would be handled and discharged using BMPs to prevent erosion, impacts to the site, and surface water.

3.1.4.2 Operations Impacts

Geologic hazard impacts are discussed below in terms of how the Proposed Action would affect the existing soil and geologic conditions at the site. For impacts associated with damage to Project facilities resulting from geologic hazards, see Section 3.5 (Health and Safety).

Seismic Hazards

The Tacoma LNG Facility site and Pipeline Segment A would be located in areas mapped as fill and alluvium deposits (see Figures 3.1-1b and 3.1-2b). These soils are often loose or soft and saturated, and consequently they are considered susceptible to liquefaction and lateral spreading, landslides, and ground rupture during seismic events. These soils also have the potential to amplify the ground motion at certain seismic frequencies during an earthquake. The ground improvements that would be implemented at the Tacoma LNG Facility site, including the installation of subsurface grout columns, would serve to decrease potential seismic hazards at the site. Installation and operation of the TOTE Marine Vessel LNG Fueling System and Pipeline Segment A would not exacerbate potential seismic hazards because they would be mostly buried within fill that is resistant to ground motion amplification and liquefacation. Placement of fill material and project structures in and on the earth surface would be unlikely to impact the seismic hazard risk posed to other local structures and works.

Pipeline Segment B and the Golden Given Limit Station would be located in areas mapped as having dense to very dense unsaturated soils (see Figures 3.1-1c and 3.1-2c). Accordingly, the potential for liquefaction and lateral spreading, landslides, and ground rupture during seismic events is expected to be low. Operation of these facilities would not intensify the geologic hazard level of soils at these locations, nor add to the risk of nearby structures and works.

Tsunami

Operation of the Project facilities would not exacerbate the hazards associated with a tsunami because none of the Project components would significantly alter the elevation of the ground surface in the tsunami wave inundation area of the LNG Facility and the TOTE Marine Vessel LNG Fueling System.

Volcanic Activity and Lahars

Operation of the Project facilities would not exacerbate the hazards associated with volcanic activity or lahars because none of the Project components are of sufficient size to affect the size or direction of movement of pyroclastic flows, debris flows, lahars, or related flooding.

Sea Level Rise

Operation of the Project facilities would not exacerbate effects associated with sea level rise because none of the Project components would significantly alter the elevation of the ground surface in the area of the LNG Facility and the TOTE Marine Vessel LNG Fueling System, and the pipeline system would be below grade in areas distant from potential sea level rise occurrence. The LNG process area is at an elevation of 15 to 20 feet above mean sea level, which is much higher than the projected 3 to 55 inches of sea level rise for Commencement Bay. Project improvements along the Hylebos Waterway shoreline would increase the site's resistance to slope failure from sea level rise.

Future sea level rise impacts could include changes to shoreline slope stability due to changes in tidal flux and wave action and higher frequency of flooding at the facility.

3.1.4.3 Decommissioning Impacts

Decommissioning of the Tacoma LNG Project components would generate impacts to earth resources similar to those discussed in Section 3.1.4.1 (Construction Impacts). Potential impacts would be temporary and would end upon completion of the decommissioning. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Project components.

3.1.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action-related impacts to earth elements would not occur.

3.1.6 Avoidance, Minimization, and Mitigation

This section describes mitigation measures that would be implemented during construction and operation of the Project to minimize and mitigate impacts to earth resources. Federal regulations found at 49 CFR 193, via their adoption of National Fire Protection Association 59A 2013 establish requirements for seismic protection design of LNG facilities. Additionally, local jurisdictions' adoption of the IBC and critical areas ordinances also establish regulatory requirements regarding structures in and near geologic hazard areas. As the Project moves closer to construction, mitigation may involve changes in the sequencing of the different elements of the Project, such as moving ahead with Blair Waterway components while allowing more time to gather/collect information on sediment quality in the Hylebos, and plan construction there accordingly.

3.1.6.1 Construction

The following mitigation measures could alleviate potential impacts during construction.

Grading/Earthwork Activities

Mitigation measures for potential impacts from grading activities include the following:

- Because of the uncertainty of embankment soil and sediments, additional soil and sediment characterization should be conducted prior to any shoreline or in-water construction.
- Final construction sequencing and design of structures along the Hybelos Waterway will depend on further sediment characterization.
- Using properly designed and constructed shoring systems to prevent caving of excavation faces from temporary construction excavations.

- Using appropriate methods to remove, contain, and discharge groundwater accumulated in excavations to mitigate dewatering impacts, as needed. Extracted groundwater would be handled and discharged using BMPs to prevent erosion, impacts to the site, and surface water. Groundwater extracted from known areas of contamination would be analyzed to determine treatment and disposal options.
- Controlling ground settlement by a variety of methods; methods typically used at the Port include preloading and mat foundations and driven piles or drilled shafts. Ground improvements are required to meet the seismic design criteria in 49 CFR Part 193. These ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in an OBE or SSE. Ground improvement methods would likely involve installation of grout columns under the tank and in other areas. The grout columns would range between 80 and 100 feet in depth and would displace and/or densify the soil around them, thereby avoiding creation of preferential pathways for groundwater migration. The number of columns would vary depending on the method selected, but could range from about 4,000 to 6,000 columns.
- Reusing excavated soils on site to the extent practical to reduce the volume of material exported from the site and associated impacts.
- Developing specifications criteria for controlling the quality of materials imported to the site.
- Disposing of excess excavated materials at approved locations if the materials cannot be spread on site and incorporated into the final grading plan.
- Developing a work plan for actions to be taken if contamination is found during construction. This plan would address necessary characterization of impacted media, protection of worker health and the environment, temporary storage of impacted media, and proper reuse or off-site disposal of contaminated soil in accordance with local, state, and federal regulations. Investigation results also would be used to evaluate management options for dewatering liquids (groundwater) if dewatering is anticipated to be necessary during construction in impacted areas.

Erosion and Sediment Control

During construction, contractors would employ temporary erosion and sedimentation control measures and BMPs to minimize erosion as described in Sections 3.3.6.1 (Construction). Additional measures include:

- Stabilizing exposed areas as soon as earthwork is completed;
- Routing surface water through temporary drainage channels around and away from disturbed soils or exposed slopes;
- Using straw mulch and erosion control matting to stabilize graded areas and reduce erosion and runoff impacts to any sloped areas, where appropriate;
- Intercepting and draining water from any surface seeps, if encountered;
- Using quarry spalls at construction ingress and egress to dislodge sediment;
- Using lined aprons or energy dissipaters at stormwater outlets to prevent scour; and
- Using sediment filter, elevated rim, or impounding area around storm drains.

3.1.6.2 Operations

The following mitigation measures could alleviate potential impacts during operations:

- Installation of ground improvements to reduce the damage associated with seismic soil liquefaction and lateral spreading. A more detailed discussion of ground improvement techniques is included in the Geotechnical Report and in the mitigation measures described for construction activities above.

- Emergency operations and plant shutdowns: The facility would be designed for two levels of earthquakes—an OBE and an SSE.
  - The OBE is an earthquake to which the facility could be subjected during its design lifetime. All elements of the facility would be designed to withstand the OBE to allow the facility to remain operational thereafter.
  - The facility would be designed to prevent catastrophic failure of critical facilities during an SSE, the maximum considered earthquake ground motion per the definition in ASCE 7 Code and the IBC. Applicable ASCE 7 Code and IBC standards do not require a facility to remain operational following the event.
- Ground improvements would be installed to meet the seismic design criteria in 49 CFR Part 193. The ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading in an OBE or SSE. The LNG tank is the largest component of the facility. Ground improvement efforts would be concentrated at this location. A seismic base isolation system would be added under the LNG tank to address potential seismic events. Other portions of the facility, such as the process area and land adjacent to the Hylebos pier and TOTE Marine Vessel Fueling System, would also require ground improvement.
- Pipelines would be designed to withstand pressure greater than that which it normally carries. Design practices overseen by the Washington Utilities and Transportation Commission would limit the stress level to below 20 percent of the specified minimum yield strength for piping in the distribution system, resulting in a factor of safety of five, a level that is twice the most stringent federal requirement. In addition, although not required by state and federal regulations, PSE has adopted and would implement more frequent survey and inspection cycles for the high-pressure supply piping in its distribution system.
- Detailed pipeline records regarding construction and maintenance would be maintained by the applicant.
- To protect the pipelines against inadvertent excavation by third parties, which is the most frequent cause of pipeline damage, Washington law requires an excavator to call 811, a toll-free number, to have the pipe's location marked before any digging is attempted.
- During a tsunami event, operational staff at the Tacoma LNG Facility would be warned by the PEWS. The PEWS is a system of five pole-mounted sirens linked to a central control point at the City of Tacoma Fire and Emergency Communication Center. The PEWS sirens warn of natural hazards such as a tsunami in the immediate Port area and broadcast specific instructions and evacuation routes according to specific inundation zones (City of Tacoma 2014). Sirens are located throughout the Port area, including one location at the northwest end of the Blair-Hylebos peninsula where the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located (Port of Tacoma 2011). In addition, operations staff at the Tacoma LNG Facility would be educated by PSE on the *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013), which ensures that emergency operation and evacuation efforts in response to a tsunami follow FEMA's ICS/NIMS. Operations staff would also be educated by PSE on the *Port of Tacoma Evacuation Map*, which outlines primary and secondary evacuation routes from the Port for use in the event that a tsunami requires the evacuation of the Port area (City of Tacoma 2009).
- During a volcanic event, operational staff at the Tacoma LNG Facility would be warned by the PEWS. The PEWS is also compatible with the Pierce County Department of Emergency Management's Lahar Warning System, which is a larger network of 24 sirens located throughout the Puyallup River valley and includes portions of unincorporated Pierce County and the City of Fife, Washington (Pierce County

2010). Again, operations staff would also be educated by PSE on *City of Tacoma Comprehensive Emergency Management Plan* (City of Tacoma 2013) and *Port of Tacoma Evacuation Map* (City of Tacoma 2009).

3.1.7 Conclusion

The proposed Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling system would not result in substantial adverse impacts to area geology or groundwater. The planned development would also not exacerbate nearby preexisting environmental contamination.

Emergency shutdown protocols, precursory monitoring in the event of volcanic activity, and county-wide area alerts would be used in an emergency to minimize the effects of environmental or geologic hazards. Facility design and ground improvements would further mitigate the potential negative side effects of a seismic event during facility operation, including landslides, liquefaction, and flooding during tsunami. The Project would not exacerbate the local damage of these geologic hazards because of these site improvements.

The Project would not influence ongoing environmental remediation on nearby and adjacent parcels. Migration of subsurface contamination during construction and facility operation would be avoided with stringent compliance to a Construction Stormwater General Permit, a Stormwater Pollution Prevention Plan, a Materials Handling Plan, and an Industrial Stormwater General Permit.

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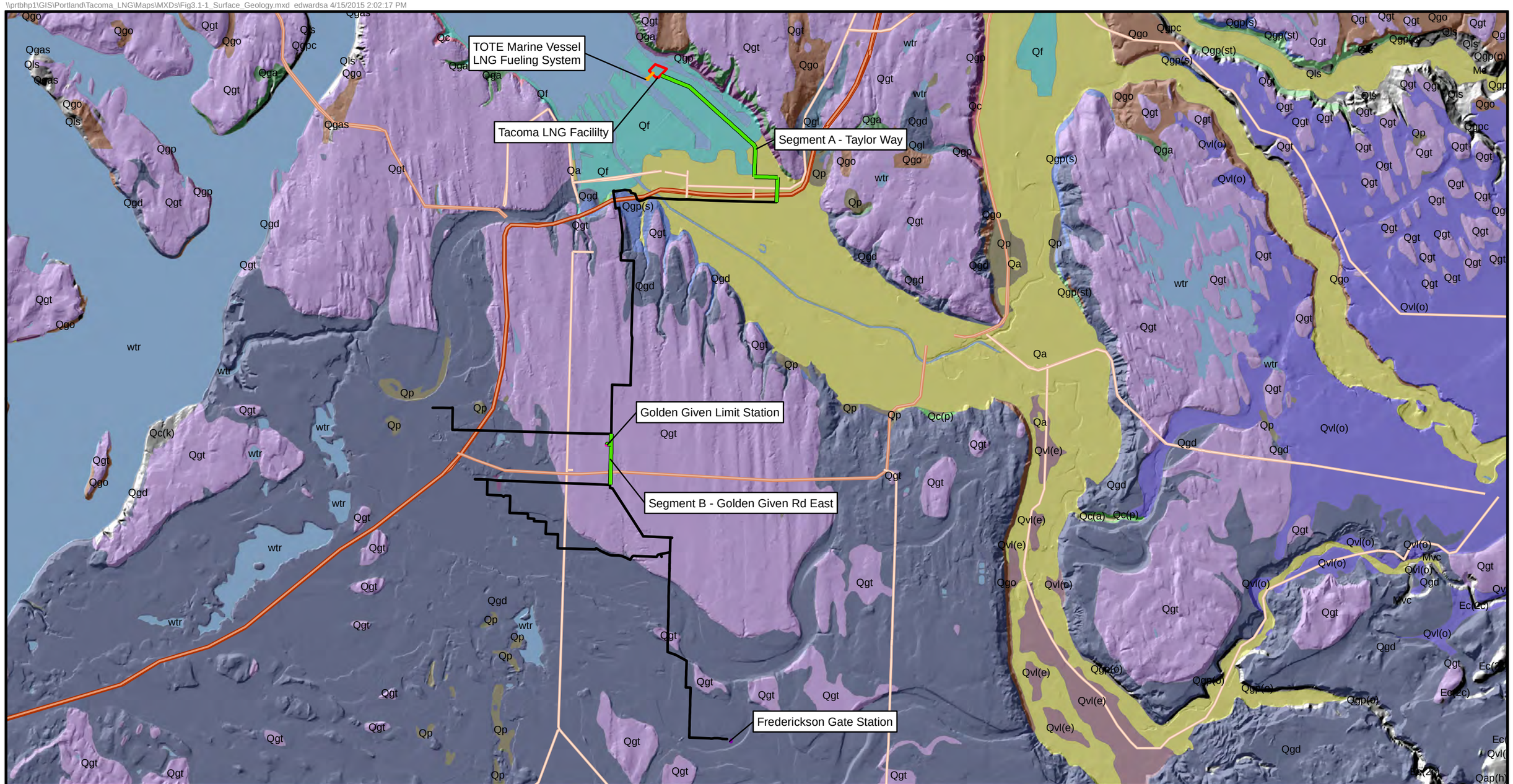
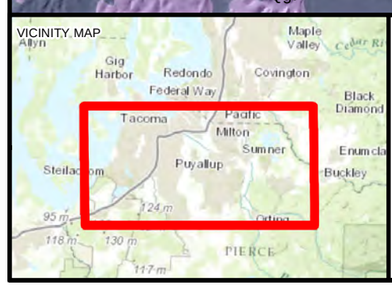




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Geologic Unit

Qa, Qc, Qc(a), Qc(p), Qf, Qga, Qgd, Qgl, Qgo, Qgp, Qgp(s), Qgp(st), Qgt, Qp, Qvl(e), Qvl(o), water, wtr

Notes:
1. The locations of all features shown are approximate.

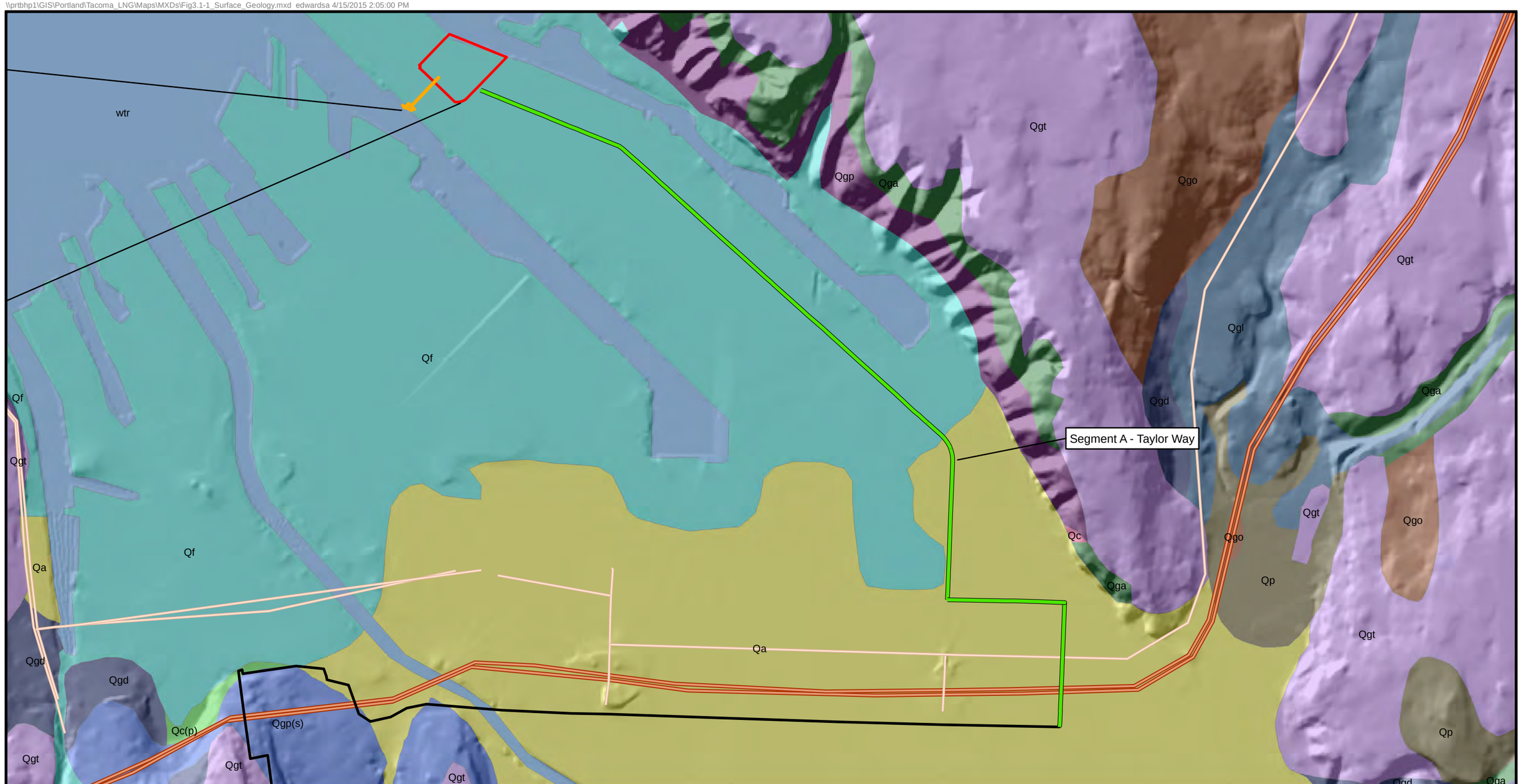
N W E S

0 10,000 20,000 Feet

City of Tacoma

Figure 3.1-1a
Surface Geology

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Geologic Unit

Qa	Qga	Qgp(st)
Qc	Qgd	Qgt
Qc(a)	Qgl	Qp
Qc(p)	Qgo	Qvl(e)
Qf	Qgp	Qvl(o)
	Qgp(s)	water, wtr

Notes:
1. The locations of all features shown are approximate.

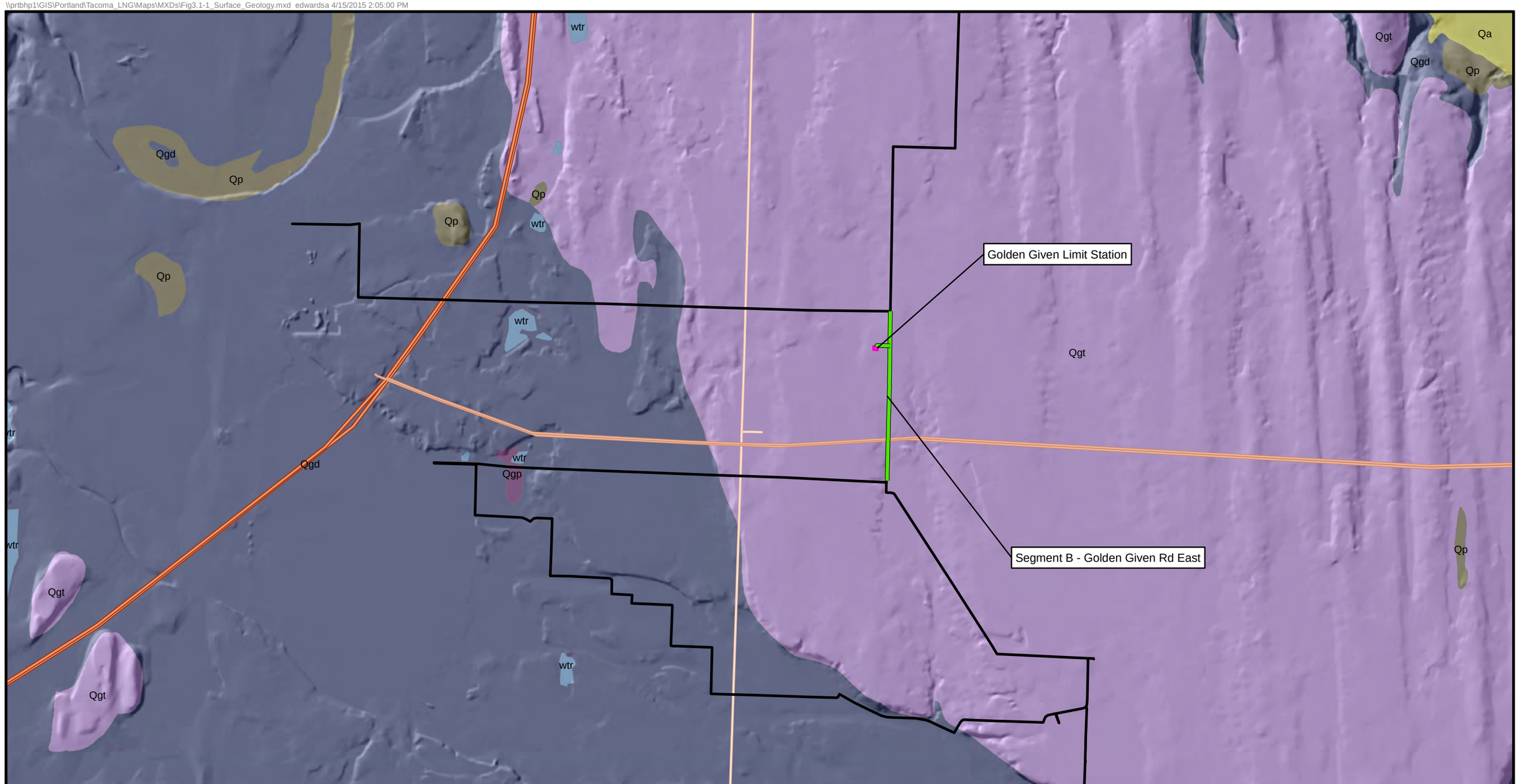
N W E S

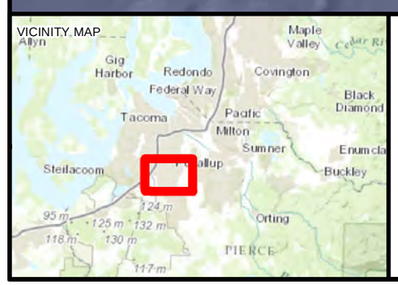
0 2,000 4,000 Feet

City of Tacoma

Figure 3.1-1b
Surface Geology

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Geologic Unit

- Qa
- Qc
- Qc(a)
- Qc(p)
- Qf
- Qga
- Qgd
- Qgl
- Qgo
- Qgp
- Qgp(s)
- Qgp(st)
- Qgt
- Qp
- Qvl(e)
- Qvl(o)
- water, wtr

Notes:
1. The locations of all features shown are approximate.

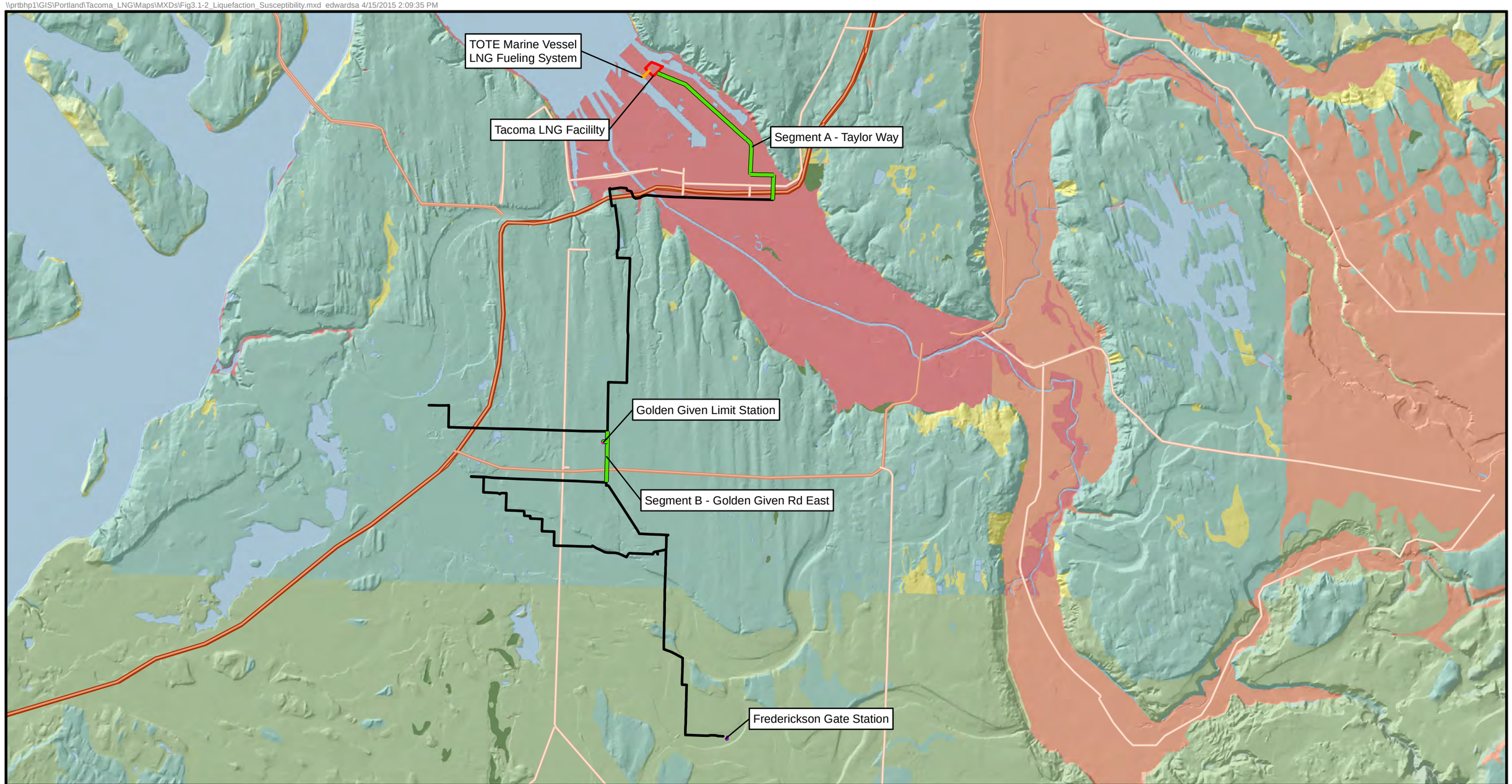
N W E S

0 3,000 6,000 Feet

City of Tacoma

Figure 3.1-1c
Surface Geology

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Liquefaction Susceptibility

- HIGH
- MODERATE to HIGH
- MODERATE
- LOW to MODERATE
- LOW
- VERY LOW to LOW
- VERY LOW
- N/A (bedrock)
- N/A (peat)
- N/A (water)
- N/A (ice)

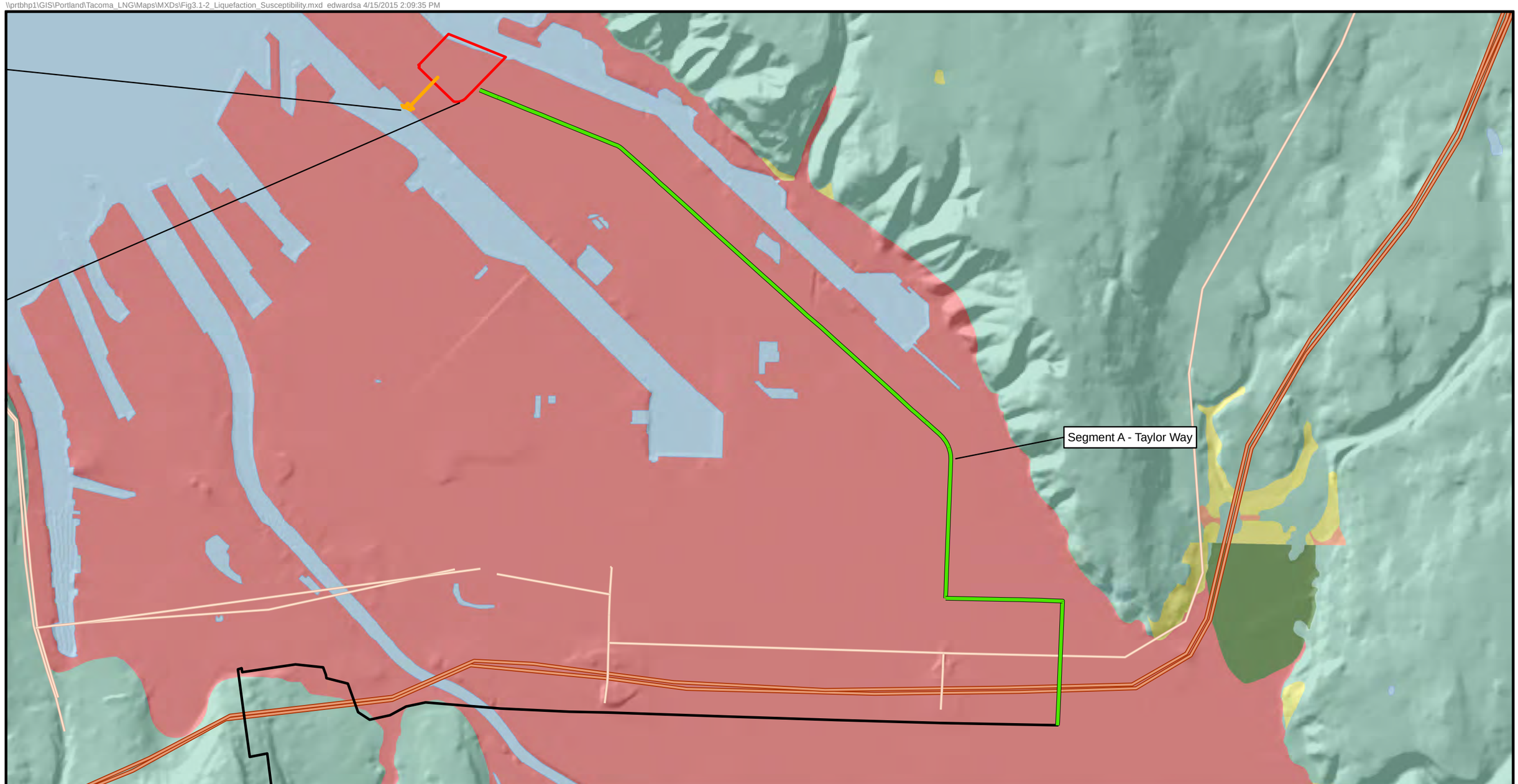
Notes:
1. The locations of all features shown are approximate.

N W E S

0 10,000 20,000 Feet

City of Tacoma

Figure 3.1-2a
Liquefaction Susceptibility
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Liquefaction Susceptibility

- HIGH
- MODERATE to HIGH
- MODERATE
- LOW to MODERATE
- LOW
- VERY LOW to LOW
- VERY LOW
- N/A (bedrock)
- N/A (peat)
- N/A (water)
- N/A (ice)

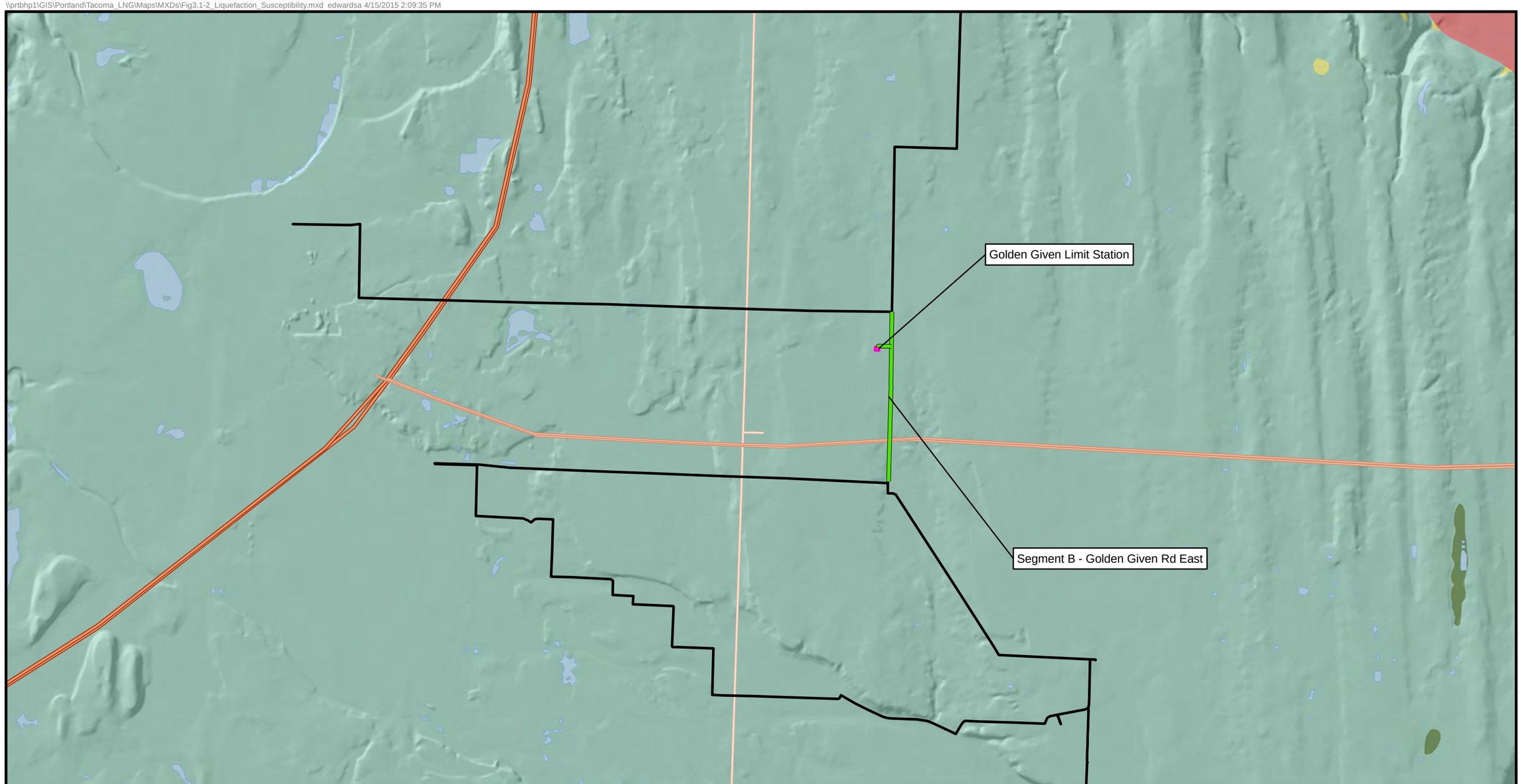
Notes:
1. The locations of all features shown are approximate.

N W E S

0 2,000 4,000 Feet

City of Tacoma

Figure 3.1-2b
Liquefaction Susceptibility
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- New Pipeline
- Existing Pipeline
- Tacoma LNG Facililty
- TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station

Liquefaction Susceptibility

- HIGH
- MODERATE to HIGH
- MODERATE
- LOW to MODERATE
- LOW
- VERY LOW to LOW
- VERY LOW
- N/A (bedrock)
- N/A (peat)
- N/A (water)
- N/A (ice)

Notes:
1. The locations of all features shown are approximate.

N W E S

0 3,000 6,000 Feet

City of Tacoma

Figure 3.1-2c
Liquefaction Susceptibility
Tacoma LNG Project

3.2 Air Quality

This section describes the existing air quality in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on air quality that may result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action).

3.2.1 Study Methodology

Air quality resources are affected by both natural conditions and human activities that may alter the levels of atmospheric emissions in an airshed. The proposed Project would be located within areas of the Port of Tacoma, the cities of Tacoma and Fife, and unincorporated Pierce County, which all lie within the Puget Sound airshed.

Potential air quality impacts could result from both construction and operation of the proposed Project. Air quality in the vicinity of the Project was analyzed on both a local and regional basis. Locally, impacts may occur in the general vicinity of the three Project components, as described in Chapter 2 (Description of the Proposed Action): the Tacoma LNG Facility, the Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System, and the improvements to the existing Puget Sound Energy (PSE) Natural Gas Distribution System. Because of the types and amounts of air emissions associated with the Proposed Action, impacts are analyzed primarily in this local Proposed Action area.

The study area for air quality lies within the Puget Sound region. On a regional level, the Proposed Action may have an overall positive impact on air quality due to the replacement of existing regional diesel combustion sources with new LNG sources. These effects are qualitatively assessed. In addition to the "criteria" air pollutants (described further in this section), greenhouse gas (GHG) emissions may also have effects that extend beyond regional boundaries. This section addresses the potential impacts on air quality that may result from the Proposed Action, including the direct impacts of emissions from air pollution sources, and the indirect impacts represented by the expected conversion of combustion sources from diesel to LNG throughout the region as a consequence of implementing the Proposed Action.

3.2.2 Regulatory Framework

This section provides an overview of the federal, state, and local agencies with jurisdiction over the Proposed Action area, and a summary of specific regulations that apply to aspects of construction and operation of the proposed Project.

3.2.2.1 Agency Jurisdiction

Three agencies have jurisdiction over the ambient air quality for the areas of the Port of Tacoma, cities of Tacoma and Fife, and Pierce County: the United States Environmental Protection Agency (EPA), Washington State Department of Ecology (Ecology), and Puget Sound Clean Air Agency (PSCAA). The primary regulatory agency responsible for air quality permitting and overseeing compliance of the Proposed Action is the PSCAA.

3.2.2.2 Air Quality Standards

EPA established National Ambient Air Quality Standards (NAAQS) to protect the public from air pollutants that have been proven harmful to public health and the environment. There are two types of NAAQS. Primary standards protect public health, including sensitive categories such as elderly, children, and asthmatics. Secondary standards protect animals, crops, vegetation, and buildings and are effective against degradation of visibility. Air pollutants regulated by the NAAQS are called "criteria" pollutants. Table 3.2-1 summarizes the current NAAQS. Current Washington State Ambient Air Quality Standards are established in the Washington Administrative Code (WAC) Title 173. Ecology adopted the NAAQS per WAC 173-476. The PSCAA enforces these standards and has also established a more stringent daily average goal for particulate matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$).

Table 3.2-1 Ambient Air Quality Standards

Pollutant	Averaging Period	National and Washington State Standards		Details
		Primary	Secondary	
Ozone (O_3)	8-hour[a]	0.075 ppm	0.075 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$)	Annual (Arithmetic Mean)	12.0 µg/m^3	15.0 µg/m^3	Annual mean, averaged over 3 years
	24-hour[a]	35 µg/m^3	35 µg/m^3	98th percentile, averaged over 3 years
Particulate Matter less than or equal to 10 micrometers in diameter (PM_{10})	24-hour	150 µg/m^3	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Carbon Monoxide (CO)	8-hour	9 ppm (10 mg/m^3)		Not to be exceeded more than once per year
	1-hour	35 ppm (40 mg/m^3)		Not to be exceeded more than once per year
Nitrogen Dioxide (NO_2)	Annual (Arithmetic Mean)	53 ppbv (100 µg/m^3)	53 ppb (100 µg/m^3)	Not to be above this level in a calendar year
	1-hour	100 ppbv		The 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor is not to be above this level
Sulfur Dioxide (SO_2)[b]	3-hour		0.5 ppm (1300 µg/m^3)	Not to be exceeded more than once per year
	1-hour	75 ppb		99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Lead (Pb)	Rolling 3-Month Average	0.15 µg/m^3	0.15 µg/m^3	Not to be exceeded

Source: EPA 40 CFR Part 50 (http://www.epa.gov.air/criteria.html) and WAC Chapter 173-476 (http://www.ecy.wa.gov/laws-rules/ecywac.html#air).

Notes:

[a] PSCAA has also established a health goal of 25 µg/m^3 on a daily average. The health goal is the $PM_{2.5}$ level that PSCAA would eventually like to achieve; however, it is not a standard like the NAAQS.

[b] "Sunset" provisions apply to the Annual and 24-hour SO_2 standards under WAC 173-476-130(1)(a) and (b). The Proposed Action area has been in attainment for over 1 year and therefore it is not subject to these standards.

Key:

µg/m^3 = micrograms per cubic meter
CFR = *Code of Federal Regulations*
mg/m^3 = milligrams per cubic meter
ppb = parts per billion
ppbv = parts per billion by volume
ppm = parts per million
PSCAA = Puget Sound Clean Air Agency
WAC = Washington Administrative Code

3.2.2.3 Attainment, Nonattainment, and Maintenance Areas

In order to implement the Clean Air Act, and to comply with the NAAQS through state implementation plans, Section 107 of the Clean Air Act calls for the establishment of Air Quality Control Regions (AQCRs), which can be intra- or interstate regions. Improving the air quality in one portion of an AQCR requires emission reductions throughout the AQCR. EPA, Ecology, and PSCAA maintain a network of air quality monitoring stations throughout Washington State, particularly the Puget Sound Intrastate Air Quality Control Region, to measure existing air quality and determine whether areas are designated as "attainment" or "nonattainment" areas for each NAAQS (criteria air pollutant). "Attainment" for a given pollutant indicates that the air quality in an area complies with the NAAQS for that pollutant.

If the area does not meet the NAAQS for a particular pollutant, EPA designates the area as "nonattainment" for that pollutant. For these areas, the state (Ecology and PSCAA) must develop a State Implementation Plan (SIP), for approval by EPA, to achieve attainment of the NAAQS. SIPs can include a wide variety of pollution control measures. When the air in a nonattainment area has been restored such that an applicable NAAQS is met, the area is redesignated as "maintenance" and requires a maintenance plan to ensure that ambient concentrations do not deteriorate back to nonattainment levels. Maintenance areas that continue to meet the standards for several years (usually at least 10 years) may be reclassified again as "in attainment."

The Proposed Action would occur in an area that is in attainment for all NAAQS except for $PM_{2.5}$. A map of the Tacoma-Pierce County Nonattainment Area, along with the component locations of the Proposed Action, is provided in Figure 3.2-1. Further discussion about the status of $PM_{2.5}$ in this area is provided in Section 3.2.3.2 (Existing Air Quality).

3.2.2.4 Conformity

The Conformity Rule requires a federal agency to demonstrate that every action it undertakes, approves, permits, or supports in nonattainment and maintenance areas conforms to an applicable SIP.

The Proposed Action is not a federal project, nor does it use any federal money. However, emissions from construction activities in a nonattainment or maintenance area that require a federal permit must be assessed under the General Conformity Rule. Section 404 (Clean Water Act) and Section 10 (Rivers and Harbors Act) permits issued by the United States Army Corps of Engineers for in-water work are the only federal permits required for the Proposed Action. Therefore, the General Conformity Rule would apply to only those construction activities and would not apply to the remaining construction activities associated with the Proposed Action.

3.2.2.5 Greenhouse Gas Emissions

In March 2008, the Washington legislature enacted House Bill 2815, which directed Ecology to develop rules for the mandatory reporting of GHG emissions by sources that emit more than certain specified threshold amounts. These rules are codified in WAC Chapter 173-441.

On December 7, 2009, EPA determined that the presence of six GHGs in the atmosphere endangers public health and public welfare and included them as contributors to air pollution: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

GHGs are ranked by their global warming potential (GWP). The GWP is based on the ability of a GHG to absorb solar radiation, as well as its residence time in the atmosphere, compared to CO_2. Thus, CO_2 has a GWP of 1, CH_4 has a GWP of 25, and N_2O has a GWP of 298. Emissions of GHGs are typically estimated as carbon dioxide equivalents (CO_2e). Estimates of individual GHGs are converted to CO_2e by multiplying each pollutant by its GWP relative to CO_2.

On November 8, 2010, EPA finalized reporting requirements for the petroleum and natural gas industry under 40 Code of Federal Regulations Part 98 Subpart W. This subpart was then amended on December 23, 2011. Subpart W requires petroleum and natural gas facilities that emit 25,000 metric tons or more of CO_2e per year to report annual emissions of specified GHGs from various processes within the facility. In addition, per WAC 173-441, any source that emits 10,000 metric tons of CO_2e per calendar year is required to report its GHG emissions to Ecology. Once a source is subject to the GHG reporting requirements, it must submit an annual GHG report, even if the source does not meet the applicability requirements in WAC 173-441-030(1) or (2) in a future year.

The document titled *Guidance for Ecology Including Greenhouse Gas Emissions in SEPA Reviews* (Ecology 2011) indicates that for projects emitting at least 10,000 metric tons of CO_2e per year, but less than 25,000 metric tons per year, a qualitative disclosure of GHG emissions is required under the Washington State Environmental Policy Act (SEPA). For projects emitting more than 25,000 metric tons per year, a quantitative disclosure of GHGs is required. The quantitative analysis should include GHG emissions from all

aspects of the project, including Scope 1 emissions (project direct), Scope 2 emissions (associated with purchased electricity), and Scope 3 emissions (which include construction emissions as well as new, ongoing transportation emissions associated with the project).

GHG pollutants associated with the proposed Project include CO_2, N_2O, and CH_4. Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are expected to have the potential to emit more than 10,000 metric tons of CO_2e per year, but less than 25,000 metric tons per year; therefore, only a qualitative disclosure of GHG emissions would be required. Emission estimates, including GHGs, related to construction and operation of the proposed Project are described in Section 3.2.4 (Potential Impacts of the Proposed Action).

3.2.2.6 Hazardous and Toxic Air Pollutants (Technology-based Regulation)

The United States Congress amended the federal Clean Air Act in 1990 to address a large number of air pollutants that are known to cause or may reasonably be anticipated to cause adverse effects on human health or adverse environmental effects. A total of 188 specific pollutants and chemical groups were initially identified as hazardous air pollutants (HAPs), and the list has been modified over time.

Section 112 of the Clean Air Act governs the federal control program for HAPs. National emissions standards for hazardous air pollutants (NESHAPs) are issued to limit the release of specified HAPs from specific industrial sectors. These standards are “technology-based,” meaning that they represent the maximum available control technology currently used in that industrial sector. For many of the NESHAP standards, EPA is currently evaluating risk to public health and may revise those standards, as required by the federal Clean Air Act. It is expected that NESHAPs may apply to some tanks, flares, and emergency engines at the Tacoma LNG Facility. An evaluation of NESHAP applicability and standards will be made during the permitting process, when more specific equipment design details are known. The Clean Air Act does not require the establishment of air quality standards for HAPs that define legally acceptable concentrations of these pollutants in ambient air.

Toxic air pollutants (TAPs) are listed in WAC 173-460-150. The term TAP may include particulate matter and volatile organic compounds (VOCs) if an individual substance or a group of substances within either of these classes is listed in WAC 173-460-150. The purpose of WAC 173-460, Controls for New Sources of Toxic Air Pollutants, is to establish the systematic control of new or modified sources emitting TAPs in order to prevent air pollution, reduce emissions to the extent reasonably possible, and maintain such levels of air quality as would protect human health and safety. Project emission estimates for HAPs and TAPs are described below in Section 3.2.4 (Potential Impacts of the Proposed Action).

3.2.2.7 Air Quality Permitting Requirements

New Source Review

New source review (NSR) refers to the preconstruction permitting programs under Parts C and D of the Clean Air Act required for the construction and operation of any new stationary source to confirm compliance with applicable ambient air quality standards and emission standards, as well as to confirm that appropriate control technologies are employed. The program under which a new source or modification is reviewed depends on the type and quantity of the potential air emissions associated with the new source or modification. The Proposed Action would likely only be subject to NSR requirements for minor sources that are administered by PSCAA.

Notice of Construction and Order of Approval

Before actual construction of a new facility can begin, the applicant must obtain approval from the permitting agency (PSCAA) confirming that the NSR process is completed and a preconstruction permit or permit to construct obtained. A Notice of Construction (NOC) application must be filed and an Order of Approval obtained from the applicable clean air agency—in this case, PSCAA.

The State of Washington air permitting requirements are codified under WAC 173-400-110, 173-400-700, and 173-401. The responsible local clean air agency regulations are PSCAA Regulation 1, Articles 5 and 6. These regulations incorporate federal permitting program requirements and establish permit review procedures for all facilities that can emit regulated pollutants to the ambient air.

PSCAA Regulation 1, Section 6.03 states that it is unlawful for any person to cause or allow the establishment of a new source, or the replacement or substantial alteration of control equipment installed on an existing source, unless an NOC application has been filed and an Order of Approval has been issued by the agency.

NOC permits are required for a variety of stationary air contaminant generating equipment and air pollution control equipment. Agency Regulation I Section 6.03 also discusses which types of equipment require permits as part of the NOC process. All nonexempt emission units must go through a technology review to determine Best Available Control Technology for criteria, and TAP emissions. The facility must also estimate emissions from the affected units and determine if the ambient impacts resulting from those emissions are acceptable.

Other PSCAA Requirements

In addition to the NOC requirements, PSCAA Regulation 1 Sections 9.03, 9.07, 9.09, 9.11, 9.13, 9.15, and 9.20 address fugitive dust, visible emissions, odor, and concealment. PSCAA regulations require that persons use reasonable precautions to prevent particulate matter emissions from becoming airborne, including (but not limited to) the use of water or chemicals for dust suppression.

3.2.3 Affected Environment

3.2.3.1 Local Climate and Meteorological Conditions

The Cascade Mountain range divides the state of Washington into two major climatic regions: the Western Washington climatic region and the Eastern Washington climatic region. Each region comprises several districts (NOAA 1985).

The Project would be located in the Puget Sound-Lowlands climate district of the Western Washington climatic region. Variations in the temperature, length of the growing season, fog, rainfall, and snowfall in the district are due to such factors as distance from the sound, the rolling terrain, and air from over the ocean reaching this area through the Strait of Juan de Fuca and the Chehalis River valley. Occasionally, in the winter, cold air from the interior of Canada flows southward through the Fraser River canyon and over the northern Puget Sound lowlands.

Precipitation in the area of the Proposed Action is frequent during late fall and winter, with light rainfall in the summer. The average annual precipitation is approximately 43.5 inches. Approximately 75 percent of the annual precipitation occurs from October to March. According to the NOAA National Climatic Data Center (NOAA 2015), climate summaries collected for the Tacoma region are as follows: average maximum temperature = 59.1 degrees Fahrenheit (2000–2013); average minimum temperature = 42.5 degrees Fahrenheit (2000–2013); average annual precipitation = 43.5 inches (1901–2012).

A wind rose for the three-year period of January 1, 2011, through December 31, 2013, is presented in Figure 3.2-2. The wind rose is based on data collected by a sonic anemometer located at the Tacoma tideflats. The wind rose can be created using a tool located on the PSCAA web site: (http://airgraphing.pscleanair.org/) (PSCAA 2015). On an annual basis, this site shows bimodal winds, primarily from east southeast and west northwest. This is likely a localized effect corresponding to general onshore and offshore flow through Commencement Bay, and topographical features to the north of the site (west northwest to east southeast ridge).

3.2.3.2 Existing Air Quality

The Project components would be located within the Tacoma-Pierce County nonattainment area for $PM_{2.5}$ (see Figure 3.2-1). EPA and Ecology are in the process of redesignating this as a maintenance area after monitoring data demonstrated that the NAAQS for $PM_{2.5}$ had been consistently met. The proposed maintenance plan for $PM_{2.5}$ includes an enhanced burn ban enforcement/outreach, removal of uncertified wood stoves (supported by legislation passed in 2012), solid fuel burning regulatory updates (legislation in 2012 and 2013), and plans to limit/reduce on-road vehicle emissions.

Ecology submitted a redesignation request and maintenance plan to EPA as a revision to the SIP. In the December 11, 2014, *Federal Register*, EPA proposed to redesignate to "attainment" the entire Tacoma-Pierce County Nonattainment Area for the 2006 24-hour $PM_{2.5}$ NAAQS. EPA is also proposing to approve as a revision to the SIP the associated maintenance plan that provides for continued compliance of the 24-hour $PM_{2.5}$ NAAQS.

In general, agencies conduct air quality monitoring in areas where there is a potential for concern from a specific pollutant. There are currently two PSCAA monitoring stations for $PM_{2.5}$ in the Tacoma area. The maximum 98th percentile $PM_{2.5}$ value, averaged over the last three years (2012 through 2014), was 29 micrograms per cubic meter ($\mu g/m^3$) at the Alexander Avenue station and 23 $\mu g/m^3$ at the L Street station. These are both below the standard of 35 $\mu g/m^3$. No other ambient air pollutant monitoring is conducted in the Tacoma area; therefore, the concentrations of other criteria pollutants in this area are expected to be well within air quality standards.

3.2.3.3 Existing Sources of Air Emissions in the Proposed Action Area

The Port of Tacoma is a major center for container cargo, bulk, breakbulk, autos, and heavy-lift cargo. Existing sources of air pollutant emissions in the area associated with the transportation of cargo are on-road and nonroad sources. On-road emissions include emissions from vehicles such as cars and trucks, with nearby Interstate 5 being a significant contributor. Nonroad sources of emissions include emissions from sources such as marine vessels (including ocean freighters and harbor vessels such as tugs), cargo handling equipment, railroad locomotive operations, and heavy-duty, off-road vehicles. Air pollutant emissions from these on-road and nonroad sources include criteria pollutants, HAPs, TAPs, and GHGs (all described above) from the combustion of fossil fuels and from fugitive releases.

Vessel emissions from sources within the vicinity of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System include the existing TOTE Terminal and the Washington United Terminal. Also in the vicinity of the Proposed Action are a refinery, U.S. Oil & Refining Company; a Kraft pulp mill, formerly known as Simpson Tacoma Kraft Company, LLC, but recently purchased by Rock Tenn; and other industrial facilities that generate emissions of criteria pollutants, HAPs, TAPs, and GHGs from the combustion of fossil fuels, most commonly in boilers and heaters. Ecology maintains an air pollutant emission inventory that includes permitted point sources within the state, along with other source types such as motor vehicles, wood stoves, outdoor burning, agriculture, and natural sources (Ecology, not dated).

The Tacoma LNG Facility site itself covers approximately 34.7 acres consisting of four separate parcels. The parcels currently contain a gravel pad and an empty naval building that is sometimes used for container storage. Current emissions from the site result from mobile sources used to move the containers around; these emissions are relatively minor and sporadic in nature.

3.2.4 Potential Impacts of the Proposed Action

The proposed Project would consist of the following main components:

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System.

- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 1-2 in Chapter 1 (Purpose, Need, and Alternatives Considered).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments, the new Golden Given Limit Station, and an upgrade to the existing Frederickson Gate Station.

For a detailed description of the Proposed Action, refer to Chapter 2 (Description of Proposed Action). The Proposed Action area encompasses all three components of the proposed Project. Construction of the Proposed Action would result in short-term air quality impacts over the assumed buildout period (see Section 3.2.4.1 [Construction Impacts]). Operation of the Tacoma LNG Facility would result in an increase in emissions at the site. Operations impacts are discussed in Section 3.2.4.2 (Operations Impacts).

The Tacoma LNG Facility and the adjacent TOTE Marine Vessel LNG Fueling System would be located at the Port of Tacoma. The modifications to the PSE Natural Gas Distribution System would occur at the Port of Tacoma as well as surrounding areas, including the cities of Tacoma and Fife, and unincorporated Pierce County. The only air emissions associated with these ancillary modifications would be due to construction.

In general, replacing a diesel propulsion engine with a pure LNG propulsion engine creates an emission reduction for nitrogen oxides, particulate matter both 2.5 and 10 microns in diameter, sulfur oxides, and CO_2 (The Glosten Associates 2010). The use of LNG produced by the proposed Project, instead of diesel, in trucks and marine vessels, is expected to result in an overall decrease in emissions of these pollutants in the Puget Sound region, where this fuel would eventually be combusted.

3.2.4.1 Construction Impacts

Construction of the Project would generate air emissions temporarily from construction activities over a four-year period. Air quality may be degraded on a short-term basis while construction is taking place. During construction, PSE would implement emission control measures specified by Ecology and PSCAA guidelines and regulations to reduce impacts associated with construction, as described above in Section 3.2.2.7 (Air Quality Permitting Requirements).

This section describes the following impacts from general construction activities:

- Site preparation, including clearing, grading, trenching, excavation of footings and foundations, and backfilling operations;
- Combustion in fuel-burning equipment and vehicles;
- Fugitive dust associated with travel on paved and unpaved roads;
- Foundation work;
- Installation of pipeline/major equipment; and
- Right-of-way restoration.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Air emissions from the construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be ongoing during the approximately four-year construction period. Construction is expected to begin in the third quarter of 2015 and would include construction of the pier and docking facilities and construction and installation of buildings and equipment, including the new substation.

Construction emissions related to the site would result from combustion of fuel burning equipment and vehicles, and from fugitive dust associated with site preparation, grading, and travel on the access road. Appendix D contains estimated emission data from the construction of the Tacoma LNG Facility and TOTE

Marine Vessel LNG Fueling System, including footnotes with assumptions and references for emission factors. Pollutant emissions were calculated using conservative assumptions for equipment scheduling and usage, along with standard EPA and Washington State–approved emission factors. Table 3.2-2 provides a summary of the estimated emissions for each year in tons per year and a comparison to the federal de minimis levels for conformity.

Table 3.2-2 Estimated Construction Emissions from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Equipment	NO_x (tpy)	CO (tpy)	SO_2 (tpy)	VOC (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)	CO_2e (tpy)
Year 1							
Construction Equipment	11.5	6.84	0.43	1.07	0.88	0.88	2,074
Road Vehicles/Commuting	0.02	0.004	2.13E-05	7.29E-04	1.10E-03	9.88E-04	2.55
Fugitive Dust					8.29	0.83	
Year 2							
Construction Equipment	15.8	8.92	0.11	2.02	1.31	1.31	3,791
Road Vehicles/Commuting	0.36	1.54	4.03E-03	2.86E-02	2.94E-02	1.94E-02	225
Fugitive Dust					0.73	0.18	
Year 3							
Construction Equipment	11.1	6.24	0.02	1.54	0.93	0.93	2,920
Road Vehicles/Commuting	0.30	1.96	5.66E-03	3.03E-02	3.06E-02	1.70E-02	305
Fugitive Dust					1.08	0.26	
Year 4							
Construction Equipment	5.74	3.27	0.01	0.84	0.48	0.48	1,703
Road Vehicles/Commuting	0.008	0.002	1.23E-05	3.34E-04	4.72E-04	4.08E-04	1.50
Fugitive Dust					8.83E-04	2.17E-05	
Total	**44.8**	**28.8**	**0.58**	**5.53**	**13.8**	**4.91**	**11,021**
Federal De Minimis Levels for Conformity	**100**	**100**	**100**	**100**	**100**	**100**	

Key:
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
NO_x = oxides of nitrogen
PM_{10} = particulate matter up to 10 microns in diameter
$PM_{2.5}$ = particulate matter up to 2.5 microns in diameter
SO_2 = sulfur dioxide
VOC = volatile organic compound

Only a subset of the Proposed Action requires federal permits and thus is subject to the Conformity Determination (see Section 3.2.2.4 [Conformity]). Emission estimates include construction activities for in-water Project facilities proposed on both the Hylebos and Blair waterways that would have federal permits are clearly at or below de minimis levels (stated in 40 Code of Federal Regulations Part 93.193), so the construction activities with federal permits would conform with the SIP.

Pipeline and Associated Facilities

Potential air pollutant emissions related to the construction of the two new pipeline segments, new limit station, and modifications to the existing gate station include the following:

- Emissions from fuel-burning construction equipment and vehicles,
- Fugitive dust emissions from site preparation, trenching, and backfilling, and
- Fugitive dust emissions from travel of vehicles/equipment on paved and unpaved roads.

As discussed in Chapter 2, the proposed new pipeline segments would be located within existing road rights-of-way, and vegetation clearing would not be required. Excavated material from trenching would be removed (no stockpiling). The new limit station would be constructed entirely within a previously developed parcel; no previously undisturbed area would be developed, and no additional construction workspace would be required. As a result of these existing developed site characteristics, fugitive dust emissions are expected to be small. In addition, standard pollutant minimization and mitigation measures (as described below in Section 3.2.6.1 [Construction]) would be implemented to further reduce potential emissions from both combustion and fugitive sources.

Based on the short-term and transitory nature of these construction emissions, the segment and station locations and existing conditions, and the implementation of emission controls, the impacts on air quality of emissions from construction of the pipelines, limit station, and gate station are expected to be less than significant. Therefore, emission estimates have not been calculated for pipeline or station construction.

3.2.4.2 Operations Impacts

Some air pollutant emissions would result from long-term operation of the Project. Operations include the following LNG processes:

1. Pretreatment: Impurities are cleaned from the pipeline gas, and these compounds are sent to the enclosed ground flare. The ground flare combusts any of the volatile organics present to CO_2 and water, and converts the hydrogen sulfide, mercaptans, and other sulfur compounds into sulfur dioxide and other sulfur oxides
2. Liquefaction and LNG storage: Natural gas is liquefied using a single mixed refrigerant and a series of heat exchangers, and stored in a single LNG storage tank that maintains cryogenic temperatures.
3. LNG fuel transfer facilities: Cryogenic pipelines to transfer LNG fuel from the storage tank to both the pier on the Hylebos Waterway for direct marine fueling or barge fueling and the TOTE dock on the Blair Waterway for direct marine fueling of TOTE vessels, and a cryogenic line to a truck loading area to deliver LNG to tractor-trailer trucks for land-based delivery of fuel to other areas.
4. Vaporization: When needed, LNG can be converted back to natural gas through vaporization (heating the LNG) and reinjection into the PSE distribution system.[2]
5. Fuel Transfer Support Operations: Other specific components to support fuel transfer operations including a meter station, boil-off gas compressor, enclosed ground flare system, and emergency flare.
6. Support Facilities: Other specific components needed to support the process facilities, including control systems, safety systems, other buildings, electrical systems, and other utilities and firewater systems (included in these systems is an emergency flare and a backup diesel generator).

These processes are described in greater detail in Chapter 2.

Of these processes, emissions would primarily result from the pretreatment process, the enclosed ground flare system, fugitive emissions from any processes, and refrigerant losses from the liquefaction and

[2] Only one pipeline would convey natural gas to and from the Tacoma LNG Facility, so when the vaporization and reinjection system is operating the LNG liquefaction system would be shut down because the two systems cannot operate concurrently.

storage, transfer, vaporization, and support facilities. Emissions could also result on a more sporadic basis from the emergency flare, the LNG vaporizer, and the emergency diesel generator. The overall purpose of the Proposed Action is, in part, to construct and operate a facility with the capability to supply fuel for marine, land transportation, and other potential industries in the Pacific Northwest, that is cleaner (i.e., has fewer air emissions) than traditional fuels used by these industries.

The potential emissions for the Tacoma LNG facility and TOTE Marine Vessel LNG Fueling System are presented in Table 3.2-3. At the bottom of the table, the total emissions are compared to Prevention of Significant Deterioration (PSD) and Title V applicability thresholds. Pollutant emissions were calculated using conservative assumptions for equipment and operations, along with standard EPA and Washington State–approved emission factors. Detailed calculations are provided in Appendix D, including footnotes with assumptions and references for emission factors.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Air pollutant emissions would result from the long-term operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. Emission estimates for the sites assume that the facilities would operate 365 days per year. Actual operation of the sites would be closer to 350 days per year because of scheduled downtime for maintenance activities. Emissions were estimated for emission units at the pretreatment plant and terminal. Emission estimates for fugitive VOCs include emissions from storage tanks, flanges, valves, pumps, and other equipment sources.

On-road Emissions

The Tacoma LNG Facility would have the capability to deliver LNG to tractor-trailer trucks for land-based delivery of the fuel to other areas. The emissions from this part of the process are fugitive emissions from leaks, valves, pump seals, connectors, and other equipment sources, which are included in the emission estimates for the facility provided in Table 3.2-3.

A majority of the tanker truck deliveries of LNG would likely be to industrial facilities in the region, and a significant proportion of those deliveries would be to sources that have elected to use LNG instead of diesel.

Nonroad Emissions

The Proposed Action would not affect locomotive emissions, as these sources are not utilized by the facility, nor are they affected by the potential fuel change to LNG. The Proposed Action also has the potential to reduce emissions from vessels calling at existing facilities, by replacing the use of marine diesel in the vessel engines with LNG. The potential emission reductions are not included in these emission estimates.

Table 3.2-3 Potential Emissions for Tacoma LNG and TOTE Marine Vessel LNG Fueling System

	Potential to Emit (ton/year)									
Description	**PM_{10}**	**$PM_{2.5}$**	**NO_X**	**CO**	**SO_2**	**VOC**	**H_2SO_4**	**TAPs[a]**	**HAPs**	**CO_2e (metric)**
Tacoma LNG Emission Sources										
Pretreatment Heater	0.28	0.28	1.36	2.75	0.03	0.79	1.52E-03	4.14	6.90E-02	3,952
Enclosed Ground Flare (pilot and vent gas)	0.46	0.46	6.32	12.8	5.45	7.23	2.73E-01	24.6	2.75E-01	14,654
Emergency Flare (pilot)	0.02	0.02	0.19	0.39	0.002	0.11	9.21E-05	0.58	4.17E-03	181
LNG Vaporizer (Backup)	0.11	0.11	0.52	1.05	0.01	0.30	5.80E-04	1.59	2.64E-02	981
1,600-kW Emergency	0.18	0.18	5.36	3.09	0.01	0.28	-	8.65	5.90E-03	614

Table 3.2-3 Potential Emissions for Tacoma LNG and TOTE Marine Vessel LNG Fueling System

	Potential to Emit (ton/year)									
Description	**PM_{10}**	**$PM_{2.5}$**	**NO_X**	**CO**	**SO_2**	**VOC**	**H_2SO_4**	**TAPs[a]**	**HAPs**	**CO_2e (metric)**
Diesel Generator										
Total[b]	**1.03**	**1.03**	**13.8**	**20.1**	**5.50**	**8.72**	**0.27**	**39.6**	**0.38**	**20,381**
Fugitives										
Tacoma LNG Facility and TOTE Fueling System	-	-	-	-	-	2.89E-03	-	-	-	51.2
Refrigerant losses	-	-	-	-	-	77.0	-	-	-	318
Total						**77.0**				**369**
Total for Permit (Emission Units and Fugitives)	**1.03**	**1.03**	**13.8**	**20.1**	**5.50**	**85.7**	**0.27**	**39.6**	**0.38**	**20,751**
Significant Emission Rate	40	100	40	15	10	40	7	N/A	N/A	N/A
PSD Applicability	250	250	250	250	250	250	250	N/A	N/A	N/A
Exceeds PSD threshold?	NO	NO	NO	NO	NO	NO	NO	N/A	N/A	N/A
Title V Applicability	100	100	100	100	100	100	100	NA	10 individual or 25 combined	100,000
Exceeds Title V threshold?	NO	NO	NO	NO	NO	NO	NO	NA		N/A

Notes:
[a] TAP emissions include emissions of NO_2, CO, SO_2, and diesel particulate matter.
[b] Total is conservative, since the value includes the liquefaction process operating 8,760 hours per year and the vaporization process operating 1,000 hours per year. In actuality, the two processes cannot operate at the same time.
Note: Emissions are based on data provided by Chicago Bridge and Iron on September 9, 2013, and would be refined in the future. The emission estimates in this table are based on conservative assumptions.
Key:
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
H_2SO_4 = sulfuric acid
HAP = hazardous air pollutant
kW = kilowatt
LNG= liquefied natural gas
N/A = not applicable
NO = nitric oxide
NO_2 = nitrogen dioxide
NO_X = oxides of nitrogen
PM_{10} = particulate matter up to 10 microns in diameter
$PM_{2.5}$ = particulate matter up to 2.5 microns in diameter
PSD = Prevention of Significant Deterioration
SO_2 = sulfur dioxide
TAP = toxic air pollutant
VOC = volatile organic compound

As stated above, Table 3.2-3 indicates that, based on the potential emissions from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, the Proposed Action would not be subject to PSD nor to Title V permitting, but would be required to get an NOC permit from PSCAA.

Greenhouse Gas Emissions

As shown in Table 3.2-3, the Proposed Action would emit more than an estimated 20,000 metrics tons of CO_2e per year and thus would be subject to GHG reporting requirements, per WAC 173-441. An annual GHG report must be submitted to Ecology each year even if the source does not meet applicability requirements in WAC 173-441-030(1) or (2) in a future year.

3.2.4.3 Summary of Potential Impacts

Based on the estimated emissions, the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would need to prepare and submit an NOC application to PSCAA for a facility air permit. As part of the permit application process, ambient impact modeling would be conducted for each TAP that exceeds its respective small quantity emission limits, as defined in WAC 173-460 WAC, to determine if the impacts are below acceptable levels. No criteria pollutant modeling is expected to be required as part of permitting.

Operating emissions would be negligible from the two new pipeline segments and the limit and gate stations. Only extremely small emissions are expected from the valves and fittings; impact assessments from these sources are not expected to be required.

3.2.4.4 Decommissioning Impacts

Decommissioning of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System at the end of its useful life would generate impacts similar to those discussed in Section 3.2.4.1 (Construction Impacts). Potential impacts associated with decommissioning activities would result from combustion in fuel burning equipment and vehicles; fugitive dust associated with demolition, removal of material, grading, and travel on the access road. Regulated pollutant emissions associated with decommissioning include criteria pollutants, HAPs/TAPs, and GHGs. However, with the continual improvements in engine technology, it is not possible at the present time to specifically predict emissions from construction equipment and activities 50 years into the future when the decommissioning activities may occur. The emissions from decommissioning would be temporary and are not anticipated to have any long-term impacts.

3.2.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and Proposed Action–related impacts to air quality would not occur. However, a new and consistent supply of cleaner fuel with fewer air emissions than traditional fuels, as would be provided by the Proposed Action for marine and land transportation, would remain unavailable in the Proposed Action area. Further, the peak shaving capability of the Proposed Action would be unavailable to augment natural gas service to PSE customers.

3.2.6 Avoidance, Minimization, and Mitigation

3.2.6.1 Construction

Because of their temporary nature, construction emissions would not have a long-term impact on ambient air quality, and PSE's implementation of its proposed emission control measures, as well as other measures specified by the PSCAA, would reduce impacts associated with construction emissions to less than significant levels.

In its construction contracts, PSE would require its contractors to employ standard dust control measures during construction to reduce generation of fugitive dust from surface disturbance. Dust control measures may include the following:

1. Multiple applications of water during grading.
2. Paving, chip sealing, or chemical stabilization of internal roadways after completion of grading.
3. Reduction of speeds on unpaved roads to 15 miles per hour or less.
4. Use of sweepers or water trucks to remove "track-out" at any point of public street access.
5. Stabilization of dirt storage piles by chemical binders, tarps, fencing, or other erosion control.

PSE would also require its contractors to implement the following measures to reduce emissions from vehicles and construction equipment during construction:

- Properly maintain construction equipment in accordance with manufacturers' specification or standard practices;
- Encourage carpooling by construction workers; and
- Limit truck idling to the extent practicable.

3.2.6.2 Operations

As stated above, PSE would prepare and submit an NOC application to PSCAA for an air permit (Order of Approval) for the facility. During review of the NOC application, PSCAA would conduct a detailed review of applicable regulatory requirements, emissions, impacts, and potential mitigation measures. The Tacoma LNG facility would likely implement the following mitigation measures to reduce the potential for air quality impacts during operations:

- Ultra-low sulfur diesel would be used in the emergency generator,
- Best Available Control Technology would be implemented as required by local rules, and
- A leak detection and repair program for fugitive VOC emissions would be implemented.

3.2.7 Conclusion

No significant or unavoidable adverse air quality impacts would be anticipated as a result of the Proposed Action.

Construction and operation of the proposed Project would contribute new criteria pollutant, HAP/TAP, and GHG emissions sources at the facility site. However, the Proposed Action would result in a net reduction in some pollutant emissions regionally by displacing the use of liquid fuels in marine vessels and diesel trucks.

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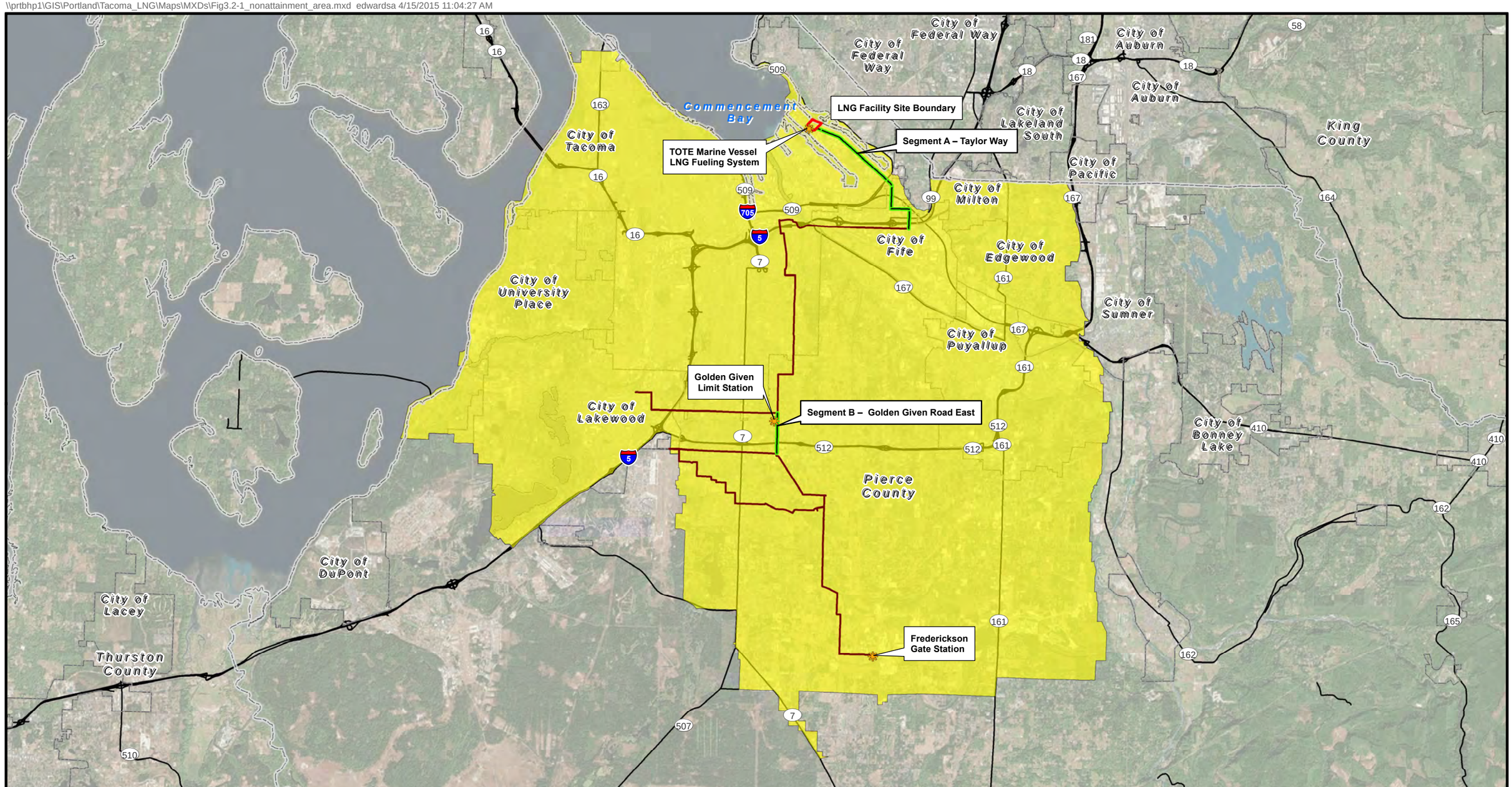


Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Pierce County Nonattainment Area for Particulate Matter
- Proposed Action Components
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary
- County Boundary
- Highway

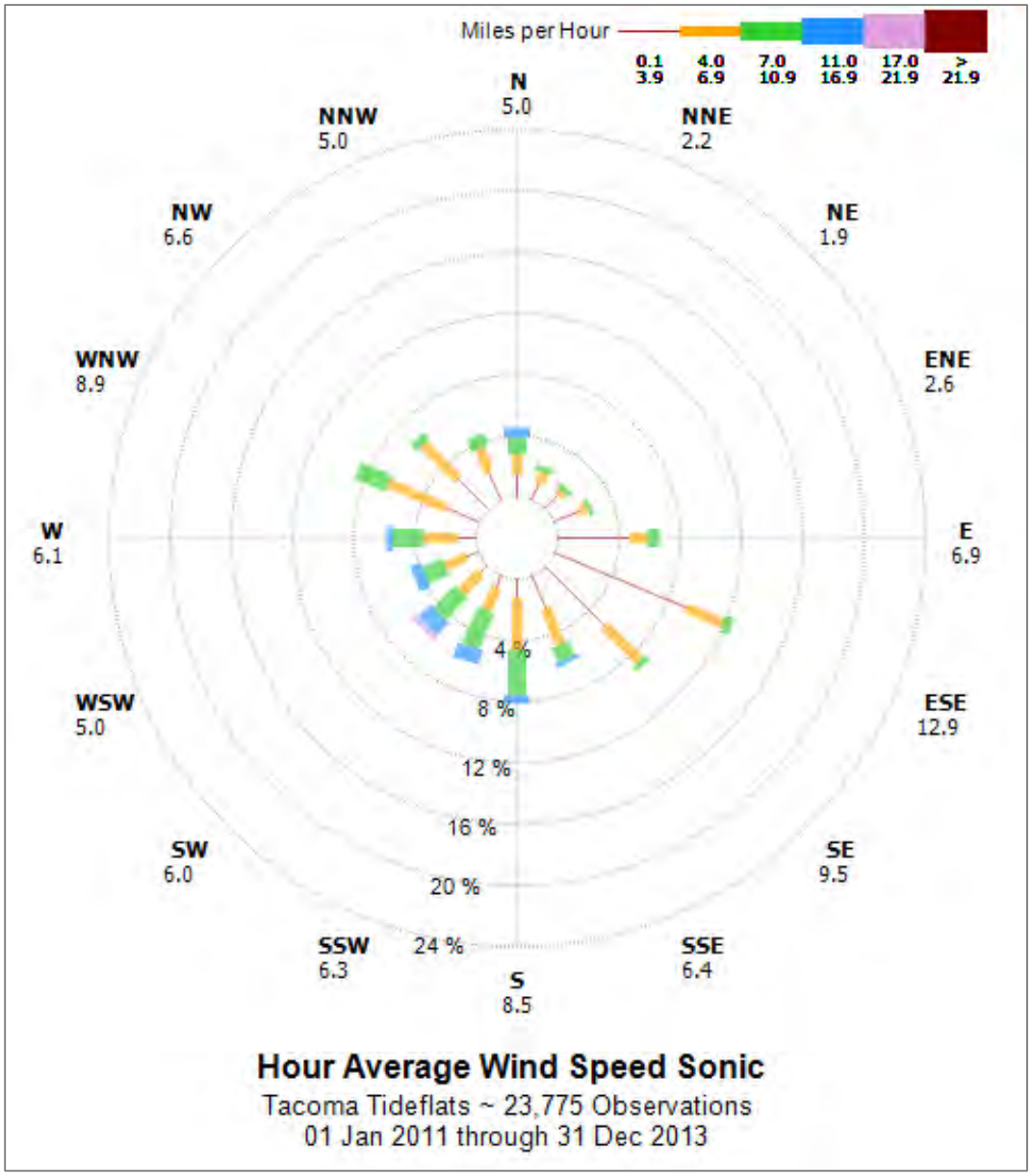
N W E S

0 1 2 Miles

City of Tacoma

Figure 3.2-1
Fine Particulate Nonattainment Area in Tacoma and Pierce County
Tacoma LNG Project

FIGURE 3.2-2
Tacoma Tideflats Wind Rose



3.3 Water

This section describes existing surface and groundwater resources in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on surface and groundwater quantity and quality that could result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action).

3.3.1 Study Methodology

The study methodology for water combined desktop reviews of existing information resources with field data collection and survey activities. Information about surface water (i.e., waterbodies and wetlands), floodplain, stormwater, and groundwater in and surrounding the Proposed Action area was collected from the following resources during the desktop review:

- Pacific Northwest Hydrography Framework (PNWHF 2011);
- National Wetland Inventory (USFWS 2014);
- Pierce County Wetland Inventory (Pierce County 2006);
- Washington Department of Ecology Environmental Information Management database and well logs (Ecology 2012);
- Washington Department of Health (DOH), Drinking Water Division Sentry Internet database; and
- City of Tacoma, City of Fife, and Pierce County codes.

A wetland survey of the proposed Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System was conducted on December 6, 2012. The survey identified potential wetlands and jurisdictional waterbodies. Survey results are documented in the *Wetland and Waters Delineation Report for Tacoma LNG Project – Pierce County, Washington* (CH2M HILL 2014) (see Appendix E).

3.3.2 Regulatory Framework

This section identifies and describes required federal, state, county, and city regulatory and permitting requirements applicable to the Proposed Action.

3.3.2.1 Surface Waters

As described in this section, surface water, wetlands, and stormwater are regulated at federal, state, and local levels.

Clean Water Act

The Clean Water Act (CWA) is the primary federal law governing water pollution intended to restore and maintain the integrity of the nation's surface water by preventing point and nonpoint pollution sources and maintaining the integrity of wetlands. Applicable to the Proposed Action, the CWA requires a permit for discharge of dredged or fill material into waters of the United States, including wetlands, and discharge of stormwater, and these permit requirements in turn necessitate a certification by the state that permitted activities would meet water quality standards for surface water.

Discharge of Dredge or Fill Material

Section 404 of the CWA governs the discharge of dredged or fill material into waters of the United States, including wetlands. A 404 permit is required prior to discharging dredge or fill material into waters of the United States unless the activity falls under an exemption. The United States Army Corps of Engineers, the Section 404 implementing agency, evaluates 404 permit applications under a public interest review as well as the environmental criteria (EPA 2012). The Proposed Action would likely not qualify for an exemption,

and thus would require a 404 permit for the proposed in-water work within the Hylebos and Blair waterways.

Stormwater

Pursuant to CWA Section 402, EPA regulates discharges from point sources through its National Pollutant Discharge Elimination System (NPDES). Ecology has delegated authority from the EPA to administer the NPDES program in Washington. Separate stormwater permit coverage would be required for construction and operation of the Project.

- **NPDES Construction Stormwater General Permit.** Construction site operators are required to obtain a NPDES Construction Stormwater General Permit if they are engaged in clearing, grading, and excavating activities that disturb one or more acres and discharge stormwater to surface water of the state. The Proposed Action would require coverage under Ecology's current Construction Stormwater General Permit.
- **Port of Tacoma NPDES Municipal Stormwater Permit.** Operations at the site require coverage under a municipal or industrial stormwater permit. The Port of Tacoma maintains a NPDES Phase I Municipal Stormwater Permit (MS4 permit), which covers discharges from regulated municipal storm sewer systems. The MS4 permit allows discharge of stormwater runoff from municipal drainage systems into the state's waterbodies. Discharges are allowed only as long as programs are implemented to protect water quality. The Port of Tacoma's Stormwater Management Plan was prepared as a condition of its MS4 permit and is consistent with the Stormwater Management Manual for Western Washington (Ecology 2012). The Stormwater Management Plan serves as a planning tool for the Port of Tacoma to use in its stormwater management activities.
- **City of Tacoma Municipal Code 12.08 Wastewater and Surface Water Management – City of Tacoma Surface Water Management Manual.** The City of Tacoma adopted an ordinance change (Tacoma Municipal Code [TMC] 12.08.080) authorizing implementation of the City of Tacoma Surface Water Management Manual effective January 1, 2008, to control the quality and quantity of stormwater in accordance with the CWA. The City updated the manual in 2012.

  The Tacoma 2012 stormwater manual includes, among other elements, minimum drainage requirements for new development and redevelopment; source control Best Management Practices (BMPs) for a variety of land uses, including commercial and industrial activities; construction BMPs; and proprietary stormwater treatment devices. Compliance with these stormwater manual requirements must be demonstrated to the City during the building permit review process.

Water Quality Certification and Standards

Section 401 of the CWA requires certification by the Washington Department of Ecology (Ecology) that a permitted activity meets state water quality standards to protect the overall health of water and wetland resources and the functions they provide. These functions include shoreline stabilization, nonpoint source runoff filtration, wildlife habitat, and erosion control, which directly benefit adjacent and downstream waters.

Water quality standards, including designated uses, quality criteria, and an antidegradation policy, provide a legal basis for protecting surface water and wetland resources through state water quality management programs. Ecology's *Water Quality Standards for Surface Waters of the State of Washington* (Washington Administrative Code [WAC] Chapter 173-201A) establish water quality standards consistent with public health and public enjoyment, and the propagation and protection of fish, shellfish, and wildlife. The water quality standards are established in conformance with present and potential uses (that is, designated uses) of the surface water and in consideration of natural water quality potential and limitations. Issuance of a 401 Certification means that Ecology has reasonable assurance that the applicant's project would comply

with state water quality standards and other aquatic resources protection requirements under Ecology's authority.

Ecology uses specific numeric criteria to protect the designated uses in order to set water quality standards. Individual numeric criteria are based on specific data and scientific assessment of adverse effects. The numeric criteria specify limits or ranges of chemical concentrations. Based on their designated uses, specific numeric criteria from WAC 173-201A-210 for the Hylebos and Blair waterways are shown in Table 3.3-1. Further discussion of the existing water quality conditions at the Hylebos and Blair waterways is provided in Section 3.3.3.2 (Wetlands and Waterbodies).

The Proposed Action’s application for a CWA 404 permit would trigger the need for a CWA 401 certification.

Table 3.3-1 Washington State Surface Water Quality Designated Use Numeric Criteria for the Hylebos and Blair Waterways (WAC 173-201A-210)

Designated Use	*Classification*	*Criteria*							
		Temperature	**Dissolved Oxygen**	**pH**	**Turbidity**	**Bacteria**	**Nutrients**	**Toxics**	**Radioactive Substances**
Aquatic Life Uses	Good	66.2°F	5.0 mg/L	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.	Turbidity must not exceed 10 NTUs over background when the background is 50 NTUs or less; or a 20 percent increase in turbidity when the background turbidity is more than 50 NTUs.	NA	NA	See Table 240 (3) from WAC 173-210A-240	Top of Form Deleterious concentrations of radioactive materials for all classes shall be as determined by the lowest practicable concentration attainable and in no case shall exceed: (a) 1/12.5 of the values listed in WAC 246-221-290 (Column 2, Table II, effluent concentrations, rules and regulations for radiation protection); or (b) EPA Drinking Water Regulations for radionuclides, as published in the *Federal Register* of July 9, 1976, or subsequent revisions Bottom of Form
Recreation	Secondary Contact	NA	NA	NA	NA	Enterococci organism levels must not exceed a geometric mean value of 70 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 208 colonies/100 mL.	NA		NA
Miscellaneous Uses	Wildlife Habitat	NA	NA	NA	NA	NA	NA	NA	NA
	Harvesting	NA	NA	NA	NA	NA	NA	NA	NA
	Commercial Navigation	NA	NA	NA	NA	NA	NA	NA	NA
	Boating	NA	NA	NA	NA	NA	NA	NA	NA
	Aesthetics	NA	NA	NA	NA	NA	NA	NA	NA

Key:
°F = degrees Fahrenheit
EPA = United States Environmental Protection Agency
mg/L = milligram(s) per liter
mL = milliliter
NA = not applicable
NTU = nephelometric turbidity unit(s)
WAC = Washington Administrative Code

Rivers and Harbors Appropriation Act of 1899

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the United States Army Corps of Engineers, for the construction of any structure in or over any navigable water of the United States. The law applies to any dredging or disposal of dredged materials, excavation, filling, rechannelization, or any other modification of a navigable water of the United States, and applies to all structures, from the smallest floating dock to the largest commercial undertaking.

The Proposed Action would trigger this law owing to the placement of structures within navigable waters, which are the Hylebos and Blair waterways.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) is the primary federal law that ensures the quality of Americans' drinking water, from both surface and groundwater sources. Under the SDWA, the EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. Washington drinking water regulations provide health quality standards that are maintained for public drinking water supplies. Drinking water standards established by the DOH comply with the SDWA (WAC 246-290-300). A mix of groundwater wells and the Green River are the primary drinking water sources in the area of the Proposed Action.

City of Tacoma and Pierce County Critical Areas Ordinances

The Growth Management Act (Revised Code of Washington [RCW] 36.70A) requires the designation and protection of "critical areas" to prevent harm to the community from natural hazards and to protect natural resources. Each jurisdiction (city and county) adopts a critical areas ordinance to define critical areas and to regulate their protection.

TMC Chapter 13.11 Critical Areas Preservation defines critical areas within the city of Tacoma. The City of Fife Municipal Code (FMC) defines critical areas under Chapter 17.05 Critical Areas – General Provisions. The Pierce County Code (PCC) defines critical areas in Chapter 18E Development Regulations – Critical Areas. Each jurisdiction (cities of Tacoma and Fife and Pierce County) impacted by the Project's proposed pipeline segments exempts "activities within an improved right-of-way" from critical areas review. This exemption does not authorize the degradation of a critical area or the ignoring of risk from natural hazards.

City of Tacoma

The City of Tacoma regulates two critical areas specific to the preservation of surface water. Wetlands are defined as a critical area and regulated under the provisions of TMC 13.11.300. Stream corridors are also defined as a critical area and are regulated under the provisions of TMC 13.11.400. Wetland and stream corridor classifications, buffers, and mitigation requirements are included in the applicable sections of TMC 13.11.300 and TMC 13.11.400, respectively.

City of Fife

Wetlands are identified as critical areas under FMC 17.17. Critical wetlands are defined according to the definitions provided in FMC 17.17.020 and regulated activities in wetlands as well as wetland buffers and mitigation requirements are described in the applicable sections of FMC 17.17.

Pierce County

Wetlands are defined and regulated as a critical area according to the provisions provided in PCC 18E.30. General wetland classifications are provided in PCC 18E.30.020. Regulated activities in wetlands as well as wetland classification, buffers, and mitigation requirements are described in the applicable sections of PCC 18E.30.

Flood Hazards

The Federal Insurance Administration prepared flood insurance studies and associated flood insurance rate maps to delineate flood hazard areas, including floodplains. Local jurisdictions regulate development of flood hazards through land use regulations such as critical areas ordinances. The Project would be sited with consideration to these flood hazards.

County and City Critical Areas Ordinances

City of Tacoma

The City of Tacoma classifies flood hazard areas as critical areas under TMC 13.11.600. Flood hazard areas are areas consistent with the most recent official Flood Insurance Rate Maps produced by the Federal Insurance Administration that delineate areas of special flood hazards (TMC 13.11.610). The City identifies appropriate flood hazard area development standards in TMC 13.11.620.

City of Fife

The City of Fife defines frequently flooded areas as critical areas under FMC 17.09. Specifically, floodplains and other areas subject to flooding that perform important hydrological functions meet the applicability criteria for frequently flooded areas provided in FMC 17.09.030. The City requires that development in frequently flooded areas be consistent with regulations provided in FMC 17.09.040.

Pierce County

Pierce County defines flood hazard areas as critical areas under PCC 18E.70. The intent of the provisions regulating flood hazard areas is to minimize public and private losses due to flood conditions in flood hazard areas and provide criteria necessary for regulated activities located within flood hazard areas in Pierce County (PCC 18E.70.010). Pierce County flood hazard areas are generally defined according to the criteria provided in PCC 18E.70.020. Flood hazard area development standards are provided in PCC 18E.70.040.

Groundwater

Groundwater is protected as drinking water at both the federal and state levels. See Section 3.3.2.1 (Surface Waters). Other aspects of groundwater are regulated at a state and local level.

Washington State Groundwater Standards

The State of Washington regulates groundwater under Revised Code of Washington (RCW) 90.44. Ecology has the authority under RCW 90.44 to establish standards, criteria, and a process for the designation of specific groundwater areas or subareas, or separate depth zones within such area or subarea. Ecology provides for local governments or groundwater users of a given area or subarea to initiate development of a groundwater management program that is consistent with state and local government objectives, policies, and authorities. Ecology works with local governments and users to identify groundwater management areas or subareas that have aquifer systems that are “a) declining due to restricted recharge or over-utilization; b) the primary source of supply for public water supply systems; c) designated as a sole-source aquifer by the EPA; or d) in geographical areas where land use may result in contamination or degradation of the groundwater quality” (RCW 90.44.400). The DOH administers the state Wellhead Protection Program. Other state agencies, such as Ecology and the Washington State Department of Agriculture, integrate wellhead protection into their programs. The proposed Project would not be located in a groundwater management area.

County and City Critical Areas Ordinances

City of Tacoma

Aquifer recharge areas are regulated as a critical area under TMC 13.11.800. Aquifer recharge areas are established where surface expressions of the Wellhead Protection Areas (WHPAs) of the water supply wells overlap coarse-grained (permeable) surface deposits. Generally, aquifer recharge areas are classified based on the susceptibility of the aquifer to degradation and contamination (TMC 13.11.810).

In accordance with TMC 13.11.820, standards for development in aquifer recharge areas must comply with the provisions of TMC Chapter 13.09, which regulate the South Tacoma Groundwater Protection District. No portion of the Project would be located in the South Tacoma Groundwater Protection District.

City of Fife

Aquifer recharge areas are regulated as a critical area under FMC 17.07. In accordance with applicability criteria described in FMC 17.07.030, the City of Fife would use the latest edition of the National Water Well Association and EPA's DRASTIC[3] map of Pierce County to identify areas where the potential for contamination of groundwater resources is high in association with land use activities. The Proposed Action would occur in a City of Fife aquifer recharge area as described in Section 3.3.3.5 (Groundwater).

Pierce County

Aquifer recharge areas and wellhead protection areas are classified and regulated as critical areas under PCC 18E.50. The purpose of these critical area regulations is to protect aquifer recharge areas and wellhead protection areas from degradation or depletion resulting from new land use activities in Pierce County (PCC 18E.50.010). Because groundwater underlying aquifer recharge areas would be exceptionally susceptible and vulnerable to contamination, and such groundwater is an important public water supply, Pierce County intends to safeguard groundwater resources by mitigating or precluding future discharges of contaminants from new land use activities (PCC 18E.50.010). Aquifer recharge areas and wellhead protection areas are identified on the Pierce County Critical Areas Atlas-Aquifer Recharge and Wellhead Protection Area Map and would be subject to the review procedures provided in PCC 18E.50.030. The Proposed Action would occur in a Pierce County aquifer recharge area as described in Section 3.3.3.5 (Groundwater).

3.3.3 Affected Environment

The study area used for the analysis of surface and groundwater consists of the location of the Project components. Project components associated with the Proposed Action are summarized as follows and further described in Chapter 1 (Purpose, Need, and Alternatives Considered) and Chapter 2 (Description of Proposed Action):

- **Tacoma LNG Facility:** Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the Puget Sound Energy (PSE) Natural Gas Distribution System. The study area for the Tacoma LNG Facility is defined by the facility site boundary (see Appendix F).
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities, and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 1-2. The study area for the TOTE system is defined by the site boundary (see Appendix F).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segments A and B), a new limit station (the Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. The study area for the pipeline segments is defined as the roadway corridor for project alignment. The limit station and gate station study areas are defined by their site boundaries. The figures in Appendix F show the study areas for the PSE Natural Gas Distribution System.

A detailed description of the Proposed Action components is provided in Chapter 2.

3 DRASTIC is an acronym for the parameters used to develop a rating for a particular area: D = Depth to recharge, R = Net Recharge, A = Aquifer media, S = Soil media, T = Topography, I = Impact of the Vadose Zone (Vadose is type of wetland soil), and C = Hydraulic Conductivity of aquifer.

3.3.3.1 Hydrologic Setting (Drainage Basins and Watersheds)

This section describes existing surface and groundwater resources in the Proposed Action area. Based on available information from the United States Geographical Survey, DOH, and Washington Water Resources Inventory Areas (WRIAs), elements of the Project would cross two drainage basins and two watersheds. Watershed council area boundaries are generally consistent with the subbasin boundaries and are listed in Table 3.3-2 and shown in Figure 3.3-1.

Table 3.3-2 Subbasins and Watershed Council Areas Crossed by the Proposed Project

Watershed Council	Proposed Action Element	WRIA	4th Field Hydrologic Unit Code	Watershed (5th Field Hydrologic Unit Code)
Puyallup River Watershed Council	Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, Pipeline Segment A	10 Puyallup-White	17110014	Hylebos Creek-Frontal Commencement Bay
Chambers-Clover Watershed Council	Pipeline Segment B, Golden Given Limit Station and Frederickson Gate Station	12 Chambers-Cover	17110019	Clover Creek

Key:
LNG = liquefied natural gas
TOTE = Totem Ocean Trailer Express
WRIA = Water Resources Inventory Area

Ecology-designated uses for the streams, rivers, and estuaries within the watersheds in the vicinity of the Proposed Action include public domestic water supply, salmonid fish spawning, private domestic water supply, resident fish and aquatic life, industrial water supply, wildlife and hunting, irrigation, fishing, livestock watering, boating, anadromous fish passage, water contact recreation, salmonid fish rearing, and aesthetic quality.

Available source water assessments for public water supplies were obtained from the DOH (DOH 2013). The source water assessments identify groundwater drinking water protection areas (Figure 3.3-2A,B,and C) and sensitive areas for surface water sources. The sensitive areas are those where the potential contamination sources, if present, have a greater potential to impact the water supply, including areas with high soil permeability, high soil erosion potential, high runoff potential, and areas within 1,000 feet of rivers and streams.

No surface water drinking water sources occur at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites, or would be crossed by the new distribution pipeline segments. Discussion of groundwater sources of drinking water is provided in Section 3.3.3.5 (Groundwater).

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The hydrologic setting of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites is primarily a function of the historical development of the Port of Tacoma area within Commencement Bay. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are situated on relatively flat areas of upland fill that make up the Blair-Hylebos peninsula. These sites were created decades ago from dredge and fill material and are situated on what was historically mudflat and salt marsh habitat. The resulting upland, marine tidal, and subtidal habitats have been actively developed, managed, and maintained for industrial and commercial shipping since that time.

Site conditions are the result of Port of Tacoma development activities beginning in the 1920s. The Hylebos and Blair waterways, both tidally influenced arms of Commencement Bay, were excavated from Commencement Bay tide lands. Adjacent tide lands were filled to create the upland portion of the sites.

Commencement Bay is a navigable natural deepwater embayment, trending northwest to southeast and located near the southern end of the main basin of Puget Sound. The bay is approximately 2 miles wide and has a water depth of 560 feet at the entrance. Urbanized areas of the city of Tacoma and its suburbs currently dominate the shorelines.

Commencement Bay became a Superfund cleanup site in 1983. The EPA oversaw the cleanup of polluted sediments, and Ecology worked to control the sources of pollution as well as cleanup. As cleanup is progressing, the state has increased its efforts to prevent sources of pollution, protect cleaned-up sites, and restore natural habitats (Ecology 2012). The current 303(d) listed parameters in Commencement Bay include bacteria, bis(2-ethylhexyl) phthalate, chlorinated pesticides, dichlorodiphenyltrichloroethane DDT, Dieldrin, dissolved oxygen, high molecular weight polycyclic aromatic hydrocarbons, and polychlorinated biphenyls (PCBs), which were identified through water and tissue samples (Ecology 2012). More information on the nearby contamination areas is provided in Section 3.1.1.4 (Earth: Environmental Conditions).

PSE Natural Gas Distribution System

Proposed Pipeline Segment A would be located within WRIA 10 Puyallup-White Basin, which drains to Puget Sound. Pipeline Segment B and the limit and gate stations would be located in WRIA 12 Chambers-Clover Basin, which also drains to Puget Sound.

3.3.3.2 Wetlands and Waterbodies

This section identifies the wetlands and waterbodies within the study area for the Proposed Action. The waterbodies are described below relative to the main Project components. The *Wetland and Waters Delineation Report for Tacoma LNG Project – Pierce County, Washington* (CH2M HILL 2014) (see Appendix E) documents the results of a wetland and waterbody survey conducted on the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. This wetland delineation documents that no wetlands were identified on either the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites.

The locations for the PSE natural gas distribution system improvements were specifically selected where wetlands and waterbodies are not present or could be avoided (see Appendix F).[4] The two new distribution pipeline segments would be constructed entirely within the paved portion of existing road rights-of-way (ROWs), as described in Section 2.3.3 (Description of Proposed Action: PSE Natural Gas Distribution System).

No wetlands or waterbodies occur on the sites of the existing Frederickson Gate Station or the proposed Golden Given Limit Station (see Appendix F). The limit station would be built entirely on an area previously developed as a building and paved parking area. Modifications to the existing gate station would occur entirely on previously developed area and within the existing fence line for the Frederickson Gate Station.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Proposed Action would include in-water development within the Hylebos Waterway for the Tacoma LNG Facility and Blair Waterway for the TOTE Marine Vessel LNG Fueling System. No other waterbodies were delineated on either of the two sites.

Ecology's designated uses for the Hylebos and Blair waterways are identified in Table 612 of WAC 173-201A-612 and include aquatic life, recreational, and miscellaneous uses. All of the port waterways are ranked "good" or Class B water for aquatic life use, which in turn requires maintaining Ecology-defined numeric

[4] There are two legend items for "Stream/River" on the figures in Appendix F. Both legend items represent waterbody data that originated from Pierce County and are dated 2012. The data include linear and area features. The linear feature, shown as a blue line, represents the centerline of waterbodies. The area feature, which is the shaded polygon, represents the approximated width of waterbodies.

criteria. Numeric water quality criteria for the designated uses in the Hylebos and Blair waterways are shown in Table 3.3-1.

Hylebos Waterway

The Hylebos Waterway is a navigable channel dredged for Port of Tacoma activities. It is the easternmost waterway in the port and flows east to west, draining into Commencement Bay. The mean higher high water elevation for the Hylebos Waterway is 11.8 feet above mean lower low water (MLLW), based on the National Oceanic and Atmospheric Administration tidal datum for the Tacoma tide gauge, located on Commencement Bay.

The Hylebos Waterway shoreline in the vicinity of the Tacoma LNG Facility site is covered with slope-protection materials, including a creosote-treated timber bulkhead and riprap. Two piers extend into the Hylebos Waterway. One of the piers is approximately 40 by 15 feet, with an approximately 90-foot walkway. This creosote-treated timber pier is abandoned and in disrepair. The second pier is a creosote-treated timber structure measuring roughly 600 by 25 feet.

Blair Waterway

The Blair Waterway is a navigable channel dredged for Port of Tacoma activities. It is situated between the Hylebos Waterway to the east and the Sitcum Waterway to the west. The mean higher high water elevation for the Blair Waterway is 11.8 feet above MLLW, based on the National Oceanic and Atmospheric Administration tidal datum for the Tacoma tide gauge, located on Commencement Bay.

The Blair Waterway shoreline in the vicinity of the TOTE Marine Vessel LNG Fueling System site is developed with wharves, piers, and riprap armored slopes. It is generally sloped at approximately 40 to 60 percent and is covered with various slope protection materials, including riprap, concrete and asphalt pieces, and various debris. Several existing in-water structures in the Blair Waterway are associated with existing TOTE operations, including one timber T-pier, three concrete piers, and one concrete breasting dolphin.

PSE Natural Gas Distribution System

Four waterbodies cross under the paved roadways where the two new distribution pipeline segments are proposed. These waterbodies are all within existing culverts where they cross under the roadways. Table 3.3-3 summarizes the main characteristics of these four waterbodies.

Table 3.3-3 Existing Drainages Crossing New Distribution Pipeline Segments

Name	Pipeline Milepost	USGS Hydrologic Unit Code (HUC)	WRIA	Flow Type	Stream Width	WDNR Stream Type	Proposed Crossing Method
Kaiser Ditch	A1.58	17110019	10 Puyallup-White	Intermittent	Culvert	X	Horizontal Bore or Drill
Fife Ditch	A2.24	17110019	10 Puyallup-White	Intermittent	Culvert	X	Horizontal Bore or Drill
Unnamed Drainage Ditch	A2.76	17110019	10 Puyallup-White	Ephemeral	Culvert	X	Horizontal Bore or Drill
Unnamed Drainage Ditch	A3.25	17110019	10 Puyallup-White	Ephemeral	Culvert	X	Horizontal Bore or Drill

Key:

WDNR = Washington Department of Natural Resources
WRIA = Water Resources Inventory Area
X = WDNR water type that identifies various water features (E.g., irrigation ditches, sanitation ponds, pipeline, etc.) that are not part of the S, F, Np, or Ns classifications.

Kaiser Ditch is connected to the Hylebos Waterway and appears to receive tidal influence from the Hylebos Waterway. Kaiser Ditch historically conveyed discharge from the former Kaiser Aluminum Smelter operations, and currently a large section of Taylor Way drains to Kaiser Ditch before discharging to the Hylebos Waterway. Kaiser Pond, a stormwater detention basin, discharges to Kaiser Ditch through a culvert under Taylor Way.

Fife Ditch is an artificially constructed channel that connects Wapato Creek to Hylebos Creek, which drains into the Hylebos Waterway. A pump station controls discharge to Hylebos Creek. Fife Ditch crosses under Taylor Way in a culvert.

An unnamed drainage ditch crosses under 54th Avenue East in a culvert. The ditch connects Fife Ditch to Hylebos Creek. Another unnamed drainage ditch crosses under 12th Street East in a culvert. The ditch discharges into Hylebos Creek.

Stormwater

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Stormwater runoff from existing properties on the western portion of the Blair-Hylebos peninsula typically is collected and conveyed via underground stormwater pipelines that discharge through stormwater outfalls to both the Hylebos and the Blair waterways. Generally, either the Port of Tacoma or the City of Tacoma has ownership of the stormwater outfalls. Outfall ownership depends on the location. The existing stormwater facilities located throughout the Blair-Hylebos peninsula were developed before modern-day stormwater quality treatment and quantity requirements had been established for new development. As a result, most stormwater runoff on the peninsula does not comply with modern-day stormwater quality or quantity requirements prior to discharging into the waterway waterbodies. With the recent redevelopment of properties and associated upgrades, the properties are coming into compliance with applicable modern-day stormwater quality treatment and quantity requirements.

The existing Tacoma LNG Facility site stormwater runoff is currently collected via conventional catch basins, then conveyed through an underground pipeline network and discharged through stormwater outfalls to the Hylebos Waterway. In preliminary investigative record drawing and field observation work, five existing outfalls are located along the shoreline, as shown in Appendix F. There may be potentially one to three more existing stormwater outfalls along the Hylebos Waterway frontage for the Tacoma LNG Facility. All of the existing stormwater outfalls that discharge to the Hylebos Waterway belong to the Port of Tacoma. All of the existing stormwater collection and conveyance systems appear to directly discharge to the Hylebos Waterway without stormwater treatment or quantity facilities. Some of the existing stormwater outfall pipelines are installed at elevations such that they are vertically influenced by the tides. During the higher tides, the outfall pipeline elevation may be partially or completely submerged from the tidal elevations. None of the existing outfall pipelines is provided with check valves, which are typical of newer outfall upgrades.

The existing TOTE site stormwater runoff is collected via conventional catch basins, conveyed through an underground pipeline network and discharged through stormwater outfalls to the Blair Waterway. Preliminary investigative record drawings indicate that there may be as many as 14 existing outfalls located along the riprapped shoreline, of which two or three may belong to the City. The majority of the existing site stormwater collection and conveyance systems appear to provide some stormwater runoff treatment via oil/water separator facilities. No other stormwater quality or quantity systems appear to be in place. Some of the existing outfall pipelines are tidally influenced, and some are provided with check valves.

PSE Natural Gas Distribution System

During heavy rainfall events, sheet flow enters the channels from the impervious road pavement. Stormwater infrastructure (lines, outfalls, and manholes) occur under and parallel to the roadway along

Taylor Way and Alexander Avenue, the proposed locations for Segments A. At Milepost A2.3, Pipeline Segment A would cross Highway 509 into the City of Fife jurisdiction. The intersection of State Route 509 and Taylor Way drains to Fife Ditch, where stormwater is discharged through a tide gate and pumping system to the mouth of the Hylebos Creek. Stormwater infrastructure parallels 54th Avenue East, 12th Street East, and 62nd Avenue. The outfall (end of pipe) at the intersection of 62nd Avenue and 12th Street East discharges to a swale on the southwest corner of the intersection. The outfall at the intersection of 54th Avenue East and 8th Street discharges to Fife Ditch.

Runoff from existing roadway and properties drains to a mix of open channel and closed pipe drainage lines parallel to roadways along the proposed pipeline alignments for Pipeline Segment B ultimately discharging to county outfalls. The proposed Golden Given Limit Station would be located on a previously developed parcel near the north end of Pipeline Segment B. The property currently is occupied by one 4,800-square-foot building and asphalt area, together totaling approximately 100 percent impervious surface, with no existing stormwater controls or infrastructure. The existing Frederickson Gate Station is located on gravel surface. During rainfall events, runoff infiltrates through the gravel surface.

3.3.3.3 Existing Contaminated Soils and Sediments

As described in Section 3.1.3 (Earth: Affected Environment), contamination associated with the historical industrial uses in the surrounding area may extend to locations within the construction footprint proposed for the Tacoma LNG Facility and portions of the proposed natural gas distribution pipeline (Pipeline Segment A) on the Blair-Hylebos peninsula.

Hylebos Waterway

Historically, the Hylebos Waterway has been contaminated from several industries, including chemical manufacturing plants, scrap metal recycling, log transfer facilities, and shipbuilding. The Port of Tacoma worked to extend the Hylebos Waterway in the 1960s to a 3-mile-long waterway, 200 feet wide (EPA 2011). EPA issued three unilateral administrative orders requiring four responsible parties to clean up the Hylebos Waterway, and sediment cleanup actions have been completed under EPA oversight. During the previous cleanup actions, sediment in the general vicinity of the Tacoma LNG Facility site was designated for monitored natural recovery. A 2014 EPA report reviewing the Hylebos Waterway indicates that aside from the Arkema and Occidental sites (located approximately 1 mile east and immediately west of the Proposed Action area, respectively, on the Blair-Hylebos peninsula), Hylebos cleanup has been completed (EPA 2014). The Hylebos Waterway is on the CWA 303(d) list for Diedrin and PCBs. Water in the Hylebos Waterway has been determined to contain up to two times higher concentrations of lead and copper and up to 43 times higher concentrations of zinc than seawater flowing into Puget Sound (Port of Tacoma 2009).

Blair Waterway

Historically, the Blair Waterway was part of the 10 to 12 square miles of what was named the Commencement Bay, Near Shore/Tide Flats on the National Priorities List as an EPA Superfund Site. This was primarily due to the Asarco Smelter Facility, which contaminated sediments and groundwater. Between 1993 and 1995, the entire Blair Waterway navigation channel was dredged as part of the Sitcum Waterway Remediation Project. After completion of this remediation, the EPA removed the Blair Waterway from the National Priority List. Although Blair Waterway is not included on Ecology's Category 303(d) list for water quality impairments (Ecology 2012), it has been determined to contain up to two times higher concentrations of lead and copper, and up to 43 times higher concentrations of zinc, than seawater flowing into Puget Sound (Port of Tacoma 2009).

3.3.3.4 Flood Hazards

Flood hazards identified by the Federal Emergency Management Agency and local jurisdictions are shown in Figure 3.3-3A and only encompass the Hylebos and Blair waterways at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. No flood hazard areas would be crossed by the PSE Natural Gas

Distribution system improvements except for four small crossings by Pipeline Segment A within the city of Fife.

3.3.3.5 Groundwater

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are underlain by a series of aquifers and aquitards. Neither site would be located within an aquifer recharge area, as shown in Figure 3.3-2A. No WHPAs or EPA sole-source aquifers occur within either site. Two WHPAs are located to the south of both sites on the Blair-Hylebos peninsula.

Surrounding surface waterbodies consisting of the Blair and Hylebos waterways, Hylebos and Wapato creeks, and Commencement Bay serve as regional groundwater discharge areas. Groundwater within the aquifers flows horizontally and vertically toward these waterbodies (Port of Tacoma 2009). As stated in Coastal Monitoring Associates (2006; cited in Port of Tacoma 2009), the aquifer systems under the site are as follows, from shallowest to deepest: Shallow Fill Aquifer (3 to 10 feet below ground surface [bgs], depending on the season and, in places, by local tide conditions); Intermediate Aquifer (200 feet bgs and subject to tidal influence by the Blair and Hylebos waterways); and Deep Regional Aquifer System (below 200 feet bgs). For the Shallow Fill Aquifer and the upper portion of the Intermediate Aquifer, groundwater flow is generally toward the nearest surface waterbody. Localized variations to this flow pattern occur at certain parcels, but overall, the groundwater flows horizontally within the aquifers from the center of the peninsula to the nearest surface waterbody, with groundwater seeps occurring along the banks and shorelines that discharge at variable rates.

Review of available data in the Ecology well log database identified no domestic or public water supply wells within 150 feet[5] of the of the Tacoma LNG Facility (Ecology 2013). The majority of the well reports reviewed in the Ecology database are for either geotechnical borings or monitoring wells.

PSE Natural Gas Distribution System

Pipeline Segment A would occur in an area with two main aquifer recharge areas. One is a circular area near the northern end of the pipeline segment centered on the tideflats monitoring well (Ecology Well ID #ACN703). This monitoring well withdraws water from the Deep Regional Aquifer System. Another aquifer recharge area is a large area near the southern end of Pipeline Segment A centered on the WHPAs of two deep water-supply wells, Wells 1 and 4, serving the Kaiser Aluminum and Chemical water system. These water wells withdraw water from the Deep Regional Aquifer System. This water system, originally used for minor domestic supply, is no longer used for domestic supply[6] and is now used for dust control and other minor uses (Port of Tacoma 2009). Pipeline Segment B, the limit station, and the gate station would be located in an aquifer recharge area that includes the Central Pierce County Sole Source Aquifer and Shallow Fill and Intermediate Aquifers as shown in Figure 3.3-2B,C.

Sole-source or principal aquifers are designated as aquifers that supply 50 percent or more of the drinking water for an area and for which there is no other reasonably available alternative source should the aquifer become contaminated.

Review of available data in the Ecology well log database identified no domestic or public water supply wells within 150 feet of the of the new distribution pipeline segments, limit station, or gate station. The majority of the well reports reviewed in the Ecology database are either geotechnical borings or monitoring wells for

[5] 150 feet is the Federal Energy Regulatory Commission (FERC) designated distance to identify groundwater supply wells within vicinity to a project site. According to 18 CFR 380.12 (d), minimum FERC requirements for project application include: (1) Identification of the location of known public and private groundwater supply wells or springs within 150 feet of proposed construction areas; and (2) Identification of locations of EPA or state-designated sole-source aquifers and wellhead protection areas crossed by the proposed pipeline facilities.

[6] WAC 173-505-030: "Domestic water use" includes uses such as potable water to satisfy the human domestic needs of a household or business, including water used for drinking, bathing, sanitary purposes, cooking, laundering, and other incidental uses.

nearby facilities. The nearest municipal drinking water well is approximately 0.28 mile east of Pipeline Segment B.

3.3.4 Impacts of the Proposed Action

Following is an analysis of potential impacts related to surface and groundwater resources. Impacts are discussed separately for construction and operation of development at the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System.

3.3.4.1 Construction Impacts

The Proposed Action and related construction procedures for the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System are described in Chapter 2 (Description of Proposed Action). General procedures for in-water construction at the Tacoma LNG Facility within the Hylebos Waterway would include demolition of existing in-water structures, construction of in-water structures including pile driving, and shoreline improvements. General procedures for upland construction of the Tacoma LNG Facility include demolition of upland buildings and structures, site preparation and grading, ground improvements and foundations, LNG storage tank construction, support facilities, site access and traffic, and hydrostatic testing of the LNG storage tank and piping.

Construction of the TOTE Marine Vessel Fueling System would include demolition and replacement of an existing over-water catwalk and installation of a pile-supported access trestle and an LNG loading platform within the Blair Waterway, as described in Chapter 2. A cryogenic pipeline would also be constructed to connect the Tacoma LNG Facility and TOTE in-water LNG loading platform.

Construction of the new pipeline segments would follow general pipeline construction techniques: horizontal boring, directional drilling, or trenching in existing roads; stringing, bending, and welding; trench backfill; hydrostatic testing; cleanup; and permanent erosion control. Pipeline segment construction would follow federal, state, and local permit conditions.

No previously undisturbed area would be developed, and no additional construction workspace would be required for the new limit station. The existing building and pavement would be removed as needed for construction of the proposed improvements. The specific improvements and components of the limit station would then be completed including some trenching for underground piping.

The upgrades to the existing Fredrickson Gate Station would occur entirely within the existing developed footprint. No previously undisturbed area would be affected, and no additional construction workspace would be required outside of the existing developed footprint.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potential impacts from construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are described below.

Surface Waters

The in-water structures on both the Hylebos and Blair waterways are specifically designed to avoid the need for dredging and thus minimize impacts to surface water. Construction surface water issues are discussed below.

Creosote-treated Timber Piling Removal

It is the policy of resource agencies, including the National Marine Fisheries Service and United States Fish and Wildlife Service, to require replacement of creosote-treated wood pilings with steel or concrete pilings where possible when new construction includes new pilings, because creosote is a carcinogen. Accordingly, to reduce the amount of creosote in the environment, approximately 508 creosote-treated timber piles would be removed from the Hylebos and Blair waterways Project-wide (the majority from the Hylebos) as part of the Proposed Action. The proposed method of extraction is with a vibratory hammer. Creosote-

treated wood would also be removed from the Hylebos Waterway as part of the shoreline improvement along the Tacoma LNG Facility. As described below (see "Fill," below), the existing creosote-treated timber bulkhead would be removed.

Given the limited polycyclic aromatic hydrocarbon (PAH) concentration information available for the Proposed Action site seafloor, it is difficult to predict what concentrations would be in the water column during creosote-treated pile removal. Nevertheless, it is reasonable to assume that PAH concentrations in the water column would be elevated somewhat for a short period of time throughout the entire duration of these activities, as a result of resuspension of contaminated sediments. It is also reasonable to assume that there would be short- and long-term elevated concentrations of PAHs in surface sediments in the vicinity of removed piles until natural sedimentation processes bury the contaminated materials below the depth of burrowing invertebrate species. Following the completion of removal activities, elevated PAH (including creosote) concentrations are likely to be greatly diminished within one or two tide cycles. The long-term consequence of this action cannot be quantified but would be qualitatively beneficial by improving sediment and water quality from the creosote source being removed from the environment.

Turbidity

Temporary increases in turbidity would be caused by suspended sediments during pile removal and pile-driving activities, as well as the regrading of 600 feet of shoreline in the Hylebos waterway. Increased suspended sediment loads associated with pile removal/driving would be minimal. Turbidity impacts would be relatively minor and would last only a matter of hours or a few days because tidal exchange quickly disperses turbid water. The veneer of silt deposition in adjacent areas near these types of activity is typically very thin.

Sediment cleanup actions have been completed in portions of Hylebos Waterway under EPA oversight. During the previous cleanup actions, sediment in the immediate vicinity of the existing pier adjacent to the Tacoma LNG Facility site was designated for monitored natural recovery.

Fill

The Proposed Action includes minimal amounts of marine-related direct fill effects. The existing shoreline at the site along the Hylebos waterway is constructed of gravel and soil fill material supported by a creosote-treated timber bulkhead, which is located at about elevation 11.8 feet MLLW. A new steel sheet pile bulkhead approximately 600 feet in length would be installed approximately 9 feet shoreward of the existing bulkhead. The existing creosote-treated timber bulkhead and supported fill material would be removed and replaced with light, loose riprap varying in size from 3 inches to ½ cubic yard, constructed at a 2:1 slope below elevation 11.8 feet MLLW. The work would require approximately 1,900 cubic yards of excavation and 690 cubic yards of fill within a 5,440-square-foot disturbance area. The onshore ends of the proposed piers on both waterways would land on an abutment and wingwall system constructed with land-based equipment and would not require any in-water work.

As described in Section 3.6 (Noise), the Proposed Action would remove existing creosote-treated piles via a vibratory hammer. Holes remaining following removal would be filled with clean sand or other habitat mix approved by the Washington Department of Fish and Wildlife. It is conservatively estimated that 25 percent of the piles to be removed from the Hylebos and Blair waterways would have some portion of a hole remaining following extraction. The total quantity of clean sand or other habitat mix needed to fill pile holes for the Project in both the Hylebos and Blair waterways is estimated to be no more than 360 cubic yards, including up to 340 cubic yards in the Hylebos Waterway and 20 cubic yards in the Blair Waterway.

Spills

Water quality impacts from spills of materials during construction, such as oil, gasoline, and hydraulic fluids, may occur. Hazardous materials entering waterbodies resulting from material spills being flushed into waterbodies with stormwater runoff or entering waterbodies directly from leaks or spills at the facility could

have an adverse impact on water quality and subsequent adverse impacts on fish and wildlife using the waterways.

Construction Water Use

Approximately 9 million gallons of water would be required during the temporary construction phase of the Proposed Action and would be supplied by Tacoma Public Utilities. Most of this water would be used to mix with grout for ground improvements. Concrete would be brought in ready-mix trucks from Tacoma suppliers in/near the Port of Tacoma. Construction water inadvertently discharged could temporarily impact water quality in the Hylebos and Blair waterways by fluctuating water temperature and pH. The Tacoma Public Utilities water system has the overall capacity to supply up to 292 million gallons per day and maintain approximately 140 million gallons in additional storage (Tacoma Public Utilities 2015).

Hydrostatic Test Water

Before being placed into service, the LNG storage tank at the Tacoma LNG Facility would be hydrostatically tested to ensure structural integrity. Hydrostatic testing is described in Chapter 2.

PSE would use approximately 5 million gallons of water from the Tacoma Public Utilities potable water system for hydrostatic testing of the LNG storage tank. At the proposed intake pumping rate of 1,000 gallons per minute, it would take approximately four days to fill the tank to the required level for testing, or approximately 1.25 million gallons per day. As described above, the Tacoma Public Utilities water system has the capacity to supply up to 292 million gallons per day (Tacoma Public Utilities 2015).

Test water would be batch discharged to the municipal stormwater system in coordination with the Port and City of Tacoma. The discharge points to the stormwater system would be determined as part of more detailed engineering design. Surface waters would not be impacted from any withdrawal of hydrostatic test water because a municipal system would be used as the source under the City's existing water right. Although hydrostatic test water discharged to the municipal stormwater system would eventually reach the Hylebos Waterway and, potentially, the Blair Waterway, these surface water would not be significantly impacted. No chemicals or additives would be added to the hydrostatic test water

Stormwater

During construction, temporary introductions of pollutants, including but not limited to, sediments, metals, oil and grease, and other organic compounds to the Hylebos or Blair waterways could occur from rainstorm runoff. This is specifically true during improvement activities along the shoreline of the Hylebos Waterway. PSE would implement code-required temporary erosion and sedimentation control measures or BMPs in an effort to mitigate or prevent such events from occurring.

Construction work, including implementation of erosion and sediment control BMPs, may account for the potential presence of other contamination and would be reviewed by EPA and Ecology to ensure compatibility with potential future remedial actions. An environmental site assessment was conducted in May 2014 to evaluate whether contaminated soil or groundwater is present within upland portions of the construction footprint proposed for the Tacoma LNG Facility. The results are discussed further in Section 3.1 (Earth)**.**

Flood Hazards

Figures 3.3-3A,B,C show that the only flood hazard areas shown in the vicinity of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are the Hylebos and Blair waterways. However, these waterways are part of the marine environment of Commencement Bay, which is tidally influenced. In addition, the Proposed Action would result in a net reduction in the amount of pilings present in the waterways. Thus, the Proposed Action would have no adverse impact these flood hazard areas.

Groundwater

Groundwater would not be consumptively used during construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, except for the construction water needs and hydrostatic testing of the LNG storage tank as previously described, which would obtain water from the Tacoma Public Utilities potable water system. A portion of the Tacoma Public Utilities potable water system is derived from groundwater wells. However, this would not impact the groundwater supply, as the majority of water use would be spread across the construction phase of the Proposed Action and the overall Tacoma Public Utilities system has the capability to supply approximately 292 million gallons per day.

Shallow groundwater could experience a minor disturbance from changes in overland flow and recharge caused by clearing, trenching, and grading of the proposed Tacoma LNG Facility site. Near-surface soil compaction caused by heavy construction vehicles also could reduce the soil's ability to absorb water. These impacts from demolition, trenching, pipe installation, clearing, or grading would be temporary and would not significantly affect groundwater resources or groundwater quality in the future.

Dewatering might be necessary in conjunction with excavation activities performed during construction of the Tacoma LNG Facility. Impacts on groundwater quality are anticipated to be negligible as a result of dewatering within the Tacoma LNG Facility. Installation of displacement-drilling grout columns at the Tacoma LNG Facility would include use of a vibratory hammer. These ground improvements would range from 80 to 100 feet bgs and likely would be deeper beneath the tank and along the shoreline. Groundwater displaced from vibratory activities would be stored on site for potential chemical analytical testing prior to handling. There are no adverse impacts on groundwater quality reasonably expected from Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System construction activities. Changes in groundwater recharge within the Shallow Fill and Intermediate Aquifers would not affect the recharge rates for the Deep Regional Aquifer system. Thus, the aquifer recharge areas in the general vicinity the Tacoma LNG Facility would not be significantly impacted (GeoEngineers 2009).

New Distribution Pipeline Segments

Potential impacts from construction of the two new distribution pipeline segments are described below.

Surface Waters

The two new distribution pipeline segments would be constructed entirely within the paved portion of existing road ROWs, as described in Section 2.3.3 (Description of Proposed Action: PSE Natural Gas Distribution System). The general construction technique where new pipeline is proposed would consist of open-cut trenching. All four waterbodies that would be crossed by the new pipeline segments are streams/drainages located within culverts and would be crossed perpendicularly by the proposed pipeline segments. The pipeline would be installed under existing culverts by using a horizontal bore or directional drill without disturbing the culverts. Pipeline crossings under the existing culverts would maintain at least 36 inches vertical separation from the bottom of the culverts to prevent damage during the installation. No other waterbodies or wetlands would be crossed during construction of the pipeline segments. Other issues related surface water are discussed below.

Hydrostatic Test Water

After construction of each pipeline segment and before the new pipeline segments are placed in service, the entire lengths would be hydrostatically tested with water to ensure structural integrity. The hydrostatic testing would require approximately 222,000 gallons for Pipeline Segment A and approximately 31,000 gallons for Pipeline Segment B. Discharge at the point of disposal has no significant impact to surface water.

Hydrostatic test water would be drawn from nearby fire hydrants and discharged to the municipal sanitary sewer. The water drawn from fire hydrants may need to be stored in a tank before use, but the only additive may be soap to remove grease and oil in the pipeline as necessary. The fire hydrant sources and discharge points to the sanitary sewer would be determined as part of more detailed engineering design. PSE would

obtain the requisite approvals for use of hydrants and discharge to sanitary sewer systems, before initiation of construction. Surface waters would not be impacted from any withdrawal of hydrostatic test water because a municipal system would be used as the source under existing water rights. Surface waters would not be impacted from hydrostatic test water discharge because no chemicals would be added and the discharge would be directed to the municipal sanitary system, where the water would receive treatment prior to discharge to surface water.

Spills

Equipment fueling and storage of oil, fuel, or other materials near waterbodies could create a potential water quality impact if a spill were to occur. Leaks from equipment and vehicles could also cause potential impacts to surface water. Because no surface water or wetlands are present in the pipeline segments, no adverse impacts are anticipated to occur from spills. There is a potential impact to wetlands or waters adjacent to work areas from spills that would be minimized through mitigation measures provided in Section 3.3.6 (Mitigation Measures), including appropriate spill containment efforts and other BMPs.

Stormwater

The two new distribution pipeline segments would be constructed entirely within the paved portion of existing road ROWs in dry summer months. Runoff could occur along the pipeline segments if significant precipitation occurs during the construction period. However, BMPs consistent with the conditions of the Project's coverage under the NPDES General Construction Stormwater Permit would be implemented to prevent erosion and sedimentation. Thus, stormwater during construction would not significantly impact surrounding waterbodies or wetlands.

Material excavated during construction from the pipeline trench would not be stockpiled. These materials would be hauled from the pipeline workspace areas and disposed of at approved sites. The pipeline construction contractor would import clean material from local commercial sources to use as backfill and pipe bedding. During construction, the open trench occasionally may accumulate water either from groundwater intrusion or precipitation. The trench would be dewatered periodically to allow for proper and safe construction. If trench dewatering is required during construction, the dewatering would be conducted in a manner that minimizes impacts to surface water, as described in Section 3.3.6 (Mitigation Measures).

Flood Hazards

Pipeline Segment A would involve four short crossings of flood hazard area in the vicinity of the city of Fife. However, no impacts would occur to flood hazard areas, as the new pipeline would be constructed entirely within paved roadway and no new fill would be placed within the 100-year floodplain.

Groundwater

The new pipeline segments would be constructed between 3 and 5 feet bgs in aquifer recharge areas as identified in county and city Critical Areas Ordinances. Pipeline Segment B would be located within the EPA Central Pierce County sole source aquifer. The depth to water in the shallow aquifer ranges from 10 to 30 feet along proposed Pipeline Segment B (Fort Lewis Directorate of Public Works 2010). However, no impacts are anticipated as the construction activities would be short term.

Pipeline installation may require localized pipeline trench dewatering in locations where groundwater may be encountered near the ground surface. The size and rate of these dewatering operations would not be extensive enough to impact the shallow groundwater beyond the immediate vicinity of the trench. Minor fluctuations in groundwater levels and turbidity may occur.

<u>Golden Given Limit Station and Frederickson Gate Station</u>

Potential impacts from construction of the new Golden Given Limit Station and upgrades to the Frederickson Gate Station are described below.

Surface Waters

Impacts on waterbodies and wetlands would not occur from construction of the Golden Given Limit Station and upgrades to the Frederickson Gate Station. No waterbodies or wetlands occur on the sites proposed for the new limit station or existing gate station. The limit station would occur entirely on an area previously developed as a building and paved parking area. Modifications to the existing gate station would occur entirely on previously developed area for the Frederickson Gate Station.

Neither the new limit station nor upgrades to the gate station would cross or occur within designated shoreline in any jurisdiction.

Equipment fueling and storage of oil, fuel, or other materials near waterbodies could create a potential water quality impact if a spill were to occur. Leaks from equipment and vehicles could also cause potential impacts to surface water. Because no surface water or wetlands are present where construction activities would occur at the limit or gate stations, no adverse impacts are anticipated to occur from spills.

The Golden Given Limit Station and upgrades to the Frederickson Gate Station would both be constructed on previously developed areas. Runoff could occur from both sites if significant precipitation occurs during the construction period.

Flood Hazards

Impacts on flood hazard areas would not occur from construction of the Golden Given Limit Station and upgrades to the Frederickson Gate Station. Designated flood hazard areas do not occur on the sites proposed for the new limit station or upgrades to the existing gate station.

Groundwater

Construction of the new limit station and improvements to the existing gate station would occur in aquifer recharge areas as identified in county Critical Areas Ordinances. The limit station and gate station are located within the EPA Central Pierce County sole source aquifer. Shallow groundwater (where encountered along the proposed pipeline segments) could experience a minor disturbance from changes in overland flow and recharge caused grading and trenching on the proposed site. Degradation of water quality would be unlikely and in the unlikely event that any temporary degradation were to occur, it would be limited to the immediate vicinity of the construction activity or borehole; thus, no significant impact would occur to groundwater resources during construction activities.

3.3.4.2 Operations Impacts

Potential impacts during operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are described below.

<u>Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System</u>

Surface Waters

Spills may occur during the processing and transmission of LNG and other chemicals used in the processing of LNG. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would include secondary containment for LNG and various other chemicals as required by federal and state law and described in Chapter 2 (Description of Proposed Action). Although highly unlikely, any LNG spill would be directed to spill containments consisting of below grade open top concrete sumps. This would include collection of LNG spills occurring on the over-water structures (trestles and piers) proposed in both the Hylebos and Blair waterways. For example, LNG spills emanating on the loading platform at the end of either pier would be collected in a concrete curbed area under the loading arms or hoses and piping, which would gravity drain to a concrete trench that runs the length of the pier back ashore. The trench would be directed to the marine loading sump. No other direct impacts to water quality would be anticipated from loading bunkering barges at the proposed Hylebos pier. Separate LNG containment would also be provided at the Tacoma LNG Facility in the vicinity of the LNG storage tanks, LNG process area and LNG truck loading area.

In addition to the LNG spill impoundments described above, the Tacoma LNG Facility would include other impoundments for collection of spilled mixed-refrigerant, heavy hydrocarbons, water/propylene glycol (WPG), amine, and equipment lubrication system and transformer oil. General features of these impoundments include curbed concrete containment and storage areas with sumps as necessary.

Vessels operations as part of the Proposed Action in the vicinity of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be tugs and barges. Vessel transport around the Blair-Hylebos peninsula at the Port of Tacoma includes the potential for fuel, oil and hydraulic fluid spills into the Hylebos and Blair waterways or Commencement Bay, which could contribute short-term water quality impacts. Both tugs and barges already operate within the Hylebos and Blair waterways as part of other existing operations and have minimal risk of fuel spills and neither require ballast discharges. Tugs would be fueled at other locations and would be subject to spill prevention plans at those facilities. In the unlikely event of leakage of LNG from a barge, the LNG would vaporize and not affect water quality. When exposed to ambient heat sources such as water or soil, LNG vaporizes rapidly.

As described in Section 2.2.1.7 (Description of Proposed Action: Other Process Facilities), cooling water consisting of 60/40 weight percent WPG would be utilized in a closed loop to provide heat rejection for various users within the facility. The source of water for the cooling water system would be potable water from the municipal water supply system.

The only water-based fire suppression system for the Project would be the hydrant loop on the Tacoma LNG Facility site. The hydrants would be flushed at a periodic interval every several years, and tested as required. The source of water for flushing and testing would be the municipal water supply system.

Stormwater

The existing Tacoma LNG Facility site does not currently have any on-site stormwater treatment. The Proposed Action would bring the site into compliance with current stormwater management requirements, including, but not limited to, the Port of Tacoma's 2014 Stormwater Management Plan, City of Tacoma Stormwater Management Manual and applicable Ecology Secondary Permittee requirements.

The Project would use existing stormwater systems as much as feasible, but would also install enhanced treatment facilities to improve the quality of stormwater discharged from the site to the Hylebos Waterway.[7] The Project also would upgrade the existing stormwater outfalls to include backflow prevention. The overall result would be much-improved stormwater quality in the Hylebos Waterway because the stormwater discharge from the Tacoma LNG site would be properly treated as compared to no treatment under existing conditions.

The TOTE Marine Vessel LNG Fueling System would convey rainwater from the new loading platform back onto the TOTE terminal property. The Project also proposes to provide applicable stormwater treatment facilities for the new loading platform facilities on the Tote site. The proposed loading platform stormwater treatment facilities would be separate from existing TOTE site infrastructure and facilities and would treat any stormwater before connecting existing stormwater facilities for discharge into the Blair Waterway.

Flood Hazards

Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would not result in any additional significant impacts to designated flood hazard areas.

Groundwater

There would be no adverse impacts on groundwater quality reasonably expected from stormwater infiltration that may occur during operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. The net effect of the proposed changes to the stormwater facilities at the Tacoma LNG Facility

[7] The project is not required to provide stormwater quantity facilities due to direct discharge to a salt water body reasons allowed by code.

would be a small increase in the recharge rate to the Shallow Fill and Intermediate Aquifers. The changes in groundwater recharge within the Shallow Fill and Intermediate Aquifers would not affect the recharge rates for the Deep Regional Aquifer system. Aquifer recharge areas near the site would not be significantly impacted.

The potential for spills during operations to reach groundwater is unlikely and would have no adverse impact to groundwater quality due to spill impoundments as described above. Any observed spills or stained surfaces would be cleaned up according to the site's approved Spill Prevention, Containment, and Countermeasure (SPCC) Plan.

PSE Natural Gas Distribution System

The operation of the two new distribution pipeline segments, new limit station, and upgrades to the gate station would not result in any impacts on surface water quality or flood hazard areas. During operation, the pipeline segments would be underground and within paved roadway surfaces in their entirety. The limit and gate station sites do not contain and are not directly adjacent to waterbodies, wetlands, or floodplains.

During operations, impacts from stormwater runoff would be unchanged along the new pipeline segments and at the new limit station and upgraded gate station. Site conditions along the pipeline segments would be restored as closely as possible to preexisting conditions following construction. The existing limit station site is almost entirely impervious and consists of a building and paved parking lot. At the limit station site, the Proposed Action would include demolition of the existing facilities and construction of smaller buildings creating less overall impervious surface. Additionally, perimeter vegetation screening with native plantings would incorporate low impact development stormwater management techniques to retain stormwater on site through infiltration into the ground rather than running off into Pierce County's stormwater utility system currently present in the adjacent 99th Avenue East ROW. The surface at the upgraded gate station would remain gravel, which matches existing conditions.

Operation of the two distribution pipeline segments, new limit station, and upgrades to the gate station would have no adverse impacts on groundwater quality unless maintenance activities resulted in a spill or leak from maintenance equipment or vehicles. In such cases, the impacts would be isolated and likely small considering the type of equipment used to perform maintenance activities. An isolated spill during maintenance activities would be cleaned up immediately consistent with PSE's existing operations plans and procedures.

3.3.4.3 Decommissioning Impacts

Decommissioning of the Project components would cause surface water and groundwater impacts similar to those discussed in Section 3.3.4.1 (Construction Impacts). Potential impacts include those related to in-water, upland, and shoreline disturbances, but would be temporary and would likely be less severe than those experienced during construction. PSE anticipates that in-water and shoreline improvements would remaining in place during decommissioning, therefore limiting impacts to the removal of upland structures.

3.3.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and there would be no impacts to water resources related to the Proposed Action. No additional stormwater treatment measures would be taken.

3.3.6 Avoidance, Minimization, and Mitigation

This section presents mitigation measures proposed to alleviate potential impacts during construction and operation of the Project. The Project would be water-dependent, and therefore, impacts to waterbodies cannot be fully avoided. The LNG from the Proposed Action is intended to be made available for the marine transportation industry as a cleaner burning fuel than traditional diesel fuel. Thus, direct access to the water is a necessity. However, specific Proposed Action components were selected to avoid impacts, which could

occur from alternative options. For example, siting the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System in a developed industrial port site and constructing the pipeline segments within existing road ROWs would avoid many new impacts on water quality and resources.

Another aspect of impact avoidance integrated into the Project's design is the avoidance of dredging. In-water structures in both the Hylebos and Blair waterways, including the Tacoma LNG Facility pier and TOTE Marine Vessel LNG Fueling System loading platform, have been configured to avoid the need for dredging.

As described further below, impacts that could not be avoided would be minimized through implementation of specific measures.

3.3.6.1 Construction

Before initiating construction, PSE would prepare an Environmental Construction Plan and Procedures document specifically applicable to the Proposed Action. This document would provide a variety of information such as the following:

- Construction and environmental requirements;
- Erosion and sedimentation control including construction Stormwater Pollution Prevention Plan (SWPPP);
- Pipeline construction methods;
- Site-specific construction plans; and
- SPCC Plan.

PSE would prepare and approve the SWPPP before construction to address applicable water quality requirements of the NPDES Construction Stormwater General permit. BMPs identified for use during construction may include erosion control measures such as silt fence, straw/hay bales, temporary cover, and catch basin protection in accordance with an approved SWPPP.

As part of the Environmental Construction Plan and Procedures, the SPCC Plan would outline specific preventive measures and procedures to minimize hazardous or regulated waste spills, as well as actions to be undertaken in the event of accidental spills. For example, fueling of construction equipment would not occur within 100 feet from designated aquatic resources or 150 feet from water supply wells.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The following BMPs would be implemented to minimize potential impacts to water quality and resources, including the Hylebos and Blair waterways, stormwater quality, and groundwater.

General Best Management Practices

- Wet or uncured concrete would not be allowed to enter waters of the state.
- Excess or waste materials generated during construction would not be disposed of or allowed to enter waters of the state. Excess or waste materials would be collected and recycled or disposed of at an approved upland facility. Demolition and construction materials would be stored where wave action or upland runoff cannot cause materials to enter surface water.
- Land-based staging areas for activities such as storage of machinery, equipment, materials, and stockpiled soils in shoreline areas or waterward of shoreline areas would be prohibited. Land-based staging areas would be located a minimum of 50 feet from surface water. A silt fence would be installed around the perimeter of the upland locations where machinery, materials, and stockpiled soils are situated.
- Silt fences would be installed. The silt fencing would be delineated on the final plans, and fences would be installed and remain on site until the Project is completed. Silt fences and/or coir rolls would be

installed above the shoreline slope adjacent to the work area to prevent silt from entering the waterway.

- Any temporary stockpiles would be covered when not in use.
- Water trucks and dust controlling agents would be used to control dust in work areas, and temporary access road entrances and exits would consist of gravel.
- Work barges would not be allowed to ground on the shoreline during construction.
- All equipment that would operate over water or below the mean high higher water mark would be cleaned of accumulated grease, oil, or mud. All leaks would be repaired prior to arriving on site. Equipment would be inspected daily for leaks, accumulations of grease, etc., and any identified problems would be fixed before operating over water or below the mean high higher water mark.

Spill Prevention

- Vessels, construction equipment, fuel hoses, oil drums, oil or fuel transfer valves and fittings, and other equipment components would be checked regularly for drips or leaks and would be maintained and stored properly to prevent spills; the contractor would have a spill kit with oil-absorbent materials on site to be used in the event of a spill or in the event that any petroleum product is observed in the water; and the contractor would be responsible for the preparation of an SPCC Plan to be used for the duration of construction.
- Fueling of upland and land-based construction equipment would not occur within 100 feet of surface water.
- Any spills related to maintenance would be cleaned up by PSE personnel consistent with their existing system operations plans and procedures. Corrective actions would be taken in the event of any discharge of oil, fuel, or chemicals into the water, including:
  - In the event of a spill, containment and cleanup efforts would begin immediately and completion would occur as soon as possible, taking precedence over normal work. Cleanup would include proper disposal of any spilled material and used cleanup material.
  - In the event of an oil or hydraulic spill during transport, the barge would employ containment measures such as floating absorbent booms.
  - The cause of the spill would be assessed and appropriate action would be taken to prevent further incidents or environmental damage.
  - Spills of oil or hazardous materials would also be reported immediately to the National Response Center at 1 (800) 424-8802, to Washington's Emergency Management Division at (800) 258-5990, and the Ecology Regional Office at (360) 407-6300.

Surface Waters

The following mitigation measures would be implemented to minimize potential impacts to the Hylebos and Blair waterways.

Turbidity Minimization. Water quality standards and procedures that limit the impact of turbidity would be observed (WAC 173-201A-210(1)(e)(i)). Turbidity monitoring requirements and mixing zones will be established in the CWA Section 401 certification conditions for in-water work. Turbidity monitoring requirements will also be described in the SWPPP monitoring plan as follows:

- The area of mixing established for marine waters is a 150-foot radius surrounding the in-water activity. Turbidity occurring outside that zone that is more than 5 nephelometric turbidity units (NTU) over

background when the background is 50 NTU or less, or a 20 percent increase in turbidity when the background turbidity is more than 50 NTU is a violation of the turbidity water quality standard.

- Visible turbidity anywhere at or beyond the 150-foot point of compliance from activity would be considered an exceedance of the standard.
- During and immediately after Project construction, PSE or its contractor would monitor for turbidity discharges at the point of compliance as specified in WAC 173-201A-210(1)(e)(i). A turbidimeter or visual gauging with photographic documentation of turbidity would be used.

Demolition of In-water Structures and Creosote-treated Timber Piling Removal. The following measures would be implemented as part of removing existing in-water structures and creosote-treated timber pilings.

- During demolition, including removal of existing piles in both the Hylebos and Blair waterways, containment booms would be used to surround the work areas. The booms would serve to contain and collect any oily material released, as well as floating debris. Oil-absorbent materials would be employed immediately if visible product is observed. The booms would remain in place until all in-water and shoreline demolition activities are complete. All accumulated debris would be collected daily and disposed of at an approved upland site.
- A silt curtain may be installed around the pile removal area to prevent sediment from migrating beyond the existing project footprint.
- Existing piles would either be fully extracted in a single slow and continuous motion using a vibratory hammer or cut 2 feet below the mud line should the piling break during extraction. If cut 2 feet below the mud line, the resulting holes would be filled with clean sand or other habitat mix approved by the Washington Department of Fish and Wildlife. Piling would not be broken off intentionally by twisting, bending, or other deformation.
- All creosote-treated wood would be contained during and after removal to preclude the entrance of sediments and any contaminated materials to the aquatic environment. Piles removed from substrate would be moved immediately from the water onto the upland or barge. The pile would not be shaken, hosed off, left hanging to drip, or any other action intended to clean or remove adhering material from the pile.
- The work surface on the uplands or barge would include a containment basin for piles and any liquid or sediment removed during pulling of the piling. Basins may be constructed of durable plastic sheeting with sidewalls supported by hay bales or support structure to contain all sediment and liquid. Water left in the basins would not be discharged into waters of the state.
- Creosote-treated wood and piles from demolition of existing structures would be disposed of at an appropriate upland facility, meeting the liner and leachate standards of the Minimum Functional Standards, WAC Chapter 173-304.
- Sediments spilled on work surfaces would be contained and disposed of with the pile debris at an approved upland disposal site.
- Hydraulic water jets would not be used to remove or place piles.

Shoreline Improvement. As described above, shoreline improvements to the Hylebos Waterway would include removal of a creosote-treated bulkhead structure to be replaced with a new steel sheet pile bulkhead. To minimize potential impact during construction of these shoreline improvements, the existing bulkhead would remain in place while the work behind it is completed. The existing bulkhead would provide a measure of erosion and sediment control during construction of the new cleaner bulkhead and regrading of the resulting shoreline.

Hydrostatic Test Water. Water for hydrostatic testing of the LNG storage tank would be drawn from the Tacoma Public Utilities potable water system. Disposal of used test water would occur through the sanitary sewer.

Stormwater. Before construction, BMPs, including many described above, would be implemented to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. The BMPs would be consistent with the conditions of the project's NPDES General Construction Stormwater Permit. The NPDES permit guides construction stormwater planning for land-disturbing construction work and would be obtained before initiation of construction. The BMP controls would be inspected and maintained until the end of construction.

Groundwater

The construction and operation of the Tacoma LNG Facility is not expected to affect groundwater quality. As described above, the SPCC Plan would provide standard guidelines to reduce the potential for groundwater contamination. Restrictions on refueling and storage of hazardous materials near groundwater sources would be enacted to prevent potentially affecting groundwater quality.

No drinking water wells were identified within 150 feet of the proposed Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites. Should any drinking water wells be subsequently identified within 150 feet of either site, these wells would be inspected for water quality and flow characteristics before and after construction, as required. In the unlikely event that construction activities temporarily impair well water production or quality, PSE would provide alternative sources of water or otherwise compensate the owner.

PSE Natural Gas Distribution System

In addition to the use of applicable measures from the General Best Management Practices and Spill Prevention sections above, the following additional mitigation measures would be implemented for construction of the new distribution pipeline segments, new limit station, and upgrades to the existing gate station.

Surface Waters

The following mitigation measures would be implemented for pipeline crossings under existing, culverted waterbodies located within paved roadways:

- The pipeline would be installed under existing culverts by using a horizontal bore or directional drill. The proposed crossing under Interstate 5 and Pacific Highway East would be directionally bored to minimize construction and transportation impacts in the city of Fife. Consideration would also be given to directionally boring portions of Taylor Way in the Port of Tacoma to avoid existing sources of contamination within the peninsula.
- Pipeline crossings under the existing culverts would maintain at least 36 inches vertical separation from the bottom of the culverts during installation.
- The SPCC Plan would outline specific preventive measures and procedures to minimize hazardous or regulated waste spills, as well as actions to be undertaken in the event of accidental spills during construction of the new distribution pipeline segments, limit station, or improvements to the gate station.
- Water for hydrostatic testing of the new distribution pipeline segments would be drawn from fire hydrants and discharged into sanitary sewer systems.
- If dust control is necessary, PSE would use water obtained primarily from municipal sources. The amount of water required for dust control could vary depending on the time and dryness of the year and specific site conditions.

- During trench dewatering, water would be pumped from the trench into stable, vegetated areas through an approved dewatering structure. The rate of flow from the pump would be regulated to prevent erosion from runoff. The structure would be maintained and sediment cleaned out as required.

As described above, BMPs would be implemented consistent with the conditions of the Project's NPDES General Construction Stormwater Permit to prevent erosion and sedimentation.

Groundwater

Impacts on private or public wells are not anticipated. No drinking water wells were identified within 150 feet of the proposed pipeline segments.

The SPCC Plan would outline specific preventive measures and procedures to minimize hazardous or regulated waste spills, as well as actions to be undertaken in the event of accidental spills during construction of the new distribution pipeline segments, limit station, or improvements to the gate station.

If pipeline trench dewatering is required during construction, the dewatering would be conducted in a manner that does not cause sediment to leave the site and would not result in exceedances of water quality standards. Groundwater encountered during construction would be placed into a tank and then discharged into a sanitary sewer system or decant facility in coordination with the applicable local jurisdiction.

If contaminated groundwater is encountered during trenching operations, the removed groundwater would be contained and disposed of at an approved facility in accordance with applicable federal, state, and local requirements.

3.3.6.2 Operations

The following operational mitigation measures would be implemented at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System:

- Spill impoundments for collection of spilled LNG, mixed-refrigerant, heavy hydrocarbons, WPG, amine, and equipment lubrication system and transformer oil design features would minimize impacts to surface water during operations.
- The stormwater management system would be designed to meet the water quality requirements of the Port of Tacoma's 2014 Stormwater Management Plan, Washington Industrial Stormwater General Permit, and applicable requirements from the Western Washington Stormwater Manual.
- Promptly remove motor oil and hydraulic fluids as a good housekeeping practice.
- Handle vehicle washing and maintenance off site.
- Conduct personnel training for general environmental awareness, spill management, hazardous waste management, and stormwater inspections in accordance with permit conditions.

No mitigation measures are proposed for operation of the new distribution pipeline segments, limit or gate stations. These components are proposed entirely on previously developed areas so any potential impact to water during operation would be negligible.

3.3.7 Conclusion

During construction of operation of the Project, some impacts to surface and groundwater quality would have the potential to occur; however, with implementation of the above mitigation measures, no significant unavoidable adverse water-related impacts would be expected to result from the Proposed Action.

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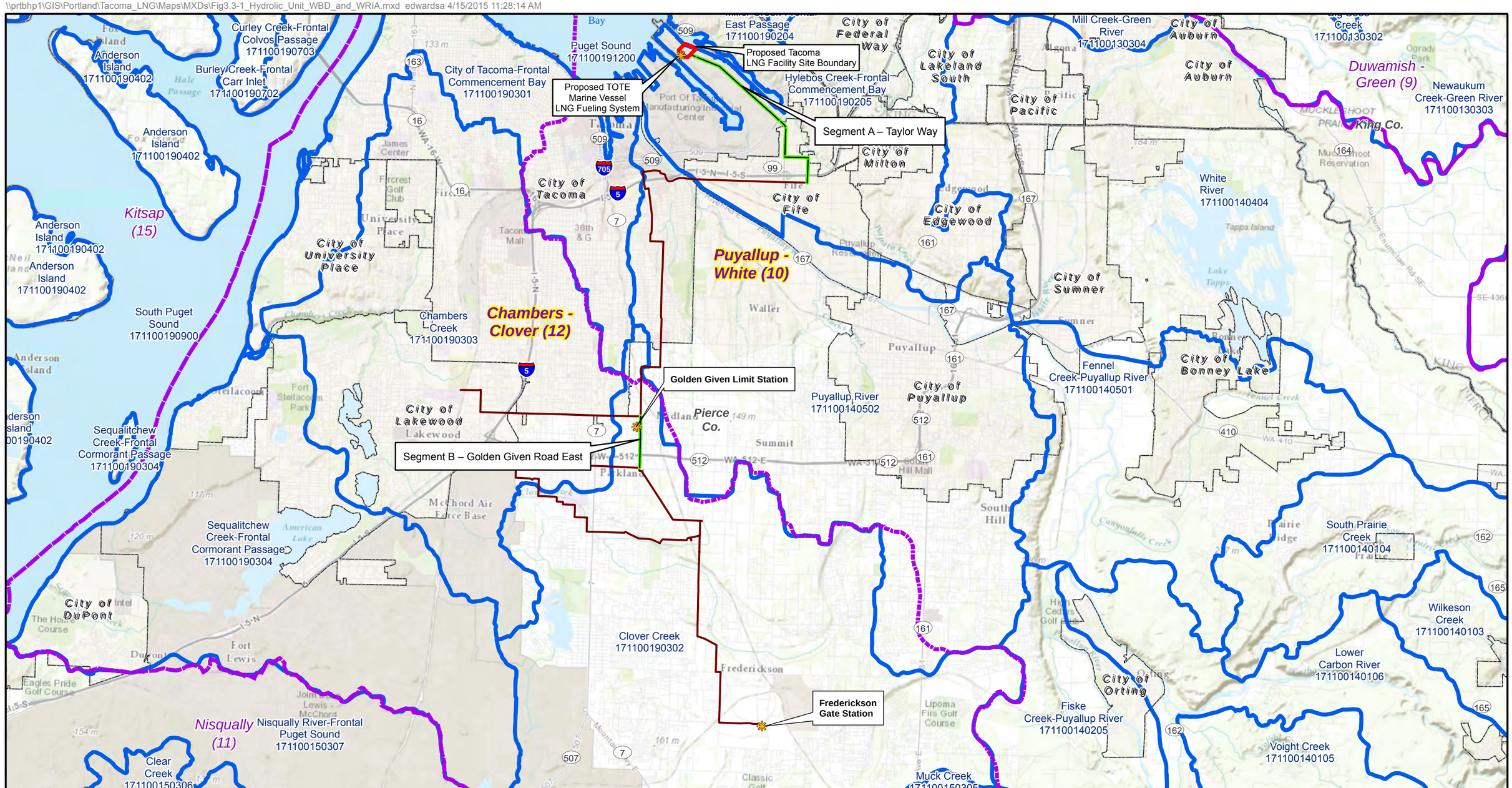

City of Tacoma

Figure 3.3-1
Hydrologic Unit Boundaries and Water Resource Inventory Areas (WRIA)
Tacoma LNG Project

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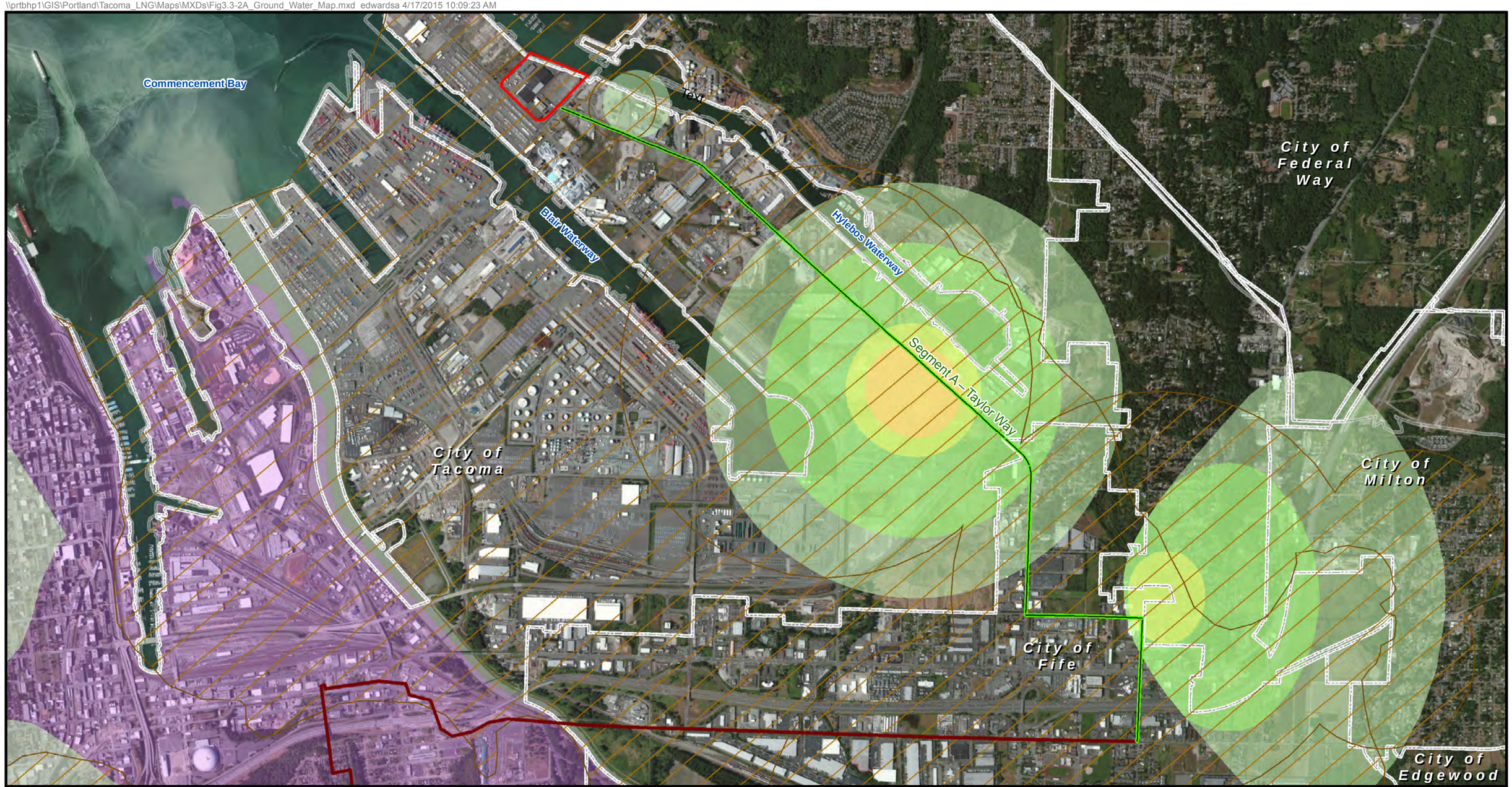
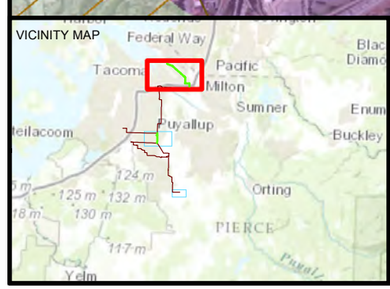




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Tacoma LNG Facility Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Aquifer Recharge Area

EPA Sole Source Aquifers

- Central Pierce County Aquifer Area SSA

Wellhead Protection Areas

- Wellhead Protection 6 Month
- Wellhead Protection 1 Year
- Wellhead Protection 5 Year
- Wellhead Protection 10 Year
- City Limit Boundary
- County Boundary

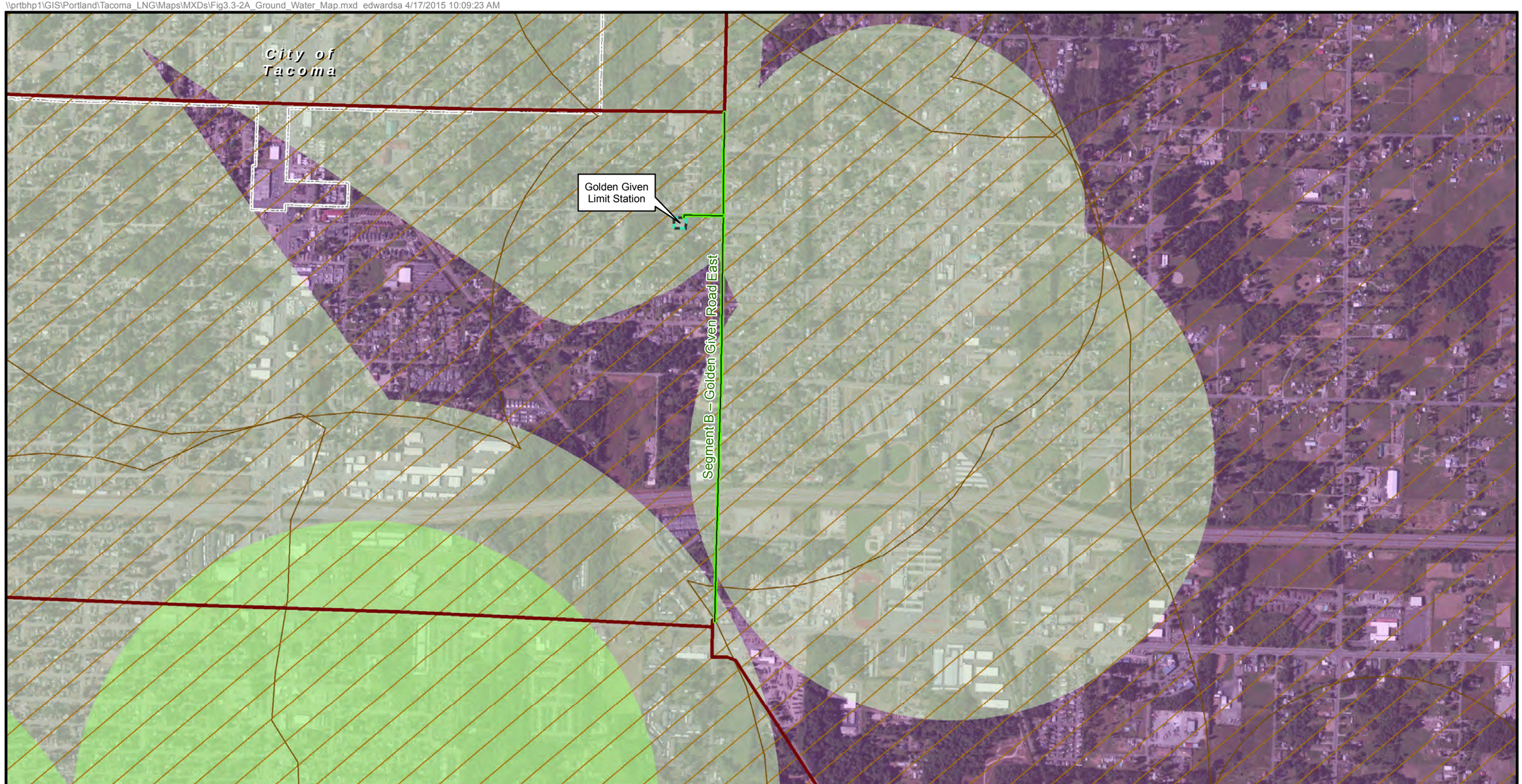
N W E S

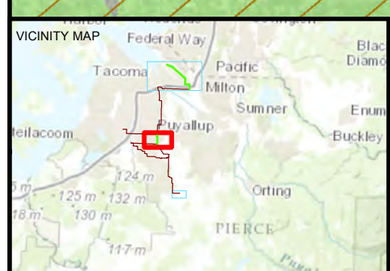
0 1,250 Feet

City of Tacoma

Figure 3.3-2A
Groundwater Resources

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- Aquifer Recharge Area

EPA Sole Source Aquifers

- Central Pierce County Aquifer Area SSA
- Wellhead Protection 5 Year
- Wellhead Protection 10 Year
- City Limit Boundary
- County Boundary

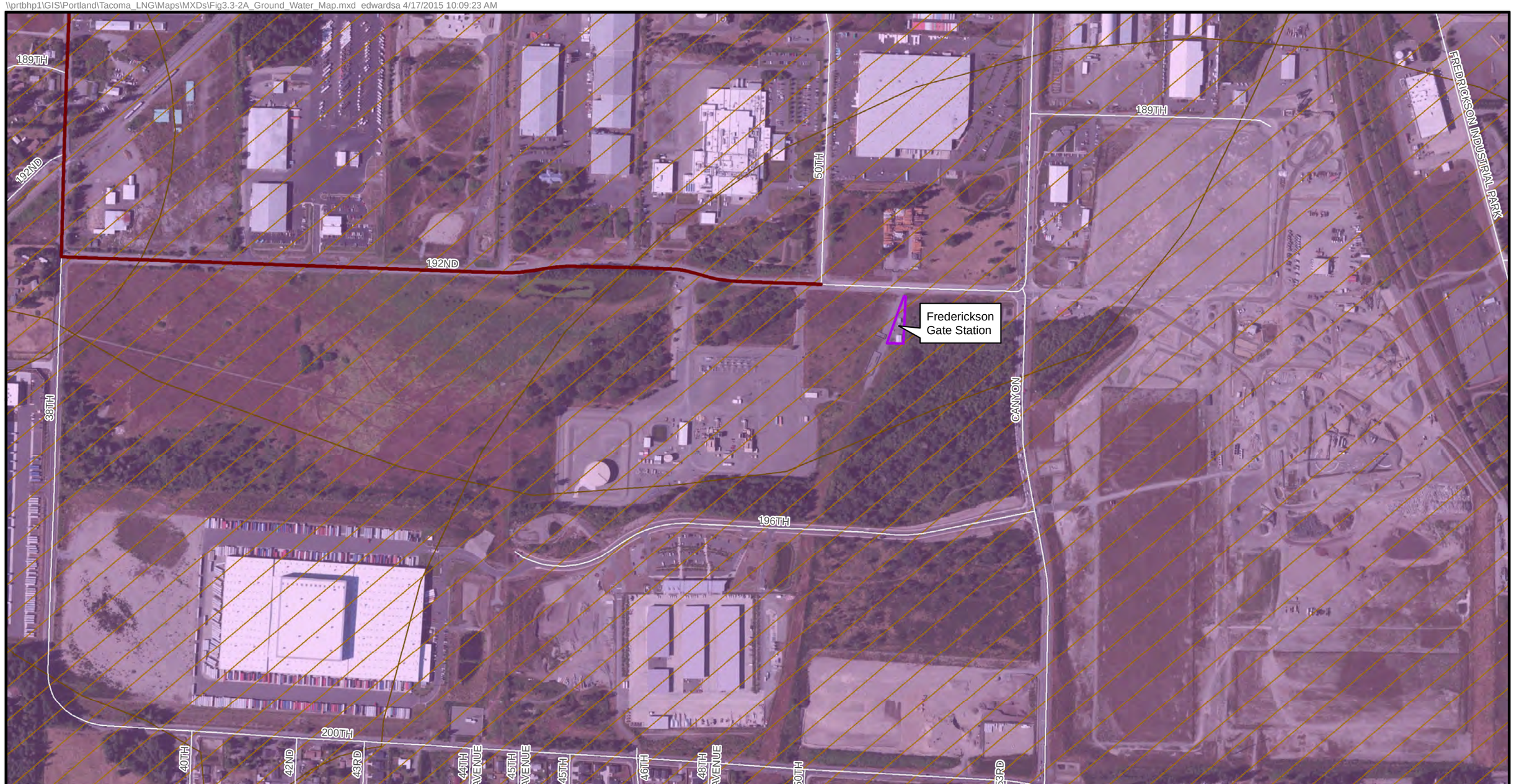
N W E S

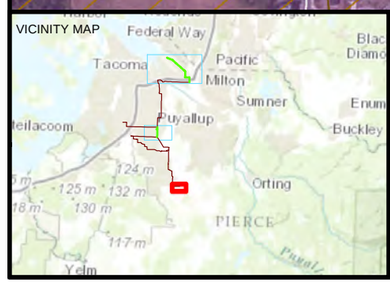
0 1,000 Feet

City of Tacoma

Figure 3.3-2B
Groundwater Resources

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Frederickson Gate Station
- Existing Pipeline
- Aquifer Recharge Area

EPA Sole Source Aquifers

- Central Pierce County Aquifer Area SSA
- County Boundary

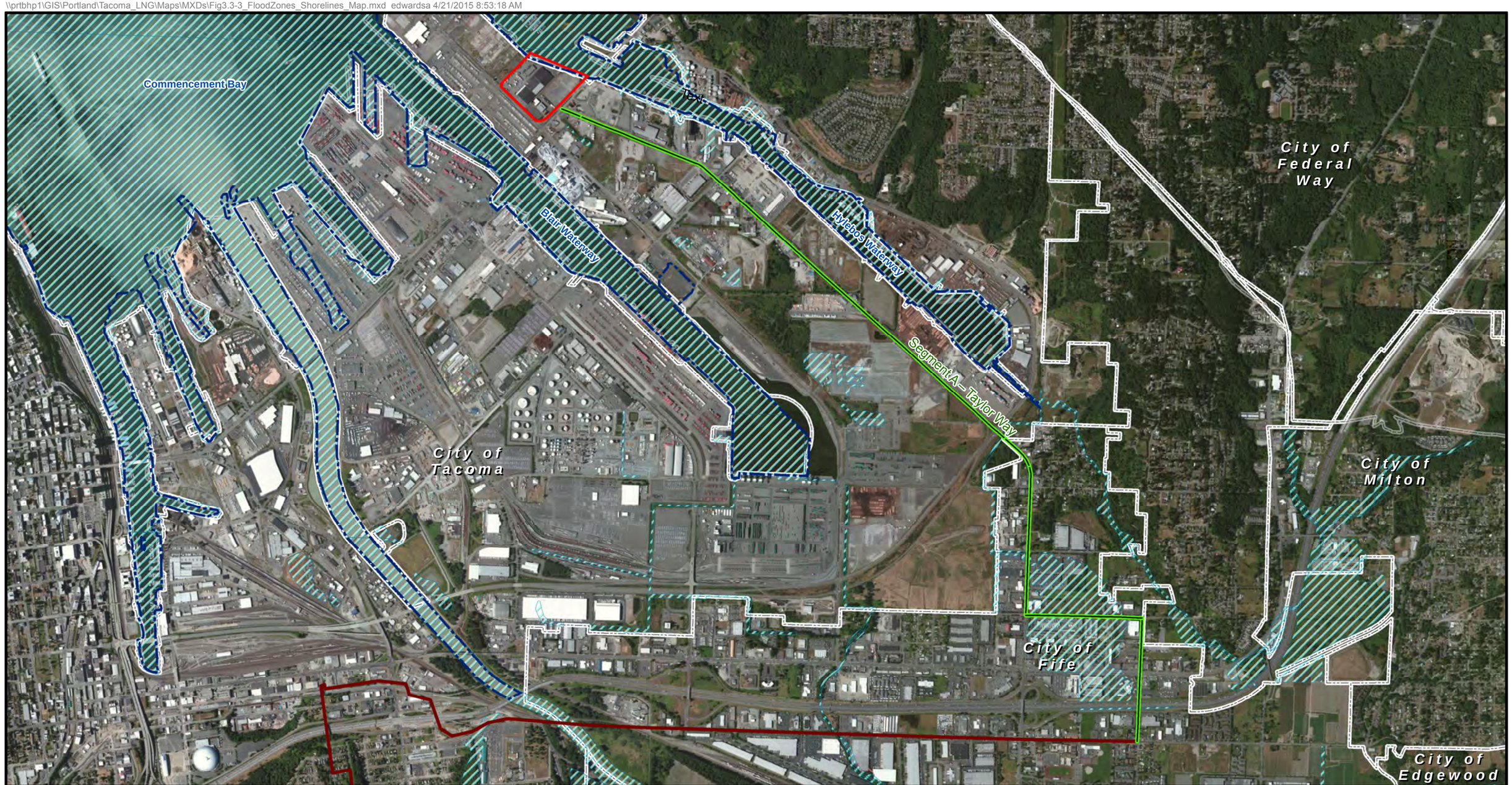
N W E S

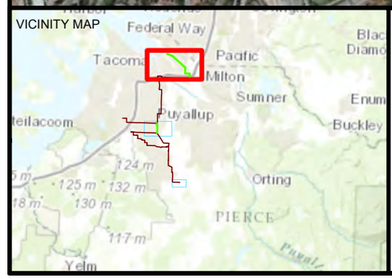
0 500 Feet

City of Tacoma

Figure 3.3-2C
Groundwater Resources

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Tacoma LNG Facility Site Boundary
- Proposed New Pipeline
- Existing Pipeline

Federal Emergency Management Agency Flood Zone

- 100-Year Flood Zone
- The area waterward of the line of extreme low tide is a shoreline of statewide significance.

- City Limit Boundary
- County Boundary

N W E S

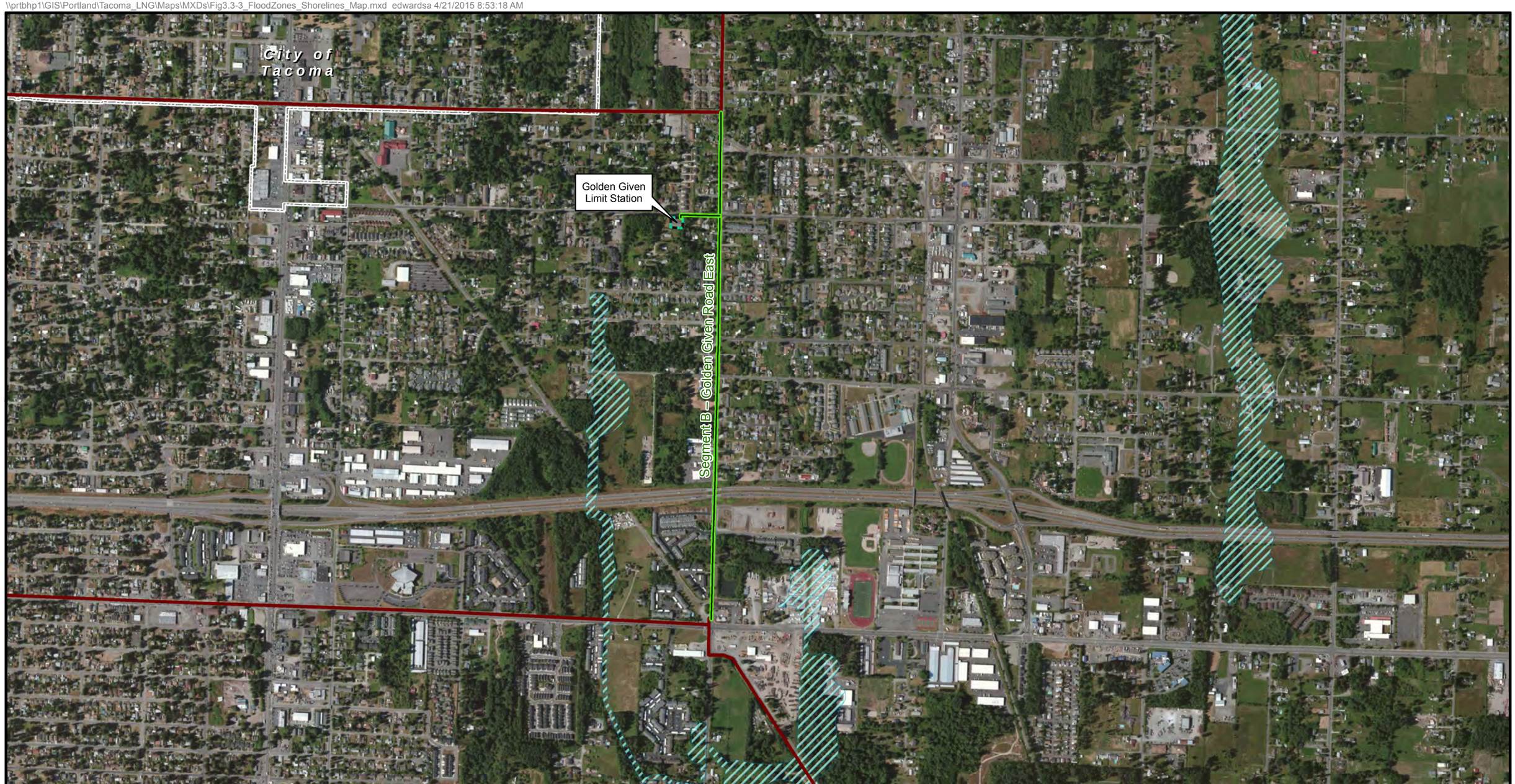
0 1,250 Feet

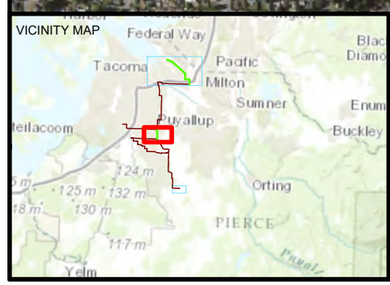
Tacoma

City of Tacoma

Figure 3.3-3A
Flood Zones and Shorelines of Statewide Significance

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Golden Given Limit Station Site Boundary
- Proposed New Pipeline
- Existing Pipeline
- **Federal Emergency Management Agency Flood Zone**
- 100-Year Flood Zone
- City Limit Boundary
- County Boundary

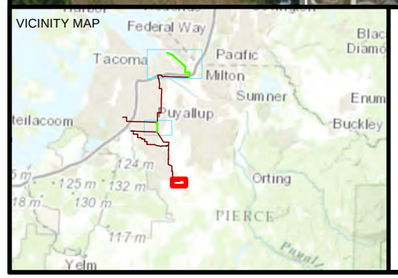
N W E S

0 1,000 Feet

City of Tacoma

Figure 3.3-3B
Flood Zones and Shorelines of Statewide Significance

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Frederickson Gate Station
- Existing Pipeline
- County Boundary

N W E S

0 500 Feet

City of Tacoma

Figure 3.3-3C
Flood Zones and Shorelines of Statewide Significance

Tacoma LNG Project

3.4 Plants and Animals

This section summarizes the study methodology for surveying plants and animals on or adjacent to the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project); characterizes existing plant and animal habitats and conditions; identifies the potential impacts that the operation, construction, and decommissioning of the Project (herein referred to as the Proposed Action) may have on these resources; and proposes avoidance, minimization, and mitigation measures for these impacts.

3.4.1 Study Methodology

Due to the presence of special-status species, an action area for the Proposed Action was established and is defined as all areas that could be affected directly or indirectly by the Proposed Action and not merely the immediate area impacted by the action (50 Code of Federal Regulations [CFR] 402.02). The action area has both terrestrial and in-water components.

The study methodology for plants and animals combined desktop reviews of existing information resources with field data collection and survey activities. Information about special-status species and habitats in and surrounding the Proposed Action area was collected from the following resources:

- *Revised Plants and Animals Technical Report for the Blair-Hylebos Terminal Redevelopment Project* (Grette Associates 2009);
- Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) database records for sensitive habitats and state-listed species within 5 miles of all proposed facilities (WDFW 2012);
- StreamNet database for special-status fish species that might occur in the action area (StreamNet 2014);
- United States Fish and Wildlife Service (USFWS) online Information, Planning, and Conservation Web site for information about special-status fish, wildlife, and plant species (USFWS 2014);
- USFWS Critical Habitat Mapper to identify areas of designated and proposed critical habitat for federally protected species (USFWS 2015);
- National Marine Fisheries Service (NMFS) website of protected resources for information about special-status anadromous fish and marine mammals (NMFS 2014a) with potential to occur in the general Proposed Action area;
- *Federal Register* for identification of final designations of critical habitat (NMFS 2014b);
- City of Tacoma, City of Fife, and Pierce County resource maps;
- Low-altitude, high-resolution aerial photography; and
- *Draft Biological Survey Results for the Tacoma LNG Project*, a biological survey conducted on December 6, 2012 (CH2M HILL 2012). This survey identified potential wetlands, jurisdictional drainages, protected habitats, special-status species, and the potential for nesting birds.

3.4.2 Regulatory Framework

This section identifies and describes required federal, state, county, and city regulatory and permitting requirements applicable to the Proposed Action. The main federal and state requirements driving this analysis of plants and animals are described below, followed by a listing of other pertinent requirements at the federal, state, and local levels.

3.4.2.1 Federal Endangered Species Act

The federal Endangered Species Act (ESA) of 1973 (16 United States Code [U.S.C.] 1536) as amended in 1988, establishes a national program to conserve threatened and endangered species of fish, wildlife, and plants and to preserve the ecosystems on which they depend. This act is administered by the USFWS for wildlife and freshwater species, and by National Oceanic and Atmospheric Administration (NOAA) Fisheries for marine and anadromous species. It defines procedures for listing species, designating critical habitat for listed species, and preparing recovery plans and specifies prohibited actions and exceptions.

ESA Section 7 requires federal agencies to ensure that the actions they authorize, fund, and carry out do not jeopardize endangered or threatened species or their critical habitats. A federal agency is required to consult with the USFWS, NOAA Fisheries, or both agencies if it is proposing an action that may affect listed species or their designated critical habitat. If listed species or designated critical habitat are present and could be affected by the Proposed Action, Section 7 requires that the federal agency prepare a biological assessment to analyze the potential effects of the action on listed species and critical habitat and make an effect determination for each species.

3.4.2.2 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act of 1996 (MSA) and subsequent reauthorizations require that federal agencies consult with NMFS about any federally authorized activity that may adversely affect Essential Fish Habitat (EFH) (16 U.S.C. 1855(b)). “EFH” is defined as waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. “Waters” are characterized as aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish. “Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities. “Necessary” is defined as the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem (16 U.S.C. 1802; 50 CFR 600.10). NMFS must provide conservation recommendations for activities that may adversely affect EFH.

The MSA also requires Regional Fishery Management Councils to identify and describe EFH in fisheries management plans. The Pacific Fishery Management Council (PFMC) has created several management plans that designate EFH in waters that may be affected by the Project. These include plans for West Coast groundfish, salmon (Chinook and coho), and coastal pelagic species (PFMC 1998a, 1998b, and 1999).

3.4.2.3 Marine Mammal Protection Act

Under the Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. 1361 et seq.), the Secretary of Commerce is responsible for the protection of all cetaceans (whales, porpoises, and dolphins) and pinnipeds (seals and sea lions) except walruses, and has delegated authority for implementing the MMPA to NOAA Fisheries. Under Section 3 of the MMPA, all marine mammals are protected from “take,” which is defined as “harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal,” and “harassment” is defined as “any act of pursuit, torment, or annoyance that has the potential to injure marine mammal stock in the wild; or has the potential to disturb a marine mammal or marine mammal stock in the wild by disrupting behavioral patterns, including migration, breathing, nursing, breeding, feeding, or sheltering.”

3.4.2.4 Fish and Wildlife Conservation Act and Fish and Wildlife Coordination Act

The Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901 et seq.) encourages federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. In addition, the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) requires federal agencies undertaking projects affecting water resources to consult with USFWS and the state agency responsible for fish and wildlife resources.

3.4.2.5 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act of 1940 prohibits the taking or possessing of and commerce in bald and golden eagles, with limited exceptions (16 U.S.C. 668–668d, June 8, 1940, as amended 1959, 1962, 1972, and 1978). This act only covers intentional acts or acts in "wanton disregard" of the safety of bald or golden eagles.

3.4.2.6 Migratory Bird Treaty Act

The Migratory Bird Treaty Act implements various treaties and conventions between the United States and other countries, including Canada, Japan, Mexico, and the former Soviet Union, for the protection of migratory birds (16 U.S.C. 703-712, July 3, 1918, as amended 1936, 1960, 1968, 1969, 1974, 1978, 1986, and 1989). Under this act, taking, killing, or possessing migratory birds or their eggs or nests is unlawful. Most species of birds are classified as migratory under this act, except for upland game birds and nonnative birds such as ring-necked pheasant (*Phasianus colchicus*), house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), and rock dove (*Columba livia*).

3.4.2.7 Washington Endangered Species Act

The Washington State Endangered Species Act is administered by WDFW. Washington Administrative Code (WAC) 232-12-297 classifies wildlife species as endangered, threatened, and sensitive and outlines recovery and management priorities for listed populations.

3.4.2.8 City of Tacoma Critical Areas Preservation Ordinance

The purpose of the City of Tacoma's Critical Areas Preservation Ordinance (Tacoma Municipal Code 13-11) is based on best available science that classifies, protects, and preserves Tacoma's critical areas by providing standards to manage development in association with these areas and by designating some of these areas as environmentally sensitive in accordance with the Washington State Environmental Policy Act. Many critical areas provide a variety of valuable and beneficial biological and physical functions that benefit the city and its residents, while others may pose a threat to human safety or to public and private property. Critical areas include critical aquifer recharge areas, fish and wildlife habitat conservation areas, flood hazard areas, geologically hazardous areas, stream corridors, and wetlands.

3.4.2.9 Pierce County Critical Areas Ordinance

The Pierce County Code (PCC) includes a Critical Areas Ordinance (Title 18E Development Regulations – Critical Areas), which addresses protections for a variety of resources, including "certain fish and wildlife species and habitat." As part of its Critical Areas Ordinance, Pierce County adopted several mapping resources to meet its conservation goals, including the Washington Natural Heritage database of species and habitat and the PHS program and PHS maps.

3.4.2.10 Additional Regulations

The following is a list of federal, state, and local codes relevant to fish, wildlife, plants, and habitat in the Proposed Action area:

- 16 U.S.C. 757a–757g: Anadromous Fish Conservation Act;
- 16 U.S.C. 4701–4751: Nonindigenous Aquatic Nuisance Prevention and Control Act;
- Washington State Hydraulic Project Approval (HPA) authorized in 1943 by Revised Code of Washington (RCW) 77.55 and regulated through rules adopted in 1983 in Chapter 220-110 of the WAC. On November 7, 2014, the Washington Fish and Wildlife Commission adopted a comprehensive update to the HPA rules, which will replace those in Chapter 220-110.
- WAC 232-12-011: Wildlife classified as protected shall not be hunted or fished;
- WAC 232-12-014: Wildlife classified as endangered species;
- WAC 365-196-830: Protection of critical areas;

- Priority Habitats and Species List (WDFW 2008);
- Fife Municipal Code (FMC): FMC 17.15.040 – Fish and Wildlife Habitat Conservation Areas; and
- Pierce County Code (PCC:) PCC 18E.40.020 – Fish and Wildlife Species and Habitat Conservation Areas.

3.4.3 Affected Environment

The study area for plants and animals consists of the Project components as described in Chapter 1 (Purpose, Need, and Alternatives Considered) and Chapter 2 (Description of Proposed Action) and are summarized as follows.

The Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the City of Tacoma. The two new distribution pipeline segments would be located within the city of Tacoma and city of Fife (Segment A) and unincorporated Pierce County (Segment B). In addition, the Golden Given Limit Station and Frederickson Gate Station would be located within unincorporated Pierce County. A detailed description of the Proposed Action components is provided in Chapter 2.

The majority of the Proposed Action site consists of developed areas for the upland and aquatic/marine environments. The following discussion addresses each environment separately for the Tacoma LNG Facility and TOTE sites, and the PSE Natural Gas Distribution System.

3.4.3.1 Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System Sites

Descriptions of upland habitat, wetlands and stream habitat, and aquatic/marine habitat and the associated plant and animal species that may occur within the habitats are documented herein.

Upland Habitat

The majority of the ground surface on the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites is highly disturbed and is covered with built structures , pavement, or gravel. The site provides little wildlife habitat because of the lack of vegetation, isolation from larger tracts of habitat, and surrounding industrial land use. Riprap is present along the shorelines within the Proposed Action area. Non-special-status species are discussed here; for a discussion of special-status species, refer to “Special-Status Species and Protected Habitat,” below.

Plants

The upland habitat primarily supports weedy and noxious grasses and forb plant species. Vegetation along the top of the shoreline bank of the Hylebos and Blair waterways is minimal as most of the shoreline consists of riprap. A creosote-treated timber bulkhead is also a prominent feature along the Hylebos shoreline. Approximately nine trees (Google Earth 2015), including two cottonwood (*Populus balsamifera*) trees and one Douglas fir (*Pseudotsuga menziesii*) (CH2M HILL 2012) were observed along the Hylebos Waterway shoreline. There are no trees along the shoreline of the Blair Waterway at the Project site. Himalayan blackberry (*Rubus discolor*), Scotch broom (*Cytisus scoparius*), Japanese knotweed (*Fallopia japonica*), and butterfly bush (*Buddleia davidii*) were observed primarily along shorelines. Ornamental landscape trees also line a parking area along Alexander Ave E.

Animals

The upland habitat in the industrialized site provides limited habitat for wildlife. Terrestrial wildlife includes resident and migratory songbirds, raptors, wading birds (i.e., great blue herons [*Ardea Herodias*]), reptiles, small mammals (e.g., raccoon [*Procyon lotor*], opossum [*Didelphis virginiana*], and possibly coyotes (*Canis latrans*). (Port of Tacoma 2009)

Birds observed during the December 2012 biological survey of the Tacoma LNG Facility site included American robin (*Turdus migratorius*), American crows (*Corvus brachyrhynchos*), and European starlings (CH2M HILL 2012). A crow (American or Northwest) nest from the 2012 breeding season was observed in an

ornamental tree during the survey (CH2M HILL 2012). Trees on site may provide nesting and roosting opportunities for birds that are adapted to the high level of disturbance on the site, such as the American crow (CH2M Hill 2015). Killdeer (*Charadrius vociferous*) have the potential to nest in the Proposed Action area; killdeer are ground-nesting birds and may utilize gravely sites that are heavily disturbed (Jackson and Jackson 2000). Avian nesting habitat is generally poor, and no nests from the 2012 breeding season were observed on buildings or structures.

Because of the proximity to the Hylebos and Blair waterways and Commencement Bay, birds frequenting upland portions of the Proposed Action area include species such as wading birds and waterfowl. These species are covered in detail in the Estuarine Habitat section, below.

Suitable habitat for reptiles consists of unvegetated soil or grassy areas, which may be present along the shoreline of the proposed Tacoma LNG Facility and TOTE sites. Species that have the potential to occur include common garter snake (*Thamnophis sirtalis*), northern alligator lizard (*Elgaria coerulea*), painted turtle (*Chrysemys picta*), and western fence lizard (*Sceloporus occidentalis*). These reptiles are common in the Puget Sound region and are documented as occurring near the Hylebos Waterway (DNR, BLM, WDFW, and USFS 2011).

Wetlands and Stream Habitat

No wetlands or streams are located within the Tacoma LNG Facility or TOTE sites (CH2M HILL 2014a). Hylebos Creek flows into the Hylebos Waterway at the far southeastern end of the waterway, approximately 2 miles from the proposed Tacoma LNG Facility. Wapato Creek flows into the southeastern corner of Blair Waterway, approximately 1.8 miles from the proposed TOTE Marine Vessel LNG Fueling System.

Estuarine Habitat

Commencement Bay is a navigable, natural, deep-water embayment, trending northwest to southeast and located near the southern end of the main basin of Puget Sound. The east end of the bay is currently dominated by the Port of Tacoma industrial area, a large flat area of filled tidelands that supports a variety of industrial and commercial uses. The shoreline of Commencement Bay has been substantially altered since the 1880s as a direct result of urbanization and industrialization (USACE, EPA, USFWS, and NOAA 1993). The east end of the bay, once a broad tide flat formed by the Puyallup River delta and other small deltas, was dredged and filled between approximately 1920 and the late 1960s, resulting in channelization of the lower Puyallup River and the relocation of the Puyallup River Mouth.

The shorelines of Commencement Bay have been altered by shoreline and erosion protection materials (e.g., bulkheads, riprap) (Kerwin 1999). These modifications to the physical environment, combined with the introduction of runoff and waste discharges from developed shoreline uses, have resulted in a general degradation of water and sediment quality and habitat loss. The relict natural aquatic habitats that persist in Commencement Bay are typically small, isolated, and surrounded by extensive development. The remaining narrow margins of intertidal and shallow subtidal habitat that surround the bay are important migratory routes for salmon, waterfowl, and shorebirds; the edges of the waterways and peninsulas also provide habitat for these species. However, most, if not all, of the remaining aquatic habitat is of a lesser quality than what existed historically.

As discussed in Section 3.3.3.1 of Section 3.3 (Water), the inner portion of Commencement Bay, which includes the Hylebos and Blair waterways, is listed as impaired on the 303(d) list for dieldrin, polychlorinated biphenyls (PCBs), chlorinated pesticides, dichlorodiphenyltrichloroethane (DDT), and high molecular weight polyaromatic hydrocarbons. The Commencement Bay impaired listings on the Washington State Department of Ecology's current 303(d) list as approved by the United States Environmental Protection Agency include two areas within the Hylebos Waterway that are listed for impairment due to dieldrin, PCBs, chlorinated pesticides, and DDT (Ecology 2012). The inner Commencement Bay impaired listings also include one area listed for impairment due to both dieldrin and PCBs. Both waterways have twice the

concentrations of lead and copper and up to 43 times higher concentrations of zinc than the seawater flowing into Puget Sound.

Estuarine habitat in the vicinity of the Tacoma LNG Facility and TOTE sites is associated with central Puget Sound, including the Hylebos and Blair waterways and Commencement Bay. The estuarine conditions associated with the Tacoma LNG Facility and TOTE areas are typical of an industrial area and reflect the area's history as a maritime industrial and shipping center. Grette Associates (2009) reported that the area has been previously modified from its original state, resulting in the loss of special aquatic sites (mudflat, salt marsh). The shoreline consists of areas completely modified with riprap and a timber bulkhead along the Hylebos shoreline. Several existing in-water structures in the Blair Waterway are associated with existing TOTE operations: one timber T-pier, three concrete piers, and one concrete breasting dolphin. Existing in-water structures in the Hylebos Waterway in the Proposed Action area are limited to two timber-pile supported piers.

Plants

Shoreline and aquatic vegetation along Hylebos and Blair waterways is sparse. Macroalgae coverage is similarly sparse, consisting primarily of sea lettuce (*Ulva fenestrata*). At approximately +1 foot mean lower low water (MLLW), sea lettuce; sugar kelp (*Laminaria saccharina*); *Gracilaria* spp., and two species in the genus of red algae were observed during the December 2012 biological survey (CH2M HILL 2012). Species found along the top of the shoreline bank included Himalayan blackberry (*Rubus discolor*), Scotch broom (*Cytisus scoparius*), Japanese knotweed (*Fallopia japonica*), and butterfly bush (*Buddleia davidii*).

Animals

Estuarine habitat near the Tacoma LNG Facility and TOTE sites is associated with Hylebos Waterway, Blair Waterway, and Commencement Bay. Grette Associates (2009) noted that fish and wildlife species that may be present within the Proposed Action area were similar to those typically found in Puget Sound; however, the sparse shoreline vegetation and heavily industrialized and trafficked waters limit the amount of suitable habitat. Non-special-status species are discussed here; for a discussion of special-status species (e.g., marine mammals), refer to "Special-Status Species and Protected Habitat," below.

Birds

Wading birds and waterfowl forage in the intertidal and subtidal zones in central Puget Sound, including those of Commencement Bay and Hylebos and Blair waterways.

These birds may use the Hylebos and Blair waterways throughout the year, though species composition may change by season. Waterfowl and other aquatic birds observed in the Hylebos Waterway during the December 6, 2012, biological survey were bufflehead (*Bucephala albeola*), double-crested cormorants (*Phalacrocorax auritus*), and Barrow's goldeneye (*Bucephala islandica*) (CH2M HILL 2012). Other species of waterfowl potentially present during spring and fall migrations include American wigeon (*Anas americana*), greater scaup (*Aythya marila*), green-winged teal (*Anas carolinensis*), mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), pigeon guillemot (*Cepphus columba*), ring-necked duck (*Aythya collaris*), and western grebe (Grette Associates 2009). In addition, horned grebe (*Podiceps auritus*) and red-necked grebe (*Podiceps grisegena*) are known to use the Hylebos and Blair waterways (Kapantais 2012, personal communication). Both species are common in Commencement Bay during the winter and may move toward the mouth of the Port of Tacoma waterways during high tides. Western grebes (*Aechmophorus occidentalis*) are also common in Commencement Bay during the winter and may potentially occur in the marine waters that border the Tacoma LNG Facility site and dock.

Additional birds that are associated with open water and aquatic habitats and are potentially present within the Hylebos and Blair waterways and Commencement Bay include the following (Dames and Moore 1981, as cited in Grette Associates, 2009):

- Glaucous-winged gull (*Larus glaucescens*);
- Bald eagle (*Haliaeetus leucocephalus*) – further discussed in "Special-Status Species and Protected Habitat," below ;
- Peregrine falcon (*Falco peregrinus*) - further discussed in "Special-Status Species and Protected Habitat," below;
- Marbled murrelet (*Brachyramphus marmoratus*);
- Great blue heron;
- Osprey (*Pandion haliaetus*);
- Dunlin (*Calidris alpine);*
- Mew gull (*Larus canus*); and
- Common tern (*Sterna hirundo*).

Canada geese (*Branta canadensis*), cackling geese (*B. hutchinsii*), double-crested cormorants, several species of gull, and great blue herons roost on the existing docks and structures during high tide and transition to the shoreline and exposed mudflats during low tide (CH2M HILL 2012; Grette Associates 2009; Ehrlich et al. 1988; Kapantais 1998). Approximately 20 great blue herons were observed roosting on pilings at the dock and pier during high tide in December 2012 (CH2M HILL 2012). No great blue heron nests (i.e., rookeries) were observed within the Tacoma LNG Facility site. Several pairs may continue to nest on the bluff overlooking Hylebos Waterway and Commencement Bay located 0.8 mile north of the Tacoma LNG Facility site (PHS database and observations during the 1997 and 1998 breeding seasons per Kapantais 2012, personal communication).

Fish

Salmonids migrate through Hylebos and Blair waterways, returning to Hylebos and Wapato creeks during the fall months as adults destined for spawning areas in fresh waters. Their progeny travel through the waterway during the spring and early summer months as they migrate to the sea. The online StreamNet Interactive Mapper indicates that Hylebos Creek, which flows into the Hylebos Waterway, provides potential migration habitat for pink salmon (*Oncorhynchus gorbuscha*), chum (*Oncorhynchus keta*), winter steelhead, (*Oncorhynchus mykiss*), coho, (*Oncorhynchus kisutch*), and fall Chinook (*Oncorhynchus tshawytscha*) StreamNet 2014). Sea-run cutthroat trout may be present year-round in Hylebos Waterway. Wapato Creek, where it flows into Blair Waterway, is a potential migration corridor for winter steelhead, chum, coho (StreamNet 2014), and cutthroat (Nauer 2001, personal communication). Chinook, chum, and pink salmon juveniles migrating out of the Puyallup and White rivers are present briefly in Hylebos and Blair waterways during their migration out to the Pacific Ocean. This migration occurs during the months of late February through July. Bull trout (*Salvelinus confluentus*) associated with the Puyallup and White rivers may be present seasonally as well.

Other fish species that may be present in the Proposed Action area include those typically found in Puget Sound, including the following: (Dames and Moore 1981, as cited in Grette Associates 2009):

- Pacific herring (*Clupea pallasii*),
- Surf smelt (*Hypomesus pretiosus*),
- Threespine stickleback (*Gasterosteus aculeatus*),
- Bay pipefish (*Syngnathus leptorhyncus*),
- Shiner perch (*Cymatogaster aggregate*),
- Striped seaperch (*Embiotoca lateralis*),
- Pile perch (*Rhacochilus vacca*),

- Snake prickleback (*Lumpenus sagitta*),
- Crescent gunnel (*Pholis laeta*),
- Red gunnel (*Pholis schultzi*),
- Pacific sand lance (*Ammodytes hexapterus*),
- Pacific staghorn sculpin (*Leptocottus armatus*),
- Flathead sole (*Hippoglossoides elassodon*),
- Starry flounder (*Platichthys stellatus*),
- Ratfish (*Hydrolagus colliei*),
- Blackbelly eelpout (*Lycodes pacificus*),
- Speckled sanddab (*Citharichthys stigmaeus*),
- Rock sole (*Lepidopsetta* sp.),
- Dover sole (*Microstomus pacificus*),
- Sand sole (*Psettichthys melanostictus*),
- C-O sole (*Pleuronichthys coenosus*), and
- Many ground fish species.

Bivalves and Crustaceans

Bivalves and crustaceans are also expected to be present in the vicinity of the Proposed Action, but may be present in small numbers or not at all due to dredging of the waterways. Species include (Dames and Moore 1981, as cited in Grette Associates 2009):

- Butter clam (*Saxidomus gigantea*),
- Little neck clam (*Leukoma staminea*),
- Horse clam (*Tresus* sp.),
- Soft-shell clam (*Mya arenaria*),
- Cockles (several species, *Clinocardium* spp.),
- Geoduck (*Panopea generosa*),
- Purple crab (*Hemigrapsus nudus*),
- Graceful crab (*Matacarcinus gracilis*),
- Red rock crab (*Grapsus grapsus*),
- Dungeness crab (*Metacarcinus magister*),
- Pink shrimp (*Pandalus borealis*),
- Coonstripe shrimp (*Pandalus danae*), and
- Spot shrimp (*Pandalus platyceros*).

Special-Status Species and Protected Habitat

This section addresses threatened, endangered, and other protected species of fish, plants, and wildlife, and protected habitats that have the potential to occur in or near the Proposed Action area. Collectively, these species are referred to as special-status species. Principal regulatory authority for protection is provided for by the ESA, MSA, MMPA, Bald and Golden Eagle Act, and Migratory Bird Treaty Act at the federal level, and endangered species regulations at the state and local levels, including PHS species and habitats.

Little to no suitable habitat exists in the upland portions of the Tacoma LNG Facility site or the TOTE site to support listed or other protected species. No endangered, threatened, or other special-status plant species are documented to occur at the Tacoma LNG Facility or TOTE sites. No critical habitat is within the Proposed Action area.

Although they are not federally listed as endangered or threatened, the following special-status fauna have the potential to occur in upland portions of the Proposed Action area:

- **Bald eagle** is a state sensitive species and is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In Washington, bald eagles occur in similar numbers during the breeding season and winter months (Stinson et al. 2007). During the breeding season, bald eagles nest near marine environments and other open waters such as rivers and lakes. Winter habitat is dictated by foraging opportunities that include concentrations of waterfowl and fish.
- There is potential for bald eagles to use the Tacoma LNG Facility site and area year round for day roosts or foraging. One adult bald eagle was observed flying over Hylebos Waterway and the proposed facility site during the December 2012 biological survey (CH2M HILL 2012). A bald eagle nest was documented in 2007 approximately 0.6 mile from proposed Pipeline Segment A (WDFW 2013). WDFW confirmed an active bald eagle nest in 2013 approximately 0.5 mile northeast of the Proposed Action area.
- **Peregrine falcon** is a state sensitive species and is federally protected under the Migratory Bird Treaty Act. Peregrine falcons are found throughout Washington year round. Northern regions of Puget Sound contain some of the greatest numbers of breeding pairs (Hayes and Buchanan 2002). Similarly, the estuaries of the entire Puget Sound support significant populations of wintering peregrine falcons where they forage on concentrations of waterfowl and other birds. Peregrines typically nest on cliffs near aquatic habitats, but will nest on buildings and bridges in urban areas. Suitable man-made nesting habitat is within the region of the Proposed Action area. Peregrine falcons have historically nested within 0.2 mile of the Tacoma LNG Facility site near the Hylebos Waterway (WDFW 2013). Peregrine falcons may also use the area during the winter season to prey on waterfowl in nearby aquatic and marine habitats.

The following special-status fish species are potentially present near the Proposed Action area:

- **Chinook salmon** (Puget Sound Evolutionarily Significant Unit) is federally listed as threatened and listed as a state candidate in Washington. Hylebos Creek and the Puyallup River are the closest streams in which Puget Sound Chinook salmon are known to occur. Hylebos Creek supports a small run of Chinook salmon (approximately 20 to 30 fish), which spawn primarily in the Spring Valley reach of the West Branch (Russ Ladley, Puyallup Tribe of Indians, biologist, personal communication, 2005 and 2007, as cited in CH2M HILL 2011). Hylebos Creek enters Hylebos Waterway approximately 2 miles southeast of the proposed Hylebos Waterway pier. The mouth of the Puyallup River is located approximately 1 mile southwest.
- Juvenile Chinook salmon migrate along the shorelines of Commencement Bay. Some of these salmon can be expected to be migrating in the vicinity of the Hylebos and Blair waterways during late spring/ early summer on their way out to the open ocean.
- The Proposed Action area includes critical habitat for the Puget Sound Chinook salmon (see “Critical Habitat,” below).
- **Steelhead trout** (Puget Sound Distinct Population Unit) is federally listed as threatened. The Puget Sound steelhead trout are documented to occur within Wapato Creek (Fife Ditch), Commencement Bay, and the Hylebos and Blair waterways (StreamNet 2014). The proposed Pipeline Segment A would cross under Wapato Creek at Fife Ditch, approximately 1,000 feet south of where Fife Ditch enters the Hylebos Waterway near the confluence with Hylebos Creek.

  Adult winter-run steelhead generally occur in the Puyallup River system from November through May, with spawning occurring from March through June and peak spawning occurring in April and May. The species’ ‘presence in Commencement Bay, as adults, is expected to occur from approximately November through March. Juvenile outmigrants are generally present during March and April. Outmigrant steelhead quickly move out of nearshore areas and into deeper waters.

The Proposed Action area includes no designated critical habitat for Puget Sound steelhead. However, critical habitat was proposed in 2013 for the species within the action area. The proposed critical habitat consists of Wapato Creek (Fife Ditch) and Hylebos Creek. Proposed critical habitat for the Puget Sound steelhead does not include the nearshore zone of Puget Sound waterways, based on the known rapid movement of steelhead out of freshwater and into offshore marine waters.

- **Bull trout** is federally listed as threatened and listed as a state candidate in Washington. The Coastal-Puget Sound Distinct Population Segment of bull trout has been documented in the Puyallup River, Blair Waterway, and Commencement Bay (WDFW 2014). Hylebos Creek, located approximately 2 miles southeast of the proposed Hylebos Waterway pier, does not support a spawning bull trout population (WDFW 2014). The Proposed Action area generally provides potentially suitable foraging habitat for adult bull trout migrating from Commencement Bay into the Puyallup River watershed, as well as for juvenile rearing and outmigration. Most migratory bull trout leave freshwater and enter Puget Sound during late winter and spring, then return to freshwater during late spring and early summer (Goetz et al. 2004). Foraging adults and subadults are possible in the Proposed Action area from mid-February through mid-July. Adult and/or rearing juvenile bull trout could be present in Commencement Bay any time of year.

  During extensive sampling efforts in Commencement Bay, no juvenile bull trout were captured, and only four adult bull trout were captured (PIE 1999). These adults were captured in April, May, and June, which is when bull trout are expected to be present in Commencement Bay. In 2001, the USACE and the Puyallup Tribe conducted a juvenile fish sampling and radio-tagging study of bull trout/native char in the lower Puyallup River and Commencement Bay. Sampling conducted in the lower Puyallup River over a 10-week period between February 7 and April 20, 2001, resulted in the capture of one juvenile char on February 21 that was too small to tag (Ladley 2001). Based on this information, juvenile, adult, and subadult bull trout are unlikely to be present within Commencement Bay or the Blair or Hylebos waterways in substantial numbers at any time.

- The Proposed Action area includes critical habitat for the Coastal-Puget Sound bull trout (see “Critical Habitat,” below).

- **Canary rockfish** (*Sebastes pinniger*) is federally listed as threatened and listed as a state candidate in Washington. Canary rockfish have been documented throughout Puget Sound (Miller and Borton 1980), although absolute numbers are relatively low compared to other rockfish species (Palsson et al. 2009; NMFS 2008). There is some indication from recreational fishing records that canary rockfish have been occasionally caught around the Tacoma Narrows, but more so in north Puget Sound and around the San Juan Islands.

- This is a relatively deepwater species. However, the larvae are planktonic for approximately one year. The young settle out of the planktonic stage in places as shallow as intertidal areas. Initial residence is in habitats such as rocky reefs, kelp beds, and rocky and cobble areas. Settlement timing is variable but can be any time from early summer through fall. The young reside in shallow areas for several years before moving into deeper water. These life history traits suggest that canary rockfish juveniles may be present in the vicinity of Point Defiance. Because there is no suitable habitat for adults nearby (the Tacoma Narrows is the closest), and because the planktonic stage is extensive, dispersal would be great, resulting in the density or probability of larvae or juvenile residence in any one location being extremely small (NMFS 2003). Because spawning areas are in very deep water (outside of Commencement Bay) and because Commencement Bay experiences estuarine circulation, rockfish larvae are highly unlikely to settle out inside of the bay or waterways such as in the Hylebos and Blair waterways.

- There is no critical habitat designated for the canary rockfish within the Proposed Action area. However, nearshore critical habitat has been designated along the southern shoreline of Commencement Bay

outside of the action area. Designated deepwater critical habitat for canary rockfish in the Proposed Action area extends from outside of the waterways and into deep water.

- **Bocaccio** (*Sebastes paucispinis*) is federally listed as endangered and listed as a state candidate in Washington. Bocaccio have not been documented in Puget Sound since 2001; however, it is assumed that a population still exists (NMFS 2008). Historically, bocaccio were observed as bycatch in the southern portion of Puget Sound, including the area around Point Defiance and the Tacoma Narrows (NMFS 2009, 2008; Palsson et al. 2009), which are located on the south side of Commencement Bay.
- This is a relatively deepwater species. However, the young settle out of the planktonic stage in shallow areas. After a few weeks, they move into water depths of 60 to 100 feet. Thus, at least for the earlier stages of development, bocaccio may be present a few weeks each year in the vicinity of Point Defiance. This brief time period could occur any time between April and September, based on larval release and planktonic residence information (NMFS 2008). Because there is no suitable habitat for adults nearby (the Tacoma Narrows is the closest), and because the planktonic stage is extensive, dispersal would be great, resulting in the density or probability of larvae or juvenile residence in any one location in the Project vicinity being extremely small (NMFS 2003).
- Nearshore critical habitat for this species has not been designated within the Proposed Action area. However, critical habitat for the species was designated along the southern shoreline of Commencement Bay outside of the Proposed Action area. Designated deepwater critical habitat for canary rockfish in the Proposed Action area extends from outside of the waterways and into deep water.
- Nearshore critical habitat for juvenile bocaccio has been designated in the vicinity of Point Defiance. Nearshore habitat is described in the listing document as follows: “juvenile settlement habitats located in the nearshore with substrates such as sand, rock, and/or cobble compositions that also support kelp are essential for conservation because these features enable forage opportunities and refuge from predators and enable behavioral and physiological changes needed for juveniles to occupy deeper adult habitats” (NMFS 2014b).
- **Yelloweye rockfish** (*Sebastes ruberrimus*) is a federal threatened species and listed as a state candidate species in Washington. Little is known about yelloweye rockfish during their first year of life. It is known, however, that as they settle out of the surface-oriented ichthyoplankton stage, they seek areas as deep as 48 feet, or deeper, that are characterized as high-relief and rocky (Love et al. 2002). The habitats described above do not occur in the Hylebos and Blair waterways, nor do deep rocky habitats suitable for adults of the species. Suitable adult habitats are defined as “rugose” (rough) terrain of complex bathymetry and depths greater than 98 feet (NMFS 2014b). Habitat of this nature is present in the vicinity of Point Defiance at the mouth of Commencement Bay. As they grow, they move into deeper water. Because of their pelagic nature, larval yelloweye rockfish could occur within the vicinity of the Proposed Action area, though they are readily dispersed by currents after they are born, making the density or probability of presence of larvae in any one location extremely small (NMFS 2003). Because spawning areas are in very deep water (outside of Commencement Bay) and Commencement Bay experiences estuarine circulation, rockfish larvae are highly unlikely to settle out in nearshore areas inside the bay, such as in the Hylebos and Blair waterways.
- Nearshore critical habitat has not been designated for this species in the immediate vicinity of the proposed marine facilities on the Hylebos and Blair waterways, although it has been designated along the southern shoreline of Commencement Bay outside of the Proposed Action area. Designated deepwater critical habitat for yelloweye rockfish in the action area extends from the shallowest known habitat used by juvenile yelloweye rockfish (-48 feet MLLW) outside of the waterways and into deep water (Love et al. 2002).

- **Marbled murrelet** is federally and state listed as threatened. Marbled murrelets live primarily in a marine environment, but during the nesting season fly inland to nest in old-growth coastal forests and make daily flights to forage in a variety of nearshore marine environments. Adult marbled murrelets feed in Puget Sound throughout the year, with larger concentrations during the fall and winter. Open water areas near entrance channels off rocky shores or over reefs are important feeding locations (NOAA 2011). There are no PHS records for marbled murrelets within 1 mile of the Tacoma LNG Facility (WDFW 2013). Commencement Bay, within the western portion of the Proposed Action area, may provide suitable foraging habitat for marbled murrelets (USFWS 2006); however, there is no suitable nesting habitat for the species in the Proposed Action area. Reported occurrences in Commencement Bay are generally absent from the literature; however, a few anecdotal sightings have been reported, the nearest of which are from sites approximately 2.5 miles from the peninsula (Seattle Audubon 2014).

  No critical habitat has been designated within the Proposed Action area. The nearest critical habitats for marbled murrelet are approximately 30 miles away.

- **Purple martin** (*Progne subis*) has no federal designation but is a state candidate for listing as threatened or endangered. Purple martins are in the swallow family. They are found in emergent wetlands, open ponds and lakes, and mudflats and are often seen using nest boxes located in or over water. According to the PHS data, there are two nesting colonies within 1 mile of the Proposed Action (WDFW 2013). The first colony is located approximately 0.3 mile west-northwest of the Tacoma LNG Facility site, toward the mouth of Hylebos Waterway. The second colony is located 0.25 mile north of the location of the facility site pier on Hylebos Waterway, where the birds have been observed using tubes and boxes on dolphins and pilings.

- **Harbor seal** (*Phoca vitulina*) is protected by the MMPA, is common in Puget Sound and Commencement Bay, and has been observed close to the Proposed Action area. Harbor seals have been observed northeast of the Tacoma LNG Facility and TOTE sites at the Saltchuck Mitigation Site (Grette Associates 2009) and also within Hylebos and Blair waterways. Within Commencement Bay, approximately 0.9 mile northwest of the mouth of Hylebos Waterway, adult and pup harbor seals regularly use a log boom as a year-round haul-out (Jefferies et al. 2000). Approximately 10 harbor seals, including one pup, were observed using the log boom during the December 2012 biological survey. Adult and juvenile harbor seals have also been observed along the Hylebos Waterway directly in front of the proposed Tacoma LNG Facility site (CH2M HILL 2012).

- **Killer whale** (*Orcinus orca)* is federally and state listed as endangered and protected by the MMPA. Killer whales occur in Washington within four distinct populations; the “southern resident” and “transient” populations are known to occur within coastal or near-shore waters (Wiles 2004). Killer whales enter Puget Sound between June and October as they forage for salmon (USAR 2011). Southern resident killer whales are relatively rare in Commencement Bay, with only 13 sighting days over the 18-year record (Grette Associates 2013). The Southern Resident killer whales have the potential to occur within Commencement Bay. Based on a query of NMFS killer whale sighting data conducted for the Citadel Yachts Project in April 2013, Southern Resident killer whales are relatively rare in Commencement Bay, with only 13 sighting days over the 18-year record (Grette Associates 2013). Because of the high level of maritime and other industrial activity around the mouth of the Hylebos and Blair waterways, Southern Resident killer whales are not expected to use either of these waterways.

  Within the Proposed Action area, Commencement Bay and nearly all of Puget Sound are designated critical habitat for killer whales. The Hylebos and Blair waterways are not included as critical habitat.

Special-status wildlife species potentially present in Puget Sound, but unlikely to be present near the Proposed Action, include the following:

- **Steller sea lion (Eastern Distinct Population Segment)**. Steller sea lions (*Eumetopias jubatus*) of the eastern Distinct Population Segment (see "Critical Habitat," below) are federal species of concern and state-listed as threatened and protected by the MMPA. Steller sea lions use onshore sites for two activities: breeding and resting (Wiles 2015). Breeding occurs on rookeries, which are used from May to August. There are no rookery sites in Washington. Haul-out sites are used year-round or seasonally for resting and are located throughout Washington's coastlines. There are eight documented haul-outs in the central Puget Sound. The nearest haul-outs to the Proposed Action area are to the south, between Fox Island and the Nisqually River, and to the north near Bainbridge Island. There are no records of Steller sea lions in the Hylebos or Blair waterways (NOAA 1999). In January 2015, the WDFW recommended that the Steller sea lion be removed from the state threatened and endangered list (Wiles 2015). There are no records of Steller sea lions occurring in the Hylebos and Blair waterways (NOAA 1999) and Steller sea lions do not normally occur near the mouth of Commencement Bay. Therefore, Steller sea lions are unlikely to be present at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites.
- **Harbor porpoise** *(Phocoena phocoena)* is state listed as a candidate and a federal species of concern and protected by the MMPA. Harbor porpoises are found in the bays, estuaries, and harbors of Washington. Recent vessel surveys conducted in 2009 and 2010 have indicated a return and increase of harbor porpoises throughout the Puget Sound population, despite observed declines in southern Puget Sound in the mid-1990s (Calambokidis, no date, as cited in NOAA 2011; Hanson, no date, as cited in NOAA 2011). There are no documented reports of harbor porpoises in the vicinity of the Tacoma LNG Facility site.
- **Humpback whale** *(Megaptera novaeangliae)* is federally and state listed as endangered and protected by the MMPA. The National Marine Mammal Laboratory has documented humpback whales in Washington State waters in every month except February, March, and April. However, sightings of humpback whales remain uncommon along the coast of Washington and rare in Puget Sound, even more so in Commencement Bay. No documented reports exist for humpback whale sightings in Commencement Bay (Carretta et al. 2013). Humpback whales are extremely unlikely to be present at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites. In April 2015, NOAA proposed to identify 14 Distinct Population Segments of humpback whale and delist 10 of them, which includes humpback whales in the region of Washington (80 Federal Register 22304). No critical habitat has been designated for the humpback whale across its entire range.
- **Gray whales** *(Eschrichtius robustus)* of the Eastern North Pacific stock are a state sensitive species and protected by the MMPA. Gray whales are found mainly in shallow coastal waters in the North Pacific Ocean. Gray whales migrate in nearshore waters between their breeding grounds in Baja, California, and their summer feeding grounds in the Gulf of Alaska. Some gray whales do not make the full migration and are known to feed off the coasts of Oregon and Washington in the summer months (Angliss and Outlaw 2008). Gray whales have been observed in central Puget Sound, including Commencement Bay. Sightings in central Puget Sound have occurred as recently as March 2014, when a gray whale was spotted feeding in Possession Sound (Seattle Times 2014). Gray whales do not normally occur in southern Puget Sound and have not been documented in Commencement Bay. Due to the proximity to industrial uses in addition to lack of prey and no past sightings in Commencement Bay, the potential for gray whales to enter Hylebos or Blair waterways is very low. Therefore, gray whales are extremely unlikely to be present at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites.
- **Leatherback sea turtle** (*Dermochelys coriacea*) is federally and state listed as endangered. Leatherback sea turtles prefer deep water and are infrequently observed on the outer coast of the Olympic Peninsula. The closest documented sighting to Commencement Bay occurred at Port Angeles, more than 100 miles to the north (McAllister 1999, personal communication, as cited in NOAA 1999). Owing to the lack of documented occurrences in southern Puget Sound, the potential for leatherback sea turtles to

enter Hylebos or Blair waterways is effectively zero (NOAA 1999). Therefore, leatherback sea turtles are unlikely to be present at the Tacoma LNG Facility or TOTE sites. There is no critical habitat designated for the leatherback sea turtle within the region of the Proposed Action area.

- **Northern sea otter** (*Enhydra lutris kenyoni*) is a federal species of concern and state-listed as endangered. Sea otters generally occur within the marine waters of Washington State. A few isolated sightings of sea otters have occurred in inland Washington waters, in the eastern Strait of Juan de Fuca, the San Juan Islands, and southern Puget Sound near Olympia (Richardson and Allen 2000). However, no sightings have been reported in Commencement Bay (NOAA 2011), and the likelihood of occurrence in Hylebos or Blair waterways is low. Therefore, northern sea otters are unlikely to be present at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites.

Critical Habitat

As outlined in the sections above, critical habitat is federally designated within the Hylebos and Blair waterways for Chinook salmon and bull trout (USFWS 1999; NOAA 2006; NMFS 2014b). Critical habitat is proposed in the Proposed Action area for Puget Sound steelhead. Within Commencement Bay, but not within the Hylebos and Blair waterways, designated critical habitat is present for five species: the Southern Resident killer whale, steelhead, canary rockfish, bocaccio, and yelloweye rockfish.

- **Chinook salmon** – Designated critical habitat for Chinook salmon includes the Hylebos and Blair waterways, Commencement Bay, and areas contiguous with the shoreline from the line of extreme high water out to a depth no greater than 98 feet relative to MLLW.
- **Bull trout** – Designated critical habitat (Unit 2, Puget Sound) for the Coastal-Puget Sound bull trout includes Commencement Bay, Hylebos Waterway, and Blair Waterway. As specified in the revised critical habitat designation (USFWS 2010), the inshore extent of critical habitat in nearshore marine areas, including tidally influenced freshwater heads of estuaries, extends to the mean higher high water (MHHW) line. The offshore extent of critical habitat is limited to a depth of -33 feet (-10 meters) relative to MLLW.

Essential Fish Habitat

The Proposed Action area contains EFH for Pacific salmon, groundfish, and coastal pelagic species. Designated EFH for salmonid species in estuarine and marine areas includes nearshore and tidally submerged environments within state territorial water, out to the full extent of the exclusive economic zone (230.2 miles) offshore from Washington (PFMC 1999). Designated EFH for groundfish and coastal pelagic species includes all waters from the MHHW line along the coasts of Washington upstream to the extent of saltwater intrusion and seaward to the boundary of the United States exclusive economic zone (230.2 miles) (PFMC 1998a, 1998b).

Priority Habitats and Species Use Areas and Habitat

WDFW's PHS List is "a catalog of habitats and species considered to be priorities for conservation and management" (WDFW 2008). The PHS List was created by WDFW to identify fish and wildlife assemblages and habitats that are a priority for management and preservation. Since 1989, the PHS List has served as the backbone for the state's wildlife management program. The PHS List includes habitats and species that require additional guidelines for conservation and management. Typically, habitats and species included on the PHS List are sensitive to habitat disturbances; are listed as state endangered, threatened, sensitive, or candidate species; form congregations that are considered sensitive or vulnerable, such as breeding bird colonies or bat hibernacula; or have a commercial or tribal importance. A total of 20 habitat types, 155 vertebrate species, 41 invertebrate species, and 11 species groups currently are on the PHS List.

Table 3.4-1 shows PHS habitat polygons located within 1 mile of the Proposed Action area. No PHS habitat polygons are located within the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System sites. The

PHS habitat polygons within 1 mile are summarized in Table 3.4-1; this summary includes the pipeline segments that are discussed in more detail in Section 3.4.3.2, below.

Table 3.4-1 Priority Habitat and Species Polygons Located within 1 Mile of the Proposed Action

Proposed Action Feature	Distance in Miles	Type	Description
Tacoma LNG Facility	0.05	Wetlands	Wetlands associated with tributaries near Commencement Bay, including Hylebos Waterway and Wapato Creek drainages
Tacoma LNG Facility	0.1	Biodiversity Areas And Corridor	Hylebos Waterway bluff area consists of steep slopes and bluffs overlooking the Commencement Bay waterways
			Area provides raptor habitat and refugia for many bird and mammal species
Tacoma LNG Facility	0.2	Estuarine zone	Estuary associated with the Hylebos Waterway; intact intertidal estuary/mudflat
Tacoma LNG Facility	0.3	Wetlands	Region 4 saltwater wetland: Puget Sound coastal salt marshes, salt meadows, and brackish marshes
Tacoma LNG Facility	0.4	Estuarine zone	Rhone-Poulenc restoration site
		Pigeon guillemot breeding occurrence	Pigeon guillemots observed nesting in cliffs in 2001; nest holes still present in 2006
Segment A	0.8	Estuarine zone	Slip 5 restoration site; new intertidal habitat
Segment A	0.9	Waterfowl concentrations	Large regular waterfowl concentrations area, nonagricultural in Pierce County
Segment A	1.0	Waterfowl concentrations	Small waterfowl concentration area, agricultural
Segment A	1.0	Biodiversity Areas And Corridor	Steep slopes along the valley terrace that consist of native mixed forest associated with the Carbon River Open Space area
Segment B	0.2	Wetlands	Wetlands associated with Chambers Creek drainage
Segment B	0.7	Wetlands	Lower Puyallup River valley wetlands

Source: WDFW 2012. Priority Habitat and Species Digital Data.

3.4.3.2 Puget Sound Energy Natural Gas Distribution System

The locations for the PSE natural gas distribution system improvements were specifically selected where wetlands and waterbodies are not present or could be avoided by selecting specific construction techniques. The two new distribution pipeline segments would be constructed within the existing road rights-of-way (ROWs), either paved or shoulder, by using a horizontal directional drill or open trench method, as described in Section 2.3.3, (Puget Sound Energy Natural Gas Distribution System). The new pipeline would be constructed under four existing culverted stream crossings using a horizontal bore or drill to avoid impacts. Figures 2-18 and 2-19 show the location of the new distribution system pipeline segments. The PSE natural gas distribution system is located entirely within a non-estuarine environment.

Upland Habitat

The two new distribution pipeline segments presented in Section 2.3.3 (Puget Sound Energy Natural Gas Distribution System) would traverse through an urban environment. The majority of neighboring properties support industrial, commercial, and residential buildings, as well as associated impervious roadways and parking lots.

Plants

No plant assemblages occur within the proposed pipeline segments because the segments are proposed entirely within the paved portion of existing road ROWs. The areas adjacent to the proposed pipeline segments consist primarily of upland habitat that has been developed for residential and other urban uses, except on the Blair-Hylebos Peninsula, which is industrialized.

No upland habitat for special-status species occurs within the proposed Pipeline Segment A and B alignments. Pipeline Segment A would be located within the existing road prism of Taylor Way extending generally north to south from the facility to 20th Street East in Fife, just south of Interstate 5. Pipeline Segment B would extend north to south within Golden Given Road East between 96th Street East (north) and 112th Street East (south) in unincorporated Pierce County.

Habitat adjacent to proposed Pipeline Segment A and outside of the proposed workspace consists of isolated upland and wetland habitats, including Hylebos Marsh and Fife Ditch. Hylebos Marsh has several waterways and ponds supporting emergent vegetation that are separated by upland areas of forest, scrub-shrub, and weedy herbaceous areas. The Hylebos Marsh area provides some wildlife habitat because of the variety of vegetative structure. However, because the Hylebos Marsh is completely isolated from larger tracts of habitat by paved roads, buildings, and active marine terminals, its habitat value is severely limited. Habitat adjacent to proposed Pipeline Segment B consists of scattered upland areas (interspersed with development), with the exception of a small ponded area between 109th Street East and 112th Street East.

Animals

Because the developed nature of the sites considered for Project facilities results in a lack of natural habitat, few opportunities for wildlife to nest or forage occur within the Proposed Action area. The proposed pipeline segments would be confined to existing paved roads. Terrestrial wildlife may occur in habitats adjacent to the new pipeline segments. Small, isolated, remnant stands of deciduous and mixed forests occur adjacent to portions of the proposed pipeline segments. The existing urban environment surrounding the Proposed Action area in general means these areas are highly fragmented from surrounding habitats by commercial, urban, and residential developments and roadways. However, these areas still provide some isolated habitat for forest-associated resident and migratory songbirds, as well as hawks, owls, great blue herons, woodpeckers, reptiles, and mammals such as raccoon, opossum, and coyote. A large nest site, believed to be that of osprey, was observed during the December 6, 2012, biological survey approximately 0.2 mile from the proposed Pipeline Segment A alignment (CH2M HILL 2012). Ospreys using this nest site could forage within the Hylebos and Blair waterways and Commencement Bay.

Amphibians that may occur near the pipeline segments include northern red-legged frog (*Rana aurora*), Pacific tree frog (*Pseudacris regilla*), rough-skinned newt (*Taricha granulosa*), and western toad (*Bufo boreas*). These four species require aquatic habitats and lowland terrestrial habitats to provide shelter and access to moist microclimates or water. These species typically winter in either aquatic or mesic forest habitats, returning to still or slow moving wetlands, ponds, ditches, and streams to breed. They often shelter beneath vegetation or woody debris (Csuti et al. 1997). Northern red-legged frogs, Pacific tree frogs, rough-skinned newts, and western toads are all common and widespread in the Puget Sound region.

Common garter snakes, (*Thamnophis sirtalis*) painted turtles, (*Chrysemys picta*), and western fence lizards (*Sceloporus occidentalis*) are strongly associated with aquatic habitats (Csuti et al. 1997). Both common garter snakes and painted turtles require upland and aquatic habitats and are often found in sunny areas near water that provide basking structures. Common garter snakes prefer grassy habitats and forest openings, and are common in wetlands, ponds, lakes, creeks, and rivers. Painted turtles overwinter in wetlands or other waterbodies with soft bottom sediments, or inside flooded banks with dense emergent vegetation. Painted turtles migrate from their wintering waterbodies to nearby uplands in late spring to early summer to lay eggs. The Hylebos Marsh provides some wintering and basking habitat for these species.

Wetlands and Stream Habitat

Wetlands

There are no wetlands within the Proposed Action area associated with the new pipeline segments, which would be entirely within paved road ROWs. No wetlands occur on the sites proposed for the new limit station and gate station (see Appendix E). Previously disturbed wetlands near to or adjacent to the proposed pipeline segments would provide a mixture of herbaceous, shrub-scrub, and forested wetland habitats. These sites are used as breeding and foraging habitat for songbirds and small mammals and may provide habitat for waterfowl, amphibians, and reptiles.

Streams

A total of four waterbodies cross under the paved roadways where the two new distribution pipeline segments are proposed. These waterbodies are all within existing culverts where they cross under the roadways. These streams are discuss in Section 3.3.3.2 of Section 3 (Water), and Table 3.3-2 lists the four waterbodies along with other pertinent information.

An unnamed drainage ditch crosses under 12th Street East in a culvert. The ditch discharges into Hylebos Creek.

No waterbodies occur on the sites proposed for the new limit station and gate station (see Appendix E).

Special-Status Species and Protected Habitat

The pipeline segments would be proposed entirely within the paved portion of existing road ROWs. Because vegetation was previously removed during the process of roadway paving, habitat to support threatened, endangered, or other protected species does not exist within the PSE natural gas distribution system.

Plants

No endangered, threatened, or special-status plant species are present within the Proposed Action area associated with the new pipeline segments.

Animals

There is no suitable habitat to support listed or other protected animal species within the Proposed Action area associated with the new pipeline segments. However, the following species have potential to occur in suitable habitat adjacent to the pipeline segments:

- **Marbled Murrelet** (see description in Section 3.4.3.1 [Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System Sites). There is potential for marbled murrelet to fly over the Proposed Action area from aquatic habitat to inland critical habitats. There is no suitable habitat for this species within the Proposed Action area, and the nearest marbled murrelet critical habitats are approximately 20 miles away to the east and south.
- **Streaked horned lark** (*Eremophila alpestris strigata*) is federally listed as threatened and state-listed as endangered. Streaked horned larks are associated with bare ground or sparsely vegetated habitats and nest in grass seed fields, pastures, wetland mudflats, and disturbed habitats. However, streaked horned larks have evolved to prefer highly disturbed, early successional habitats and have been increasingly reported utilizing human-made disturbed areas. Streaked horned larks currently breed on six sites in the south Puget Sound, four of which are located on Joint Base Lewis-McChord and make up the 13th Division Prairie, Gray Army Airfield, McChord Field, and 91st Division Prairie (USFWS 2012). There is no nesting or foraging habitat within the paved roadways of the pipeline segments. However, there is potential suitable habitat adjacent to the road ROW. The nearest documented nest site is approximately 2.5 miles from proposed Pipeline Segment B. However, there is the potential for streaked horned like to forage in open areas and disturbed habitat adjacent to the ROW near Segment B. The closest designated critical habitat for streaked horned lark occurs approximately 80 miles west of the facility (USFWS 2015).

- **Taylor's checkerspot butterfly** (*Euphydryas editha taylori*) is both federally and state listed as endangered. Taylor's checkerspot butterflies occupy open habitat dominated by grassland vegetation throughout their range. Currently, 13 individual populations of Taylor's checkerspot butterflies are known to occur range-wide, with 10 located in Washington (USFWS 2012a). There were no PHS records within 5 miles of the Proposed Action site (WDFW 2013). There is no potential for host plants or nectar sources within the paved roadway where the pipeline segments would be located and very low potential in the open areas and disturbed habitat adjacent to the ROW. Therefore, Taylor's checkerspot butterfly is not discussed further in this report.
- **Mardon skipper** (*Polites mardon*) is a candidate for federal listing and is state listed as endangered. Mardon skippers are dependent upon grassland habitats that are dominated by native grass species. There are no PHS records within 5 miles of the Proposed Action site (WDFW 2013).There is no potential for host plants or nectar sources within the paved roadway where the pipeline segments would be located and very low potential in the open areas and disturbed habitat adjacent to the ROW. Therefore, Mardon skippers are not discussed further in this report.
- **Oregon vesper sparrow** (*Pooecetes gramineus affinis*) is a federal species of concern and a state candidate species. Oregon vesper sparrows are associated with grasslands and open habitats such as native prairies, hayfields, pastures, and other agricultural habitat types. There were no PHS records within 1 mile of the Proposed Action site (WDFW 2012). There is no potential for nesting or foraging habitat within the paved roadway where the pipeline segments would be located. However, Oregon vesper sparrows have the potential to occur in the open areas and disturbed habitat adjacent to the ROW.
- **Western gray squirrel** (*Sciurus griseus*) is a federal species of concern and is state listed as threatened. Western gray squirrels are associated with oak woodlands and oak habitat. The closest PHS record of the species is located approximately 2.5 miles from Segment B (WDFW 2013). There is no potentially suitable habitat for the species within the paved roadway where the pipeline segments would be located or in the adjacent habitats. However, oak habitat adjacent to the Frederickson Gate Station (see below) may be suitable for the species.

Priority Habitats and Species Use Areas and Habitat

Wetlands

Two PHS wetland habitat areas would be crossed by Pipeline Segment A (see Table 3.4-1 for the PHS habitat areas within 1 mile of the Proposed Action.) However, the new pipeline segments would be constructed entirely within paved road ROW, so these specific areas do not accurately portray wetlands where they would be crossed by the pipeline segment. Because these areas are already paved, no impacts are expected to priority habitats or species.

Oak Habitat

Pierce County has mapped oak habitat adjacent to the Frederickson Gate Station. This forested habitat parallels the eastern boundary of the gate station parcel. Construction would be limited to the existing developed areas of the parcel, and no trees would be removed.

3.4.4 Impacts of the Proposed Action

This section discusses potential impacts to existing plant and animal resources within the Proposed Action area from construction and operation of the Project.

3.4.4.1 Construction Impacts

Upland Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Site preparation for the land-based Project facilities would require grading activities within the construction footprint on both sites. Again, the vast majority of the ground surface on both sites is either paved or covered with gravel. The minimal existing vegetation or organic materials would be stripped; however, existing trees would be retained if possible. Existing concrete or asphalt within the footprint of the proposed improvements would be removed to expose the native ground surface, crushed for nonstructural fill, or disposed of in a permitted solid waste landfill. Existing concrete or asphalt outside the proposed footprint would remain in place.

Plants

Impacts to plants would be avoided or minimized because construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would take place on industrial sites that were previously paved or graveled. Scattered areas of landscaping and weedy areas provide little habitat value owing to a lack of diversity of vegetation species, predominance of invasive species (such as Himalayan blackberry and Scotch broom), isolation of the area from larger tracts of habitat, and proximity to busy roads and parking area. Riparian vegetation is virtually nonexistent. Clearing these areas would have negligible impact on overall upland wildlife habitat in the vicinity. Although few trees are present, a worst-case assumption is that one or two trees would be removed during construction to accommodate the facilities.

Animals

Impacts to terrestrial wildlife would be mostly avoided or minimized because construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would take place on paved industrial sites where no habitat of value has been identified. As indicated above, if trees are to be removed, and if removal would occur during the nesting season, a preconstruction nest survey would be conducted to identify any active nests for avoidance. No impacts would occur to migratory birds. Increased noise from pile driving would be the primary impact, which could cause some species to temporarily avoid the area. Construction of the new bulkhead along the Hylebos Waterway could result in some mortality of reptiles and amphibians. Collision mortality of birds is unlikely to occur because they are mobile species that can easily move out of the way of construction equipment.

Noise from construction of the facilities may reach up to 110 A-weighted decibels (dBA) during pile driving, which is predicted to attenuate to ambient levels within approximately 1,991 feet (see Table 3.4-2). While a regulatory disturbance threshold for herons has not been established, WDFW-recommended buffers for nesting colonies of this species have been used to assess potential impacts. WDFW recommends a seasonal (February to September) buffer around nesting colonies of 1,320 feet from extremely loud noises (e.g., blasting) and a year-round buffer around nesting colonies in urban areas of 197 feet (Azzerad 2012). Due to the location of the rookery approximately 0.8 mile from the Project site, both buffers are located well beyond the 1,991-foot noise impact area during construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. In addition, herons nesting in the vicinity of Port of Tacoma operations have likely become habituated to increased noise levels.

Special-Status Species

Terrestrial construction activities such as excavation, trenching, and pipeline installation would temporarily increase noise disturbance levels in the upland portions of the action area. Additionally, in-air noise would also be temporarily influenced by pile driving. As indicated in Table 3.4-2, terrestrial construction noise levels are anticipated to range from 83 dBA for construction equipment associated with the pipeline installation, and 89 dBA for other construction equipment associated with the construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System.

To address noise impacts associated with in-air noise, the methodology outlined in the Washington State Department of Transportation (WSDOT) *Advanced Biological Assessment Preparation Manual* was used (WSDOT 2014).

In-air noise effects from construction are presented in Table 3.4-2. In summary, maximum in-air noise levels from construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are predicted to result in no effects to marbled murrelets at >0.25 mile. Murrelets may still be affected between 0.02 and 0.25 miles, but the effects are unlikely to be adverse. There is a risk of harassment or harm to the species at distances of 120 yards or less.

Masking of marbled murrelet communication would be limited to the area within 138 feet (42 meters) of the pile-driving activities. Because of a lack of suitable nesting habitat, no marbled murrelets would be expected to be nesting within this distance. Therefore, no impacts would be expected to nesting murrelets as a result of construction of the Tacoma NG Facility and the TOTE Marine Vessel LNG Fueling System. In-water noise impacts to the species are discussed in "Estuarine Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System," below.

Table 3.4-2 Predicted Distance of In-Air Noise Effects to Marbled Murrelets in the Project Area from Construction

Sound Source	No Effects	No Adverse Effects	Harassment	Harm (Direct Injury or Mortality)
Pile driving	>0.25 mile	121 yards to 0.25 mile	≤120 yards	≤5 yards
Other construction equipment (Tacoma LNG Facility and TOTE)	>0.25 mile	111 yards to 0.25 mile	≤110 yards	N/A
Other construction equipment (in-road pipeline segments)	>0.25 mile	111 yards to 0.25 mile	≤110 yards	N/A

Source: USFWS, 2013b.

dBA = decibels on an A-weighted scale

N/A = not applicable

Upland Habitat: Puget Sound Energy Natural Gas Distribution System

Plants

Impacts to plants would be avoided because construction of the proposed pipeline segments would be entirely within the paved portion of existing road ROWs and would not contribute to increased urbanization or loss of plant habitat. Likewise, the site proposed for the limit station is currently developed in its entirety, with one building and a paved parking lot. There are no wetlands, waterbodies, or undisturbed upland habitat at the site. Construction activities, including staging and storage, would occur within the parcel boundaries at the limit station site. Modifications of the existing gate station would occur entirely on a previously developed and graveled area at the existing Frederickson Gate Station.

Animals

New impacts to wildlife habitat would be avoided because construction of the proposed pipeline segments, including temporary workspaces, would occur entirely within the paved portion of existing road ROWs. The site proposed for the limit station is developed in its entirety, with one building and a paved parking lot. There are no wetlands, waterbodies, or undisturbed upland habitat at the site. Construction activities, including staging and storage, would occur within the parcel boundaries at the limit station site. Modifications of the existing gate station would occur entirely within the previously developed area of the

existing Frederickson Gate Station. Noise associated with construction of the new gate station and upgrading the gate station would be temporary and similar to noise generated from construction of the existing residential, commercial and industrial development surrounding the limit and gate station sites. Therefore, no wildlife would be significantly impacted by construction noise from the limit and gate stations.

Based on the location of the heron rookery along Marine View Drive and distance from the Proposed Action site, herons continuing to nest in the rookery would not be disturbed by construction activities related to the PSE Natural Gas Distribution System. The rookery would not be located within direct line of sight from the pipeline segments, and potential noise impacts would be negligible because the colony would be approximately 0.8 mile from the Tacoma LNG Facility site and noise from construction of the pipeline segments would attenuate to background levels within 998 feet (see Table 3.4-2, above). However, herons do use the Hylebos and Blair waterways for foraging and roosting and could potentially be disturbed during construction activities associated with the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, as well as Pipeline Segment A. Refer to "Upland Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System," above, for a discussion of those impacts.

Bald eagles and other raptors that may use features such as pilings, tall trees, or utility towers near the Project facilities would not be disturbed by the Proposed Action. There are no established noise disturbance thresholds or management buffers for bald eagles; however, like great blue herons, eagles using the Proposed Action area have likely become habituated to high levels of ambient noise associated with Port of Tacoma operations.

No noise impacts would occur to the marbled murrelet as a result of construction of the natural gas distribution system because this species is not known to nest in or near the Proposed Action area.

Wetlands and Stream Habitat: Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and Puget Sound Energy Natural Gas Distribution System

No wetlands are present within the Proposed Action site; therefore, no construction impacts to wetlands would occur. Indirect impacts to wetlands adjacent or in the vicinity of the Proposed Action area are discussed in Section 3.3 (Water).

All four waterbodies that would be crossed by the new pipeline segments are streams located within culverts and would be crossed perpendicularly by the proposed pipeline segments, as discussed in Section 3.3.4.1 of Section 3.3. The pipeline would be installed under existing culverts by using a horizontal bore or directional drill without disturbing the culverts. Pipeline crossings under the existing culverts would maintain at least 36 inches vertical separation from the bottom of the culverts to prevent damage during the installation. No other waterbodies would be crossed during construction of the pipeline segments.

Estuarine Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Proposed Action would remove existing pier structures and replace new pier structures in aquatic/marine habitats. Existing creosote-treated wood pilings would be removed in their entirety via vibratory hammer. A creosote-treated wood bulkhead along the Hylebos Waterway shoreline would be removed and replaced with a new light, loose, riprap surface at a 2:1 slope. The new bulkhead would be constructed above elevation 11.8 feet MLLW and approximately 9 feet shoreward of the existing bulkhead and would result in the restoration of approximately 5,440 square feet of intertidal habitat. The existing bulkhead and supported fill material would be removed and replaced with light, loose riprap varying in size from 3 inches to ½ cubic yard, constructed at a 2:1 slope similar to the existing shoreline slope below elevation 11.8 feet MLLW and the existing timber bulkhead. New in-water structures would be constructed in the Hylebos and Blair waterways, including trestles and piers. In each waterway, these structures would be constructed on new steel pilings. The new pilings would be installed via vibratory hammer and proofed with an impact hammer. No dredging would be required. Machinery also has the potential for accidental spills of fuels, oil, or other potentially hazardous chemicals.

Habitat Alteration (Loss/Gain)

The in-water work proposed in both the Hylebos and Blair waterways would result in 532 fewer creosote-treated piles, a 4,095-square-foot reduction in creosote-treated material (including both pile and over-water structures) and an increase of 5,440 square feet of intertidal habitat. The majority of the in-water work associated with both removal of existing structures and construction of new structures is proposed for deep subtidal habitat (deeper than -14 feet MLLW) in both the Hylebos and Blair waterways. In addition, the new in-water structures in the Hylebos Waterway would be constructed within the footprint of the existing pier.

The new pilings in the Hylebos and Blair waterways would become encrusted with barnacles, jingles, mussels, and other encrusting filter feeders. Pilings' surfaces in the intertidal zone would support barnacle/mussel clusters, which can be 8 inches thick and form a substrate supporting a rich community of organisms, including amphipods, various worms, and crustaceans, and ultimately support larger shrimp, crabs, and fish living among the piles. The change in habitat is a small gain of soft substrate habitat from the difference between the footprint of the existing pilings and the footprint of the new pilings (gain of 307 square feet of seafloor), resulting in an increase in habitat.

To minimize potential impact during construction of these shoreline improvements, the existing bulkhead would remain in place while the work behind it is completed. The existing bulkhead would provide a measure of erosion and sediment control during construction of the new cleaner bulkhead and regrading of the resulting shoreline. Shoreline work, including demolition of the existing bulkhead, would occur in the dry season. The sloped shoreline would an improvement over the existing vertical bulkhead, as juvenile salmon are believed to be more vulnerable to predation along vertical bulkheads than sloped shorelines.

Turbidity and Sedimentation

Temporary turbidity would be caused by suspended sediments during pile removal and pile-driving activities, as well as the regrading of 600 feet of shoreline in the Hylebos waterway. Turbidity impacts would be relatively minor and would last only hours or a few days, because tidal exchange quickly disperses turbid water.

The potential resulting effects on salmonids and other fish include behavioral responses (e.g., disruptions to feeding or migration). Increased suspended sediment loads associated with pile removal/driving would be minimal and expected to be well below levels associated with direct mortality and sublethal effects (e.g., stress, gill damage, and increased susceptibility to disease) on salmonids and other fish.

The veneer of silt deposition in adjacent areas near these types of activity is typically very thin, perhaps 1/4 inch or less. Studies in Puget Sound have shown that benthic invertebrates and fish are unaffected by rapid sediment deposition of less than a few centimeters (Hirsch et al. 1978). Benthic invertebrates have planktonic larvae, which are part of the food web on which juvenile salmonids depend, especially when first entering marine waters. Most benthic animals can burrow out of such shallow sediment deposits (Maurer et al. 1978).

Sediment cleanup actions have been completed in portions of Hylebos Waterway under United States Environmental Protection Agency oversight. During the previous cleanup actions, sediment in the immediate vicinity of the existing pier adjacent to the Tacoma LNG Facility site was designated for monitored natural recovery.

Construction best management practices (BMPs) would be implemented to reduce the potential risk of increased turbidities and sedimentation impacts to habitat that supports local salmonid populations. One of these BMPs would be restriction of the construction period to the times when juvenile salmonids are absent, or present in very low numbers, in the waterways. Similarly, reduction of excessive turbidity through silt curtains or other mechanical measures would allow for adherence to established water quality standards by limiting the impact of turbidity to an established mixing zone. For instance, under a 401 Water Quality Certification and/or WAC 173-201A, required directives provide for managing off-site migration of

particulates and reducing impacts associated with turbidity and sedimentation to levels that are not significant.

Pile-driving Noise

The Project would include installation of 142 hollow steel pilings (maximum), 56 of which would be in the Blair Waterway and 86 of which would be in the Hylebos Waterway, ranging from 14 to 30 inches in diameter. Pile driving has the potential to impact both aquatic and upland species in the vicinity through the generation of in-water (underwater sound pressure waves) and in-air noise. Sound moves 4.5 times faster in water than it does in air, making it a very effective sensory mechanism for species that spend a large part, if not all of their lives, underwater.

The noise impact analysis for the Project employs the methodology described in the WSDOT *Advanced Biological Assessment Preparation Manual* (WSDOT 2014). That methodology uses the practical spreading model to calculate sound attenuation in water as a function of distance. The complete analysis, including step-by-step methodology and assumptions, is included under separate cover in the *Applicant-prepared Biological Evaluation for the Puget Sound Energy Tacoma LNG Project* (CH2M HILL 2014b). Three metrics are commonly used in evaluating hydroacoustic impacts on fish and marine mammals (ICF Jones and Stokes 2009; Illingworth and Rodkin 2007):

- Peak sound pressure level – The absolute value of the maximum variation from neutral
- Root mean square – The square root of the sum of the squares of the pressure contained within a defined period of time
- Sound exposure level – The constant sound level over 1 second.

The noise impact thresholds shown in Table 3.4-3 were developed by NMFS and USFWS using the best available science and based on consultations with the foremost experts (e.g., Hastings and Popper 2005; Popper et al. 2006). However, the scientific understanding of the potential effects of impulsive noise on aquatic animals is incomplete and still developing. The effect thresholds presented in Tables 3.4-2 and 3.4-3 are conservative estimates.

Figures 3.4-1 through 3.4-3 show the spatial extent of underwater (and in-air noise for marbled murrelets only) noise effects relative to the thresholds indicated in Table 3.4-3. These figures illustrate how underwater noise attenuates with distance. Underwater noise is also cut off by landforms, meaning that noise would be fully contained within Hylebos and Blair waterways.

It is assumed that wildlife using Hylebos and Blair waterways have become habituated to the heavy industrial use and existing shipping traffic. During a WSDOT study conducted near the Mukilteo Ferry Terminal, none of the diving birds that were observed before, during, and after pile-driving tests exhibited signs of distress or abnormal behavior (Laughlin 2007). However, it is important to note that the study did not include observations from a control site from which to compare behaviors. Some fish mortality may occur in the immediate vicinity of pile driving with impact hammers. However, this would likely be limited to the more susceptible species such as pile perch (*Rhacochilus vacca*) or shiner perch (*Cymatogaster aggregata*), which have swim bladders isolated from their throats. The Project would minimize in-water noise by maximizing the use of a vibratory hammer and through implementation of other noise mitigation measures described in Section 3.4.6 (Avoidance, Minimization, and Mitigation).

Table 3.4-3 Underwater Noise Effect Thresholds and Initial Sound Pressure Levels Associated with Impact Pile Driving (Proofing) in the Action Area

Assumes worst-case conditions (30-inch steel pilings with no noise reduction measures in place)

Taxon	Effect Category	Effect Threshold (dB)	Initial SPL (dB) (30-inch steel) (No BMPs)
Fish	Injury < 2 grams	183 SEL	186 SEL
	Injury > 2 grams	187 SEL	186 SEL
	Injury (peak)	206 peak	212 peak
	Behavioral disturbance	150 rms	195 rms
Marbled Murrelets[a]	Injury – Barotrauma	208 SEL	186 SEL
	Injury – Auditory	202 SEL	186 SEL
	Behavioral disturbance	150 rms	186 rms
	Effective quiet	150 rms	186 rms
Pinnipeds (e.g., whales)	Injury	180 rms	195 rms
	Behavioral disturbance (Impulsive)	160 rms	195 rms
	Behavioral disturbance (vibratory)	120 rms	152 rms[b]

Sources: WSDOT 2014, Laughlin 2011

Notes:

[a] In-air noise threshold for marbled murrelet, only

[b] timber piling extraction

Key:
BMP = best management practice
dB = decibel
rms = root mean square
SEL = sound exposure level
SPL = sound pressure level

Table 3.4-4 provides the calculated distances to which pile-driving noise levels attenuate down to the thresholds of disturbance or injury to protected species for a scenario with 30-inch hollow steel piles.

Table 3.4-4 Calculated Distances to Which Pile-Driving Noise Levels Attenuate Down to the Thresholds of Injury or Harm to Protected Species with 10-Decibel Noise Reduction

Species/Thresholds	Effect Threshold (db)	Distance to Threshold (meter)
Fish		
Injury (< 2 grams)	183 SEL	541
Injury (> 2 grams)	187 SEL	377
Injury (peak)	206 peak	5
Behavioral Disturbance	150 rms	2,154
Diving Marbled Murrelets		
Injury (auditory)	208 SEL	38
Injury (barotrauma)	202 SEL	15
Behavioral Disturbance	150 rms	2,154
Effective quiet	150 rms	541
Marine Mammals		
Injury	180 rms[a]	22

Table 3.4-4 Calculated Distances to Which Pile-Driving Noise Levels Attenuate Down to the Thresholds of Injury or Harm to Protected Species with 10-Decibel Noise Reduction

Species/Thresholds	Effect Threshold (db)	Distance to Threshold (meter)
Behavioral Disturbance (impulsive)	160 rms	464
Behavioral Disturbance (vibratory)	120 rms	N/A

Notes: Noise attenuation measures would not be employed during timber piling removal operations (vibratory extraction).
[a] 190 rms for pinnipeds
Key:
dB = decibels;
N/A = Not applicable
rms = root mean square
SEL = sound exposure level

Special-Status Species

Salmonids (Chinook salmon). Salmonids are assumed to be less susceptible to harm from impact pile driving when compared to other fish species because their swim bladders are openly connected to their throats. Salmonids would also be protected because of the timing of in-water construction, which would be scheduled to occur during the WDFW in-water work window for Commencement Bay (July 16 to February 14). Most juvenile salmonids would be absent from the site as a result of their seasonal migratory patterns. Adult salmonids do not appear to be adversely affected by pile driving. It should be noted that that the threshold for injury of salmonids is represented by knowledge of damage to the inner ear of other fish species and does not necessarily represent direct mortality of salmonids.

Only a few Chinook smolts are likely to be in the Proposed Action area after July 16. Those that are still present would be actively migrating through the action area. The rate of swimming speed of outmigrating salmon smolts is proportional to fish size and food availability. Food availability is assumed to be relatively low in the Hylebos and Blair waterways as a result of industrial development; thus, the fish would not spend much time in the vicinity of the project. As a result, Chinook salmon would not be significantly impacted by pile driving.

Steelhead trout. While tracking studies in marine waters are lacking, it is generally accepted that steelhead migrate out from river mouths quickly, without a nearshore residence period. Also, steelhead are typically larger than 2 grams when they outmigrate, making them less susceptible to pile-driving injury compared with smaller fish. In addition, steelhead outmigrate primarily in April, before the work window begins. As a result, steelhead would not be significantly impacted by pile driving.

Bull trout. Bull trout are generally protected from in-water work because of work windows. Adult amphidromous bull trout are known to leave marine waters prior to July 16 every year to stage for spawning upriver, but are very rare and can be expected to reside in marine waters where prey is abundant. The timing of the bull trout in-water work window reflects this. Subadult bull trout migrate back into freshwater in fall in preparation to over-winter in lower mainstem rivers. After mid-July, their primary prey, juvenile salmon, are out of the action area. Likewise, subadult bull trout can be expected to be elsewhere. The likelihood of their presence in the injury zone from pile driving during bulkhead installation is remote. As a result, bull trout would not be significantly impacted by pile driving.

Canary rockfish, Bocaccio, and Yelloweye rockfish. These fish are deepwater species, and adults require habitats and depths outside of the potential zone of pile-driving impacts associated with the Project and outside of Commencement Bay. Larval rockfish and bocaccio are planktonic and distributed widely. However, they are surface oriented during this stage of their lives. The nature of estuarine circulation is outwards away from river mouths on the surface. Commencement Bay has a powerful degree of estuarine

circulation effect. This means that larval fish would be carried away from areas such the Commencement Bay waterways. They can be expected to settle out as juveniles elsewhere in Puget Sound.

Juvenile bocaccio may reside in shallow water for a brief period (two weeks) before moving into deep water (Love et al. 2002). However, habitat in the Hylebos and Blair waterways is extremely marginal at best for juvenile bocaccio, and again, estuarine circulation would preclude their settlement in the upper reaches of Commencement Bay, including the two waterways. Thus, it is highly unlikely that bocaccio would be present in the zone of pile-driving impacts at any time.

Juvenile canary rockfish reside for several months in shallow water (Love et al. 2002). By the end of summer, they move into deeper water. The pile-driving zone of impact associated with the Project contains a small amount of extremely marginal juvenile habitat (kelp beds). As with the other rockfish species, estuarine circulation would preclude settlement in the upper reaches of Commencement Bay. Thus, it is highly unlikely that canary rockfish would be present in the zone of pile-driving impacts at any time.

As a result, canary rockfish, bocaccio, and yelloweye rockfish would not be significantly impacted by pile driving.

Marbled murrelet. In-water noise from construction equipment associated with installation of the steel piles would, with the use of 10 decibels (dB) of noise reduction (mitigation), reach the level of auditory injury (208 dB sound exposure level) for diving murrelets at approximately 38 meters (125 feet) from the source, whereas permanent injury from barotrauma could occur within 15 meters (49 feet) of pile-driving activities. Murrelets have never been reported in the waterways where pile driving would occur, and they are very unlikely to occur within the disturbance distances where noise impacts would occur. Based on a lack of past observations of the species, and the existing levels of disturbance from industrial ship traffic near the Proposed Action area, it is assumed that the species will not occur during in-water construction activities. Therefore, no impacts would occur from Project-related pile-driving activities.

Maine Mammals. Marine mammals would be injured within 22 meters (72 feet) of pile-driving activities with use of 10 dB of noise reduction (CH2M HILL 2014b). Behavioral disturbance would occur to marine mammals within 464 meters (1,522 feet) of impact pile driving. However, given the uncommon or rare occurrence of marine mammals occurring within either the Blair Waterway or Hylebos Waterway, no impacts would occur from Project-related pile-driving activities.

Essential Fish Habitat.

The Proposed Action has the potential to affect EFH for Pacific salmon, groundfish, and coastal pelagic species (CH2M HILL 2014b). The potential effects on managed fish species habitat (salmonids and rockfish) are applicable to all three of the fisheries. These effects include impaired water quality conditions during in-water and shoreline work, temporarily elevated noise levels within the Proposed Action area during pile removal and installation, and the direct disturbance and temporary loss/reduction of the benthic community assemblage. There is also potential for leaks and spills of fuel, hydraulic fluids, lubricants, and other chemicals from equipment and storage containers associated with the Project. Discharge of vehicle and equipment wash water and other substances could also add pollutants to the soil that would then be delivered to both waterways.

The Proposed Action would result in a net gain of approximately 307 square feet of benthic habitat after removal of the old piles and installation of the new ones. The change in habitat is a small gain of soft substrate habitat from the difference between the footprint of the existing pilings and the footprint of the new pilings. This gain will increase the area available for benthic communities (both fauna and flora).

Dredging/Filling

The in-water structures on both the Hylebos and Blair waterways are designed to avoid the need for dredging.

As described above, the Project would improve the Hylebos shoreline, requiring some fill. As previously described, the existing Hylebos shoreline is constructed of gravel and soil fill material supported by a creosote-treated timber bulkhead. A new steel bulkhead would be installed approximately 9 feet shoreward of the existing bulkhead. The existing bulkhead and supported fill material would be removed and replaced with light, loose riprap varying in size and constructed at a 2:1 slope below elevation 11.8 feet MLLW. The work would require approximately 1,900 cubic yards of excavation and 690 cubic yards of fill but would result in an increase of 5,440 square feet of intertidal habitat in place of the existing creosote-treated timber bulkhead.

The Proposed Action would remove approximately 532 existing creosote-treated piles using a vibratory hammer. Holes remaining following removal would be filled with clean sand or other habitat mix approved by the WDFW. It is conservatively estimated that 25 percent of the piles to be removed in the Hylebos Waterway (127 piles) and Blair Waterway (six piles) would have some portion of a hole remaining following extraction. The total quantity of clean sand or other habitat mix needed to fill pile holes for the Project in both the Hylebos and Blair waterways is estimated to be no more than 360 cubic yards, including up to 340 cubic yards in the Hylebos Waterway and 20 cubic yards in the Blair Waterway.

Because of the low levels of expected turbidity and the timing, the Proposed Action represents a negligible risk to salmonids (construction timing would occur in mid-July through mid-February when juvenile salmon are not abundant). Filling would also cause a short-term change in the characteristics of the benthic and epibenthic communities; however, these communities are expected to recover rapidly after filling, based on the results of studies in other areas (McCauley et al. 1977; Swartz et al. 1980; Albright and Borithilette 1981; Parametrix 1985, 1996; Hiss et al. 1990; Jones & Stokes Associates 1990a, 1990b; Romberg et al. 1995; Wilson and Romberg 1996; Pacific International Engineering and Parametrix 1998; Pacific International Engineering 2000).

Special-Status Species and Habitat: Puget Sound Energy Natural Gas Distribution System

Impacts on special-status species and habitat as a result of the construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are discussed in the previous sub-section; this section focuses on the PSE Natural Gas Distribution System.

Potential construction impacts from the Proposed Action on bald eagle and peregrine falcon include indirect impacts from increased noise levels. Direct impacts are not expected because suitable nesting and foraging habitat does not exist within the Proposed Action area. Although nuisance noise resulting from industrial activities already exists at the Port of Tacoma, demolition of the existing buildings would result in increased noise levels. Demolition and other construction activities would involve temporary bursts of sound that would be likely to startle bald eagles and peregrine falcons that may be foraging near the Proposed Action area and cause them to leave the immediate area. However, these startle impacts would be temporary, and both species would be expected to use the site again following the completion of construction activities. Therefore, construction activities within the Proposed Action area are not expected to adversely impact threatened, endangered, or other protected species that may be present in upland habitats.

Direct impacts to streaked horned lark and Oregon vesper sparrow would be avoided because construction of the new distribution pipeline segments would occur within existing paved road ROWs and thus would not contribute to loss of nesting or foraging habitat. Although there is potential for streaked horned larks to forage in the disturbed roadside adjacent to Segment B and for Oregon vesper sparrows to forage in the disturbed roadsides adjacent to both new pipeline segments, construction noise is expected to be negligible because highway and road noise is already present.

3.4.4.2 Operations Impacts

Upland Habitat: Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and Puget Sound Energy Natural Gas Distribution System

No operational impacts to plants are expected to result from the Proposed Action because the Proposed Action area would be contained within existing developed areas and previously disturbed ROWs. No operational impacts to terrestrial wildlife would occur from the Proposed Action because it would be contained within existing developed areas and previously disturbed ROWs. Given the elevated noise levels associated with existing operations within the Port of Tacoma, noise from Project operation would not be expected to exceed levels to which wildlife species are currently habituated in the vicinity of the Port of Tacoma.

Wetlands and Stream Habitat: Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System

No wetlands are present within the Proposed Action area; therefore, there would be no operational impacts to wetlands. No operational impacts to streams are expected from the Proposed Action because the Proposed Action area would be contained within existing developed areas and previously disturbed ROWs. The pipeline segments would operate at least 36 inches below the four culverted streams, which also run under the paved ROW.

Estuarine Habitat: Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Overwater Shading

The Project would result in some shading impacts over the Hylebos and Blair waterways. These impacts would involve the loss or reduction of primary productivity within the footprint of new overhead structures. The components of the proposed in-water structures on both the Hylebos and Blair waterways, which would be directly supporting equipment used for conveyance of LNG, are required to be constructed of concrete panels. Concrete panels are required to meet the requirements of 49 CFR 193, *Liquefied Natural Gas Facilities* and National Fire Protection Association Standard 59A, *Standard for the Production, Storage, and Handling of Liquefied Natural Gas* (NFPA 2013). However, the new Hylebos Waterway pier would have a slightly smaller but similar footprint to the existing structure. That structure is relatively narrow and currently allows some light under the decking. The new structure would do the same.

The new trestle and platform in the Blair Waterway would shade approximately 5,500 square feet of sea floor, including the dolphins. It is assumed for this analysis that all shaded areas currently supporting macroalgae would result in the loss of those resources within that footprint. The primary habitat for ESA-protected rockfish species in the action area is macroalgae-covered riprap. A 33-foot-wide strip of this riprap would be eliminated as a result of the new trestle in Blair Waterway.

Steel grating is proposed for in-water structures where concrete is not required. This grating is proposed for the various catwalks on the Hylebos Waterway proposed between the pier and dolphins. Steel grating would also be used for the catwalk proposed on the Blair Waterway. This would allow some light to penetrate the structures in these areas and thus minimize primary productivity loss or, in the case of the Hylebos facility, improve existing conditions. It is assumed that the steel grating to be used would allow at least 40 percent light transmission through the various catwalks.

Productivity

The use of the water surrounding the proposed Project facilities by fish would be similar to that at the existing pier structures at the site. The new pier would have approximately one third the surface area of the existing pier and approximately the same length. There would be far fewer pilings (88 versus 508), but they would be of higher quality for encrusting organisms to attach to (concrete and steel versus creosote-treated wood). The new trestle and platform in the Blair Waterway would shade approximately 5,500 square feet of sea floor, including the dolphins. It is assumed that all shaded areas currently supporting macroalgae, which

provides primary habitat for ESA-protected rockfish species in the action area, would result in the loss of those resources within that footprint. However, productivity would benefit from replacement of 24 creosote pilings with 36 steel pilings for construction of the trestle and platform. Colonization is rapid on this type of surface. Habitat for fish that have an affinity for pilings, such as pile perch, striped perch *(Perca flavescens)*, and lingcod *(Ophiodon elongates)*, would remain at the site.

Pier/Platform Structure Effects on Juvenile Salmon

Research indicates that fish distribution, habitat and assemblage structure varied with proximity to the shade cast by piers compared to more natural areas not modified by piers and bulkheads." Species assemblages at modified sites were significantly different from those at reference beaches. At modified sites, fish distribution and assemblage structure varied with proximity to the shade cast by piers; overall fish abundances were reduced under piers, and the greatest abundances were observed at high tides in areas directly adjacent to piers." (Stuart H. Munscha, et. Al. "Effects of Seawalls and Piers on Fish Assemblages and Juvenile Salmon Feeding Behavior," North American Journal of Fisheries Management, Volume 34, Issue 4, 2014.

However, It is unlikely that the proposed Hylebos Waterway pier and the platform in Blair Waterway would significantly impede juvenile salmon migrating along the shorelines of Hylebos or Blair waterways. This determination is based on three studies that focused on the threshold of light penetration under piers as it relates to salmon nearshore passage. The study at the Manchester fuel pier (Dames & Moore and Biosonics 1994) showed that approximately 50 percent of the migrating chum salmon would pass under the 70-foot-wide Manchester fuel pier. A study at the Edmonds Ferry Terminal by Toft et al. (2007) showed that juvenile Chinook would pass under a 92-foot-wide pier at low tide, but not at high tide. The study by Pentec (1997) specifically focused on underpier salmon passage at the Port of Everett. In that study, most of the pink, chum, and Chinook juveniles moving along the shoreline passed under and not around a 120-foot-wide finger pier at the Port of Everett.

The proposed trestles connecting the Hylebos Waterway pier and the Blair Waterway platform would be 33 feet wide. It is likely that shoreline-oriented juvenile Chinook salmon would pass under, rather than around, these relatively narrow marine structures. As such, adverse impacts associated with shading are unlikely and discountable.

Increased Vessel Traffic

Proposed bunkering barge and associated tugboat traffic around the peninsula is expected to be infrequent (twice per week) and at speeds of 5 miles per hour in the Hylebos and Blair waterways, as required by the City of Tacoma (Tacoma Municipal Code, Section 4.10.130). Additionally, ship traffic is already present in the Hylebos Waterway and the mouth of Commencement Bay. Therefore, operational impacts to marine fish and wildlife are expected to be negligible.

Potential for Water Quality Impacts from Vessel Traffic

The only vessels that would operate as part of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be tugs and LNG bunkering barges. Neither of these vessel types have much risk of fuel spills and neither have ballast discharges. Tugs would be fueled at existing fueling stations and be subject to spill prevention plans at those facilities. As noted above, vessel speed would be limited to a nominal speed of 5 miles per hour, which would greatly reduce the potential for collisions and thus spills.

Artificial Lighting

The Proposed Action would increase lighting on the Tacoma LNG Facility shoreline. High-intensity lighting that is directed at the water surface has the potential to alter the migratory behavior of juvenile salmonids (Prinslow et al. 1979) or their prey organisms, possibly affecting growth or survival during a critical life history stage. However, such effects have only been detected at light intensities that exceed those typical for container most port facilities, including this one. Furthermore, the surrounding shoreline of the Blair-

Hylebos peninsula already supports extensive artificial lighting for the existing port activities and development of Proposed Action is unlikely to make an appreciable difference in the existing lighting regime.

Special-Status Species and Habitat: Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System and PSE Natural Gas Distribution System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in an existing industrial setting at the Port. Operations at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would not alter the character of the setting. Therefore, upland operational impacts to threatened, endangered, or other protected species would not change from current conditions.

Marine Mammals

Most vessel strikes on marine mammals occur between 13 and 18 knots (Laist et al. 2001; Jensen and Stilber 2003; NOAA 2004). The LNG barges and tugboats would be traveling at speeds under the threshold where strikes are known to occur. Additionally, ship traffic is already present in the Hylebos and Blair waterways and mouth of Commencement Bay, and the addition of two additional round trips per week would be an insignificant increase in overall use. Therefore, operational impacts to marine mammals are expected to be negligible.

Birds

- **Marbled murrelet and purple martin**. The slight increase in ship traffic caused by LNG barges and tugboats would result in a slightly increased potential for disturbance. However, ship traffic is already present in the Hylebos and Blair waterways and the mouth of Commencement Bay, and murrelets/ purple martins are mobile species that can move out of the way of vessels. The Proposed Action would not be expected to alter prey or the aquatic habitat. Therefore, operational impacts to marbled murrelets are expected to be negligible.
- **Other migratory birds.** The Proposed Action would not be expected to result in a take or killing of migratory bird species within the meaning of the MBTA during operation.

Fish

- **Chinook salmon, steelhead trout, and bull trout**. The Proposed Action is not expected to result in long-term adverse impacts to these species. Habitat alteration at the Tacoma LNG Facility and TOTE sites would result in improved conditions. The creosote-treated pilings would be removed, resulting in a decrease in pollutant loading.
- **Canary rockfish, bocaccio, and yelloweye rockfish**. Canary rockfish and bocaccio can live in shallow water for a brief period just after settlement out of the upper water column (at about one year old). Shallow water habitats would be improved with the removal of the creosote-treated pilings. As a result, habitat conditions for these species would be improved. Yelloweye rockfish would not be affected by the Proposed Action; they are a deepwater species with no life stages other than planktonic larvae living in water less than 80 feet.

The new distribution pipeline segments would be buried in the roadways, and any required maintenance would occur in the paved ROWs. Therefore, no operational impacts to threatened, endangered, or other protected species, or their designated critical habitat, are expected.

3.4.4.3 Decommissioning Impacts

Impacts from decommissioning the Project would likely be minor compared to impacts from Project construction. It is assumed that all in-water structures would remain in place, but facilities on the upland portion of the Proposed Action area would be removed. Therefore, noise levels from decommissioning would be significantly lower than noise levels during construction, as there would be no pile driving. No fill would likely be required during decommissioning.

3.4.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and there would be no impacts to plants and animals related to the Proposed Action.

3.4.6 Avoidance, Minimization, and Mitigation

Siting the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System in a developed port-industrial site and constructing the new distribution pipeline segments within existing roads rights-of waysand the gate and limit stations within previously disturbed areas would avoid new impacts to plants, wildlife, and their habitat. This section includes measures, which would alleviate other potential impacts during construction (Section 3.4.6.1) and operation (Section 3.4.6.2) of the Proposed Action. In addition to the specific measures described below, the marine mammals, fish, and associated in-water habitat would directly benefit from the water quality avoidance, minimization, and mitigation measures described in Section 3.3.6 of Section 3.3 (Water), specifically, the measures related to general best management practices, spill prevention, turbidity minimization, demolition of in-water structures and creosote-treated timber piling removal and shoreline improvement. The water quality–related measures included in Section 3.3.6 are not repeated again here.

3.4.6.1 Construction

Direct impacts to upland plants and animals at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be avoided because construction would take place on a developed industrial site. Impacts to herons and bald eagles would be avoided because no nesting habitat would be impacted and because no nest sites are in proximity to points of noise generation. As noted above, any herons and eagles using the area are likely to be habituated to the elevated noise levels associated with Port of Tacoma operations. Construction of the new distribution pipeline segments, including temporary workspaces, would take place within existing road right-of-ways, thereby avoiding new impacts to wildlife habitat. Impacts to stream habitat along the new pipeline segments would be avoided by using trenchless technology to install the pipeline under existing culverts. Construction of the limit station and Frederickson Gate Station would occur within previously disturbed sites with no habitat for special-status species. Therefore, no impacts are expected to biological resources.

Removal of 532 creosote-treated timber piles in the Blair and Hylebos waterways, to be replaced with up to 142 steel piles, is expected to improve water quality as a result of removing creosote from the aquatic environment.

Pile-driving and Noise Abatement

The installation of new steel piles in both the Hylebos and Blair waterways would generate noise, particularly in-water (underwater). In-water and in-air noise from impact pile driving would be minimized using the following measures:

- To limit the amount of impact pile driving, pilings would be installed initially with a vibratory hammer to 90 percent-plus of their design depth (within 10 feet of design tip elevation). Impact hammering would then be employed until load-bearing or pile-tip elevation specifications have been met. When impact hammering is initiated, hammer force would start low, with light tapping, then increase to full force gradually.
- One or more other noise attenuation methods (e.g., wood blocks, nylon blocks) would be used during impact installation or proofing of all steel pilings. The sound attenuation device would include the placement of a sound block between the hammer and the pilings during pile driving.
- Intertidal pilings would be installed during dry or shallow water tide stages to the extent practicable.

Monitoring Impact Pile Driving

If required during impact pile driving, an observer qualified to monitor the activity of humpback and killer whales would be employed. This would be a land-based monitoring activity using observers trained as needed by both the USFWS and NMFS. The observers would have the authority to halt impact pile driving if humpbacks or killer whales are observed within the distances at which behavioral disturbance may occur.

In-water Work Window

Timing restrictions specifying that construction must occur when juvenile salmonids are absent or present in very low numbers in the Hylebos and Blair waterways would be strictly observed. Pile removal and installation would be conducted within approved work windows to protect salmonids from coming into contact with these construction activities. Pile removal and installation would be restricted to the in-water work window for Commencement Bay (period between July 16 and February 14). Work above MHHW would not be restricted to the in-water work window.

3.4.6.2 Operations

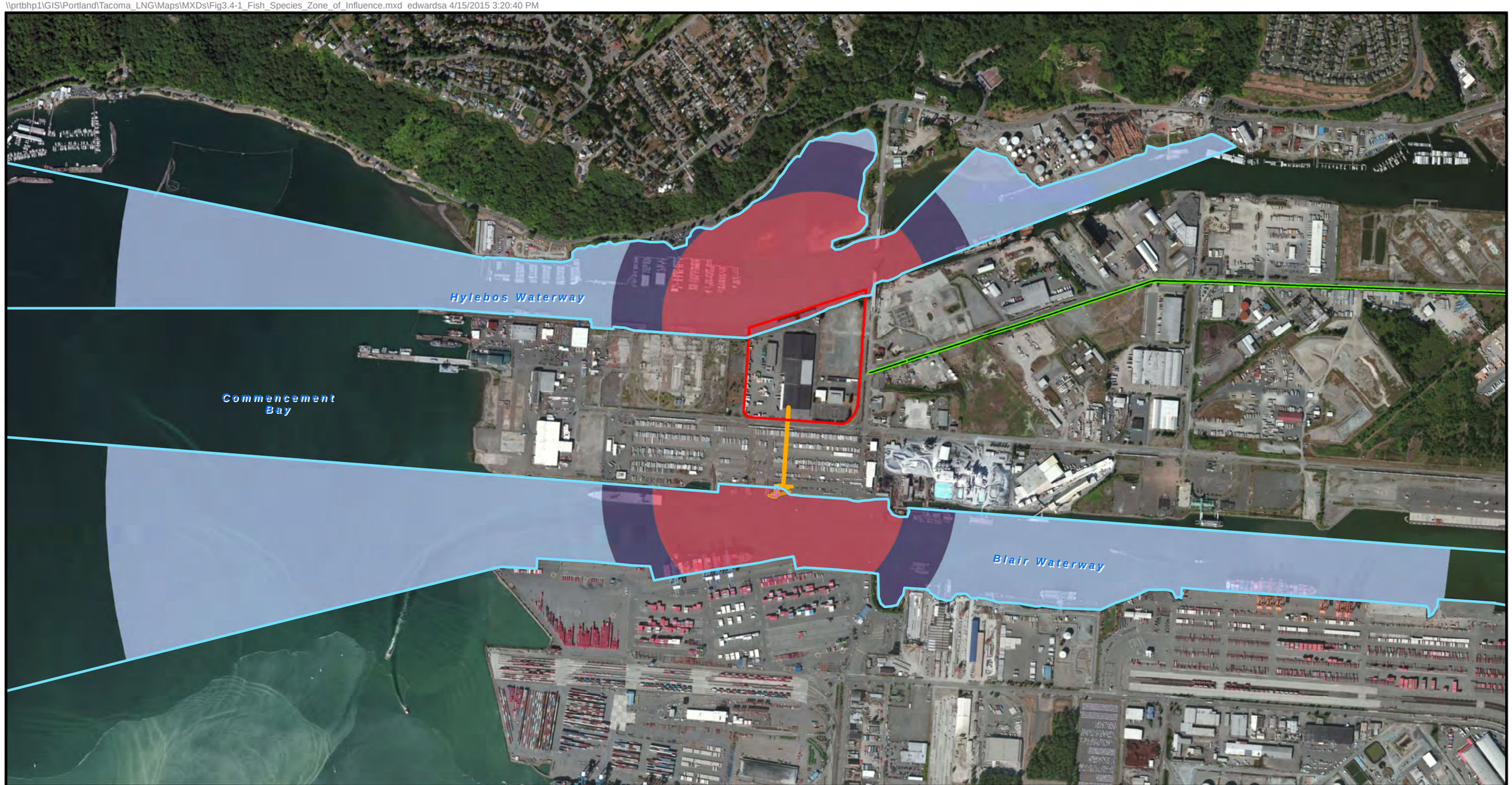
Potential impacts to aquatic and terrestrial habitat from stormwater runoff are addressed in Section 3.3.6.2 of Section 3 (Water).

Tugs and bunkering barges associated with the Proposed Action and traveling in the vicinity of the Port of Tacoma are unlikely to strike marine mammals. While the presence of whales, the most vulnerable marine mammal, in the vicinity of the Port is rare, maintaining slow speeds (less than 5 miles per hour) would be a measure to avoid strikes.

No avoidance, minimization, or mitigation measures are proposed for operation of the new distribution pipeline segments, limit station, or gate station. These components are proposed entirely on previously developed areas, so any potential impact to animals or their habitat resulting from operation of the new distribution pipeline segments and limit station would be negligible.

3.4.7 Conclusion

No significant, permanent, unavoidable adverse impacts to plants and animals are anticipated to result from the Project because the majority of the Proposed Action footprint would be contained within existing developed areas, largely port-industrial sites and paved road ROWs. Potential impacts to aquatic/marine habitat in the Hylebos and Blair waterways would be mitigated with proposed avoidance, minimization, and mitigation measures, including those related to pile driving and others that are associated with water quality, as discussed in Section 3.3.6 (Water).



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Proposed Loading Platform
- Proposed Pier
- In-Water Action Area

Fish impact distance from pile driving

- Fish Injury (Peak) 5 meters (16 feet)
- Fish Injury (>2 g.) 377 meters (1,237 feet)
- Fish Injury (<2 g.) 541 meters (1,775 feet)
- Fish Behavioral Disturbance 2,154 meters (7,067 feet)

N W E S

0 1,000 Feet

City of Tacoma

Figure 3.4-1
Spatial Extent of In-water Noise Relative to Fish Disturbance and Injury Thresholds
Tacoma LNG Project

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Proposed Loading Platform
- Proposed Pier
- In-Water Action Area

Whale impact distance from pile driving

- Whale Injury 22 meters (72 feet)
- Whale Behavioral Disturbance (impulsive) 464 meters (1,524 feet)
- Whale Behavioral Disturbance (vibratory) 1,359 meters (4,459 feet)

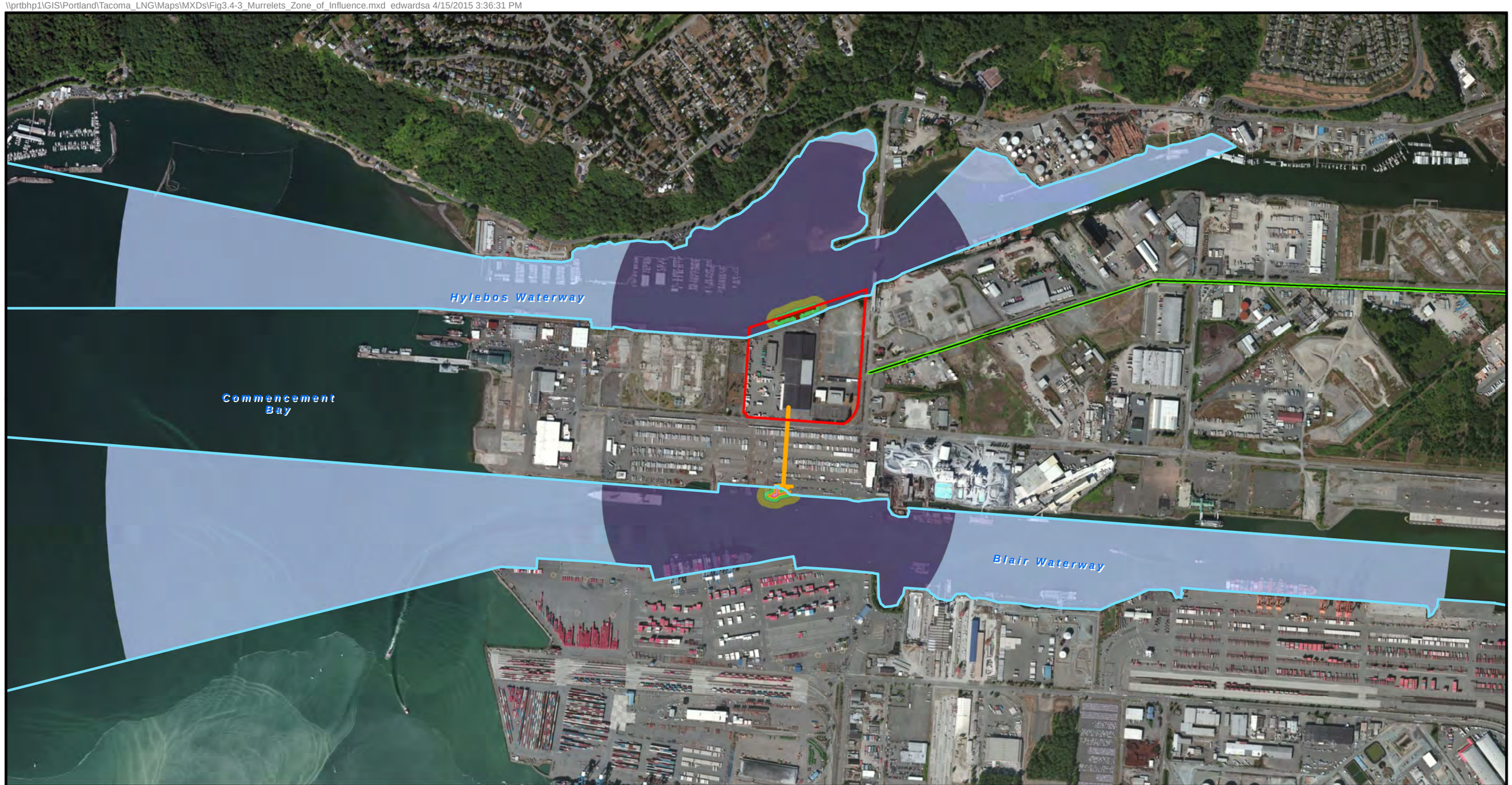
N E S W

0 650 Feet

City of Tacoma

Figure 3.4-2
Spatial Extent of In-water Noise Relative to Marine Mammal Disturbance and Injury Thresholds

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Proposed Loading Platform
- Proposed Pier
- In-Water Action Area

Diving Marbled Murrelets impact distance from pile driving

- Diving marbled murrelets (Injury - barotrauma) 15 meters (49 feet)
- Diving marbled murrelets (Injury - auditory) 38 meters (125 feet)
- Effective quiet 541 meters (1,775 feet)
- Behavioral Disturbance 2,154 meters (7,067 feet)

N W E S

0 1,000 Feet

Tacoma

City of Tacoma

Figure 3.4-3
Spatial Extent of In-water Noise Relative to Marbled Murrelet Disturbance and Injury Thresholds
Tacoma LNG Project

3.5 Health and Safety

This section describes potential health and safety impacts that may result from the proposed Tacoma Liquefied Natural Gas (LNG) Project and related natural gas pipeline (referred to herein as the Project) during its construction, operation, and decommissioning (herein referred to as the Proposed Action).

A description of LNG properties in general provides useful context for this discussion of health and safety as related to the proposed Project. LNG properties typically function as follows (see also Section 2.2.1.1 [Overview]).

- LNG is natural gas in its liquid state. To reach the liquid state, natural gas is cooled to -260 degrees Fahrenheit (°F). Similar to natural gas in a vapor state, LNG is odorless, colorless, noncorrosive, and nontoxic. LNG has a density of approximately 26.5 pounds per cubic foot and is neither flammable nor explosive. Upon conversion to liquid form, LNG collapses to occupy a volume that is 1/600 the original volume in its gaseous form. In a liquid form, LNG is stored at or near atmospheric pressure (less than 3 pounds per square inch gauge [psig]).
- LNG vaporizes rapidly on contact with a temperature greater than its own. At -259°F, LNG becomes a vapor. Between -259°F and -160°F, LNG vapor is heavier than air and pools at the ground level in collection pools or sumps. Vapor captured in the sumps continues to warm, and, at -160°F, becomes buoyant, rises, and rapidly disperses into the atmosphere.
- In the type of system that would be used by the proposed Project, LNG is produced using a mixed refrigerant design process. This closed loop system employs a specific, but adjustable, mixture of methane, ethylene, propane, isopentane, and nitrogen as the refrigerant. The refrigerant passes through heat exchangers to cool the gas stream to liquid (cryogenic) temperature.

3.5.1 Study Methodology

This section describes the methodology used to determine potential impacts to health and safety with the Proposed Action area. The Project would cross the jurisdictions of the City of Tacoma, City of Fife, and unincorporated Pierce County (see Figure 1-2 in Chapter 1 [Purpose, Need, and Alternatives Considered]). Potential impacts to health and safety were evaluated based on the applicable federal, state, and local regulations for both LNG facilities and natural gas pipelines. As discussed in Section 3.5.2 (Regulatory Framework), a review was conducted of the applicable health and safety regulations for these activities in both marine and terrestrial environments. This section examines the safety and health implications of delivering natural gas to the Tacoma LNG Facility and the processing of natural gas into its liquefied state. It also addresses handling of the product, including unplanned incidents of release of natural gas in a vapor or liquefied form and the release of other hazardous materials.

3.5.2 Regulatory Framework

3.5.2.1 Siting and Design of LNG Facilities

As detailed in Chapter 2 (Description of Proposed Action), Tacoma LNG would consist of three major components: (1) Tacoma LNG Facility, (2) Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System, and (3) associated improvement to the existing Puget Sound Energy (PSE) Natural Gas Distribution System. Each major component would be subject to federal, state, and local regulations focused on siting, design, construction, operation, maintenance, and security for these components.

With regard to health and safety, these regulations and their referenced codes ensure that the facility would be (1) sited to minimize risk to the general public, (2) designed, operated, and maintained to minimize the risk of inadvertent release and to implement safety mechanisms for protecting worker and public safety, and (3) secured against threats of intentional acts of destruction. The federal, state, and local regulations

affect facility design and implementation across numerous elements of the natural and built environment, including the following:

- Siting, design, construction, operation, and maintenance of the Tacoma LNG Facility are federally regulated by the Pipeline Hazardous Materials Safety Administration (PHMSA) under LNG Facilities: Federal Safety Standards (49 *Code of Federal Regulation* [CFR] 193 et al.), which incorporate by reference the National Fire Protection Association (NFPA) Standard for the Production, Storage, and Handling of LNG (NFPA 59A), in addition to many other national standards.
- Design, construction, operation, and maintenance of the marine loading of LNG to vessels are federally regulated by the United States Coast Guard (Coast Guard) under Waterfront Facilities Liquefied Natural Gas (33 CFR 127 et. al.) and Liquefied Hazardous Gas (33 CFR 127 et. al.), as well as by the LNG Facilities: Federal Safety Standards (49 CFR 193).
- Facility security for the proposed Project is regulated by the USCG under Maritime Security: Facilities (33 CFR 105), as well as LNG Facilities: Federal Safety Standards (49 CFR 193).
- Tanker truck loading activities would be required to meet the United States Department of Transportation requirements under 49 CFR 172, 173, and 177.
- The Washington Utilities and Transportation Commission (WUTC) adopted by reference the federal LNG facility standards (49 CFR 193) under Washington Administrative Code (WAC) 480-93, Gas Companies - Safety. Under certification by PHMSA, the WUTC Pipeline Safety Office would provide oversight of the proper design and construction of the proposed Project, as well as ongoing oversight of Project operations.
- The City of Tacoma also implements NFPA 59A (currently the 2009 edition) through its adoption of the Washington State Fire Code adopted in the Tacoma City Code, Title 3 - Fire.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Proposed LNG development activities in relation to environmental health, safety, and security are federally regulated by PHMSA and the Coast Guard. In addition to federal regulations, there are also state and local regulations related to the health and safety aspects of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System.

Federal

The federal government is primarily responsible for developing and enforcing LNG facility safety and siting regulations. The following federal regulations apply to the Project:

- Title 49 CFR 193 – LNG Facilities: Federal Safety Standards. The Proposed Action must comply with the provisions of 49 CFR 193 and the numerous standards and codes that are incorporated by reference, including NFPA 59A Standard for the Production, Storage, and Handling of LNG. NFPA 59A incorporates by reference the requirements of more than 25 additional NFPA standards and requirements, including:
  - American Concrete Institute
  - American Petroleum Institute
  - American Society of Mechanical Engineers
  - American Society for Testing and Materials
- Compliance with these federal regulations and related standards and codes is under the jurisdiction of PHMSA. Enforcement authority is delegated to the WUTC, as an agent for PHMSA.
- Title 33 of the CFR, Parts 1 through 199, provide for the Coast Guard to exercise regulatory authority over various aspects of waterfront facilities. The most relevant sections of 33 CFR are as follows:

– Part 127 Subparts A and B - Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas. These subparts ensure that a minimum level of safety is provided for LNG transfer operations conducted between shore structures and marine vessels. The subparts outline requirements pertaining to general information, general design, equipment, operations, maintenance, firefighting, and security.

  As noted in "Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System," above, Coast Guard marine safety programs are described in Navigation and Vessel Inspection Circular 01-11 *Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities*, dated January 24, 2011, and in 33 CFR 127. In compliance with these programs, new LNG waterfront projects (facilities transferring LNG to or from vessels) must perform a waterway suitability assessment (WSA) developed in collaboration with the Coast Guard, prior to the Coast Guard issuing a Letter of Recommendation to operate. In accordance with 33 CFR 127, the WSA must consist of a Preliminary WSA and a Follow-on WSA, as described in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

  PSE submitted a Preliminary WSA in December 2014. The Coast Guard Safety and Security Risk Assessment Exercise was conducted over two days in March 2015. The WSA will be revised to incorporate comments received from the Coast Guard on the previous submittal, as well as to incorporate the results of the risk assessment. The next WSA revision is expected to be submitted in May or June 2015 and will be revised periodically over the life of the proposed Project, per Coast Guard requirements.

- Part 105 – Maritime Security: Facilities. This part requires vessels and port facilities to develop security plans and conduct assessments of facility vulnerabilities.
- 49 CFR 172, 173, 177 and 29 CFR 1910: These parts regulate the transport of LNG by highway, and provide safety standards applicable to various activities that would be conducted at the Tacoma LNG Facility.

See Table 3.5-1. for Key Elements in the Federal Regulations, Codes, Standards, and Guidelines.

Table 3.5-1 Key Elements Required Under Each Regulation, Code, Standard or Guidelines of EPA, PHMSA, and NFPA

Key Elements	Coast Guard 33 CFR 127	PHMSA 49 CFR 193	NFPA 59A
Emergency Response Program			
Emergency Response Program: Preplanning and training to make employees aware of, and able to execute, proper actions in the event of an emergency.	✓	✓	✓
Operations Manual			
Operating Manual: Comprehensive documentation addressing full scope of bunkering operations, including operating conditions, required equipment, equipment compatibility, mooring, prestart checks, connection, transfer, disconnection, shutdown, safety equipment, training, communications, simultaneous operations and emergency operations.	✓		✓
Operating Procedures: (Similar to Operating Manual and can be in a combined document) Documents providing clear instructions for safely conducting activities, which covers operating limits and steps for conducting each operating stage.		✓	✓

Table 3.5-1 Key Elements Required Under Each Regulation, Code, Standard or Guidelines of EPA, PHMSA, and NFPA

Key Elements	Coast Guard 33 CFR 127	PHMSA 49 CFR 193	NFPA 59A
Mechanical Integrity/Maintenance Program: Establish and implement written procedures to maintain the on-going integrity of pressure vessels, storage tanks, piping systems, valves, relief/vent systems, emergency shutdown systems, controls and pumps.		✓	✓
Training and Credentials: Establish training program to ensure all personnel are aware of hazards, safe work practices, and understand all tasks for normal, non-routine and emergency operations.	✓	✓	✓
Vessel Fuel Transfer Procedures: Documents providing clear instruction for safely conducting transfers from the facility to the vessel.		✓	✓
Compliance Audits: Periodic certification evaluating compliance with the provisions of the regulation. Audit must be developed and documented noting deficiencies that have been corrected.	✓		
Safe Work Practices: Documentation describing how to safely perform a task with minimum risk to personnel, equipment and the environment.		✓	
Contractor Safety Program			
Contractor Safety Program: Program to ensure contractor employees are trained in safe work practices, awareness of chemical hazards and emergency response.			
Non-routine Work Authorizations: Permit describing steps to personnel must follow to obtain the necessary clearance to start the job.			
Process Hazard Program			
Process Hazard Analysis: Thorough, orderly, systematic approach for identifying, evaluating, and controlling the hazards of processes involving highly hazardous chemicals.			
Process Safety Information: Compilation of written information on chemicals, technology, and equipment used in the process			
Risk Management Plan			
Risk Management Plan: Plan that includes: (1) an assessment of potential effects of an accidental chemical release, (2) a prevention program and (3) an emergency response program			
Waterways Suitability Assessment: Assessment of the safety and security risks associated with LNG vessel operations within the port and if necessary, recommendations to mitigate identified risks.	✓		
Incident Investigation Program			
Incident Investigation Program: Identification of the chain of events and causes of an incident that resulted in, or could reasonably have resulted in, a catastrophic release of highly hazardous chemicals in the workplace, so that corrective measures can be developed and implemented.			
Incident Investigation Team: Team consisting of at least one person knowledgeable in the process and other persons with appropriate knowledge and experience to investigate and analyze the incident.			

Table 3.5-1 Key Elements Required Under Each Regulation, Code, Standard or Guidelines of EPA, PHMSA, and NFPA

Key Elements	Coast Guard 33 CFR 127	PHMSA 49 CFR 193	NFPA 59A
System to Address Corrective Actions: Establish system to address and resolve the incident report findings and recommendations.			
Communication/Follow-up: Document resolutions and corrective actions for review by all affected personnel whose job are relevant to the incident findings.			
Incident Reporting: Notification of all security breaches, spill, safety incidents, and safety related conditions and annual pipeline summary data.		✓	
Security Planning			
Security Assessment: Documentation of security background information, on-scene survey, analysis of vulnerabilities and recommendations.		✓	
Security Plan: Plan that identifies Facility Security Officer addresses each vulnerability identified in the assessment and describes security measures.	✓		✓
Safety Management System			
Safety Management System: System enabling proactive identification, evaluation and mitigation or prevention of chemical releases that could occur as a result of failures in process, procedures or equipment that could expose employees and surrounding populations to serious hazards.			
Fire Hazard Evaluation			
Fire Hazard Evaluation/Risk Assessment: Assessment of the fire risk at an LNG terminal by identifying fire scenarios of interest, their likelihood of occurrence and their potential consequences, and if necessary, identification of risk reduction measures.			✓
Hot Work Permit: Issued for hot work operations conducted on or near a covered process.	✓		
Siting Study: Quantification of the risks to populations outside the facility to ensure they do not exceed acceptable levels.		✓	✓

Source: Adapted from ABS (not dated), Table 14 "Key Elements of Applicable Regulations, Codes, Standards, and Guidelines for Bunkering Facilities."
Key:
CFR = Code of Federal Regulations
EPA = United States Environmental Protection Agency
LNG = liquefied natural gas
PMHSA = Pipeline and Hazardous Materials Safety Administration

State

The WUTC, as referenced above, has been granted enforcement authority by PHMSA to ensure compliance with federal regulations governing LNG facilities located in Washington State (PHMSA 2014a,b). The WUTC participates in the federal/state cooperative gas and hazardous liquid pipeline safety program under 49 United States Code (USC) Section 60105(a) Certification and acts as an Interstate Agent. This designation of regulatory duties is codified in WAC 480-93-999.

For elements of facility design that do not meet the specific requirements of 49 CFR 193 but meet the intent of the regulations, the WUTC may issue a state waiver pursuant to the WUTC's participation in the pipeline safety program under its certification authorized by 49 USC Section 60105 (PHMSA 2014a,b) and WAC 480-

For elements of facility design that do not meet the specific requirements of 49 CFR 193 but meet the intent of the regulations, the WUTC may issue a state waiver pursuant to the WUTC's participation in the pipeline safety program under its certification authorized by 49 USC Section 60105 (PHMSA 2014a,b) and WAC 480-93-230 – Exemptions from Rules in WAC 480-93. The Proposed Action may need a waiver to address design of the underground pipeline to transfer LNG to TOTE, which would be done in compliance with the most recent NFPA 59A safety standards that are not yet adopted by 49 CFR 193.

City of Tacoma

Pursuant to the provisions of the Revised Code of Washington (RCW) 35.21.180, the City of Tacoma has adopted by reference the 2012 edition of the International Fire Code under Title 3 – Fire, together with Appendices B and C published by the International Code Council, including all amendments and revisions in the Washington State Fire Code, WAC Title 51, Chapter 54A, effective July 1, 2013, subject to the amendments of Tacoma City Code sections 3.02.010 through 3.02.410.

PSE Natural Gas Distribution System

PSE operates and maintains a natural gas distribution system throughout portions of western Washington, including Pierce County. PSE designs, constructs, and operates its natural gas system to meet or exceed the most stringent federal and state requirements. Federal regulations include 49 CFR Part 192 (Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards), which are administered by the United States Department of Transportation – Office of Pipeline Safety. The WUTC, under an annual certification from the Office of Public Safety, assumes intrastate regulatory, inspection, and enforcement responsibilities for the regulations and also adopts and enforces additional state requirements.

The WUTC regularly inspects PSE facilities to ensure compliance with WUTC regulations. In accordance with federal regulation, all natural gas distributed by PSE is odorized to ensure that a leak is readily detectable and natural gas pressure is regulated by mechanical equipment to ensure that system pressure is less than or equal to the maximum design pressure of the system. As with all pressure-regulating stations, the Golden Given Limit Station would have overpressure protection to ensure that the facility operates safely.

Bunkering Operations

Bunker vessels arriving at the Tacoma LNG Facility would not be under PSE's control, but they would be subject to various design requirements and regulations ensuring the safety of LNG transfer operations.

Transfers of LNG from the Tacoma LNG Facility to a bunker vessel would be conducted in accordance with the following regulations:

- 46 CFR 154 – Safety Standard for Self-Propelled Vessels Carrying Bulk Liquefied Gases: delineates requirements for vessels carrying LNG, such as inspection and testing requirements; design, construction, and equipment requirements; special design requirements; and operating requirements.
- 46 CFR Chapter I, Subchapter B – Merchant Marine Officers and Seamen: provides credentialing requirements for United States merchant mariners working on LNG bunkering vessels, including training requirements.

3.5.2.2 Worker Safety

Worker safety is governed by federal and state regulations. At a federal level, the Occupational Safety and Health Act established the Occupation Safety and Health Administration (OSHA) to govern worker safety. At the state level, the Washington Industrial Safety and Health Act (WISHA) delegated authority for governing worker safety to the Washington State Department of Labor and Industries (L&I). A summary of the regulatory scope of these two agencies is provided below.

Occupational Safety and Health Administration: OSHA ensures safe and healthful working conditions by setting and enforcing standards and providing training, outreach, education, and assistance to workers (OSHA 2014). Employers are required to provide a safe workplace for their employees by following all

relevant OSHA health and safety standards, identifying and addressing hazards, abiding by chemical hazard communication requirements, providing workers with personal protective equipment, and reporting and record-keeping consistent with OSHA requirements (OSHA 2014).

Washington Industrial Safety and Health Act: WISHA (RCW Chapter 49.17) was established to ensure that employers provide their workers with safe and healthy workplaces at a state level. WISHA is administered by L&I through the Division of Occupational Safety and Health (L&I 2013).

3.5.3 Affected Environment

3.5.3.1 Safety History of the LNG Industry

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located on the Blair-Hylebos peninsula within the Port of Tacoma, an area that has been heavily developed for maritime and industrial use over the past 75 years.

Public safety is of paramount importance in siting, approving, constructing, and operating any LNG facility. The LNG industry, both in the United States and worldwide, has had an exceptionally good safety record, indicating that the regulations governing LNG siting and operation are effective.

In the 70+ year operating history of United States LNG facilities, only two LNG safety-related incidents have occurred that resulted in adverse effects to the public or environment: a fire at an LNG facility in Cleveland, Ohio, on October 20, 1944, and an ignition of enclosed vapors in Lusby, Maryland, in 1979. The LNG tank involved in the 1944 Cleveland incident was not constructed of 9 percent nickel steel because of a shortage of this metal during World War II, when the facility was built, and there was no berm or other containment to contain LNG released from the tank. The LNG tank failed, resulting in a release of LNG (Elliott et al. 1946). As a result of this incident, the codes were revised to specify the material used for tank construction and to require berms or containment for LNG tanks that are not fully contained. The proposed Project facilities would be designed, constructed, and operated in compliance with all applicable codes, use required materials for safe construction, and utilize a full-containment tank design.

In the more recent operational accident in 1979 at the Cove Point LNG facility in Lusby, Maryland, a seal failed on an LNG pump, resulting in gas vapors entering an electrical conduit. The conduit then conveyed this gas vapor to an enclosed electrical switchgear building. When a worker switched off a circuit breaker in the switchgear building, the gas ignited, resulting in damage to the building and a worker fatality. Lessons learned from this accident resulted in modifications to the National Electric Code, which is incorporated by reference in the local fire code. As noted above, the proposed Project facilities would be designed, constructed, and operated in compliance with applicable codes, including adopted fire codes.

The LNG industry has a strong commitment to public safety that is evidenced by the safety enhancements implemented as a result of lessons learned. With more than 110 functioning LNG facilities in the United States today, and an operational history beginning in the 1940s, the industry has a good safety record.

3.5.3.2 Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potential health and safety impacts from the Tacoma LNG Facility include thermal radiation from a fire or a vapor cloud from a release of LNG. PHMSA regulations establish the potential credible events (i.e., “accident scenarios”) to be modeled for thermal and vapor events. The boundaries of potential impact areas would include the parcels containing the PSE plant and the portions of the TOTE site under the control of PSE, and specified areas extending over waterbodies where LNG is present, provided that they cannot extend to areas where groups of 50 or more people assemble. The regulations that define these boundaries include 49 CFR 193.2057 and by incorporation, section 2.2.3.2 of NFPA 59A for thermal radiation, and 49 CFR 193.2059 and by incorporation, sections 2.2.3.3 and 2.2.3.4 of NFPA 59A for a vapor cloud. The Tacoma Fire Department also has jurisdictional authority of NFPA 59A (currently 2009 edition) as it pertains to siting, design and construction of the facility.

Any thermal radiation is limited to 1,600 British thermal units per hour per square foot at the boundary limit. The vapor cloud cannot exceed 50 percent of the lower flammability limit at any property line that can be built upon. Seismic design criteria are discussed in the geotechnical report titled *Geotechnical Engineering Services, Tacoma LNG Project* (GeoEngineers 2015).

3.5.3.3 PSE Natural Gas Distribution System

The affected environment encompasses the distribution system owned and operated by PSE in Pierce County and beyond. Distribution pipelines form part of the core business of PSE, which is the state of Washington's largest provider of residential and commercial natural gas. The company maintains more than 12,000 miles of natural gas main in the state. PSE distribution pipelines must be designed, built, maintained, and operated to meet applicable federal and state safety standards. The Proposed Action includes installation of two pipeline segments that connect to PSE's existing distribution network in the city of Tacoma, city of Fife, and unincorporated Pierce County. In addition, a limit station is proposed near the intersection of 99th Street and Golden Given Road in unincorporated Pierce County to regulate pipeline pressure. Modifications to regulate pipeline pressure at the Frederickson Gate Station are also proposed as part of the Project.

3.5.4 Impacts of the Proposed Action

Construction and operation health and safety regulations applicable to the Proposed Action are those promulgated by OSHA pursuant to the Occupational Health and Safety Act, 29 USC Chapter 15; the Washington Industrial Safety and Health Administration pursuant to WISHA, RCW 49.17, and approved contractor safety plans.

3.5.4.1 Construction Impacts

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

As part of the Proposed Action, certified hazardous materials contractors would remove asbestos-containing material or lead-based paints in the World War II-era buildings to be demolished. Before demolishing the building, an asbestos, lead-based paint, and universal waste survey would be performed. The waste survey would be performed to identify the hazardous materials that could be encountered by the workers or released to the environment during demolition of the buildings. Both structural and nonstructural controls would be in place to protect workers from exposure to hazardous materials and to comply with the OSHA and WISHA regulations. In addition, L&I requires the asbestos abatement to be performed by a certified contractor, who must notify L&I 10 days prior to performing the abatement. All abatement would conform to the requirements of WAC-296-62-0777, which contains provisions for worker safety during asbestos abatement. In addition, the requirements set forth in WAC 365-230 would be adhered to during demolition should lead-based paint be encountered.

As discussed in Section 3.1.3.4 (Existing Contaminated Sites and Remedial Actions), a work plan would be developed outlining the actions that would be taken if contamination is encountered during construction activities. This plan would address necessary characterization of impacted media, protection of worker health and the environment, temporary storage of impacted media, and proper reuse or off-site disposal of contaminated soil in accordance with local, state, and federal regulations.

PSE has adopted "Nobody Gets Hurt Today" as one of the company's core values. The expectation that nobody will be injured applies to all PSE personnel, as well as contractors and subcontractors through the requirement that safety plans be included in all contracts for work with PSE. These safety plans require observance of construction standards designed to avoid injury on the work site, including injury from moving equipment.

PSE Natural Gas Distribution System

PSE operates and maintains a natural gas distribution system throughout portions of western Washington, including Pierce County. PSE designs, constructs, and operates the natural gas system to meet or exceed the

most stringent federal and state requirements. Federal regulations include CFR Title 49, Part 192 (*Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards*), which are administered by the United States Department of Transportation Office of Pipeline Safety. The WUTC adopts and enforces additional state requirements. As noted above, the WUTC regularly inspects PSE facilities to ensure compliance with WUTC regulations. In accordance with federal regulation, all natural gas distributed by PSE is odorized to ensure that a leak is readily detectable, and natural gas pressure is regulated by mechanical equipment to ensure that system pressure is less than or equal to the maximum design pressure of the system. As with all pressure-regulating stations, the Golden Givens Limit Station would have a 100 percent redundancy backup regulator system to ensure that the facility operates safely.

In addition to the safety plans associated with PSE's "Nobody Gets Hurt Today" policy, standardized construction protocols (see Appendix XX, Selected Standard Protocols for PSE Construction Contracts) include developing routing plans that locate and avoid all existing utilities. In areas of brownfield development, construction plans contain methods for handling hazardous materials if encountered. Once all utilities are located and design plans are complete, the company applies for and acquires all permits needed for installation. This includes traffic control plans and other environmental impact avoidance and mitigation plans. The WUTC may conduct safety inspections at any time during the construction process. Completed pipe is subjected to and must pass pressure testing before placement into service.

Standard construction techniques within jurisdictional rights-of way (ROWs) encompass excavation, removal, and 100-percent haul-off of subsurface material; pipeline preparation, including welding and placement in the excavation; followed by proper backfill placement and compaction. Construction would occur beneath or within the paved surface or graveled road shoulder of the ROW as appropriate in consultation with the jurisdiction. The *Manual on Uniform Traffic Control Devices* would be utilized to minimize traffic impacts and provide safe working conditions (FHWA 2009). PSE would strictly adhere to local jurisdictional traffic control requirements to minimize traffic impacts, which may include nighttime work or reduced-duration daytime schedules to avoid rush hour traffic. Horizontal directional drill installation under Interstate 5 would not impede freeway traffic as the drilling and receiving pits would be located outside of the Interstate 5 ROW.

3.5.4.2 Operations Impacts

Tacoma LNG Facility and Tote Marine Vessel LNG Fueling System

Potential safety hazards that could occur at the Tacoma LNG Facility relate to the specific characteristics of LNG and the conditions under which it would be handled and stored, and associated operations that are conducted involving other hazardous materials used at the facility. As described in Section 2.2.1.1 (Overview), LNG consists of natural gas that has been pretreated to remove impurities and liquefied to cryogenic temperatures. The potential hazards of most concern at the Tacoma LNG Facility are those related to the potential flammability of any vapors released from an LNG spill and the cryogenic liquid nature of LNG.

Operation, Maintenance, and Emergency Procedures

Operation of the Tacoma LNG Facility would not pose a potential public hazard if strict design and operational measures to control potential accidents were applied. The primary concerns regarding public safety are events that could lead to an LNG spill of sufficient magnitude to create an off-site hazard. Stringent requirements are in place for the design, construction, operation, and maintenance of the facility, as well as the extensive safety systems to detect and control potential hazards. In addition to the operation and maintenance procedures that are required by both 49 CFR 193 Subpart F and NFPA 59A, emergency procedures are also required. All of the procedures (operation, maintenance, emergency) would be developed and documented prior to commissioning. With specific reference to the emergency procedures, elements that would be addressed include recognizing an emergency situation, responding to an emergency, and issuing the appropriate notifications to emergency responders. The overarching goal of all

of these procedures would be to ensure the safety of personnel through sound operation and maintenance procedures and monitoring of the various safety systems located throughout the facility.

Subpart F provides prescriptive requirements for operating procedures, emergency procedures, personnel safety, operating records, and other requirements for the ongoing operation of the facility. PSE would prepare all procedures in advance of plant operation. Each procedure would be reviewed and approved by the WUTC Pipeline Safety Office as the duly-appointed delegate of PHMSA. These procedures and records would be subject to ongoing audits by the WUTC for the life of the Project.

LNG Hazards

LNG's principal hazards result from its low temperature (-260°F), asphyxiation potential, and flammability. Each of these hazard characteristics is described in the following sections. Often, the hazards associated with LNG are compared with, and mistakenly assumed to be more severe than, diesel fuel, gasoline, propane, and compressed natural gas. This is not an accurate assessment because LNG vapor is lighter than air above temperatures of -160°F, which means that vapor at ambient temperature will rise and dissipate, thereby reducing vapor concentration such that ignition is not possible.[8] In contrast, gasoline and diesel vapors, and any other hydrocarbon vapor, are much heavier than air at ambient or normal temperatures, and so remain concentrated with a higher potential for ignition.

Low Temperatures

Although LNG can cause "freeze burns" and, depending on the length of exposure, more serious injury, its low temperature does not present a significant hazard to the public because all low temperatures are confined to the site. As a cryogenic liquid, LNG will quickly cool materials it contacts and may cause thermal stress and brittleness in materials not specifically designed for cryogenic temperatures.[9] These hazards, however, are not substantially different from the hazards associated with the storage and transportation of liquid oxygen (-296°F), liquid nitrogen (-321°F), and several other cryogenic gases that are routinely produced, used, maintained, and transported safely in the United States.

Areas with potential for cryogenic spill would all be located on the LNG plant site and in areas under PSE's control at the TOTE terminal. As described in Section 2.2.1.7 (Other Process Facilities), in the unlikely event of an LNG spill, LNG would be directed to various spill containments consisting of below-grade, open-top concrete sumps. LNG spills on the loading platform at the end of the pier would be collected in a concrete curbed area under the loading arms or hoses and piping, which would gravity-drain to a concrete trench that runs the length of the pier back ashore. Sumps would be sized for a maximum design spill pursuant to federal regulations. There would be no public access to either of these facilities.

Asphyxiation

Methane, the primary component of LNG, is colorless, odorless, and tasteless, and its vapor is classified as a simple asphyxiant. As such, methane can cause health hazards, including death from lack of oxygen at concentrations above 50 percent, as described on OSHA's website.[10] Asphyxiation, like low temperature, is a risk only in confined spaces and, as a result, normally represents a minimal risk to employees and even less risk to the public, which has no access to the facility. The facility design includes strategically placed gas detection devices that are monitored on a continuous basis and trigger alarms at levels well below those that could pose a human health hazard. Further, the siting and design of the facility are configured so that, however unlikely, any vapor cloud forming would stay on site. Operating procedures and training would address this risk to employees.

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[8] For ignition to occur, vapors must be at a concentration of 5 to 15 percent of ambient air.

[9] Concrete, nickel steel, and stainless steel can withstand cryogenic temperatures without damage.

[10] https://www.osha.gov/dts/chemicalsampling/data/CH_250700.html

Thermal Radiation, and Vapor Dispersion

To define the extent of thermal vapor dispersion and thermal radiation exclusion zones to ensure the public's safety requires quantitative modeling. When LNG is released from a container and comes in contact with air, it vaporizes and produces methane vapor. For any methane vapor to ignite (not only LNG, but any fuel containing methane), two conditions must simultaneously occur: (1) the methane vapor must be at a concentration of 5 to 15 percent in air, and (2) an ignition source must be present. If such a methane vapor-air mixture from an LNG spill ignites, the LNG flame front will either burn back to the release location (if the vapor concentration along this path is sufficiently high to support the combustion process) or, if the vapors dissipate quickly enough, the flame will burn out for lack of fuel.

For Tacoma LNG, vapor dispersion analyses have been conducted for credible spill scenarios, using the methodologies and computational models prescribed by PHMSA and approved on similar facilities. The modeling conclusively demonstrates that exclusion zones defined by federal regulation 49 CFR. § 193.2059 and, by reference NFPA 59A (2001), remain within the property lines of the proposed site. Keeping all spilled LNG (and any potential resulting flammable vapor clouds) within the property boundary eliminates the risk of off-site ignition.

LNG is not explosive in the manner that it is normally transported and stored. Any flammable vapor will develop an overpressure if ignited while in a confined space, but there is no evidence suggesting that LNG vapor will develop an overpressure in unconfined, open areas (ABS Consulting 2004). Experiments to determine if unconfined methane-air mixtures can explode have all demonstrated that, even for combustion initiated with a blasting cap, the shockwave (the characteristics of an explosion) quickly dies out, as unconfined methane combustion and flame front will not support overpressures (ABS Consulting 2004). In other words, unconfined methane-air mixtures will burn but will not explode.

A rapid-phase transition (RPT) can occur when a portion of LNG spilled onto water changes from liquid to gas, virtually instantaneously. Unlike an explosion that releases energy and combustion products from a chemical reaction as described above, an RPT is the result of heat transferred to LNG, inducing a change to the vapor state. The rapid expansion of LNG from the liquid to vapor state can cause locally large overpressures. RPTs have been observed during LNG test spills onto water. In some test cases, the overpressures generated were strong enough to damage test equipment in the immediate vicinity of the LNG release point. However, the sizes of the overpressure events have generally been small. Such a small overpressure is not expected to cause significant local damage, nor is it expected to endanger the public. With regard to testing, RPTs have not been observed when methane content is greater than 95 percent. The LNG to be produced by the proposed facility is expected to have methane content greater than 95 percent (Cleaver et al. 2013).

A common misconception of the flammability of LNG with respect to LNG tanks damaged by impact or impinged directly by flames is that this scenario has the potential to create a boiling liquid expanding vapor explosion (BLEVE). LNG storage tanks are not susceptible to BLEVEs (Ditali and Fiore 2008). The LNG storage tank is a tank within a tank with 3 feet of insulation between the two. Even with direct flame impingement on the outer tank, the inner tank would not experience an increase in temperature. Further, LNG stored in the tank is at or near atmospheric pressure; LNG stored in the tank would be less than 3 psig.

The primary safety concern of an LNG terminal is a fire from the release of LNG caused by equipment failure or spill. The siting and design of the facility would incorporate containment features, such as sumps to which a release of LNG would be directed. If a release and subsequent ignition were to occur, the fire hazard would be localized. LNG vaporizes rapidly on contact with a temperature greater than the LNG itself. At -259°F, LNG becomes a vapor. Between -259°F and -160°F, LNG vapor is heavier than air and pools at the ground level in collection pools or sumps. In the unlikely event of an LNG spill at the Project site, LNG would be directed to various spill containments consisting of below grade open top concrete sumps. LNG spills on the loading platform at the end of the pier would be collected in a concrete curbed area under the loading arms or

hoses and piping, which would gravity drain to a concrete trench that runs the length of the pier back ashore. Sumps would be sized for a maximum design spill pursuant to federal regulations.

At -159°F, LNG vapor is lighter than air. Any spilled LNG not collected in a sump would rise. LNG is flammable as a vapor, as stated above, between approximately 5 and 15 percent concentration of gas in air. LNG is less flammable than other fuels such as propane and gasoline and requires a higher ignition temperature (1,004°F). If a flammable vapor-air mixture from an LNG spill is ignited, it may result in a flash fire, which is a short-duration fire that burns the vapors already mixed with air in flammable concentrations. The flame front will burn back through the vapor cloud to the spill site, provided the vapor concentration along this path is high enough to continue burning (AcuTech 2007).

PSE Natural Gas Distribution System

PSE would operate proposed Pipeline Segments A and B of the natural gas distribution system in the affected jurisdictions at pressures of up to 250 and 500 psig. Pipeline Segment A would consist of approximately 4 miles of 16-inch pipe, and Pipeline Segment B would consist of approximately 1 mile of 12-inch pipe. Both the 16-inch pipe and the 12-inch pipeline segments would operate at a hoop stress below 20 percent Specified Minimum Yield Strength. This constitutes a safety factor of 5, which exceeds the applicable federal and state requirements.

All natural gas in distribution lines is odorized for ready detection in the event of a leak. The building density in the area where a pipeline is proposed determines the required safety factor to which a pipeline must be built. These standards are determined by Class Location 1 through 4, with the lower number representing less densely developed locations, and the highest number representing heavily urbanized locations. Pipeline Segments A B would be built to exceed the highest design factor for a Class 4 location.

With regard to minimum depth of cover over high-pressure distribution lines, federal standards require at least 24 inches. PSE designs to meet a minimum cover of 36 inches over high-pressure distribution mains.

For the operational lifetime of distribution pipelines, federal and state regulations require that leak surveys be conducted every five years unless the pipelines are located within business districts, where they undergo a leak survey annually. PSE conducts leak surveys annually on all business district pipelines and higher-pressure distribution mains; all other locations undergo leak surveys every three years.

The pressure of the gas at the proposed Golden Given Limit Station would be reduced to less than 250 psig to match the downstream pipeline. The Frederickson Gate Station is where natural gas is delivered from Northwest Pipeline to PSE. At this location, the gas is measured for custody transfer, the pressure is regulated to system pressure, and the gas is odorized so that any unintended release can be detected by the public. PSE operates its facilities, including the proposed Golden Given Limit Station and Frederickson Gate Station, in accordance with all applicable federal and state regulations.

3.5.4.3 Decommissioning Impacts

This section describes the procedures proposed to address potential decommissioning impacts associated with the end of the design life of the Project. Accounting for each Project component, the estimated total design life of the Project is 50 years. Decommissioning of the Project components would generate impacts similar to those discussed in Section 3.5.4.1 (Construction Impacts).

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Decommissioning activities would require construction worker safety training and safety plans designed to prevent workers' exposure to vapors or other contaminated media that may pose an unacceptable risk exposure scenario. Similar safety training and safety plans would be appropriate to construction workers operating in and around equipment at the decommissioning site.

During decommissioning of the facility, hazardous materials would be stored, handled, and used in accordance with plans prepared for the safe management of such materials.

Decommissioning the plant would involve removing all aboveground equipment to its foundations and demolishing the LNG tank. At the discretion of the property owner (Port of Tacoma), buildings and foundations could also be demolished. Underground utilities (e.g., stormwater, firewater) typically are abandoned in place. Any decommissioning would be conducted following consultation with the Port of Tacoma, as the removal and decommissioning of the facilities are covered in the lease between PSE and the Port of Tacoma. All necessary permits would be obtained prior to activities subject to regulatory requirements, including environmental review as required at that time.

PSE Natural Gas Distribution System

It is unlikely that the pipelines would be removed following decommissioning of the LNG liquefaction facility. The pipeline is an integral part of an existing natural gas distribution system serving both commercial and residential natural gas customers.

3.5.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action–related impacts to health and safety would not occur. Under this scenario, there would be no new, economically feasible, and consistent supply of cleaner fuel. If the Tacoma LNG facility is not constructed, vessels reliant on LNG as a fuel in the Port of Tacoma would have to either use more costly modes of delivery or relocate their fueling activities outside of the Port of Tacoma. Relocation of fueling infrastructure and activities outside the Port of Tacoma would carry with it the attendant evaluation of relocation of other enterprise activities for entities whose operations are dependent on completion during the fueling time frame.

3.5.6 Avoidance, Minimization, and Mitigation

3.5.6.1 Design and Construction

This section describes the primary construction mitigation measures that would be implemented to address health and safety during Project construction.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

- A Fire Protect Evaluation per the requirements of NFPA 59A 9.1.2 has been submitted to the City of Tacoma for review.
- To ensure evacuation routes (including Alexander Avenue, 11th Street and Taylor Way) in the vicinity of the project will remain open in the event of an LNG release, the facility design will incorporate mitigation measures to ensure that thermal radiation and vapor dispersion do not extend beyond the land portions of the PSE and TOTE property lines.
- A construction worker health and safety plan would be developed to conform to the applicable federal and state regulations for worker health and safety
- A Contaminated Media Management Plan would be developed that outlines the proper protocol that would be implemented should contaminated media be encountered during excavation or grading activities.
- Lead-based paint and asbestos abatement would be completed in accordance with applicable federal and state regulations and would be performed only by qualified and certified contractors. Hazardous materials would be stored, handled, and used in accordance with best practices for storage and management of hazardous materials. These best practices include, as appropriate, storing materials in a centralized construction staging area within secondary containment.
- Fueling and routine maintenance of construction-related equipment would occur within dedicated areas equipped with spill kits.

- The LNG storage tank would be a full-containment design, including a concrete roof and an outer, secondary concrete tank.
- Piping connections to the LNG storage tank would be from the top, with no penetrations of the inner or outer tank below the liquid level.
- LNG-containing piping would be designed as primarily all-welded construction with a minimum number of flanges.
- Piping would be either pneumatically or hydrostatically tested in accordance with appropriate codes and procedures before placement into service.
- Piping and equipment containing any liquids (e.g., LNG, refrigerant, lubricating oil) would be provided with spill-collecting troughs and area curbing to direct any potential spills to spill collection basins.
- Mixed-refrigerant components would be stored in tanks mounded in sand to prevent fire impingement.

PSE Natural Gas Distribution System

- Trench boxes, bracing, sump pumps, and other associated construction safety equipment and procedures would be utilized as required by applicable federal and state regulations, such as WAC 296-155 (Safety Standards for Construction Work).
- Appropriate engineering and construction techniques would ensure that the proposed natural gas main is properly installed.
- A construction worker health and safety plan would be developed in accordance with applicable federal and state worker health and safety regulation.
- A Contaminated Media Management Plan would be developed, outlining the proper protocol that would be implemented should contaminated media be encountered during installation of the distribution system.
- Hazardous materials would be stored, handled, and used in accordance with best practices for storage and management of hazardous materials. These best practices may include, as appropriate, storing materials in a centralized construction staging area within secondary containment.
- Fueling and routine maintenance of construction-related equipment would occur within dedicated areas equipped with spill kits.

3.5.6.2 Operations

This section describes the primary mitigation measures that would be implemented prior to or during operations to address health and safety, as follows:

- Cooperatively develop a Joint Emergency Response Plan for local first responders (e.g., local fire department, emergency medical services, and law enforcement agencies) and facility owners/operators that would include, at minimum:

  Section 1.0 Introduction

  Section 2.0 Incident Command Organization

  Section 3.0 Response Procedures

  Section 4.0 Detection, Shutdown, and Suppression Systems

  Section 5.0 Emergency Notification and Communication Systems

Section 6.0 Notifications Required

Section 7.0 Site Management of Media/Public

Section 8.0 Incident Termination

Section 9.0 Emergency Response Plan Reviews, Updates, and Training

Section 10.0 Identifying and Preventing Specific Emergencies

Section 11.0 Procedures for Responding to Specific Emergencies

Section 12.0 Public Evacuation and Mutual Aid Association

- During LNG fueling in the Blair Waterway or barge loading activities on the Hybelos Waterway PSE should consider establishing public exclusion zones around the operating area.
- The facility would be installed with a variety of fire and gas monitoring systems throughout the facility that would provide detection of flammable gas releases or fires. The monitoring system would include detectors for flammable gas, low temperature, ultraviolet/infrared flame, and smoke. The system would be strategically located in potentially affected areas. Fire and gas monitoring systems would be hard-wired from the field devices to the control room fire and gas panel.
- The facility would be provided with a fire protection system. The control building would be fully equipped with a fire sprinkler system, and numerous portable dry chemical extinguishers would be located throughout the plant. Sprinkler connections would be compatible with local municipal fire department equipment. The power distribution center (switchgear/motor control center room) would be equipped with fire suppressant systems.
- Critical operating parameters would be continuously monitored and controlled by means of a distributed control system that included programmable logic controllers and local control panels. This system would include alarms to notify operating personnel in the event of abnormal operations.
- The facility would be provided with a safety-instrumented system, independent of the main control system, to allow for the safe, sequential shutdown and isolation of the facility.
- The facility would be provided with an emergency shutdown system that included shutdown and control devices designed to leave the facility in a safe state. This system would be used for major incidents and would result in total plant shutdown, as well as shutdown of ship loading, sendout system, and individual pieces of equipment, depending on the type of incident.
- A diesel-driven standby generator would be provided to deliver back-up power for critical loads in the event of complete loss of external power. In the event of loss of normal power, the essential loads would automatically be transferred to the standby generator source.
- An uninterruptible power supply would be provided for critical instrumentation and controls in the event of a power failure. The uninterruptible power supply would allow for the orderly shutdown of the facility upon a power failure, as well the continued monitoring of critical parameters during the power outage.
- Underground metal structures and buried piping would be protected from corrosion through cathodic protection systems as required.
- A comprehensive quality control and quality assurance program would be implemented to ensure that all items installed in the facility meet the established quality standards.
- Facility maintenance procedures would be developed and implemented in accordance with Subpart G of 49 CFR 193, which delineates detailed requirements for maintenance manuals, recordkeeping, and inspections for certain plant elements.

- A maintenance program for the facility and its constituent parts would be developed with vendor and construction contractor input. The maintenance program would include a schedule for evaluating critical facility constituent parts to assess their condition, which would inform the need for possible overhaul or replacement. Detailed documentation of all work required, tested, and completed would be maintained.
- Operations and maintenance personnel training programs and appropriate documentation thereof would be developed and implemented in accordance with Subpart H of 49 CFR 193, delineating detailed requirements for personnel qualifications and training. These programs would be designed to maximize personnel involvement to decrease the opportunity for a hazardous situation to develop.
- Training would be validated through testing and certification.
- Regular safety meetings with operations and maintenance personnel would be conducted.
- Emergency procedures would be developed per the requirements of 49 CFR 193 and 33 CFR 127 to provide for responding to any emergency that may reasonably be expected to occur at the facility. These procedures include provisions for contacting and coordinating with local agencies as needed to protect public safety in the event of an incident at the facility.

3.5.6.3 Decommissioning

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The relevant mitigation measures for protecting worker safety and hazardous material handling that may occur during the decommissioning of the facility are similar to the mitigation measures discussed in Section 3.5.6.1 (Construction), as decommissioning of the facility would utilize similar techniques.

PSE Natural Gas Distribution System

The distribution system infrastructure would not likely be decommissioned following the termination of the LNG liquefaction facility operation. However, relevant mitigation measures for protecting worker safety and hazardous material handling that could occur during the decommissioning of the distribution system would be similar to the mitigation measures discussed in Section 3.5.6.1, as decommissioning of the distribution system would employ similar techniques.

3.5.7 Conclusion

Siting, design, construction, operation, and maintenance of the Tacoma LNG Facility would be federally regulated by the PHMSA under the Federal Safety Standards (49 CFR 193 et al.) and also by the Tacoma Fire Department as the authority having jurisdiction under the stated adopted fire code which incorporate by reference the NFPA Standard for the Production, Storage, and Handling of LNG (NFPA 59A), in addition to many other national standards. The WUTC adopted by reference the federal LNG facility standards. Under certification by PHMSA, the WUTC Pipeline Safety Office would provide oversight of the proper design and construction of the Project, as well as ongoing oversight of Project operations. A variety of ongoing operations, maintenance, and emergency response trainings would be conducted throughout the lifetime operations of the facility to remain not only in compliance with applicable laws and regulations, but also to stay abreast of emergent industry- and agency-based information.

Potential impacts from the facility include thermal radiation from a fire or a vapor cloud from a release of LNG. PHMSA regulations establish the potential credible events (i.e., “accident scenarios”) to be modelled for thermal and vapor events. The boundaries of potential impact areas would include the parcels containing the LNG facilities, the portion of the TOTE site under the control of PSE, and specified areas extending over water bodies where LNG is present, provided that they cannot extend to areas where groups of 50 or more people assemble. The regulations that define these boundaries are 49 CFR 193.2057 and, by incorporation, Section 2.2.3.2 of NFPA 59A for thermal radiation, and 49 CFR 193.2059 and, by

incorporation, Sections 2.2.3.3 and 2.2.3.4 of NFPA 59A for a vapor cloud. There will be no public access to the proposed facilities, and defined impacts will be limited to the controlled areas.

Washington, as a jurisdictional state, the WUTC, Office of Pipeline Safety (OPS) has been delegated PHMSA authority for siting and technical assessment of the design, construction, and operational compliance as specified in the 2001 edition of NFPA 59A. The Coast Guard has responsibility for a design review of the ship to shore interface, marine transportation and maritime facility security. The City of Tacoma Fire Department (TFD) also has statutory authority to ensure that the Project meets the state adopted Fire Code that requires LNG facilities be sited and designed to the 2009 edition of NFPA 59A. Although the UTC and PHMSA siting, design, construction and operational criteria are based on the 2001 edition of NFPA 59A the UTC and the TFD may determine to use whichever edition has the most stringent criteria for the siting, design, construction and operations of the Tacoma LNG project. To coordinate efforts on the LNG facility, the UTC has identified four phases of the project that necessitate coordination meetings with TFD and will ensure staffs are available to answer questions and discuss the project as requested.

The four key phases are as follows:

I. Decision by PHMSA on underground pipeline waiver

The decision by PHMSA on the request by PSE to place the LNG pipe underground leading to the TOTE facility will be critical for PSE in the final design process and will need to be factored into the inspection process. The UTC and TFD will coordinate meetings, work with PSE and may require guidance from PHMSA on the waiver decision.

II. Receive and Review of Design Documents

After the UTC receives the design documents for the project from PSE, UTC will reach out to Tacoma to discuss key safety elements that are being reviewed. PHMSA and PSE may be consulted during this process as well.

III. Construction Process Coordination

The UTC will coordinate with TFD on its inspection schedule, findings and concerns during the construction process. As the UTC is meeting with TFD, there may be a need to ask PHMSA and/or PSE to attend the meetings to answer technical questions.

IV. Ongoing Communication on Life of Facility

If completed, the UTC will have the responsibility for continued inspections of the facility. The UTC will be available to TFD to answer any questions and will set up periodic meetings (as requested by TFD) to review recent inspection reports, any concerns found during inspection and any issues concerning inspection schedule.

Conclusions of Braemar Engineering Technical Review

Braemar Engineering and Ecology and Environment, Inc., conducted a review of the preliminary facility design and engineering and the results of the preliminary thermal radiation and vapor expansion modeling completed for the Project. The preliminary modeling for vapor dispersion used Phast Consequence Modeling software that depicts the maximum concentration cloud footprint (i.e., worst case footprint) and potential effect zone when considering a release in any direction.

Tacoma LNG and Chicago Bridge & Iron (CB&I) have given significant effort to design a code-compliant and safe LNG facility suited to the site and local conditions. Braemar Engineering's comments are based on the preliminary nature of the Project, and the level of detail has not reached the point where many of the issues are addressed in complete detail. However, it is likely that most will be addressed by Tacoma LNG and CB&I as the design progresses. Below, is a checklist of pending conditions to be confirmed when the design is complete; however, a few are recommendations of conditions noted for improving safety or reliability.

- The pipeline design, construction, and integrity testing are compliant with 49 CFR Part 192. The design should be reviewed when complete to confirm that all conditions for the installation have been met.
- Codes for new LNG facilities are held to a very high standard to avoid unsafe conditions within the facility and to the public. The permitting and review process is rigorous and thorough, and the stipulated requirements can be relied upon.
- Standards for civil site preparation are strict to prevent facility component settlement, flooding, and damage from wind and seismic events.
- The technical design of the Project was found to be sound engineering.
- The preliminary LNG design, construction, and integrity testing are compliant with 49CFR Part 193, NFPA 59A, and Coast Guard regulations. The design should be reviewed when complete to confirm that all conditions for the installation have been met.
- Preliminary siting studies were performed for Tacoma LNG using basic modeling tools: Degadis for vapor dispersion and LNG Fire III for thermal radiation. More advanced modeling is required later in detailed engineering when the design is further defined using Computational Fluid Dynamic (CFD) software. The updated CFD models should be reviewed when they are complete to confirm that all vapor dispersion and thermal radiation conditions for the installation have been met and accepted by PHMSA.
- The underground cased LNG corridor design concept was found to be acceptable and code compliant, but expensive, if installed as proposed.
- The aboveground pipe rack and TOTE dock are located in a congested area with vapor dispersion and thermal radiation (VTDR) going beyond the security fence to adjacent unrelated dock work areas. An LNG release vapor or fire incident at this location would have greater consequences due to crowding, as well as impacts on dock workers unaffiliated with the LNG facility operation. For an LNG incident scenario involving release of LNG at or near the dock, VDTR will extend beyond the security fence to the adjacent property. Workers entering this area will require an audible and visual warning system to alert them if an unsafe condition exists, training to know the extent of the high consequence area, and what they should do if an incident occurs. Automatic systems for emergency process shutdown, warning systems, and delineation of the high consequence areas should be reviewed when the design is complete to confirm that adequate layers of protection exists for the conditions at this location.
- The proposed dock east of the LNG facility on the Hylebos Waterway is lacking in design details and should be reviewed for compliance when the design is complete, ship size, and loading rates are better defined.
- The Tacoma LNG Fire Protection Study, Plant Safety Systems, and Emergency Response Plan should be reviewed for compliance when complete.

3.6 Noise

This section describes the existing noise environment in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential noise-related impacts that may result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). A technical report titled *Noise Report* was prepared for the Blair-Hylebos Terminal Redevelopment Project and provides background information used to help form this analysis (Widener & Associates 2009).

3.6.1 Fundamentals of Acoustics

Acoustics is the study of sound, and noise is defined as unwanted sound. Airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure. Technical acoustical terms used in this section are defined in Table 3.6-1.

Table 3.6-1 Definitions of Acoustical Terms

Term	Definition
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient level is typically defined by the A-weighted equivalent continuous noise level (L_{eq}).
Background noise level	The underlying ever-present lower level noise that remains in the absence of intrusive or intermittent sounds. Distant sources, such as traffic, typically make up the background. The background level is generally defined by the L_{90} percentile noise level.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, tonal content, the prevailing ambient noise level, and the sensitivity of the receiver. The intrusive level is generally defined by the L_{10} percentile noise level.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-weighted sound level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Equivalent noise level (L_{eq})	The average A-weighted noise level, on an equal energy basis, during the measurement period.
Day–night level (L_{dn} or DNL)	The day-night noise level (L_{dn} or DNL) is a 24-hour average L_{eq} where 10 dBA is added to nighttime levels between 10:00 p.m. and 7:00 a.m. For a continuous source that emits the same noise level over a 24-hour period, the L_{dn} will be 6.4 dB greater than the L_{eq}.
Percentile noise level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (e.g., L_{90}).

Source: Beranek and Vér 1992

The most common metric for sound is the overall A-weighted sound level (dBA) measurement that has been adopted by regulatory bodies worldwide. The A-weighting network measures sound in a similar fashion to the way in which a person perceives or hears sound. There is consensus that A-weighting is appropriate for estimating the hazard of noise-induced hearing loss. With respect to other effects, such as annoyance, A-weighting is acceptable if there is largely middle and high frequency noise present, but if the noise is unusually high at low frequencies or contains prominent, low-frequency tones, the A-weighting may not provide a valid measure. Compared with other noise sources in the area, the Proposed Action is not anticipated to be a substantial source of unusual levels of low-frequency noise. Rather, it is expected to be

broadband and not the source of strong low-frequency tones. Therefore, A-weighting provides a good measure for evaluating acceptable and unacceptable sound levels for projects such as the Proposed Action.

A-weighted sound levels typically are measured or presented as equivalent sound pressure level (L_{eq}), which is defined as the average noise level on an equal energy basis for a stated period of time, and is commonly used to measure steady-state sound or noise that is usually dominant. Statistical methods are used to capture the dynamics of a changing acoustical environment. Statistical measurements are typically denoted by $L_{xx,}$ where xx represents the percentile of time the sound level is exceeded. The L_{90} is a measurement that represents the noise level that is exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

The effects of noise on people can be categorized in three ways:

- Subjective effects of annoyance, nuisance, and dissatisfaction;
- Interference with activities, such as speech, sleep, and learning; and
- Physiological effects, such as startling and hearing loss.

In most cases, environmental noise may produce effects in the first two categories only. However, workers in industrial plants may experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily due to the wide variation in individual thresholds of annoyance and habituation to noise. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

Table 3.6-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels. Because the human ear can detect such a wide range of sound pressures, sound pressure is converted to sound pressure level, which is measured in units called decibels (dB). The decibel is a relative measure of the sound pressure with respect to a standardized reference quantity. Because the dB scale is logarithmic, a relative increase of 10 dB represents a sound pressure that is 10 times higher. However, when comparing similar sounds (traffic with traffic), humans do not perceive a 10-dBA increase as 10 times louder. Instead, they perceive it as twice as loud. Similarly, a 3-dBA change is generally considered the threshold of a perceivable difference.

Table 3.6-2 Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier deck jet operation	140 130	 Pain threshold
Jet takeoff (200 feet)	120	
Auto horn (3 feet)	110	Maximum vocal effort
Jet takeoff (2,000 feet) Shout (0.5 foot)	100	
N.Y. subway station Heavy truck (50 feet)	90	Very annoying Hearing damage (8-hour, continuous exposure)
Pneumatic drill (50 feet)	80	Annoying
Freight train (50 feet)	70 to 80	
Freeway traffic (50 feet)	70	Telephone use difficult Intrusive
Air conditioning unit (20 feet)	60	
Light auto traffic (50 feet)	50	Quiet

Table 3.6-2 Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Living room Bedroom	40	
Library Soft whisper (5 feet)	30	Very quiet
Broadcasting studio	20 10	Recording studio Just audible

Adapted from Table E, New York Department of Environmental Conservation (2001).

It is also important to note that decibels cannot be directly added, that is, 50 dBA + 50 dBA does not equal 100 dBA. When two sources of equal level are added together, the result will always be 3 dB greater; that is, 50 dBA + 50 dBA = 53 dBA, and 70 dBA + 70 dBA=73 dBA. If the difference between the two sources is 10 dBA, the level will not increase; that is, 40 dBA + 50 dBA=50 dBA, and 60 dBA + 70 dBA=70 dBA. The decrease in sound level due to distance from any single sound source normally follows the inverse square law (i.e., the sound level changes in inverse proportion to the square of the distance from the sound source). In a large open area with no obstructive or reflective surfaces, it is a general rule that at distances greater than the characteristic dimension of the source (i.e., 50 feet from a typical piece of construction equipment), the sound level from a point source of sound drops off at a rate of 6 dB with each doubling of the distance from the source. Sound energy is absorbed in the air as a function of temperature, humidity, and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. The drop-off rate will also vary based on terrain conditions and the presence of obstructions in the sound's propagation path.

3.6.2 Regulatory Framework

This section describes the noise regulations and agency guidelines for evaluating potential environmental noise impacts and mitigation.

3.6.2.1 State of Washington

Washington State noise regulations (Washington Administrative Code [WAC] 173-60) specifically exempt daytime construction activities under WAC 173-60-050(3)(a). Limited nighttime construction may include soil stabilization activities and building construction. The following text and tables describe the requirements of WAC 173-60.

WAC 173-60 establishes maximum permissible sound levels based on the environmental designation for noise abatement (EDNA), which is defined as "an area or zone (environment) within which maximum permissible noise levels are established." The three EDNA designations (WAC 173-60-030) roughly correspond to residential, commercial/recreational, and industrial/agricultural uses:

- Class A – Lands where people reside and sleep (such as residential);
- Class B – Lands requiring protection against noise interference with speech (such as commercial/recreational); and
- Class C – Lands where economic activities are of such a nature that higher noise levels are anticipated (such as industrial or agricultural).

As used in this section, noise-sensitive areas are equivalent to Class A EDNA areas. Table 3.6-3 summarizes the maximum permissible levels applicable to noise received at noise-sensitive areas from an industrial facility (Class C EDNA).

Table 3.6-3 Maximum Permissible Noise Levels from a Class C EDNA (dBA)

	Class A EDNA Receiver[a]	
Statistical Descriptor	**Daytime (7 a.m. – 10 p.m.)**	**Nighttime (10 p.m. – 7 a.m.)**
L_{eq}	60	50
L_{25}	65	55
$L_{8.3}$	70	60
$L_{2.5}$	75	65

Source: State of Washington noise regulations (WAC 173-60-040)
Note:
[a] Standard applies at the property line of the receiving property sources.
Key:
dBA = A-weighted decibel
EDNA = environmental designation for noise abatement

3.6.2.2 Local

The Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System are proposed on the Blair-Hylebos peninsula at the Port of Tacoma. The Tacoma LNG Facility would receive natural gas from Puget Sound Energy's (PSE's) existing natural gas pipeline system. To do so, PSE would need to improve its existing natural gas distribution system, including constructing two new distribution pipeline segments at the Port of Tacoma, City of Tacoma, City of Fife, and unincorporated Pierce County. The Port of Tacoma is subject to City of Tacoma jurisdiction for noise regulations. This section identifies regulations for each pertinent jurisdiction.

City of Tacoma

The Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and improvements to the PSE Natural Gas Distribution System that would occur within City of Tacoma limits would be subject to City of Tacoma jurisdiction. City of Tacoma Municipal Code (TMC) Chapter 8.122 (Noise Enforcement) states under TMC 8.122.080(A) that "no person shall make, continue, or cause or permit to be made or continued any sound attributable to any device that increases the total sound level" outdoors by 10 dBA during daytime hours (7 a.m. to 10 p.m.) or 5 dBA during nighttime hours (10 p.m. to 7 a.m.).

In addition, no impulsive sounds are allowed that increase "the total sound level by 15 dBA or more above the ambient sound level, when there are [fewer] than 10 impulses per hour between the hours of 7 a.m. and 10 p.m., [or fewer] than four impulses within 1 hour between 10 p.m. and 7 a.m. If the number of impulses" during daylight hours exceeds 10, the sound level limits discussed above apply [TMC 8.122.080(B)].

Construction activities conducted between 7 a.m. and 9 p.m. during the week and 9 a.m. and 9 p.m. on the weekend are exempt from these requirements [TMC 8.122.080(D)].

Pierce County

The Proposed Action is expected to have limited noise emissions in Pierce County, primarily limited to temporary construction activities from the natural gas distribution system improvements. Pierce County Code (PCC) Chapter 8.76 (Noise Pollution Control) states under PCC 8.76.060 that "No person shall cause or permit noise to intrude into the property of another person which noise exceeds the maximum permissible noise levels." The maximum permissible noise levels are equivalent to the levels specified under Chapter 173-60 WAC [PCC 8.76.060(B)]. Sounds originating from temporary construction sites as a result of construction activity are exempt between 7 a.m. and 10 p.m. [PCC 8.76.070(C)(1)].

City of Fife

The Proposed Action is expected to have limited noise emissions in the City of Fife, primarily limited to temporary construction activities from the natural gas distribution system improvements that occur within the City of Fife. City of Fife Municipal Code (FMC) Chapter 9.56 (Noise Control) states under FMC 9.56.060 that "no person shall cause or permit noise to intrude into the property of another person which noise exceeds maximum permissible noise levels." These noise levels are identical to the Chapter 173-60 WAC requirements [FMC 9.56.060(A)]. However, "if the background sound level is above the maximum permissible environmental levels, then the maximum permissible sound source level in excess of the background sound level shall be 10 decibels, measured at or within a receiving property" [FMC 9.56.060(E)].

Sounds created by blasting are exempt between 7 a.m. and 10 p.m. [FMC 9.56.070(A)(3)]. Sounds originating from temporary construction sites as a result of construction activity are exempt within Class A EDNAs between 10 p.m. and 7 a.m. [FMC 9.56.070(C)(1)], except that no construction, excavation, hauling or removal of fill shall be permitted before the hour of 9 a.m. on Saturday or Sunday [FMC 9.56.060(D)].

3.6.3 Affected Environment

The noise study area encompasses the following main components of the proposed Project, which are further described in Chapter 2 (Description of Proposed Action):

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System (see Figure 2-1 in Chapter 2 [Description of Proposed Action).
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities, and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 2-1 of Chapter 2.
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments, a new Golden Given Limit Station, and an upgrade to the existing Frederickson Gate Station (see Figures 2-18 through 2-20 in Chapter 2).

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the City of Tacoma. The two new distribution pipeline segments would be located in the city of Tacoma and the city of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are the primary noise sources associated with the Proposed Action.

A general description of existing site conditions at the Blair-Hylebos peninsula is provided in Section 3.6.1 (Affected Environment) of the *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* (Port of Tacoma 2009). The existing noise environment on the Blair-Hylebos peninsula where the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and new distribution Pipeline Segment A would reside is consistent with that of an industrial marine port. The sources of noise emitted from shipping ports like the Port of Tacoma are varied, but generally include components of industry, such as cargo vessels, semi-trucks, freight trains, engines/generators, container loading and offloading equipment, horns, and loudspeakers. All of these sources contribute to the overall noise level in and around the Blair-Hylebos peninsula and Port of Tacoma and can operate at various levels throughout the day or night in response to demand.

3.6.4 Impacts of the Proposed Action

Development of the Proposed Action would generate noise during both construction and operation. This section describes impacts by activity.

3.6.4.1 Construction Impacts

Typical construction equipment generally emits noise in the range of 80 to 90 dBA at 50 feet and will dissipate at a rate of 6 dBA per doubling of distance. Daytime construction activities are exempt from the various noise regulations in the Proposed Action area, including those at the state and local levels. Therefore, by regulatory definition, there would be no daytime construction noise impacts.

One method of ground improvement under consideration involves driving a temporary pile used to inject grout into the earth to form a grout column. This method would entail approximately 7,100 small-diameter pile insertions. Work would be accomplished during the daytime construction hours allowed by code. Other soil improvement methods under consideration do not require driven piles, and the impact on ambient noise would be minimized with those methods.

Pile driving would be required to install piles for the in-water components of the Project in both the Hylebos and Blair waterways. The specific in-water components, including number and type of proposed piles, are described in Chapter 2 (Description of Proposed Action). There are two primary pile-driving methods: impact and vibratory. Both methods would be used for the Project and typically result in a sound level on the order of 100 dBA at 50 feet. The pile-driving sequence would be as follows: first, vibratory-drive the piles to approximately 90 percent of their design depth (typically within 10 feet of design tip elevation); second, proof the installation with an impact hammer until load-bearing or pile-tip elevation specifications are reached. It is anticipated that up to 80 blows per foot may be required for proofing.

A vibratory hammer, which is somewhat quieter than impact driving, would be used for installing the majority of the in-water piles. Vibratory pile drivers are clamped to the pile and use motors to generate vibrations in the range of 2 to 25 Hertz. The vibrations reduce the frictional grip of the soil and permit the soil at the tip of the pile to be displaced, which, coupled with the weight of the pile itself or additional dead weights, allows the pile to advance into the ground. When needed, impact hammer blows would then be used to set the pile when it reaches appropriate bearing capacity.

Impact pile drivers typically utilize a weight (sometimes referred to as a piston or hammer) to impact the top of a pile to force it into the ground. The repetitive hammer blows drive the pile into the ground, similar to hammering a nail into a piece of wood. Piles are driven until the desired resistance is achieved (typically measured in blow counts per foot or inch) or the pile fails to advance (known as refusal). The primary sources of noise associated with impact driving are the impact of the hammer on the pile/drive cap and the noise radiated from the pile. The primary sources of noise associated with vibratory driving are the engine/motor and radiated noise from the vibrating pile. The noise from a vibratory driver is a continuous or steady noise. The airborne noise from the vibratory method can be substantial and has been reported to be louder than impact drivers when driving sheet piles.

The intensity of underwater acoustic disturbances depends on many factors, including the type and size of the pile, the firmness of the substrate, the depth of water, and the type of hammer. Driving a hollow steel pile with an impact hammer results in greater sound intensities than driving a concrete pile with a vibratory hammer. The numbers, locations, and construction materials of the pilings are presented in Chapter 2 (Description of Proposed Action). It is anticipated that the majority of the pile driving would be conducted with a vibratory pile driver, which is known to result in less underwater acoustic energy. Impact piling is expected to be limited to that required for proofing or assessing the final bearing capacity of vibratory-driven piles.

Although abundance of juvenile Chinook salmon and other fish species is low during the in-water work period when pile driving would occur for the Project, it is possible that some individual fish could be harmed

by acoustic disturbance generated by pile driving. To minimize the potential for harm, the Project would incorporate mitigation specified and required by the applicable permitting agency (i.e., National Marine Fisheries Service). Bubble curtains have been shown to reduce the sound energy transmitted through the water from pile driving and are one potential measure that could be deployed during pile driving (Hardyniec and Skeen 2005; California Department of Transportation 2004). Additional assessment of pile-driving impacts on fish and wildlife and proposed mitigation is provided in Chapter 3.4 (Plants and Animals).

3.6.4.2 Operations Impacts

Potential impacts during operation of the Project are described below.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The primary source of operational noise for the Project during typical operations would be the Tacoma LNG Facility. Noise sources at the facility would include bunkering barge mooring and loading, and the operation of a number of pumps, compressors, vaporizers, fans, and blowers.

Bunkering barge mooring and loading noise would be consistent with existing noise level of barge mooring and loading operations throughout the Port of Tacoma. Vendor-specific noise information is not currently available for the Tacoma LNG Facility. PSE would work with vendors to ensure that the facility complies with the applicable noise regulations, including the City of Tacoma noise limits. Sound reduction measures may include silencers, sound walls/barriers, and enclosures.

PSE Natural Gas Distribution System

When in operation, the two new distribution pipeline segments would be underground and under functional roadways. Thus, noise emission would not occur as a result of the new pipeline segments.

The primary source of noise from the PSE Natural Gas Distribution System would be the new Golden Given Limit Station in unincorporated Pierce County. The station would include a heater, a remote terminal unit, and pigging facilities. Vendor-specific noise information is not currently available and the specific size and layout of the limit station has not been finalized. However, PSE would ensure that its operation complies with the applicable noise regulations. Sound reduction measures that may be employed include enclosures, buildings, or sound walls/barriers.

3.6.4.3 Decommissioning Impacts

This section describes the various procedures used to address potential decommissioning impacts associated with the end of the design life of the Proposed Action. Accounting for each Project component, the estimated total design life of the Proposed Action is 50 years. Decommissioning of the Tacoma LNG Project components would generate impacts similar to those discussed in Section 3.6.4.1 (Construction Impacts). Potential noise impacts would be temporary and would end upon completion of the decommissioning activities. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Proposed Action components.

3.6.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and Proposed Action-related impacts from noise would not occur.

3.6.6 Avoidance, Minimization, and Mitigation

PSE is committed to employing a combination of noise mitigation methods, including equipment noise controls and administrative measures, to minimize construction and operational noise.

3.6.6.1 Noise Minimization Measure 1

Operational sound levels would comply with the applicable sound limit. Anticipated sound reducing design measures include, but are not limited to, the use of the following:

- Acoustically rated wall, ceiling, and door assemblies;
- Silenced building ventilation;
- Electric-drive compressor motors rather than combustion engines;
- Acoustical lagging/insulation;
- Acoustical enclosures;
- Low noise fans, blowers, motors;
- Acoustical barriers; and
- Acoustical silencers.

3.6.6.2 Noise Minimization Measure 2

Semi-permanent stationary equipment (e.g., generators and lights) might be available in “quiet” packages and would be stationed as far from sensitive areas as possible.

3.6.6.3 Noise Minimization Measure 3

Haul trucks and other engine-powered equipment would be equipped with adequate mufflers. Haul trucks would be operated in accordance with posted speed limits. Truck engine exhaust brake use would be limited to emergencies.

3.6.6.4 Noise Minimization Measure 4

PSE would establish a phone number or other effective means for the public to report any significant undesirable noise conditions associated with construction and operation of the Tacoma LNG Facility.

3.6.6.5 Noise Minimization Measure 5

Throughout Project construction and operation, PSE would document, investigate, evaluate, and attempt to resolve noise complaints related to the Tacoma LNG Facility. PSE or its authorized agent would:

- Document and respond to each noise complaint,
- Attempt to contact the person(s) making the noise complaint within 24 hours,
- Investigate to attempt to determine the source of noise related to the complaint,
- Conduct 24-hour noise monitoring at the location of the noise complaint, and
- If the noise complaint is legitimate, take measures to reduce the noise.

3.6.7 Conclusion

During construction and operation of the Project, some noise would be emitted. However, the resulting sound levels would comply with the applicable standards. In addition, with implementation of the above mitigation measures, no significant unavoidable adverse noise-related impacts would be expected for the Proposed Action.

3.7 Land Use and Recreational Resources

This section describes existing land use and recreational resources near components of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates the potential effects of the development and operation of the Project (referred to herein as the Proposed Action) on both resources. Analysis provided in this section evaluates the potential impacts to land use and recreational resources that could result from construction, operation, and decommissioning of the Project. Where appropriate, mitigation measures are identified to reduce or avoid these potential impacts. The impacts of no action are discussed as an alternative to the Proposed Action.

3.7.1 Study Methodology

This section describes the methodology used to determine the Proposed Action's potential impacts to land use and recreational resources within the Proposed Action area. The Project crosses the jurisdictions of the City of Tacoma, the City of Fife, and unincorporated Pierce County (see Figure 1-2 in Chapter 1, "Purpose, Need, and Alternatives Considered").

3.7.1.1 Land Use

The land use study area used for this analysis encompasses land crossed by the Project components, as well as lands within 400 feet of the boundary of each Project component (see Figure 3.7-1). The 400-foot distance used to analyze the Proposed Action's potential impacts to land use was derived from Section 13.05.020 (Table H) of the City of Tacoma Municipal Code (TMC), which requires notification of a public hearing to be issued to all property owners within 400 feet of a proposed development. Adopting the 400-foot public notice distance as the land use study area is appropriate because it extends to incorporated adjacent lands and complies with notice requirements in all local jurisdictions within the Proposed Action area. (City of Fife 2015a; City of Tacoma 2015a; Pierce County 2014a)

Potential impacts to land use were determined using aerial photography, using geographical information system (GIS) mapping, and by reviewing and comparing these data to applicable land use planning documents. Potential land use impacts were determined based on whether the Proposed Action would comply with and be compatible with applicable comprehensive plan designations, zoning classifications, and shoreline master program designations in the land use study area.

In addition, Section 3.7.3.2 includes a brief summary of potential land use issues relating to designated critical areas in the jurisdictions crossed by the Project. However, potential impacts to critical areas are discussed in detail in Section 3.1, "Earth"; Section 3.3, "Water"; and Section 3.4, "Plants and Animals".

The ancillary question of whether the Project Action would result in displacement of residents, workers, businesses, or other current site users is dealt with in Section 3.12, "Socioeconomics".

3.7.1.2 Recreational Resources

The recreational resources study area used for this analysis encompasses land crossed by the Project components, as well as lands within 0.25 mile of the boundary of each Project component (see **Figure** 3.7-2). The 0.25 mile distance was selected as a conservative approach to ensuring that all designated and informal recreational opportunities in the immediate vicinity of the Proposed Action are taken into account.

For the purpose of this analysis, recreational resources encompass federal, state, and local recreation areas such as wildlife refuges, scenic highways and roads, forests, parks, landmarks, campgrounds, hiking trails, golf courses, fishing and boating facilities, and other significant public and special interest areas. Recreational resources were identified based on aerial photography, the Washington State Parks and Recreation Commission website, and the recreational resources master planning documents from the three jurisdictions crossed by the Project (WSPRC not dated a; Hylebos Marina 2010; City of Fife 2008a; Metro Parks Tacoma 2006; Pierce County 2014b).

3.7.2 Existing Land Use and Recreational Resources

This section describes existing land uses within the land use study area. It also identifies recreational resources and active recreational waterway uses located within the 0.25-mile recreational resources study area.

3.7.2.1 Existing Land Use

Figure 3.7-1 (sheets 1 through 6) provides an aerial view of the existing land use on each Project component site and within 400 feet of the Proposed Action. The following sections provide a supplementary narrative description of land use with reference to Project components.

Tacoma Liquefied Natural Gas Facility and TOTE Marine Vessel Liquefied Natural Gas Fueling System

Industrial uses date back a century at the sites of the Project's proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. Adjacent areas are also industrial and include predominantly maritime cargo traffic in the Hylebos and Blair waterways. (Port of Tacoma 2014b)

Current tenants on the Tacoma LNG Facility site are PCC Logistics, EHW Constructors, and Safe Boats. PCC Logistics is a warehousing, trucking, distribution, and freight services company that has approximately 15 employees, while EHW Constructors uses the site for construction storage and has up to six employees working on site at any given time. Safe Boats leases the existing pier for testing new vessels. The Port of Tacoma Maintenance Department utilizes some areas for equipment storage.

The TOTE Marine Vessel LNG Fueling System would be constructed within one 68-acre parcel located along the Blair Waterway side of the Blair-Hylebos peninsula. The TOTE site currently consists of loading/unloading ramps; administration, maintenance, and warehouse buildings; and a paved trailer yard. The shoreline along the Blair Waterway is developed with wharves, piers, and riprap armored slopes. Several existing in-water structures in the Blair Waterway are associated with existing TOTE operations: one timber T-pier, three concrete piers, and one concrete breasting dolphin. Adjacent properties contain a mix of industrial, commercial, and storage uses, interspersed with some vacant parcels.

Regulated shorelines are located along Hylebos Waterway at the northeastern boundary of the Tacoma LNG Facility and along Blair Waterway at the southwestern boundary of the TOTE Marine Vessel LNG Fueling System. Much of the shoreline along the vicinity of each site is developed with bulkheads, wharves, piers, and riprap, which is typical of water-dependent, maritime industrial uses.

Puget Sound Energy Natural Gas Distribution System

The Puget Sound Energy (PSE) Natural Gas Distribution System includes proposed distribution pipeline Segments A and B, as well as the Golden Given Limit Station and the Frederickson Gate Station.

Segment A – Taylor Way. Segment A would extend approximately 4 miles in length. Figure 3.7-1 shows Segment A mileposts (MP A) that aid in the description of the location of land uses relevant to this component.

The land use study area adjacent to Segment A between MP A0.0 and MP A2.2 is located along the Blair-Hylebos peninsula and dominated by an industrial landscape. Adjacent land uses encompass maritime industrial uses interspersed with vacant parcels and commercial, industrial, manufacturing, and timber and lumber facilities. Specific examples of surrounding industrial land use include the Graymont Tacoma precipitated calcium carbonate plant located south of Segment A near the Tacoma LNG Facility site. This plant produces several different lime-based products for five paper companies operating seven separate mills in the surrounding area. Other industrial and commercial manufacturers such as Superlon, which manufactures polyethylene pipe, and Gardner Fields Company, which manufactures roofing and waterproofing materials, are immediately adjacent to Segment A southeast of Lincoln Avenue at approximately MP A0.7.

Between MP A2.3 and MP A2.6, the land use study area includes a mix of residential, commercial, and warehouse storage uses. Between MP A2.6 and MP A3.9, the land use study area includes predominantly commercial, manufacturing, and industrial uses, intermixed with vacant lots. The majority of the land use study area south of Interstate 5 between MP A3.9 and A4.0 supports commercial facilities. Commercial and residential uses are located to the east and southeast of MP A4.0.

Portions of Segment A would cross existing sections of railroad at 11 separate locations. Segment A would cross five sections of active rail and six sections of abandoned rail.

Certain areas within the land use study area, but outside of the Segment A centerline and workspace, include land held in trust for the Puyallup Tribe of Indians between approximately MP A3.7 and A3.8 (City of Fife 2012). Tribal lands are also located within the land use study area on the Blair-Hylebos peninsula, approximately between MP A1.0 and A1.5 (Port of Tacoma 2014b).

Segment B – Golden Given Road East. Segment B would extend approximately 1 mile in length. **Figure** 3.7-1 shows Segment B mileposts (MP B) that aid in the description of the location of land uses relevant to this component.

The land use study area within 400 feet of Segment B includes primarily single-family and multifamily residential uses, interspersed with neighborhood commercial and service facilities, light industrial uses, and scattered vacant parcels. Segment B between approximately MP B0.0 and MP B0.8 is lined predominantly by single-family residential uses. South of the intersection with State Route 512 (between MP B0.8 and MP B1.0), adjacent land uses include multifamily residential uses directly to the west and an auto-mechanic business and industrial and vacant lands to the east.

Golden Given Limit Station. The site proposed for the Golden Given Limit Station is currently operated as a commercial printing business. As currently developed, the parcel includes one 5,000-square-foot building and a paved parking lot. Land uses within the 400-foot boundary of analysis surrounding the proposed site of the Golden Given Limit Station are predominantly single-family residential uses, interspersed with some vacant parcels.

Fredrickson Gate Station. Land uses within 400 feet of the proposed Fredrickson Gate Station site include:

- To the north, across 192nd Street East, industrial uses predominantly controlled by Toray Composites, Inc., which develops and supplies carbon fiber materials;
- To the southwest, an existing PSE facility;
- To the south, across 196th Street East, the Pierce County Road Operations Division facility; and
- To the east and west, largely vacant lands.

3.7.2.2 Existing Recreational Resources

Existing recreational resources within 0.25 mile of the Proposed Action are shown in **Figure 3.7-2**. The following is a supplementary narrative description of recreational resources with respect to Project components.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are located between the Blair and Hylebos Waterways.

Minimal recreational use occurs on the Blair Waterway. No marinas or loading docks on the Blair Waterway are open to the public. Recreational fishing is unlikely to take place on the Blair Waterway. The Blair Waterway has no boat access to inland streams or sources of fresh water; the shoreline is heavily industrialized; container ships frequent the waterway; and no public boat launches exist on the waterway.

The Hylebos Waterway has two public marinas located on the northern side of the waterway. Recreational vessels that travel through Commencement Bay and beyond and originate at these two marinas must travel through a portion of the Hylebos Waterway to get to their destinations. The two public marinas have the following features:

- **Hylebos Marina** is a 170-slip marina that can accommodate yachts up to 80 feet in length. The marina provides electric services but does not provide live-aboard accommodations. The marina only serves long-term guests and cannot support short-stay boaters (Hylebos Marina 2010).
- **Chinook Landing Marina** is a 213-slip marina. Live-aboard accommodations are not provided (Chinook Landing Marina, pers. comm. 2013).

The Chinook Landing Marina is located north of the Tacoma LNG Facility site, across the Hylebos Waterway, and within the 0.25-mile boundary of this recreational resources analysis. Chinook Landing Marina is a private marina providing mooring for recreational watercraft. Chinook Landing Marina provides year-round public access to the facility's pump-out station (WSPRC not dated a). Tribal commercial fishing vessels also moor at the Chinook Landing Marina (Chinook Landing Marina, pers. comm. 2013).

The Hylebos Waterway is busiest with recreational users in the summer, particularly on weekends and holidays. Recreational boaters and kayakers can also access the Hylebos Waterway from other locations, such as community waterfront access and public boat launches located on the east side of Commencement Bay. Some recreational anglers use the Hylebos Marina and Chinook Landing Marina, but fishing pressure in the Hylebos and Blair waterways is anticipated to be low. The Hylebos Waterway connects to the Hylebos Creek to the east and, as such, the potential exists for pink salmon to use the Hylebos for migration up to Surprise Lake. However, fishing for pink salmon is not believed to be common, and salmon fishing would be closed in the area for the entire months of April, June, and July. Fishing for bottom fish is not advised. Squid potentially use both waterways, and a small number of recreation squid anglers may use the area to fish for them. Squid are fished during the night, when vessel traffic is significantly diminished. (Lothrop, pers. comm. 2013)

PSE Natural Gas Distribution System

Segment A – Taylor Way. Dedicated waterfront public access opportunities do not exist on the Blair-Hylebos peninsula as industrial development activity prohibits on-site access to ensure the safety and security of Port of Tacoma operations. Accordingly, the port provides opportunities for public access off site on property owned by the port. Portions of the Port of Tacoma's Place of Circling Waters would be located within the recreational resources study area in the vicinity of Segment A near MP A2.2 and MP A2.3, including the Place of Circling Waters. The Place of Circling Waters is a 30-acre habitat site consisting of intertidal marsh, stream channels, and forested open space inhabited by salmon, water birds, and other wildlife. Recreational opportunities on the site include a paved walkway and public overlook. (Metro Parks Tacoma 2015).

In addition, the terminus of Segment A is located within 0.25 mile of Fife High School., which is designated as a "recreational provider" in the *City of Fife Parks, Recreation and Open Space Plan*. Fife High School provides access to multiple athletic fields, tennis and basketball courts, and an eight-lane track and gymnasium. (City of Fife 2008a)

Segment B – Golden Given Road East, Golden Given Limit Station, and Fredrickson Gate Station. No recreational resources have been identified within 0.25 mile of Segment B, the proposed Golden Given Limit Station, or Fredrickson Gate Station. In addition, the *Pierce County Parks, Recreation and Open Space Plan* (PROS Plan) shows that the Project would not cross or come within 0.25 mile of national or state forest lands. (Pierce County 2014c)

3.7.3 Regulatory Framework

This section summarizes the land use regulatory framework within the land use study area, as defined by state, regional, and local land use regulations. It also summarizes the applicable plans and policies that guide recreational resources within the recreational resources study area. Relevant jurisdictions include the State of Washington, Puget Sound Regional Council, City of Tacoma, City of Fife, Pierce County, and Port of Tacoma.

Although a portion of one Project component (Segment A) would be located adjacent to lands held in trust for or otherwise belonging to the Puyallup Tribe of Indians (City of Fife 2012; Port of Tacoma 2014b), no portion of the Project would be constructed on any such lands. Therefore, no tribal regulations affecting land use or recreational resources would apply to the Proposed Action.

3.7.3.1 Land Use Framework

State of Washington

Land Use regulations deriving from State law are expressed through the development and adoption of local land use plans as mandated by the State of Washington Growth Management Act (GMA) and the Shoreline Management Act. The following is a brief description of those laws.

Growth Management Act

The GMA was originally adopted in 1990 and most recently amended in 2013. This law was created to help guide development in Washington by requiring that jurisdictions subject to the GMA must prepare and adopt comprehensive plans, countywide planning policies, and development regulations that adhere to those plans and policies. These plans, policies, and regulations must be updated every seven years to ensure consistency and compliance with the GMA as it is modified and jurisdictions evolve. (Revised Code of Washington [RCW] 36.70A)

A comprehensive plan is a land use document that sets forth a jurisdiction's long-range vision of its future development, including delivery of services, demographics, transportation, industry, and community socioeconomic development. A comprehensive plan guides the adoption of specific zoning ordinances and development regulations, which in turn regulate and control land use on a daily basis.

The 13 goals listed in the GMA to guide the development of comprehensive plans and development regulations relate to urban growth, sprawl reduction, transportation, housing, economic development, property rights, permits, natural resource industries, open space and recreation, environment, citizen participation and coordination, public facilities and service, and historic preservation (RCW 36.70A.020).

The GMA also requires the designation and protection of "critical areas" to prevent harm to the community from natural hazards and to protect natural resources. Each local jurisdiction adopts a critical areas ordinance to define critical areas and to regulate their protection.

Shoreline Management Act

The Shoreline Management Act (RCW 90.58) was most recently amended in 2013. Passed by the State Legislature in 1971 and adopted by voters in 1972, the overarching goal of this act is "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines."

The Shoreline Management Act regulates the shorelines of the state through Shoreline Master Programs (SMPs) within each applicable jurisdiction in the state. Shorelines of statewide significance are generally described in RCW 90.58.030 and include portions of Puget Sound and other marine waterbodies. Waterbodies in the Proposed Action area that are regulated under the Shoreline Management Act include the Puget Sound shorelines, Commencement Bay, and other smaller waterways as identified in local SMPs.

Regional

The Puget Sound Regional Council's Vision 2040 is a document prepared by Puget Sound Regional Council to outline a shared strategy for development throughout Puget Sound region, which covers Pierce, King, Kitsap, and Snohomish Counties, through 2040. As a regional plan, the concepts within Vision 2040 guide the development of local land use plans. (PSRC 2009)

Vision 2040 lists the Port of Tacoma as a regional Manufacturing/Industrial Center (M/IC). The plan defines regional M/ICs as "locations of intensive employment with facilities having large spaces for the assembly of goods, and areas suitable for outdoor storage" and "manufacturing and industrial land uses are concentrated, which cannot easily be mixed with other activities." Vision 2040 also provides goals and policies for the growth and development of regional M/ICs. (PSRC 2009)

The "Regional M/I Centers" section of Vision 2040 states that "the region will continue to maintain and support viable regional manufacturing/industrial centers to accommodate manufacturing, industrial, or advanced technology uses" (PSRC 2009). In order to reach that goal, Vision 2040 proposes one policy that is applicable to the Proposed Action: "Focus a significant share of employment growth in designated regional manufacturing/industrial centers (MPP-DP-8)."

Local

Each local jurisdiction within the land use study area regulates land use using a number of plans and policies, including Comprehensive Plans, zoning codes, SMPs, and Critical Areas ordinances. These plans, codes, policies, and ordinances are prepared taking into account applicable State law and regional plans, including the GMA, Shoreline Management Act, and Vision 2040.

Applicable comprehensive plan designations are portrayed in Figure 3.7-3. Applicable zoning and shoreline management designations are portrayed in Figure 3.7-4.

City of Tacoma

Project components located within the City of Tacoma include the Tacoma LNG Facility, the TOTE Marine Vessel LNG Fueling System, and Segment A (MP A0.0 through MP A2.2, approximately). These components are subject to the criteria and policies contained in the Generalized Land Use Element of the *City of Tacoma Comprehensive Plan* and to the regulations contained in Title 13 (Land Use Regulatory Code) of the TMC. These components are also subject to the shoreline management provisions contained in the City of Tacoma Shoreline Master Program codified in Chapter 13.10 (Shoreline Management) of the TMC and to the critical areas provisions provided in Chapter 13.11 (Critical Areas Preservation) of the TMC. (City of Tacoma 2013; City of Tacoma 2014; City of Tacoma 2015a).

City of Fife

Project components located within the city of Fife include Segment A (MP A2.3 through MP A4.0, approximately). This component is subject to the criteria and policies contained in the Land Use Element of the *City of Fife Comprehensive Plan* (City of Fife 2015b) and to the regulations contained in Title 19 (Zoning Code) of the City of Fife Municipal Code (FMC) (City of Fife 2015c). This component is also subject to the critical areas provisions under Title 17 (Environmental Protection) of the FMC (City of Fife 2015d).

A portion of the land use study area associated with Segment A extends into the City of Fife's Urban Growth Area (UGA). Under the GMA, each county must designate such UGAs where future growth is focused (RCW 36.70a.110). Per the *City of Fife Comprehensive Plan,* land use designations within the City of Fife UGA are maintained in a manner consistent with the policies and implementation strategies of Pierce County (City of Fife 2015b).

Pierce County

New pipeline Segment B of the PSE Natural Gas Distribution System, the newly proposed Golden Given Limit Station, and upgrades to the existing Fredrickson Gate Station are within unincorporated areas in Pierce County. Accordingly, these components are subject to the following:

- Criteria and policies contained in the Pierce County Comprehensive Plan, which is included as Title 19A (Comprehensive Plan) in the Pierce County Code (PCC) (Pierce County 2014c).
- Regulations contained in Title 18A (Development Regulations - Zoning) of the PCC (Pierce County 2014d).
- Critical areas provisions provided under Title 18E (Development Regulations—Critical Areas) of the PCC (Pierce County 2014e).

Port of Tacoma

The Port of Tacoma has developed a Land Use and Transportation Plan to guide future development in a manner consistent with the Port's Strategic Plan. Under this plan, the Port of Tacoma acknowledges the jurisdiction of the City of Tacoma and the appropriate land use and zoning designations for port areas, and supplements these with port-specific Development Designations. (Port of Tacoma 2014a,b).

3.7.3.2 Land Use Designations

Comprehensive Plan Designations

Comprehensive plan designations within the land use study area appear in Figure 3.7-3, are further summarized in this section, and are listed in Table 3.7-1.

City of Tacoma

Comprehensive Plan designations for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System components are illustrated in Figure 3.7-3 (sheet 1 of 6), and include:

- **Manufacturing/Industrial Center (M/IC).** Applies to both sites and the surrounding 400-foot land use study area.
- **High-Intensity Industrial Development (IDHI).** Applies to both sites and the surrounding land use study area, except for areas with a shoreline designation.
- **Shoreline High-Intensity Environment.** Applies to the portions of both sites and the surrounding land-use study area that have a shoreline designation (see "Shoreline Management Designations," below).

Similarly, the portion of proposed distribution pipeline Segment A (and all areas within the surrounding 400-foot land use study area) is located in the city of Tacoma on lands designated M/IC and IDHI.

Generally, the *City of Tacoma Comprehensive Plan* promotes growth in marine import-export activities to increase the port's prominence in the local, regional, state, and national economy.

- The M/IC designation, as described in the City of Tacoma Comprehensive Plan, protects and preserves the port industrial area for manufacturing and industrial uses (City of Tacoma 2014a).
- The intent of the IDHI designation, as described in the City of Tacoma Comprehensive Plan, is to support industrial uses that generate high-activity patterns and high traffic and require direct access to major highway and shipping routes (City of Tacoma 2014a).
- The Shoreline High-Intensity Environment designation provides for high-intensity, water-dependent industrial uses while protecting and restoring previously degraded ecological functions (City of Tacoma 2013).

Project components located in the City of Tacoma are consistent with the intent and purpose of all applicable land use designations under the *City of Tacoma Comprehensive Plan*.

City of Fife

The portion of proposed distribution pipeline Segment A located in the City of Fife would be constructed and operated in a workspace located entirely within existing road right-of-way (ROW) and not subject to Comprehensive Plan Land Use designations, as portrayed in Figure 3.7-3 (sheets 2 through 4 of 6). In addition, the Utilities Element in the *City of Fife Comprehensive Plan* promotes the collocation of utilities and existing ROWs by "encourage[ing] the joint use of utility corridors where lawful and in keeping with prudent utility practice" (City of Fife 2015b).

Therefore, Project components located in the City of Fife are not subject to comprehensive plan land use designations but are otherwise consistent with the relevant intent and policies of the *City of Fife Comprehensive Plan*. Areas within the surrounding land use study area have designations listed in Table 3.7-1.

Pierce County

Proposed distribution pipeline Segment B would be constructed and operated in a workspace located entirely within existing road ROW and not subject to comprehensive plan land use designations, as portrayed in Figure 3.7-3 (sheet 5 of 6). In addition, section 19A.90.010.C.2 of the *Pierce County Comprehensive Plan* "encourages the joint use of utility corridors" to foster cost-effective utility services (Pierce County 2014c).

Construction and operation of the Golden Given Limit Station would occur completely within a single parcel boundary designated Moderate Density Single-Family (MSF) by the *Pierce County Comprehensive Plan,* as portrayed in Figure 3.7-3 (sheet 5 of 6). Areas within the surrounding land use study area are generally designated MSF. Per section 19A.90.010.H of the *Pierce County Comprehensive Plan*, "utility facilities should be designed to be compatible with adjacent land uses", "to reasonably avoid or mitigate the impacts of utility facility development" and "be built at a residential scale." (Pierce County 2014c)

All upgrades to the Fredrickson Gate Station would occur within an area designated Employment Center (EC) by Pierce County. Areas within the surrounding land use study area are also designated EC, as portrayed in Figure 3.7-3 (sheet 6 of 6). Pierce County's EC designation supports industrial and manufacturing needs such as heavy industrial manufacturing and processing. (Pierce County 2014c)

Therefore, Project components within unincorporated Pierce County would generally be consistent with the intent and purpose of applicable land use designations and utilities policies, although Section 3.7.4 discusses potential impacts associated with compatibility of the Golden Given Limit Station design with adjacent land uses.

Table 3.7-1 Comprehensive Plan Land Use Designations within 400 Feet of the Proposed Action

Component of the Proposed Action	Jurisdiction/ Comprehensive Plan	Comprehensive Plan Designation
Tacoma LNG Facility	City of Tacoma	High-Intensity Industrial Development (IDHI) Manufacturing/Industrial Center (M/IC) Shoreline High-Intensity Environment
TOTE Marine Vessel LNG Fueling System	City of Tacoma	High-Intensity Industrial Development (IDHI) Manufacturing/Industrial Center (M/IC) Shoreline High-Intensity Environment
Pipeline Segment A	City of Tacoma	High-Intensity Industrial Development (IDHI) Manufacturing/Industrial Center (M/IC)
	City of Fife	High Density Residential Medium Density Residential Industrial

Table 3.7-1 Comprehensive Plan Land Use Designations within 400 Feet of the Proposed Action

Component of the Proposed Action	Jurisdiction/ Comprehensive Plan	Comprehensive Plan Designation
		Mixed Commercial/High Density Residential Mixed Medium Density Residential/Commercial Small Lot Single Family Residential
	Pierce County (City of Fife Urban Growth Area)	Moderate Density Single Family (MSF)
Pipeline Segment B	Pierce County	Employment Center (EC) High Density Residential (HRD) Moderate Density Single Family (MSF) Mixed Use District (MUD)
Golden Given Limit Station	Pierce County	Moderate Density Single Family (MSF)
Fredrickson Gate Station	Pierce County	Employment Center (EC)

Sources: City of Tacoma 2014a; City of Fife 2015b; Pierce County 2014c.

Zoning

Zoning classifications within the land use study area appear in Figure 3.7-4, are further summarized in this section, and are listed in Table 3.7-2 (which also includes shoreline designations).

City of Tacoma

The proposed Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and portions of proposed distribution pipeline Segment A located between MP A0.0 and MP A2.2, as well as all non-shoreline areas in the surrounding 400-foot land use study area, would be located on land zoned Port Maritime Industrial (PMI) - (City of Tacoma 2015b). A short portion of Segment A located between MP A2.2 and MP A2.3, and the surrounding land use study area, would be located on land zoned Heavy Industrial (M2). This is portrayed in Figure 3.7-4 (sheets 1 through 3 of 6).

A variety of uses are permitted in the PMI District, including Industry, heavy; Port, terminal and industrial (water-dependent or water-related uses); and Utilities. In addition, TMC 13.06.400.B.3 states that the PMI District is intended to allow all industrial uses and uses that are not permitted in other districts. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be water-dependent industrial uses as defined in the TMC. (City of Tacoma 2015a)

The M2 Heavy Industrial District is intended to allow most industrial uses. Utilities are listed as a permitted use in this district. (City of Tacoma 2015a)

Accordingly, Project components located in the city of Tacoma are consistent with uses permitted in the applicable zoning districts. See “Shoreline Management Designations,” below, for information on Shoreline Management Designations in this area.

City of Fife

The proposed underground pipeline (Segment A) would be located within existing road ROW and would therefore not impact development on surrounding lands along the length of the pipelines, regardless of the applicable zoning districts. Areas within the surrounding 400-foot land use study area are included in zoning districts designated by the City of Fife and Pierce County (City of Fife UGA), portrayed in Figure 3.7-4 (sheets 3 and 4 of 6), and listed in Table 3.7-2.

Pierce County

The proposed underground pipeline (Segment B), and areas in the surrounding land use study area, are located in a variety of zoning districts along Golden Given Road, including Single Family (SF), Moderate Density Single Family (MSF), Community Employment (CE), Mixed Use District (MUD), and Moderate High-

Density Residential (MHR), as portrayed in Figure 3.7-4 (sheet 5 of 6). These zoning districts are specific to the *Parkland-Spanaway-Midland Communities Plan* area. Per Table 18A.28.010 of the PCC, natural gas pipelines are a permitted use under all these districts (Pierce County 2014d). In addition, PCC Section 18A.05.025.B.6 states that "natural gas distribution lines (as opposed to transmission lines) and necessary appurtenant facilities and hookups" are exempt from the Zoning Code.

Construction and operation of the Golden Given Limit Station would occur completely on a single parcel zoned SF, as portrayed in Figure 3.7-4 (sheet 5 of 6). Areas within the surrounding land use study area are also generally designated SF. As with Segment B, this designation is specific to the *Parkland-Spanaway-Midland Communities Plan* area. Construction and operation of the Golden Given Limit Station, a natural gas distribution facility, is permitted as a conditional use in the SF zone under the Utilities Use Category provided in Table 18A.28.010 of the PCC. (Pierce County 2014d)

Upgrades to the Fredrickson Gate Station would be confined to the existing site within unincorporated Pierce County zoned EC. Land within the land use study area surrounding the site is also zoned EC within the *Frederickson Community Plan* area, as portrayed in Figure 3.7-4 (sheet 6 of 6). The natural gas distribution facility at the Fredrickson Gate Station is a permitted use in the EC zone under the Utilities Use Category provided in Table 18A.22.010 to the PCC. The upgrades would not preclude future development on surrounding lands.

Shoreline Management Designations

Portions of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are located in City of Tacoma Shoreline Management areas designated Shoreline District (S-10) Port Industrial Area and Shoreline District (S-13) Marine Waters of the State, as portrayed in Figure 3.7-4 sheet 1 of 6.

- The S-10 district forms a 200-foot buffer area from the ordinary high water mark landward along the Hylebos and Blair waterways. The purpose of the S-10 district is to allow the continued development of the Port Industrial Area while increasing the intensity of development and emphasizing terminal development within the City. (City of Tacoma 2013).
- The S-13 district area includes all marine waters waterward from the ordinary high water mark to the seaward city limit of the City of Tacoma. The purpose of the S-13 district is to maintain marine waters for public navigation, commerce, and recreation and to manage in-water structures consistently throughout the City's shorelines. (City of Tacoma 2013)

The Proposed Action would be consistent with the S-10 district, as S-10 shorelines surrounding the Hylebos and Blair waterways are classified as urban and are intended to accommodate high-intensity industrial uses at the Port. The Proposed Action would also be in conformance with the S-13 district, which permits water-dependent Port Industrial development, consistent with permitted development on the adjacent upland S-10 district. (City of Tacoma 2013)

The Tacoma Shoreline Master Program (SMP) requires that development on publicly-owned land such as land owned by the Port of Tacoma provide public access to the shoreline (Tacoma Shoreline Master Program, October 15, 2013). In circumstances where there are security or safety constraints that preclude the ability to safely provide public access there are three alternative means of meeting the public access requirements.

1) Developing public access at an alternative location pursuant to the Port of Tacoma's (2013) Shoreline Public Access Plan
2) Contributing to a project identified in the City's Public Access Alternatives Plan, or
3) Providing funds calculated in accordance with the formula contained in the Interlocal Agreement Authorizing a Flexible Approach to the Shoreline Public Access Provision between the City and the Port.

Table 3.7-2 Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action

Component of the Proposed Action	Jurisdiction	Zoning Designations
Tacoma LNG Facility	City of Tacoma	Port Maritime Industrial (PMI) Shoreline District (S-10) – Port Industrial Area (HI) Shoreline District (S-13) – Marine Waters of the State (A)
TOTE Marine Vessel LNG Fueling System	City of Tacoma	Port Maritime Industrial (PMI) Shoreline District (S-10) – Port Industrial Area (HI) Shoreline District (S-13) – Marine Waters of the State (A)
Pipeline Segment A	City of Tacoma	Port Maritime Industrial (PMI) Heavy Industrial (M2)
	City of Fife	Community Mixed Use (CMU) Industrial (I) High Density Residential (HDR) Medium Density Residential (MDR) Neighborhood Commercial (NC) Neighborhood Residential (NR) Public Use/Open Space (POS) Regional Commercial (RC)
	Pierce County (City of Fife Urban Growth Area)	Moderate Density Single-Family (MSF)
Pipeline Segment B	Pierce County (Parkland-Spanaway-Midland Communities Plan)	Community Employment (CE) Mixed Use District (MUD) Moderate-High Density Residential (MHR) Moderate Density Single-Family (MSF) Single Family (SF)
Golden Given Limit Station	Pierce County (Parkland-Spanaway-Midland Communities Plan)	Single-Family (SF)
Fredrickson Gate Station	Pierce County (Fredrickson Community Plan)	Employment Center (EC)

Sources: City of Tacoma 2013; City of Tacoma 2015b; City of Fife 2012; Pierce County 2014d.

Critical Areas

Under the GMA, local jurisdictions with land use authority must identify critical areas in consultation with the Washington State Department of Ecology, per the requirements of RCW 36.70A.050.

City of Tacoma

The City of Tacoma Critical Areas Ordinance is codified in Chapter 13.11 of the City of Tacoma Municipal Code (City of Tacoma 2015a). Critical areas discussed in this ordinance include critical aquifer recharge areas, fish and wildlife habitat conservation areas, flood hazard areas, geologically hazardous areas, stream corridors, and wetlands. Maps identifying critical areas are provided in the Environmental Policy Element of the City of Tacoma Comprehensive Plan (City of Tacoma 2014a). Potential development activities and their related impacts to critical areas are discussed in detail elsewhere in this draft environmental impact statement (DEIS), as indicated:

- Geologically hazardous areas and seismic hazard areas are discussed in Section 3.1, “Earth.” The area surrounding the Tacoma LNG Facility, the TOTE Marine Vessel LNG Fueling System, the portions of Segment A within the City of Tacoma, and surrounding areas in the land use study area are identified as highly vulnerable to volcanic hazards and highly susceptible to liquefaction. (City of Tacoma 2014a)

- Wetlands, critical aquifer recharge areas, and frequently flooded areas are discussed in detail in Section 3.3, "Water Resources." Wetlands and aquifer recharge areas are both located in close proximity to the proposed Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and Segment A within the land use study area (City of Tacoma 2014a).
- Fish and wildlife habitat conservation areas are discussed in detail in Section 3.4, "Plants and Animals." Such areas are located near but not within the land use study area (City of Tacoma 2014a).

City of Fife

Critical areas for the City of Fife are addressed in Chapter 17 of the FMC (City of Fife 2015d). Critical areas regulated in Chapter 17.05 include wetlands, critical aquifer recharge areas, fish and wildlife habitat conservation areas, frequently flooded areas, geologically hazardous areas, and seismic hazard areas. The City of Fife has produced a "Critical Areas Mapset" portraying the location of potential critical areas (City of Fife 2008b). Potential development activities and their related impacts to critical areas are discussed in detail elsewhere in this DEIS, as indicated:

- Geologically hazardous areas and seismic hazard areas are discussed in **Section 3.1**, "Earth." The Critical Areas Mapset identifies the entire portion of distribution pipeline Segment A within the City of Fife, as well as the surrounding land use study area to be within an area exposed to seismic hazards and volcanic lahar hazards. However, other geological risks, such as landslides and erosion, do not appear to be a concern in this area. (City of Fife 2008b)
- Wetlands, critical aquifer recharge areas, and frequently flooded areas are discussed in **Section 3.3**, "Water Resources." The entire portion of distribution pipeline Segment A within the City of Fife, as well as the surrounding land use study area, are located within an aquifer recharge area and in a flood hazard area. The presence of wetlands and water bodies has been verified and inventoried along 12th St E between approximately MP A3.1 and MP A3.3. (City of Fife 2008b)
- Fish and wildlife habitat conservation areas are discussed in detail in **Section 3.4**, "Plants and Animals." Potential fish and wildlife habitat areas have been identified at several areas along Segment A within the City of Fife, and in particular in the vicinity of 12th St E and associated wetlands. (City of Fife 2008b)

Pierce County

Critical areas in unincorporated areas of Pierce County are defined in PCC Title 18E (Development Regulations—Critical Areas). Critical areas identified by the County include erosion, landslide, seismic, volcanic, mine, and flood hazard areas; streams; wetlands; certain fish and wildlife species and habitat; and aquifer recharge area s. Pierce County's PublicGIS system maps the location of potential critical areas under the categories "Flood Related," "Wetlands-Related Data," and "Possible Site Constraints" (Pierce County 2015). Potential development activities and their related impacts to critical areas are discussed in detail elsewhere in this DEIS, as indicated:

- Geologically hazardous areas and seismic hazard areas are discussed in Section 3.1, "Earth."
    - Segment B and Golden Given Limit Station: Potential landslide areas near State Route 512 along Segment B and in surrounding land use study area.
    - Fredrickson Gate Station: Potential erosion and landslide areas on site and in surrounding land use study area.
- Wetlands, critical aquifer recharge areas, and frequently flooded areas are discussed in Section 3.3, "Water Resources."
    - Segment B and Golden Given Limit Station: Some inventoried wetlands, and a potential flood hazard area in the land use study area near MP B1.0.

  - Fredrickson Gate Station: Some inventoried wetlands on undeveloped portion of site. Nearly whole site and surrounding land use area subject to flood hazard and wetlands review.

- Fish and wildlife habitat conservation areas are discussed in Section 3.4, "Plants and Animals."
  - Segment B and Golden Given Limit Station: No identified habitat areas within land use study area.
  - Fredrickson Gate Station: Potential fish and wildlife habitat in the vicinity of inventoried wetlands.

3.7.3.3 Recreational Resources

State and Federal

As shown in Figure 3.7-2, there are no state or federal recreational resources within the recreational resources study area. The nearest state park to the Project is Dash Point State Park in Federal Way, which is located approximately 2.5 miles north of the proposed Tacoma Liquefied Natural Gas Facility. The nearest federal recreational resource is Holiday Park FamCamp, which is located at Joint Base Lewis – McChord, approximately 3.5 miles southwest of new distribution pipeline Segment B. (US Military Campgrounds 2015; WSPRC not dated b)

Local

Local jurisdictions operating recreational resources in and around the recreation include Metro Parks Tacoma,[11] the City of Fife, and Pierce County. All three have adopted parks and recreation master planning documents to provide a long-term vision for the conservation, maintenance, and proposed improvements to park systems and recreational resources. The goals and objectives outlined in these planning documents align with the goals and policies provided in each jurisdiction's comprehensive planning document (Metro Parks Tacoma 2006; City of Fife 2008a; Pierce County 2014b).

- Metro Parks Tacoma's Strategic Parks and Program Services Plan was adopted in August 2006 and provides an inventory of regional, neighborhood, and community parks and facilities within the City (Metro Parks Tacoma 2006). The original vision of the Strategic Parks and Program Services Plan is updated and extended to 2030 through an interim update known as Green Vision 2030 (Metro Parks Tacoma 2012).
- The City of Fife Parks, Recreation and Open Space Plan was adopted in January 2008 and provides an inventory of community and neighborhood parks, natural areas and greenspaces, and special recreational facilities within city limits (City of Fife 2008a).
- The Pierce County Council adopted the 2014 PROS Plan on February 18, 2014, through Ordinance 2014-03. The 2014 PROS Plan contains the most recent inventory of park properties, regional trails, and recreational resources in Pierce County (Pierce County 2014b).

Nonetheless, while these plans for recreational areas are a type of land use, the regulatory framework for recreational resources is guided by the various land use ordinances approved and enforced by the City of Tacoma, City of Fife, and Pierce County. Accordingly, the land use regulatory framework described above under Section 3.7.3.1, above, also applies to recreational resources. Existing and proposed recreational resources are subject to comprehensive plan, zoning, shoreline management, and critical areas designations and review processes.

[11] This is a separate municipal corporation from the City of Tacoma, whose mission is specifically targeted as a Parks District. Its incorporated area covers the city of Tacoma and several adjacent areas not within the city of Tacoma.

- The Open Space Habitat and Recreational Element of the City of Tacoma Comprehensive Plan provides policies that encourage the development of opportunities for public access to Puget Sound for water-oriented recreation and enjoyment of shorelines, including access to both natural and human-made waterfront features (City of Tacoma 2014a). Shoreline and water access policies are provided through regulations in the City of Tacoma Shoreline Master Program described in TMC Chapter 13.10 (City of Tacoma 2015a).
- The Parks and Recreation Element of the City of Fife Comprehensive Plan identifies its Goal 11 as the implementation of the City of Fife Parks, Recreation, and Open Space Plan. As part of the Parks, Recreation and Open Space Plan, it appears that the City of Fife is considering an acquisition of land in the land use study area adjacent to proposed distribution pipeline Segment A. (City of Fife 2008a; City of Fife 2015b).
- The Facilities and Services Elements of the Parkland-Spanaway-Midland Communities Plan and Fredrickson Community Plan for the corresponding unincorporated areas of Pierce County both include a number of policies that encourage the general development and improvement of recreational opportunities within the recreational resources study area. The Parkland-Spanaway-Midland Communities Plan does not specifically identify areas for park acquisition in the vicinity of proposed distribution pipeline Segment B or the Golden Given Limit Station. The Frederickson Community Plan specifically lists a set of recommended site acquisitions for park development. The proposed Fredrickson Gate Station parcel is not one of those sites. (Pierce County 2008; Pierce County 2010).

3.7.4 Impacts of the Proposed Action

This section identifies the land use impacts potentially associated with construction, operation, and decommissioning of the Project, with reference to the questions posed in Section 3.7.1.

3.7.4.1 Construction Impacts

The primary construction activities and impacts that could occur under the Proposed Action are discussed in this subsection. A complete description of the construction activities associated with the Proposed Action is provided in Chapter 2, “Description of Proposed Action.” The duration of construction for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would include:

- Building demolition: approximately three months;
- Site preparation (soil improvement, grading, and installation of below-grade utilities): approximately seven months;
- Plant construction: approximately 42 months; and,
- Blair Waterway fueling platform: approximately seven months.

Some of these timeframes would occur concurrently. Site preparation and construction would begin in the third quarter of 2015 and completion would occur by the fourth quarter of 2018. The timing of shoreline developments, including the replacement of the exiting pier on the Hylebos Waterway, would depend on the future development of the LNG market.

Regarding the PSE Natural Gas Distribution System, the estimated duration of construction for each component would be:

- Segment A: approximately seven months;
- Segment B: approximately three months;
- Golden Given Limit Station: approximately three months; and,

- Fredrickson Gate Station: approximately three months;

As discussed in Section 2.3.3.2 (Special Construction Techniques), the horizontal directional drill (HDD) methodology may be utilized as an alternative to conventional standard pipeline open trenching construction for crossings of culverts, railroads, as well as under Interstate 5 and Highway 99E.

Site preparation and construction of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and improvements to the PSE Natural Gas Distribution System would result in direct impacts to the existing land use and structures within the development footprint and periodic indirect impacts to adjacent land use over the period of construction. Construction-related impacts to existing land use and structures are described below.

Land Use

During construction, land disturbances would occur entirely within the Project's development footprint. The development footprint includes the proposed Project sites, including the Tacoma LNG Facility site, the TOTE Marine Vessel LNG Fueling System site, the paved ROWs where pipeline segments would be constructed, and existing developed areas where the limit station construction and gate station upgrades would occur. No additional staging or storage areas would be needed outside the Project's development footprint. Further, public involvement and outreach efforts to minimize temporary access disruptions to adjacent landowners within the 400-foot land use study area during construction are described in Section 3.10, "Transportation" under Section 3.10.6, "Mitigation Measures."

Therefore, construction of Project components would not cause any impacts to land use in the vicinity of the Project, and would therefore be consistent with applicable comprehensive plan designations, zoning classifications, and shoreline master program designations in the land use study area.

Recreational Resources

Construction would not affect public access to the Chinook Landing Marina or Hylebos Marina. However, temporary vessel navigation impacts could occur during construction of in-water structures in both the Hylebos and Blair waterways; these impacts would be short term and limited to the duration of construction. Once the construction barges, equipment, and supplies arrive at either site, they would largely remain stationary and would not restrict recreational vessel movement up and down the remainder of the waterways.

Construction-related maritime traffic, as described in Section 3.10.3.11, "Maritime Traffic," would include materials staging on barges in the Hylebos and would occur in the vicinity of the existing pier but would not impede surrounding recreational vessel traffic in the rest of the waterway. Recreational vessel traffic would be restricted only in the immediate vicinity of the pier berth on the Hylebos Waterway where the barge-mounted crane (derrick) and support barge would be located. This limited restriction would only occur in a small portion of the overall Hylebos Waterway and would not exceed the construction period. Construction materials staging on barges in the Blair Waterway would occur in the vicinity of the existing TOTE facilities and would not impede surrounding recreational vessel traffic in the rest of the waterway. Construction-related maritime traffic would not restrict the limited recreational vessel use in either the Hylebos or Blair waterways.

As discussed in Section 3.10.4.1, "Traffic Volumes" and Section 3.10.4.1, "Level of Service", the traffic impacts associated with construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are anticipated to be very limited and concentrated during afternoon peak hours. Access to Chinook Landing Marina, Hylebos Marina, or the Place of Circling Waters would therefore not be significantly hindered by construction-related traffic. Furthermore, construction of pipeline Segment A would take place at night and would not contribute to peak hour traffic congestion. As a result, Project construction would have no impact on recreational resources at Fife High School.

No other direct or indirect impacts to recreational resources are associated with construction of the Project.

Thus, the only construction-related impacts to recreational resources caused by the Proposed Action would consist of temporary limitations on active recreational waterway uses within portions of the Hylebos waterway. This impact is not deemed significant enough to require mitigation.

3.7.4.2 Operation Impacts

Land Use

As shown in Section 3.7.3.2, above, the presence and operation of the constructed Project components would generally comply with and be compatible with all applicable comprehensive plan designations, zoning classifications, and shoreline master program designations in the land use study area.

The only exception concerns the proposed Golden Given Limit Station, which would be a conditional use under the SF zoning designation in *the Parkland-Spanaway-Midland Communities Plan* area of unincorporated Pierce County. Mitigation may therefore be required to ensure that this conditional use remains compatible with surrounding single-family residential development. Proposed mitigation measures are outlined in Section 3.7.6.

Recreational Resources

Operation of the Project would not directly affect recreational resources within the recreational resources study area or active recreational waterway uses in the vicinity of the Project. However the Project would restrict public access to the shoreline along the Hybelos and Blair waterways.

The Tacoma LNG Facility and its associated components would be seen from Chinook Landing Marina, but the facility and its components would be similar in character to that of the existing facility site, areas near it, and other maritime industrial land use along the Hylebos Waterway.

Project operations would not affect public access to the Chinook Landing Marina or Hylebos Marina. Operation-related maritime traffic, as described in Section 3.10.3.11, “Maritime Traffic,” would not restrict the limited recreational vessel use in either the Hylebos or Blair waterways. The proposed addition of two barge trips per week to fuel TOTE vessels would be a minor addition in comparison to existing maritime traffic on the two waterways as shown in tables provided in Appendix I. Therefore, the Project would have minimal, if any, impact on these recreational waterway uses during operation.

Operation of new pipeline Segment A would occur underground approximately 0.25 mile away from the Place of Circling Waters public overlook; however, its presence would not interrupt use of the site by recreationalists.

Because Fife High School’s athletic fields would be located approximately 550 feet to the west of Segment A, operation of Segment A would not directly impact recreational resources located on Fife High School property. Given that the pipeline would be located entirely within existing road ROW, the Proposed Action would not result in any permanent operational impacts to recreational resources along segments A and B.

In addition, operation of the new Golden Given Limit Station and operational improvements to the existing Fredrickson Gate Station would not occur within 0.25 mile of any designated recreational resources and would not result in any permanent operational impacts to recreational resources.

Furthermore, the Project components are not located on any parcels designated for future development of recreational facilities in the recreational resources study area in the City of Tacoma, City of Fife, or unincorporated Pierce County.

Therefore, no impacts to recreational resources are associated with operation of the Project. Thus, the presence and operation of the Project Components would not interfere with or displace any recreational uses.

3.7.4.3 Decommissioning Impacts

The estimated total design life of the Project is 50 years. Decommissioning of Project components would generate land use and recreational resource impacts similar to those discussed in Section 3.7.3.1, above.

Potential impacts include those related to land disturbance and shoreline and would likely be comparable to those experienced during construction. The potential for actions associated with decommissioning could be based on economic and operational aspects, conditions of the facility, and associated agreements or permits. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Project components.

3.7.5 Impacts of No Action

Under the No Action Alternative, current conditions would remain unchanged and Proposed Action–related impacts to land use and recreational resources would not occur.

3.7.6 Avoidance, Minimization, and Mitigation Measures

This study has identified the following impacts on Land Use and Recreational Resources that may require mitigation:

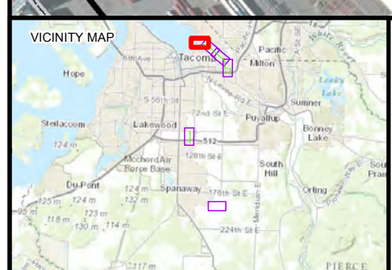
1) Development of the Golden Given Limit Station as a conditional use in an area zoned for single-family residential use. In consideration of these impacts, the following mitigation measure is proposed:
    - Per PCC 19A.90.010.H.1, “neighborhood [utility] facilities should be landscaped so as to be reasonably compatible with adjacent development” (Pierce County 2014c). Accordingly, existing vegetation bordering the site of the proposed Golden Given Limit Station should be maintained, or, where design requirements make that impossible, new row vegetation should be planted along the edges of the proposed fence, consisting of tall, dense, drought-tolerant species such as cypress, Douglas fir, or other species found in the neighborhood.
2) Development of the Project will restrict public access to the shoreline and pursuant to the requirements of the SMP PSE will work with the City to mitigate for the loss of public access by means of one of the following alternatives.
    - Developing public access at an alternative location pursuant to the Port of Tacoma’s (2013) Shoreline Public Access Plan
    - Contributing to a project identified in the City’s Public Access Alternatives Plan, or
    - Providing funds calculated in accordance with the formula contained in the Interlocal Agreement Authorizing a Flexible Approach to the Shoreline Public Access Provision between the City and the Port.

3.7.7 Conclusion

By and large, the Proposed Action would have very limited impacts on land use and recreational resources. The Proposed Action would result in the continuation of existing maritime industrial use of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites anticipated by City of Tacoma and Port of Tacoma land use plans and recreation master plans. The Proposed Action would maintain the existing character of the road ROW along the proposed distribution system improvements, as anticipated by the City of Tacoma, City of Fife, and Pierce County. Proposed pipeline segments A and B were designed to be within existing road ROW, and pipeline construction and operation would not result in the long-term alteration of existing use of the roads, surrounding lands, or recreational resources. Upgrades to the existing Fredrickson Gate Station would also not result in the alteration of existing land use or recreational resources on the Proposed Action area.

The only significant impact identified is associated with the operation of the Golden Given Limit Station as a conditional use within an area designated and zoned for single-family development. This study proposes

mitigating that impact by the use of tall, dense row vegetation bordering the site of the station, to ensure compatibility with adjacent land uses.



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

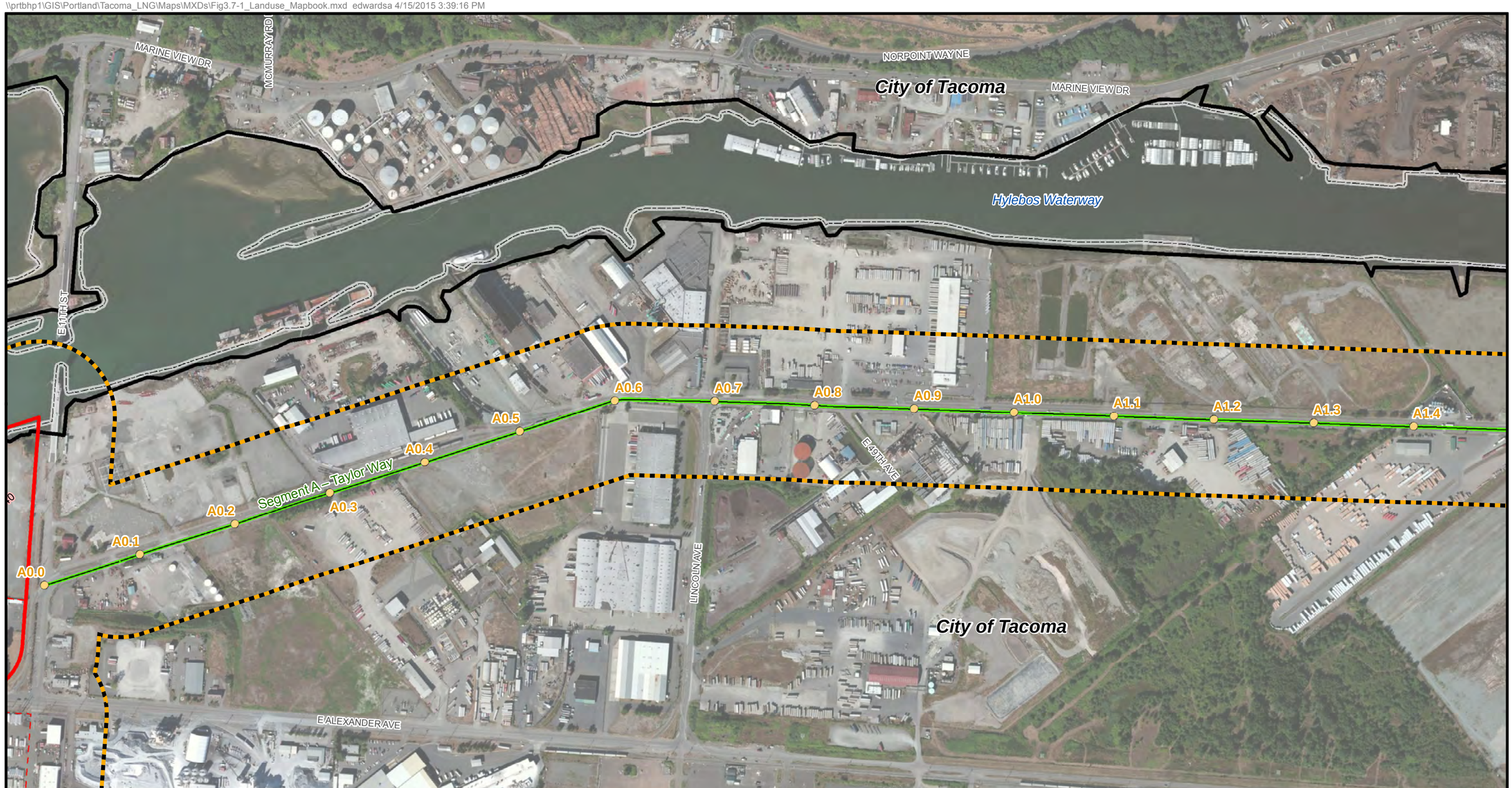
- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

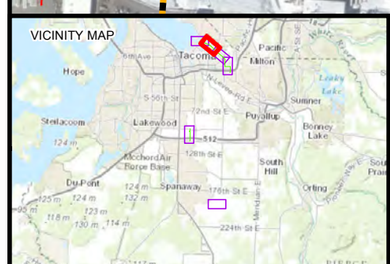
N W E S

0 500 Feet

City of Tacoma

Figure 3.7-1 (Sheet 1 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
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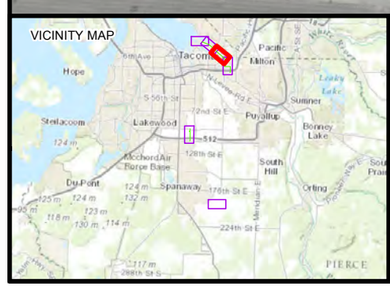
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

0 500 Feet

City of Tacoma

Figure 3.7-1 (Sheet 2 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

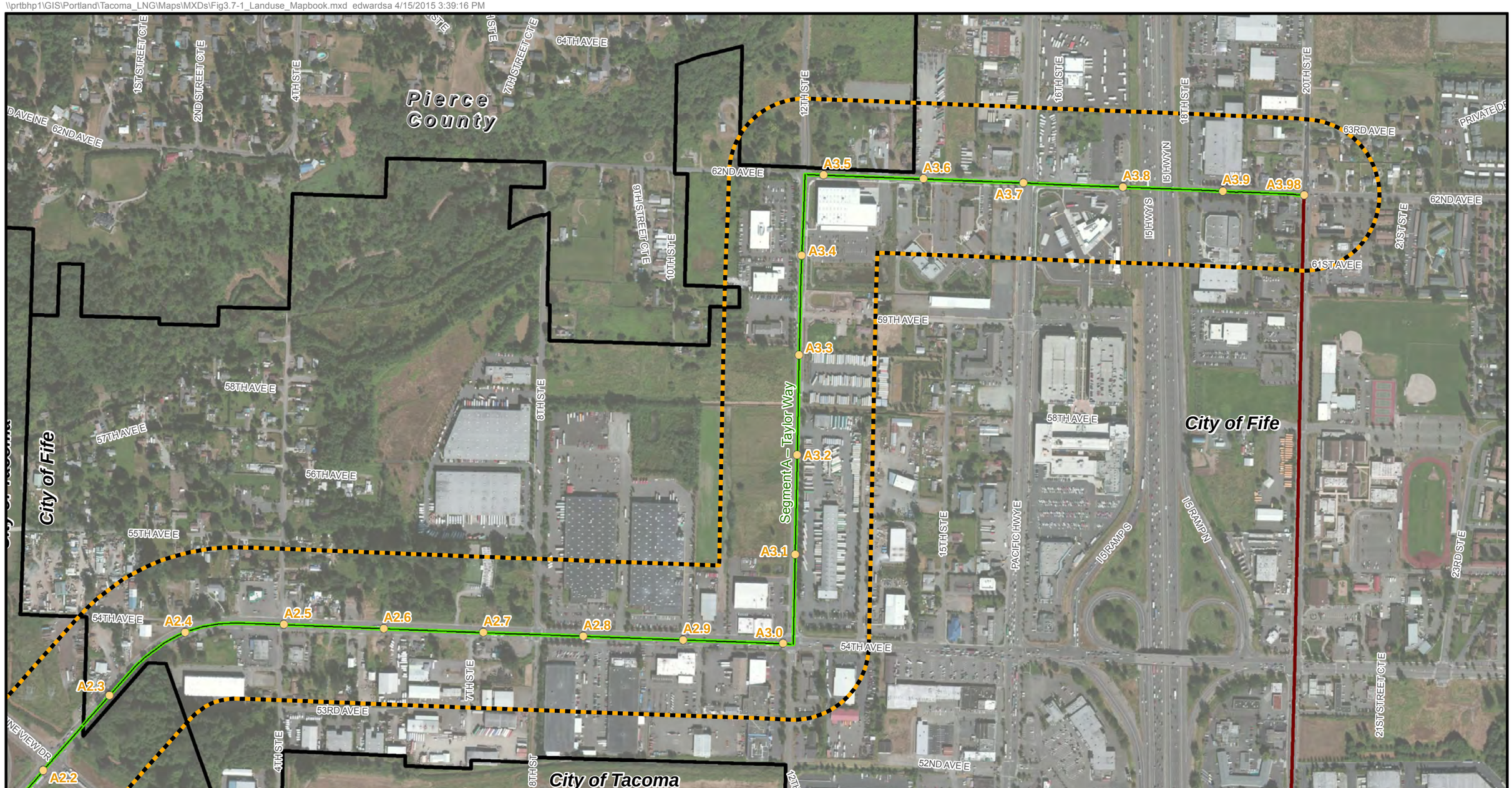
N W E S

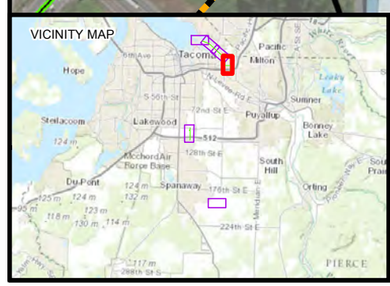
0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-1 (Sheet 3 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
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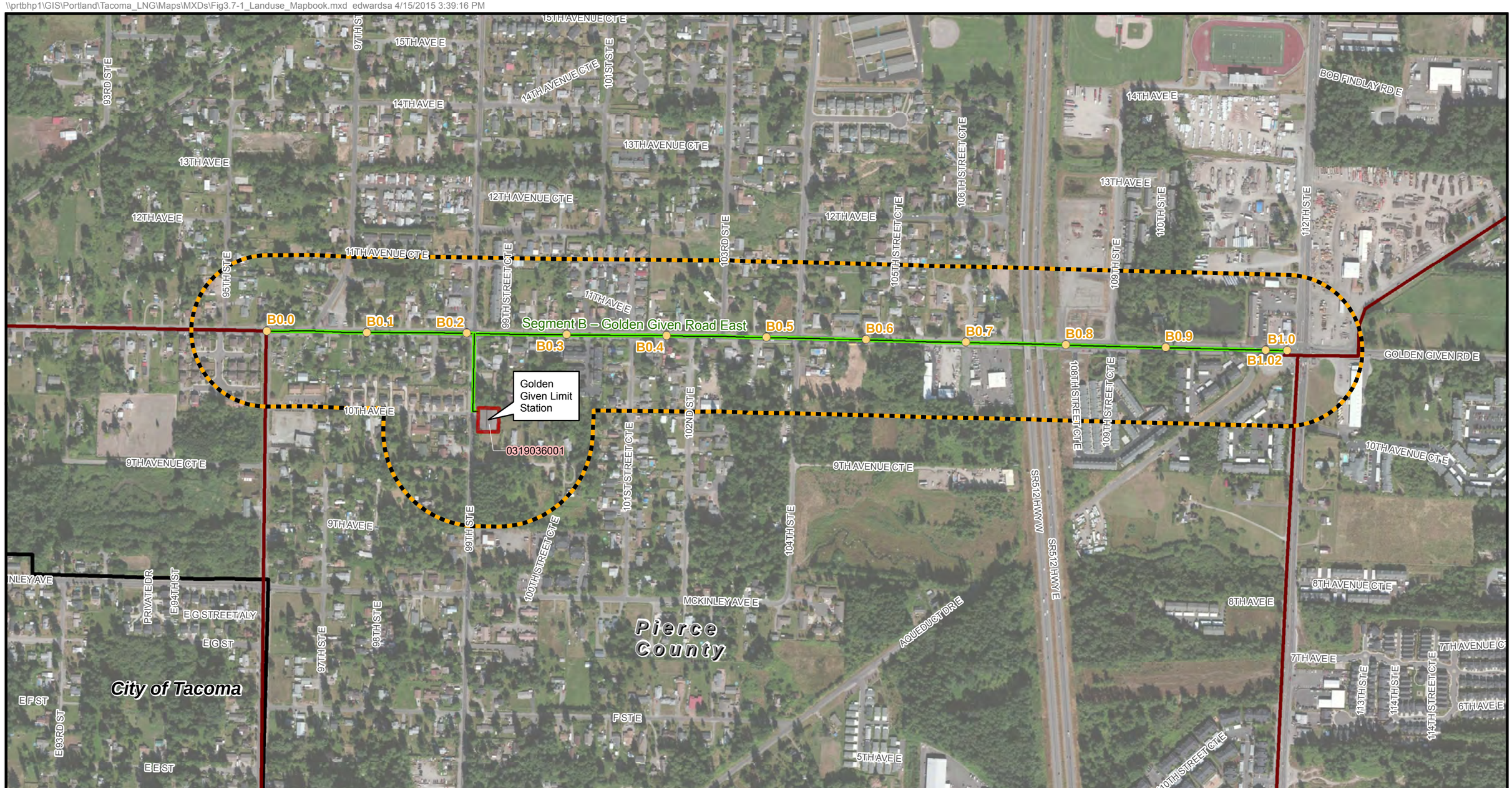
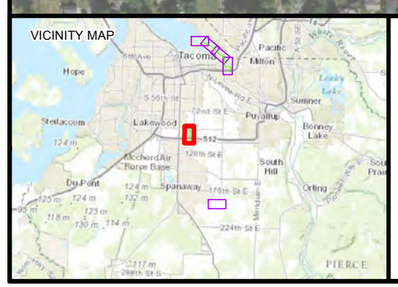
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

0 500 Feet

City of Tacoma

Figure 3.7-1 (Sheet 4 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

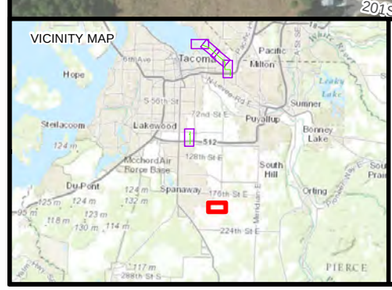
- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

N W E S

0 500 Feet

City of Tacoma

Figure 3.7-1 (Sheet 5 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

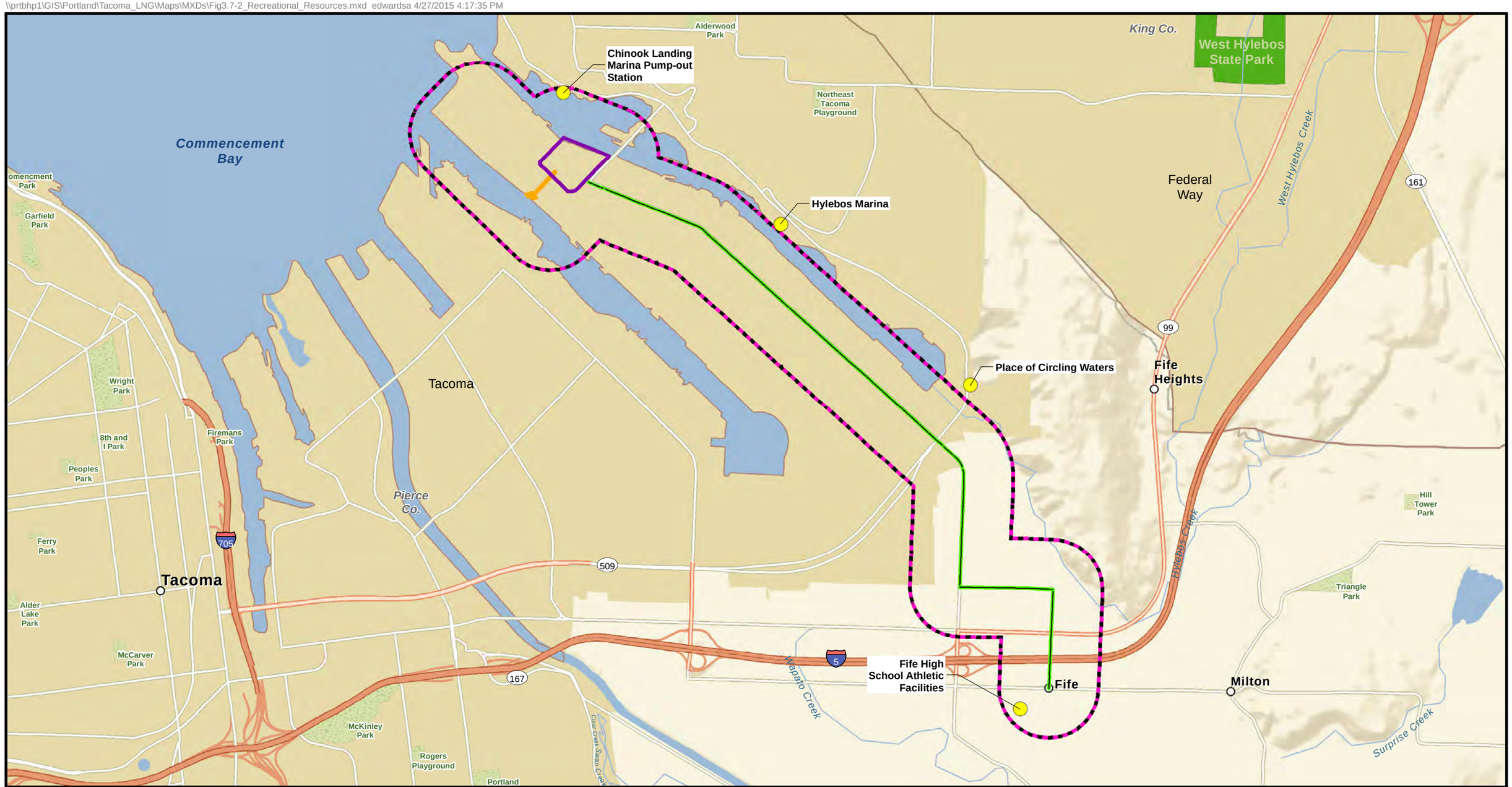
- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Project Parcels

N W E S

0 500 Feet

City of Tacoma

Figure 3.7-1 (Sheet 6 of 6)
Existing Land Uses within 400 Feet of the Proposed Action
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- Proposed New Pipeline
- Recreational Resource
- .25-Mile Recreational Resources Study Area
- State Park or Forest
- County Park
- Local Park

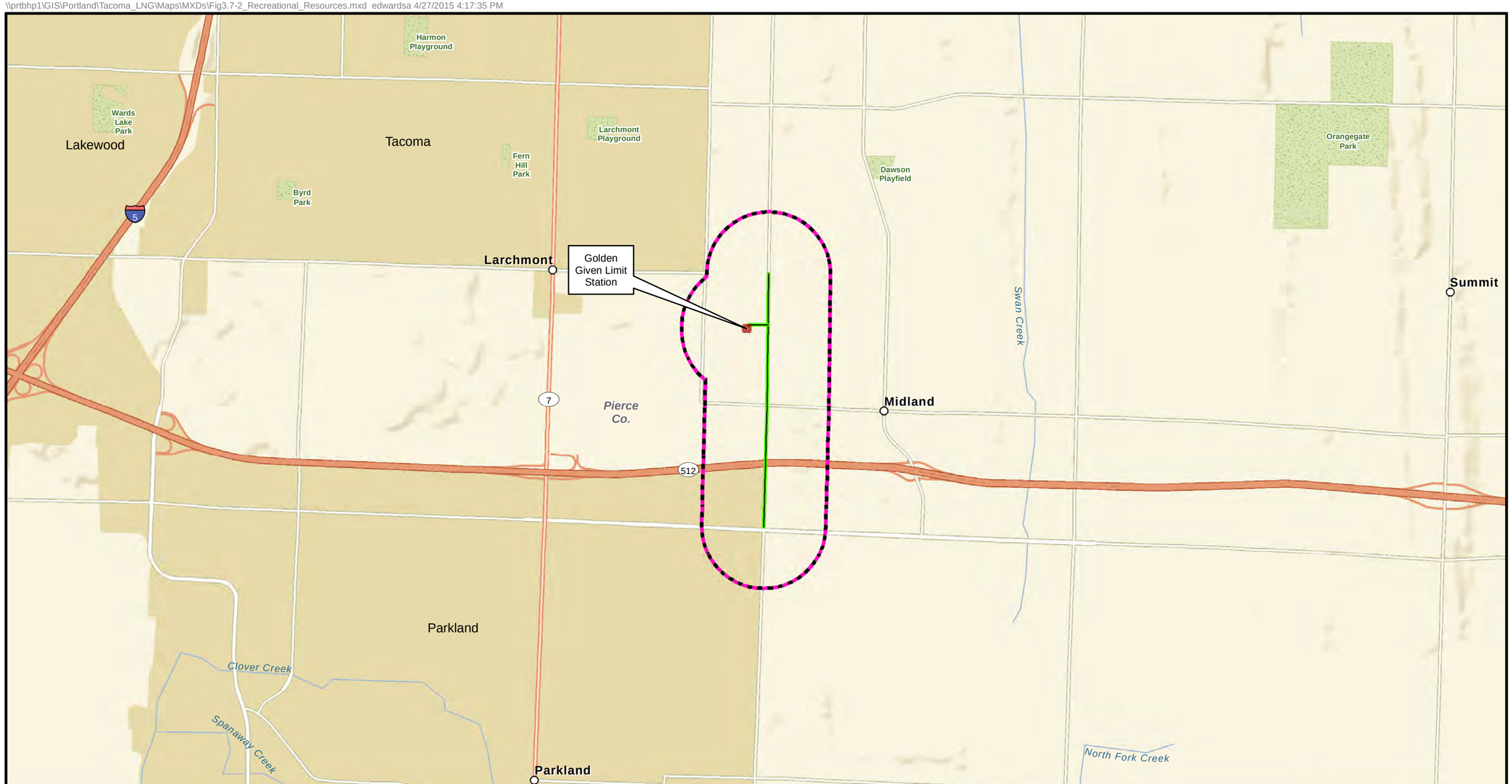
N W E S

0 0.25 0.5 Miles

City of Tacoma

Figure 3.7-2A Recreational Resources within 0.25 Mile of the Proposed Action

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- Proposed New Pipeline
- Recreational Resource
- .25-Mile Recreational Resources Study Area
- State Park or Forest
- County Park
- Local Park

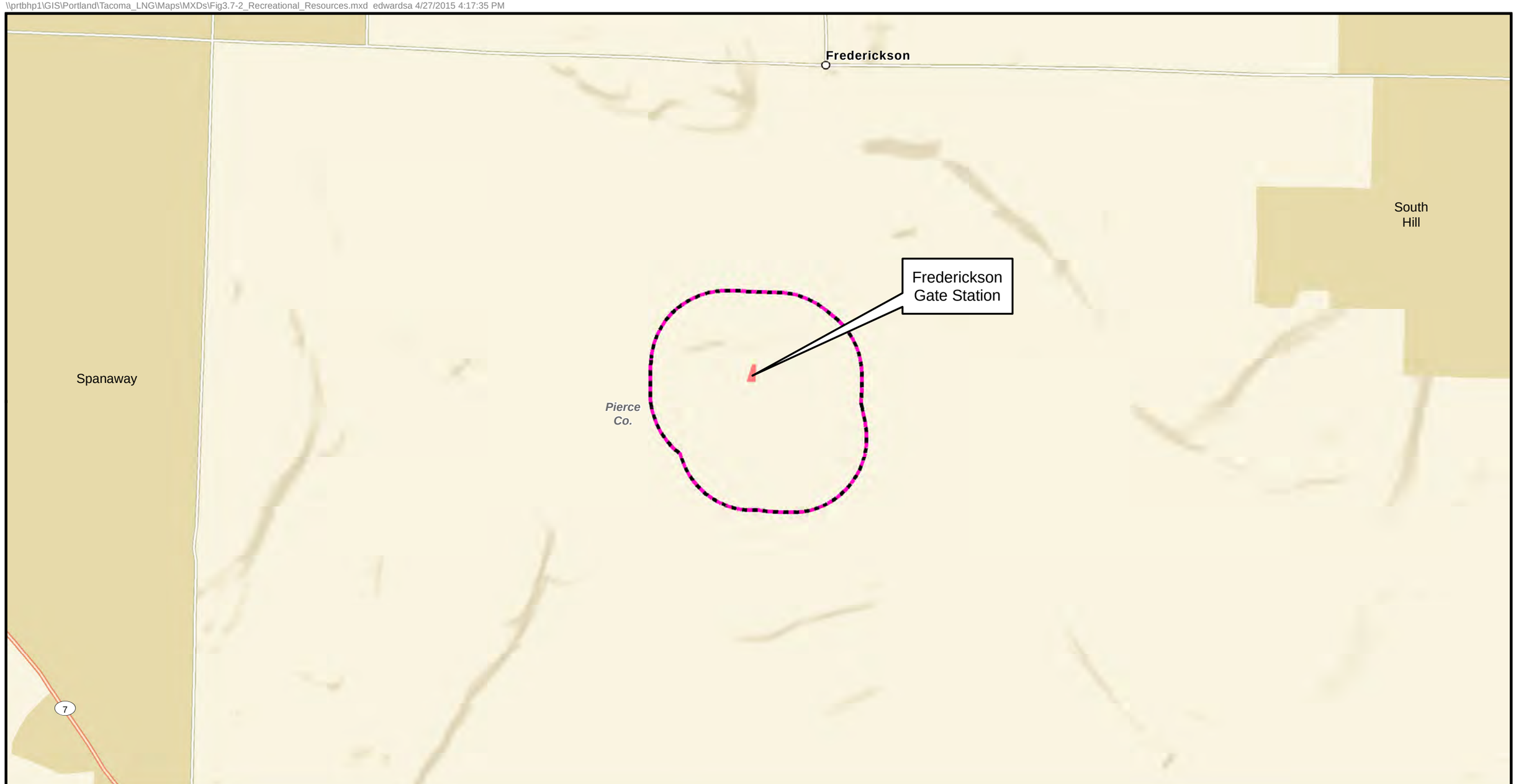
N W E S

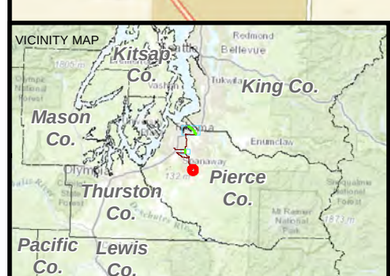
0 0.25 0.5 Miles

City of Tacoma

Figure 3.7-2B
Recreational Resources within 0.25 Mile of the Proposed Action

Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- Proposed New Pipeline
- Recreational Resource
- .25-Mile Recreational Resources Study Area
- State Park or Forest
- County Park
- Local Park

N W E S

0 0.25 0.5 Miles

City of Tacoma

Figure 3.7-2C
Recreational Resources within 0.25 Mile of the Proposed Action

Tacoma LNG Project

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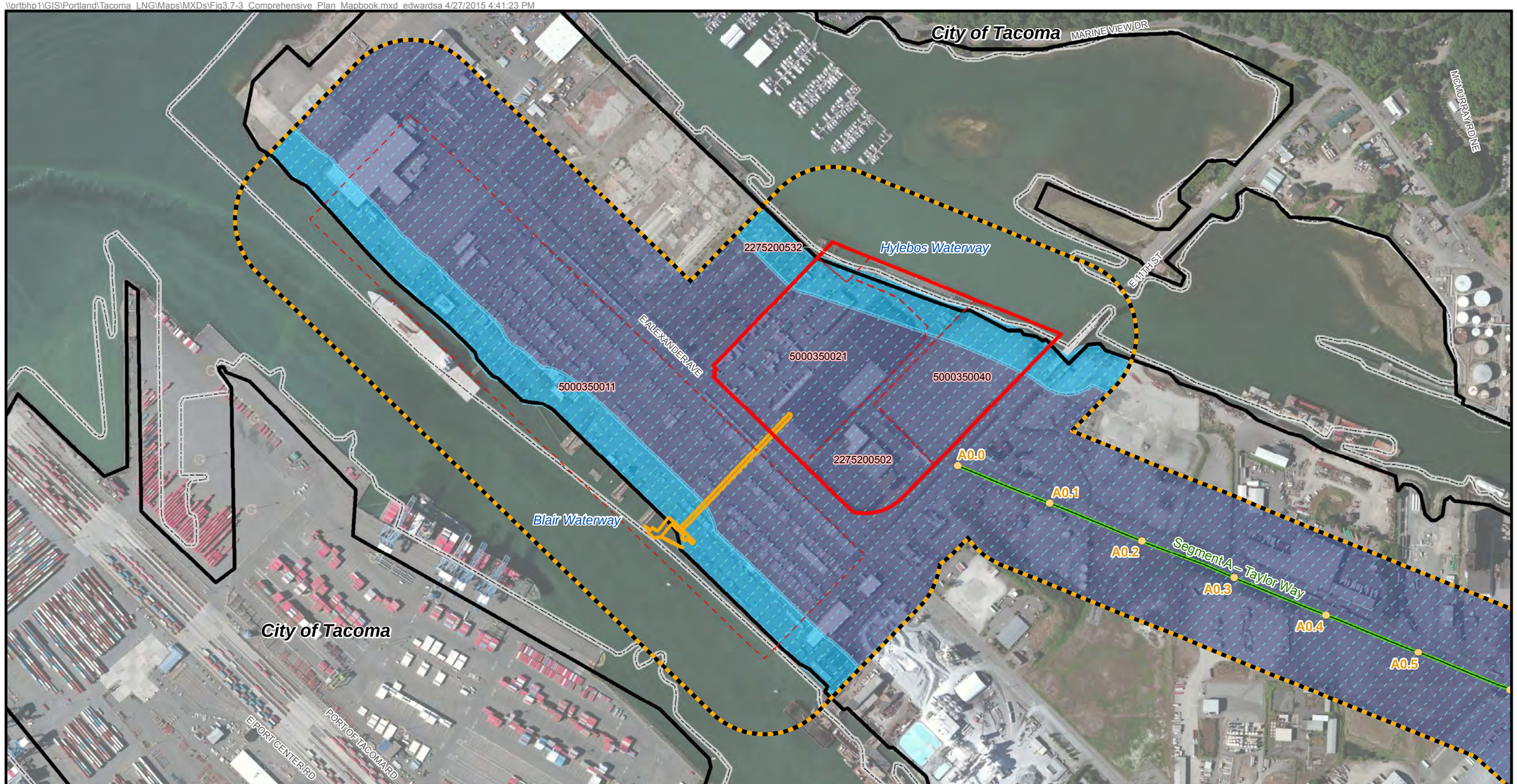

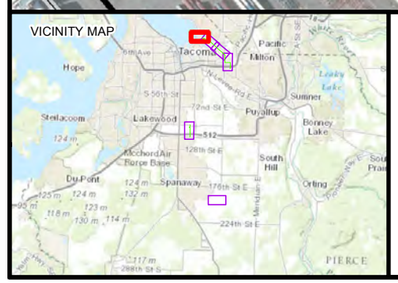

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

City of Tacoma Comprehensive Plan Designation

- Manufacturing/Industrial Center (M/IC)
- High-Intensity Industrial Development (IDHI)
- Shoreline High-Intensity Environment

N W E S

0 500 Feet

City of Tacoma

Figure 3.7-3 (Sheet 1 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project

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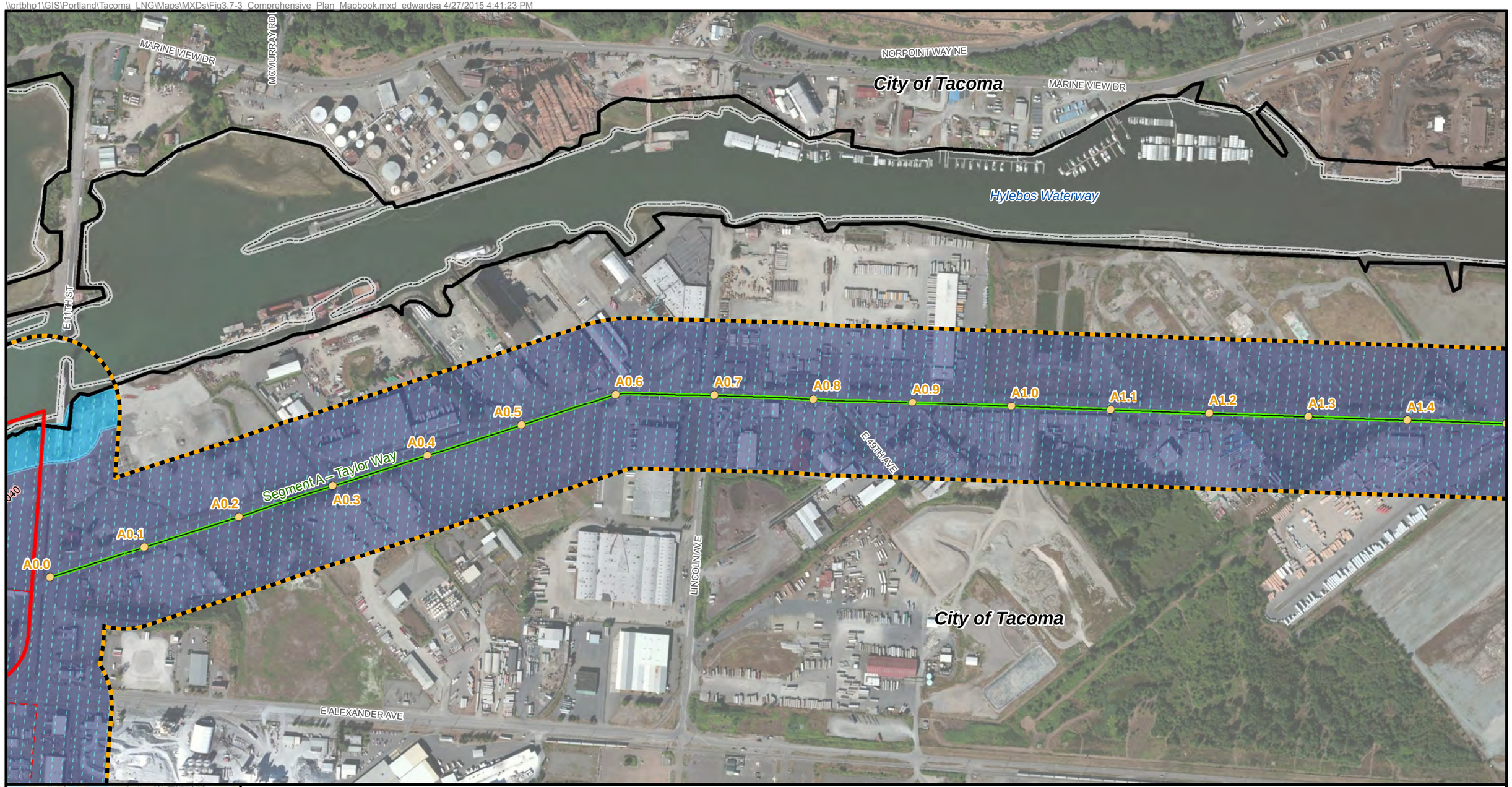

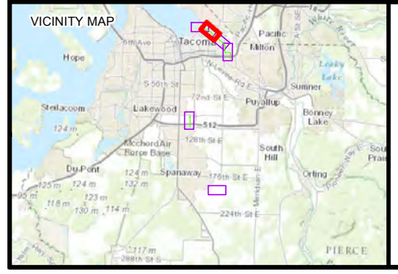

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

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- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
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- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

City of Tacoma Comprehensive Plan Designation

- Manufacturing/Industrial Center (M/IC)
- High-Intensity Industrial Development (IDHI)
- Shoreline High-Intensity Environment

N E S W

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-3 (Sheet 2 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project

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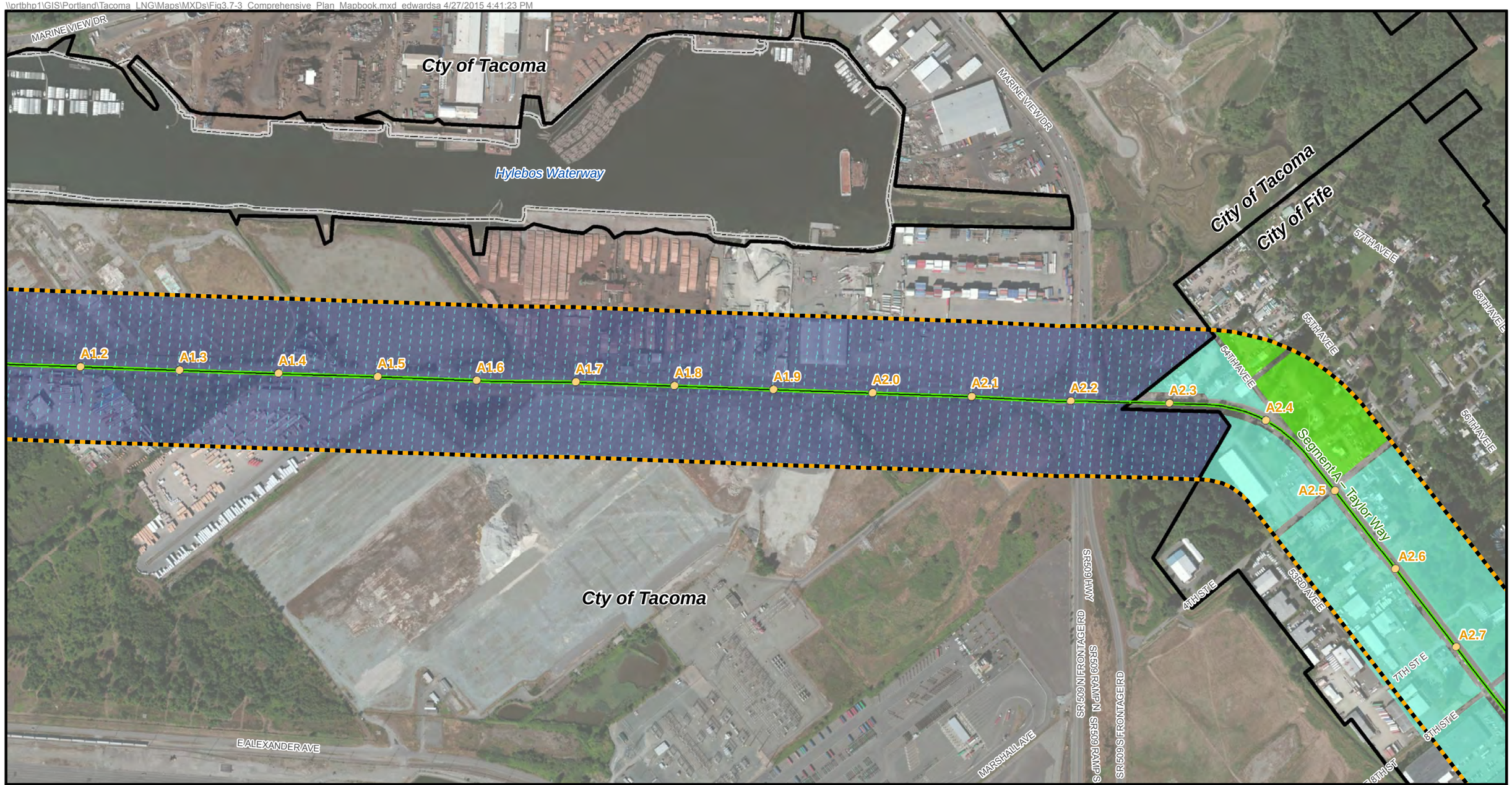

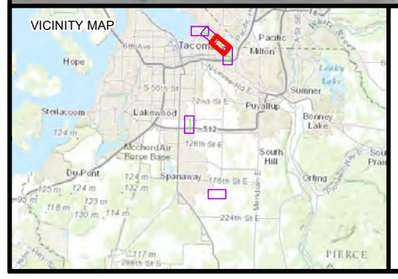

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

City of Tacoma Comprehensive Plan Designation

- Manufacturing/Industrial Center (M/IC)
- High-Intensity Industrial Development (IDHI)

City of Fife Comprehensive Plan Designation

- Industrial
- Mixed Medium Density Residential/Commercial

N E S W

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-3 (Sheet 3 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project

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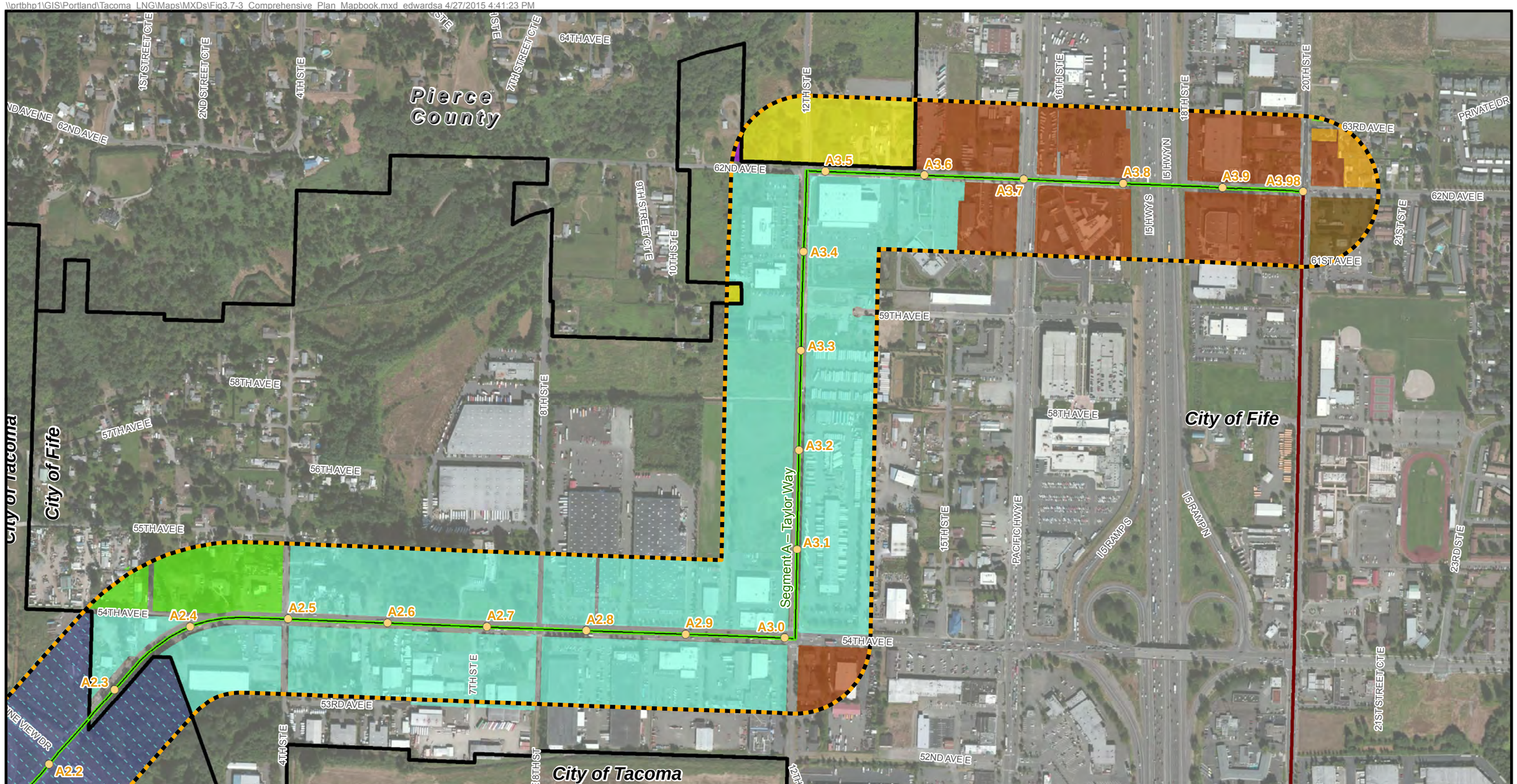
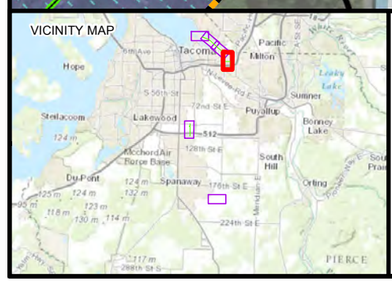


VICINITY MAP



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
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- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

City of Tacoma Comprehensive Plan Designation

- Manufacturing/Industrial Center (M/IC)
- High-Intensity Industrial Development (IDHI)

City of Fife Comprehensive Plan Designation

- High Density Residential
- Medium Density Residential
- Industrial
- Mixed Commercial/High Density Residential
- Mixed Medium Density Residential/Commercial

Pierce County Comprehensive Plan Designation

- Small Lot Single Family Residential
- MSF - Moderate Density Single Family

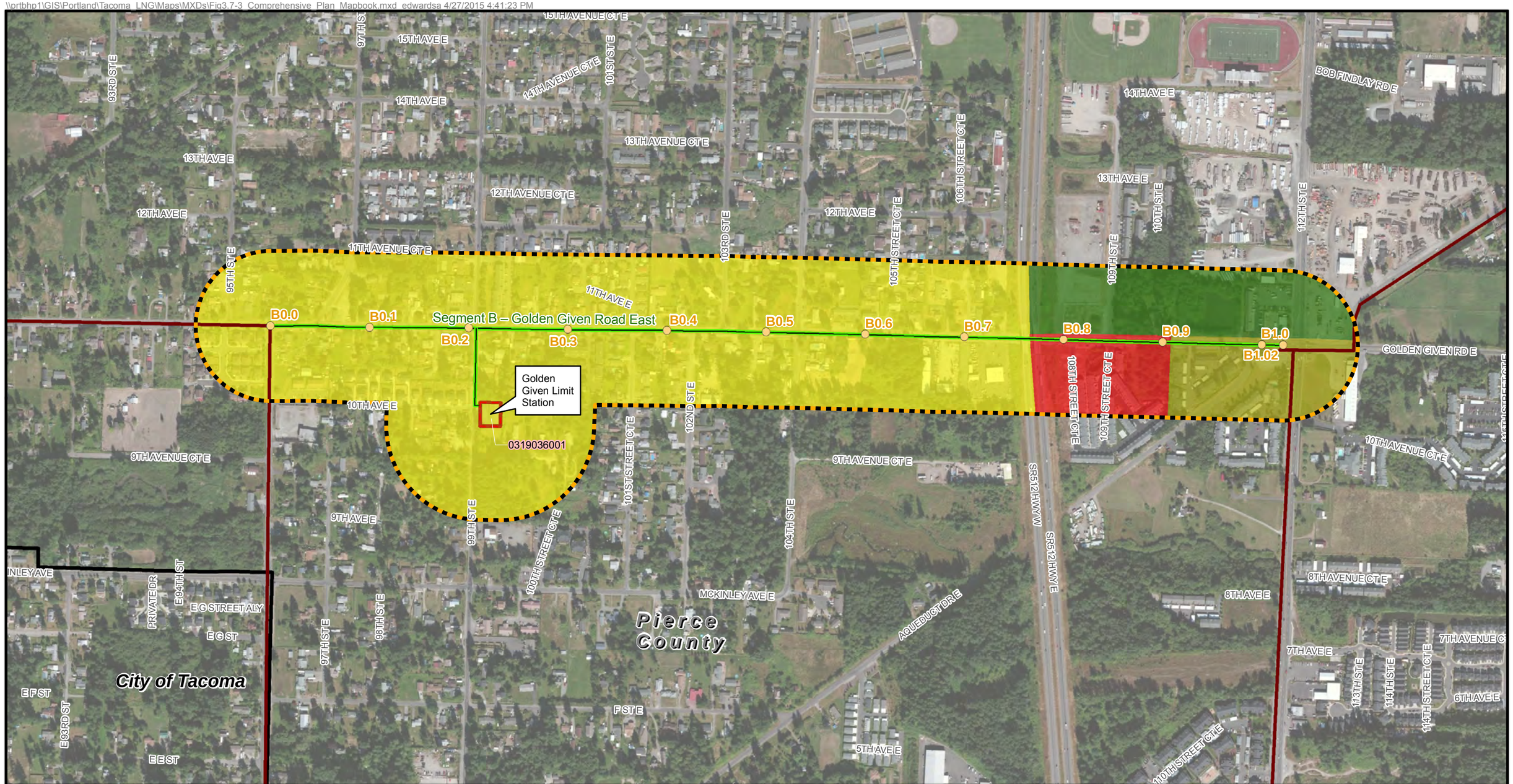
N W E S

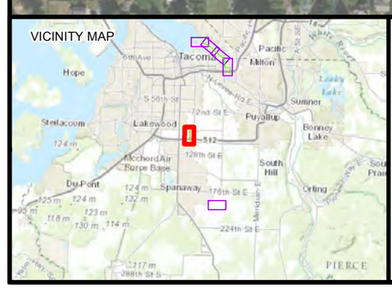
0 500 Feet

City of Tacoma

Figure 3.7-3 (Sheet 4 of 6) Comprehensive Plan Designations within 400 Feet of the Proposed Action Tacoma LNG Project

\\prtbhp1\GIS\Portland\Tacoma_LNG\Maps\MXDs\Fig3.7-3_Comprehensive_Plan_Mapbook.mxd edwardsa 4/27/2015 4:41:23 PM





Sources: ESRI 2012, Puget Sound Energy 2015

Legend

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- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

Pierce County Comprehensive Plan Designation

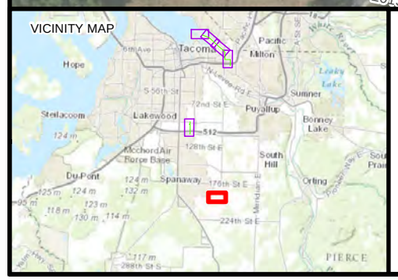
- EC - Employment Center
- HRD - High Density Residential
- MSF - Moderate Density Single Family
- MUD - Mixed Use District

0 500 Feet

City of Tacoma

Figure 3.7-3 (Sheet 5 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project

\\prtbhp1\GIS\Portland\Tacoma_LNG\Maps\MXDs\Fig3.7-3_Comprehensive_Plan_Mapbook.mxd edwardsa 4/27/2015 4:41:23 PM



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

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- Proposed TOTE Marine Vessel LNG Fueling System
- Golden Given Limit Station
- Frederickson Gate Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- Project Parcels
- County Boundary
- City Limit Boundary

Pierce County Comprehensive Plan Designation

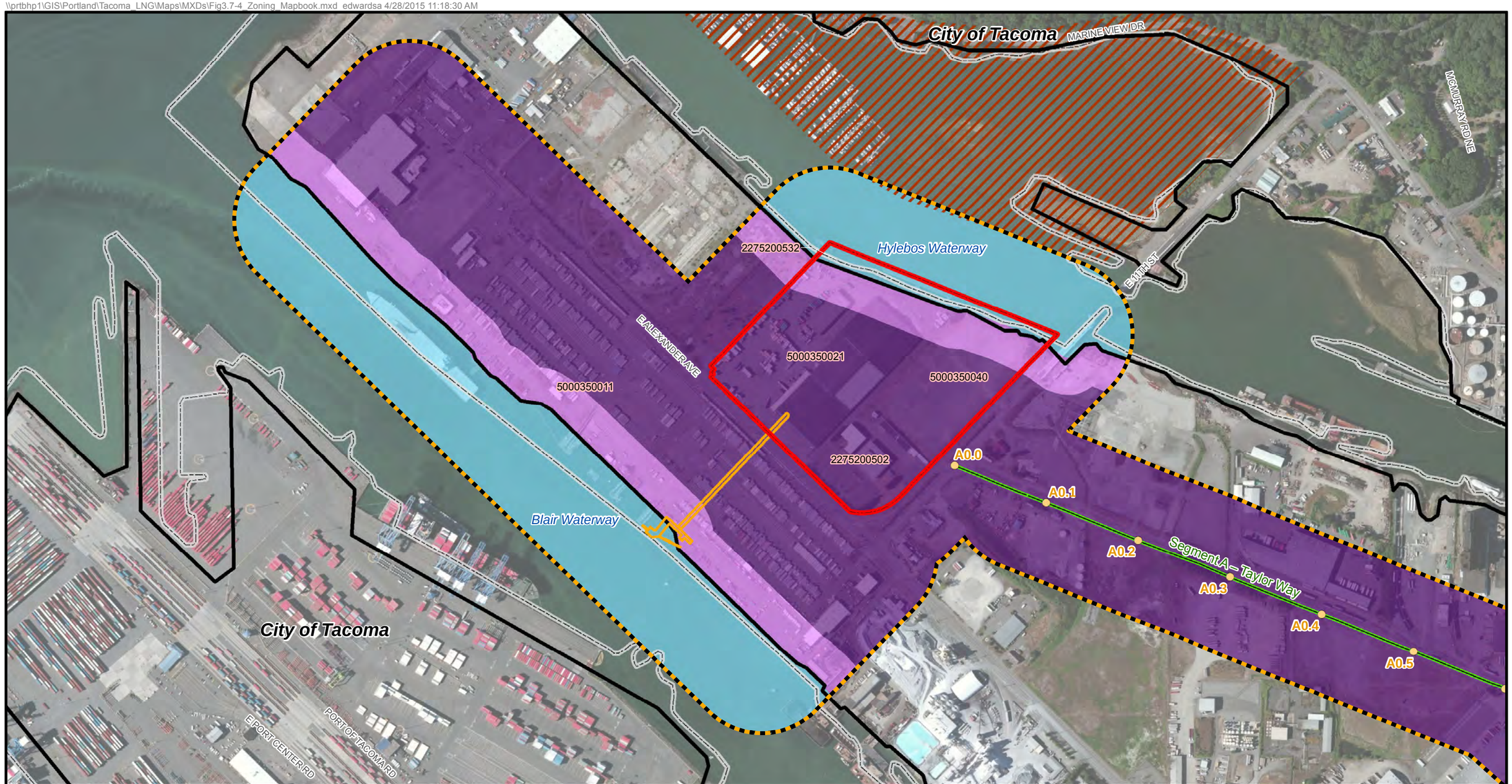
- EC - Employment Center

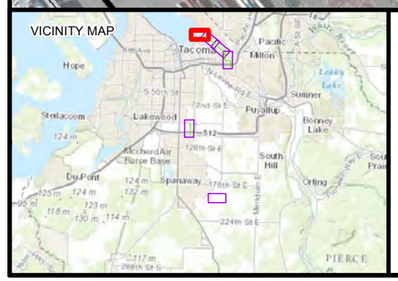
N W E S

0 500 Feet

City of Tacoma

Figure 3.7-3 (Sheet 6 of 6)
Comprehensive Plan Designations within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Proposed TOTE Marine Vessel LNG Fueling System
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Puyallup Tribal and Future Tribal Lands (Port of Tacoma)

City of Tacoma Zoning

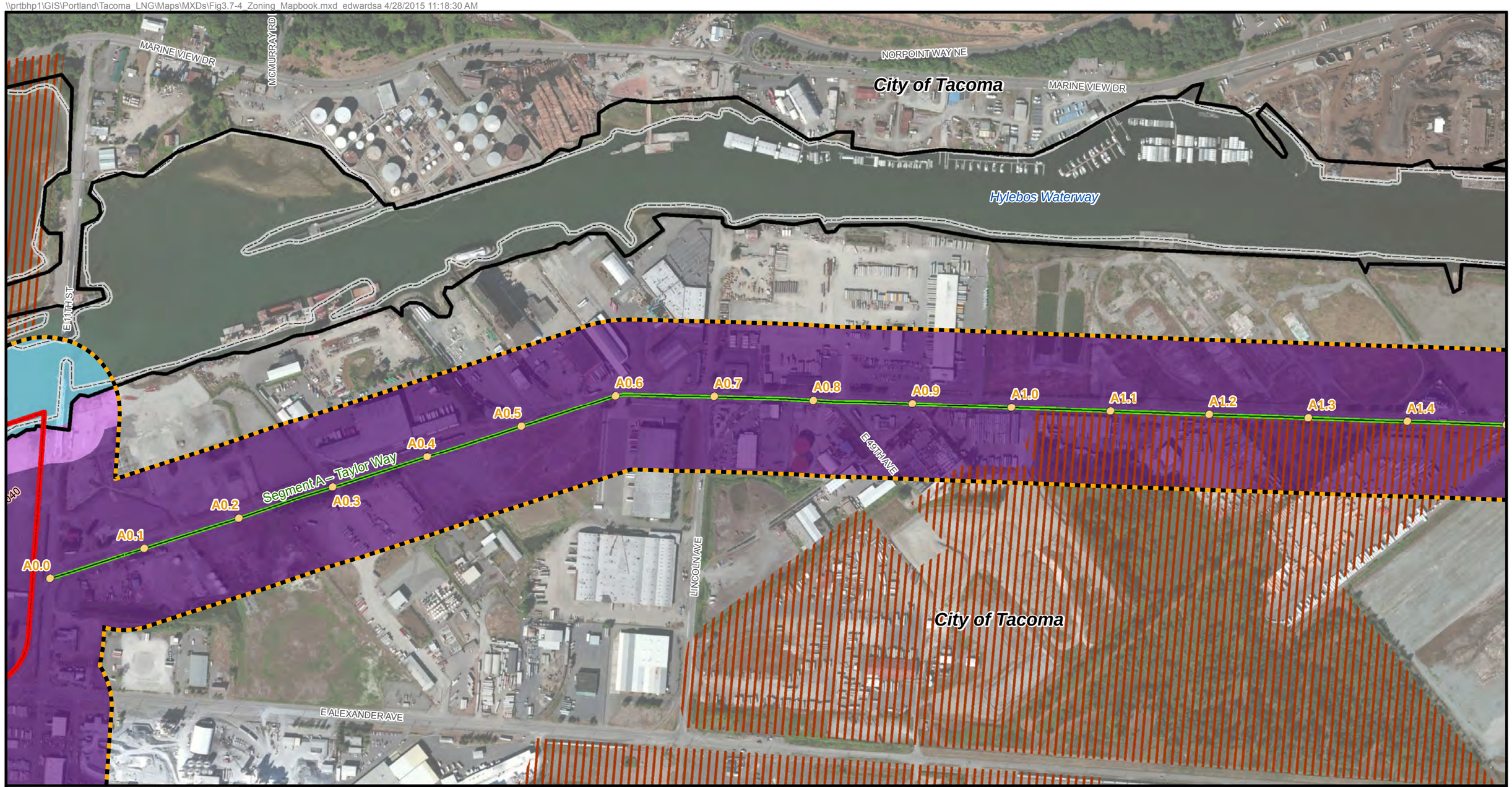
- PMI - Port Maritime Industrial
- S-10 - Shoreline District - Port Industrial Area (HI)
- S-13 - Shoreline District - Marine Waters of the State (A)

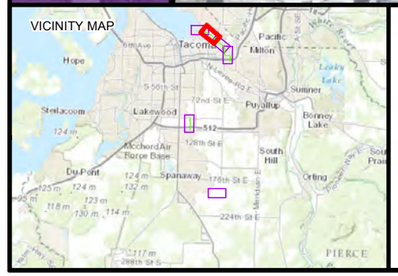
N W E S

0 500 Feet

City of Tacoma

Figure 3.7-4 (Sheet 1 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- Proposed Tacoma LNG Facility Site Boundary
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Puyallup Tribal and Future Tribal Lands (Port of Tacoma)

City of Tacoma Zoning

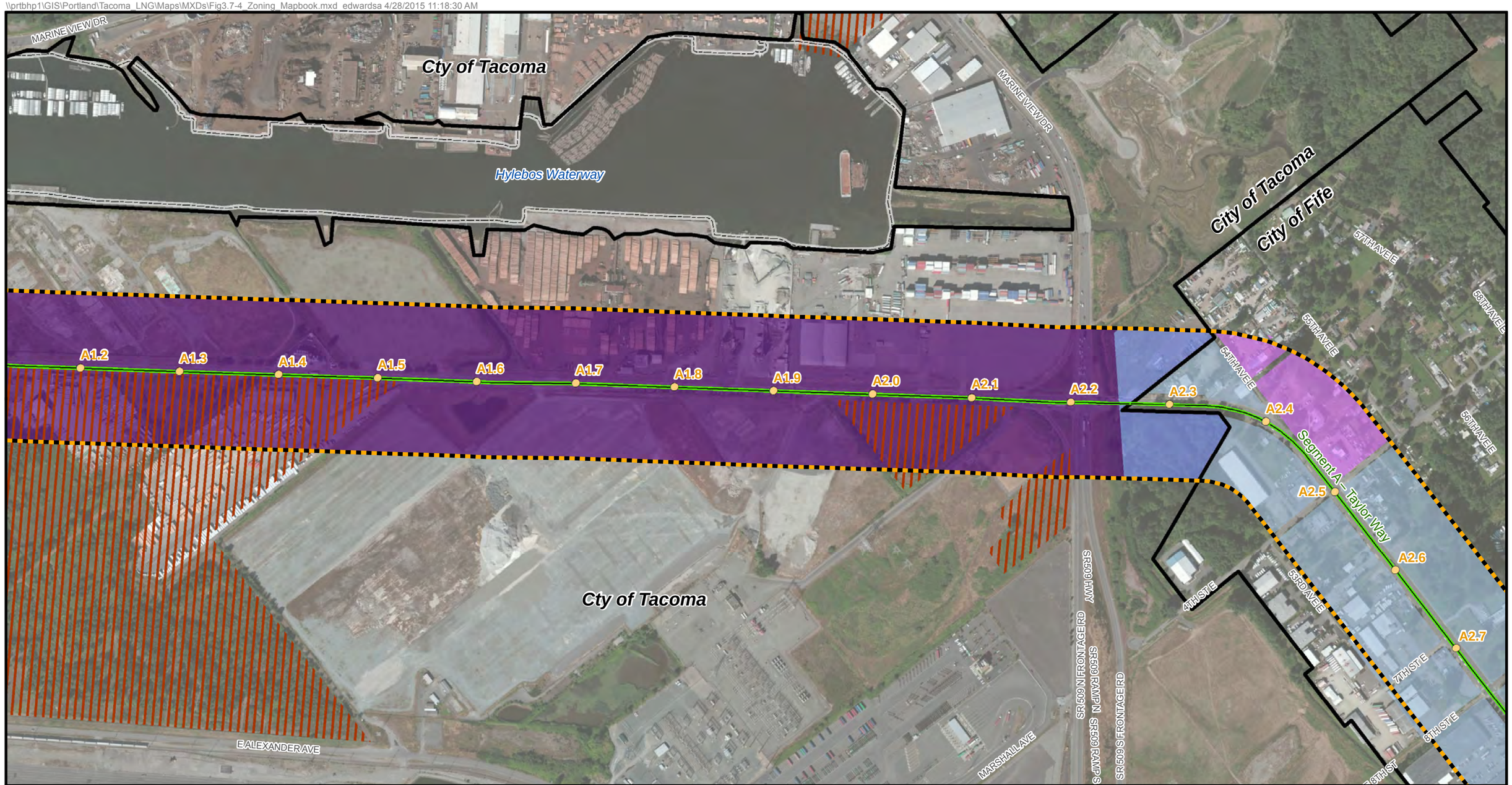
- PMI - Port Maritime Industrial
- S-10 - Shoreline District - Port Industrial Area (HI)
- S-13 - Shoreline District - Marine Waters of the State (A)

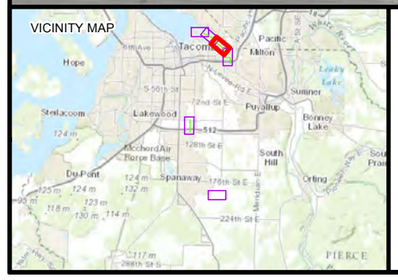
N E S W

0 500 Feet

City of Tacoma

Figure 3.7-4 (Sheet 2 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- 400-foot Land Use Study Area
- Proposed New Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Puyallup Tribal and Future Tribal Lands (Port of Tacoma)

City of Tacoma Zoning

- M2 - Heavy Industrial
- PMI - Port Maritime Industrial

City of Fife Zoning

- I - Industrial
- NC - Neighborhood Commercial

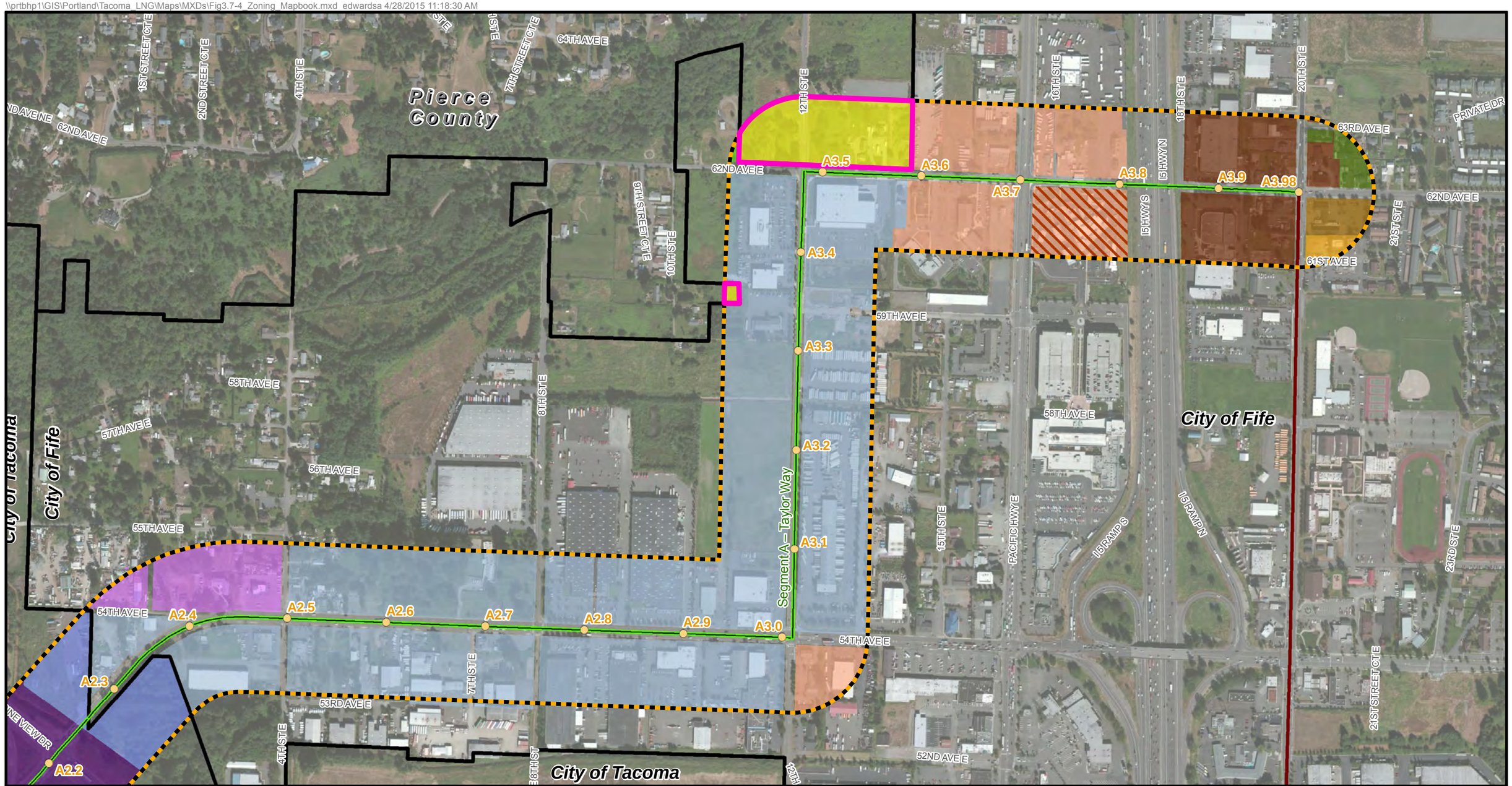
N E S W

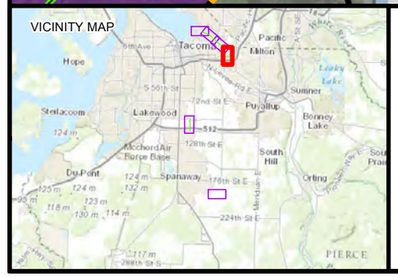
0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-4 (Sheet 3 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- Puyallup Tribe of Indians Trust Land

City of Tacoma Zoning

- M2 - Heavy Industrial
- PMI - Port Maritime Industrial

City of Fife Zoning

- CMU - Community Mixed Use
- I - Industrial
- HDR - High Density Residential
- MDR - Medium Density Residential
- NC - Neighborhood Commercial
- NR - Neighborhood Residential
- POS - Public Use/Open Space
- RC - Regional Commercial
- City of Fife Urban Growth Area

Pierce County Zoning

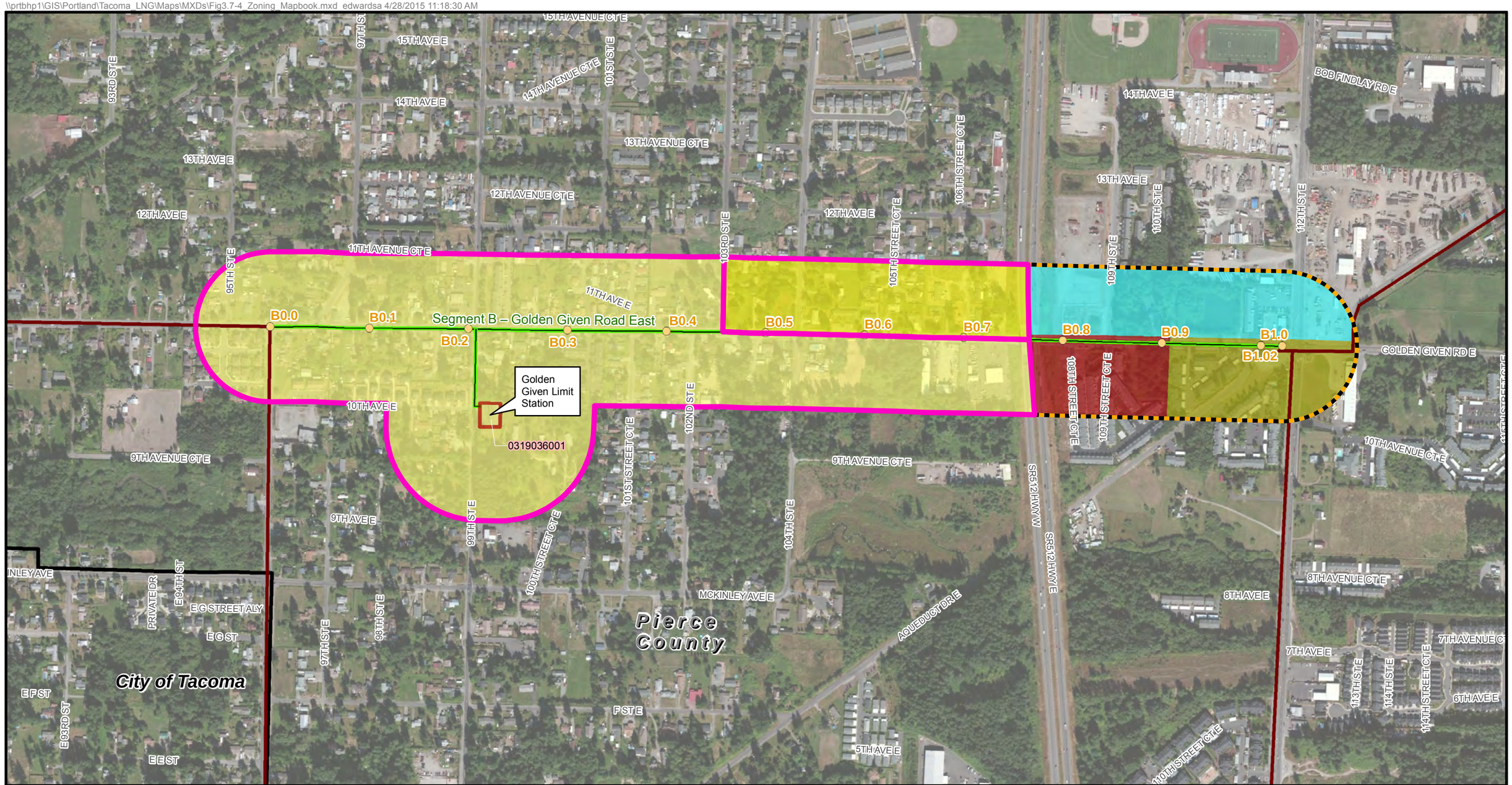
- MSF - Moderate Density Single-Family

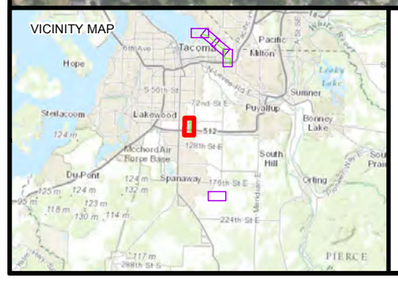
N E S W

0 500 Feet

City of Tacoma

Figure 3.7-4 (Sheet 4 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project





Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- Golden Given Limit Station
- 400-foot Land Use Study Area
- Proposed New Pipeline
- Existing Pipeline
- Milepost
- County Boundary
- Cities in Pierce County
- City of Fife Urban Growth Area

Pierce County Zoning

- CE - Community Employment
- MUD - Mixed Use Districts
- MHR - Moderate-High Density Residential
- MSF - Moderate Density Single-Family
- SF - Single-Family

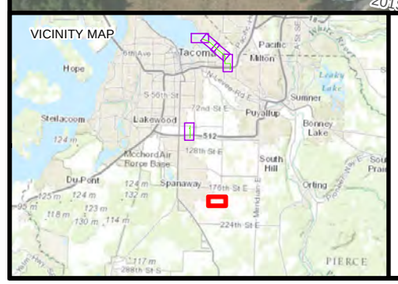
N E S W

0 500 Feet

Tacoma

City of Tacoma

Figure 3.7-4 (Sheet 5 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015, Port of Tacoma 2014b

Legend

- Frederickson Gate Station
- 400-foot Land Use Study Area
- Existing Pipeline
- County Boundary

Pierce County Zoning

- EC - Employment Center

N W E S

0 500 Feet

City of Tacoma

Figure 3.7-4 (Sheet 6 of 6)
Zoning and Shoreline Management Districts within 400 Feet of the Proposed Action
Tacoma LNG Project

3.8 Aesthetics/Light and Glare

This section assesses the potential impacts on aesthetics, light, and glare that may result from the construction, operation, and decommissioning (referred to herein as the Proposed Action) of the Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project). The geographic region for the assessment consists of areas within approximately 1 mile of the Tacoma LNG Facility site, and as needed to assess the improvements to the Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System and the Puget Sound Energy (PSE) Natural Gas Distribution System.

3.8.1 Study Methodology

The methodology used to address the Washington State Environmental Policy Act requirements for this assessment consists of the following six steps:

1. Establish the project's visual limits (viewshed).
2. Determine who has views of the project (viewers).
3. Describe and assess the landscape that exists before project construction (affected environment).
4. Determine and evaluate views of and from the project before and after project construction (using simulations).
5. Describe the potential visible changes to the project area and its surroundings that would result from the proposed project.
6. Assess the response of viewers looking at and from the project, before and after project construction (viewer sensitivity).

The methodology used for this analysis is a conventional approach to assessing impacts on aesthetics, light, and glare. The following terminology is used in this assessment and provides additional context for interpreting the analysis contained in this section:

- **Viewers** are people who potentially have views of a project and whose views near the project might be altered or obstructed by project elements. Viewers are usually discussed in terms of general categories of activities (such as residents, workers, recreationists [park users, boaters, or bicyclists], pedestrians, or motorists [both commuters and leisure travelers]). Viewers affiliated with categories of activities are referred to as "viewer groups."
- **Viewer sensitivity** is a combination of the following factors for a specific view:
  - What types of people see a view and for how long? Residents and recreationists typically have views of long duration, while bicyclists and motorists typically have views of shorter duration.
  - What is their likely level of concern about the appearance, aesthetics, and quality of the view? Level of concern, or viewer sensitivity, is a subjective response that is affected by factors such as the visual character of the surrounding landscape, the activity a viewer is engaged in, and their values, expectations, and interests. Low viewer sensitivity results when viewers are not particularly concerned about the view. High viewer sensitivity applies to viewers who see a view frequently or for a long duration and are likely very aware of and concerned about the view. Viewer sensitivity does not imply support for or opposition to a proposed project; it is a neutral term that is an important parameter in assessing visual quality. Generally, residents and recreationists are considered to be highly sensitive viewers, and local business staff and commuters are considered to be less sensitive.
- **Visual character** is an impartial description of what the landscape consists of and is defined by the relationships between the existing visible natural and built landscape features. These relationships are

considered in terms of dominance, scale, diversity, and continuity. Elements that influence visual character can include landform, waterbodies, vegetation, land use, open spaces, transportation facilities, utilities, and apparent upkeep and maintenance.

- **Viewing distance** is the distance between a viewed object and the viewer. The closer the viewer is to a viewed object, the more detail can be seen and the greater potential influence the object may have on visual and aesthetic resources.
- **Key Observation Points (KOPs)** are specific locations chosen to represent typical views of a proposed project or special, sensitive views. These are the locations from which photographs documenting existing views of a proposed project site are taken and for which photographic simulations depicting the proposed project are developed.

  Four KOPs were selected to represent views of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites from a variety of locations within the assessment area. These locations were selected after a site visit was conducted to take photographs of the assessment area. The four KOPs represent a good cross-section of views toward the Tacoma LNG Facility site, as follows:

  - KOP 1 represents an elevated view looking down at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites from the residential area northwest of the site.
  - KOP 2 was chosen to depict a level view of the Tacoma LNG Facility site from the northwest side of the Hylebos Waterway and East 11th Street.
  - KOP 3 is located on the Hylebos Bridge and was selected to depict views that people driving south on the bridge have of the site.
  - KOP 4 is located on the corner of East Alexander Avenue and East 11th Street and was chosen to depict one of the few land-based views of the Tacoma LNG Facility site.

Appendix G contains photographs that show existing conditions of the Tacoma LNG Facility site as seen from the four KOPs, as well as photographic simulations of how the site would appear after construction of the Project.

Appendix G contains a series of photographs that were taken from locations within the assessment area of the Proposed Action. The photographs are referred to as “character” photographs in that they illustrate the character of landscapes within the assessment area. A number of the photographs in Appendix G were taken looking toward the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites from locations within the assessment area to depict how visible, or not visible, these sites are from various locations. A number of the photographs were taken at twilight so that existing lights in the assessment area are depicted.

3.8.2 Regulatory Framework

The Washington State Environmental Policy Act establishes requirements for assessing environmental impacts, including impacts on aesthetic resources. Washington Administrative Code 197-11-960 provides guidance for assessing potential impacts from a proposed project on various resources and issues. Among the resources and issues that need to be addressed are aesthetics, light, and glare. Aesthetic requirements include the following:

1. Describing the height, materials, and appearance of the tallest proposed structures.
2. Identifying views in the immediate vicinity of a proposed project that would be altered or obstructed.
3. Identifying measures to reduce or control aesthetic impacts.

Requirements related to light and glare include the following:

1. Identifying off-site sources of light or glare that might affect a proposed project.
2. Describing the type of light and glare that would be associated with a proposed project and describing when it would occur (night or day).
3. Determining if light or glare could become a safety hazard.
4. Determining if light or glare could interfere with views and, if appropriate, identifying proposed measures to control light and glare.

Some jurisdictions have identified views, viewpoints, and scenic roads for which impacts from proposed projects must be assessed. The City of Tacoma has not identified protected views that are applicable to the Project. Because the Project would be located in a part of Tacoma that has been designated as the Port Maritime and Industrial District, the land use emphasis in the district is on supporting maritime and industrial uses.

The Urban Aesthetics and Design Element of the Generalized Land Use Element of the Tacoma Comprehensive Plan has a land use policy—LU-UAD-8 (Viewpoints, Gateways, and Focal Points)—of relevance to aesthetic resources. The policy instructs the City to "Designate key viewpoints, gateways, and focal points in the city. Create policies, standards, and guidelines that address the design and treatment of viewpoints, gateways and focal points to reinforce and/or enhance the unique character of neighborhoods and the city" (City of Tacoma 2013). To date, no viewpoints, gateways, or focal points in neighborhoods near the proposed Project have been designated.

Chapter 13.06 (Land Use Regulatory Code) of the Tacoma Municipal Code describes land use regulations for all zones within the city of Tacoma, including the Port Maritime and Industrial District and the Shoreline District (S-10) - Port Industrial Area (HI) designation under which the Project site would fall. Within this designation, no specific views are identified or mentioned, nor are regulations related to view preservation or visual quality.

The Port of Tacoma provides policies and procedures related to lighting in the *Port of Tacoma Environmental Compliance Program Manual* (Port of Tacoma 2014). The *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* (Port of Tacoma 2009) evaluated a site that overlaps with the proposed Project site and determined that the *Port of Tacoma Environmental Compliance Program Manual* should be used to mitigate light and glare impacts associated with *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement* site development. Similarly, this analysis assumes that the Port of Tacoma aims to prevent impacts on the visual environment by minimizing glare, obtrusive lighting, and artificial sky glow associated with outdoor lighting. Where applicable, the Project would follow policies for the design, installation, and lighting management provided in the *Port of Tacoma Environmental Compliance Program Manual*.

Land Use Elements in the Comprehensive Plans of Pierce County and the City of Fife both include goals that maintain view protection associated with open space and natural areas. In addition, both Pierce County and the City of Fife have adopted the *Countywide Planning Policies for Pierce County, Washington* (Pierce County 2012), which calls for the identification and protection of significant visual resources that preserve community character. Significant visual resources may include federal, state, and locally designated historic sites, public views, landmarks, cultural landscapes, open space, parks, and other areas of special interest. These jurisdictions have not identified significant visual resources within the vicinity of the PSE Natural Gas Distribution System. In addition, Title 18A (Development Regulations – Zoning) of the Pierce County Code and Title 19 (Zoning) of the City of Fife Municipal Code do not designate or identify specific views related to view preservation or visual quality within the Proposed Action area.

The Container Port Element of the Tacoma Comprehensive Plan identifies a Core Area of port and port-related container industrial areas which include the Project site. This element seeks to protect the long-term function and viability of this area, and in so doing, "[t]he City recognizes the important role that the

Port of Tacoma plays in regional employment and economic development. Identification and long-term preservation of the Core Area ensures that the Port of Tacoma facilities and related industrial uses will have room to thrive in the City." Policy CP-6 - Noise, Odor, and Visual Character: In the Core Area, allows for localized impacts associated with industrial activities, including noise, odor, and visual character, that that are appropriate and expected in heavy industrial areas but would not be allowed in other parts of the city. Noise and odor may be associated with transportation and manufacturing facilities. Visual character may include outdoor storage, relatively large building mass, and impervious surface area. While localized impacts are permitted, the element states that the City will continue to require Core Area industrial uses to be developed in a manner that protects the environment and preserves public health and safety from a citywide and regional perspective.

3.8.3 Affected Environment

The Project would consist of the following main components:

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System.
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The locations of these components are shown in Figure 1-2 in Chapter 1 (Purpose, Need, and Alternatives Considered).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), new Golden Given Limit Station, and an upgrade to the existing Frederickson Gate Station.

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the city of Tacoma. Pipeline Segment A would be located in the City of Tacoma and the City of Fife, and Pipeline Segment B would be located in unincorporated Pierce County. In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County. A detailed description of the Proposed Action area is provided in Chapter 2 (Description of Proposed Action).

The following sections describe the affected environment as it relates to aesthetics, light, and glare.

3.8.3.1 Aesthetics

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are located in a part of Tacoma that has been designated as Port Maritime and Industrial District. This designation and the resulting industrial and marine-oriented land uses found within the Blair-Hylebos peninsula greatly influence the landscape character of the peninsula and the sites for both Project components. The presence of ship-to-shore cranes loading and unloading ships of varying sizes and types, along with multiple waterways lining the peninsula; the storage of materials and goods in large-scale buildings or storage yards; and the presence of trains and trucks moving products all contribute to the working landscape character of the peninsula. Appendix G contains character photographs from throughout the assessment area of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites, as well as other parts of the Blair-Hylebos peninsula. The descriptions below provide site-specific information on the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System improvements.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility would be located on the Blair-Hylebos peninsula adjacent to the south side of the Hylebos Waterway. The TOTE Marine Vessel LNG Fueling System would be located within the existing TOTE

facility, directly adjacent and across Alexander Avenue East from the Tacoma LNG Facility site. Proposed aboveground components would potentially be seen from a fairly limited viewing area owing to the flatness of the peninsula and large-scale developments on the peninsula that tend to screen views within it and from the Hylebos and Blair waterways. The following three distinct geographic areas are used to describe the affected environment of areas near the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System (and to discuss potential impacts):

- Areas northwest of the Blair-Hylebos peninsula,
- Blair-Hylebos peninsula, and
- Areas southeast of the Blair-Hylebos peninsula.

The following discussion describes the context and character of the three areas and the views toward the Project from within each area.

Areas Northwest of the Blair-Hylebos Peninsula

Areas northwest of the Blair-Hylebos peninsula include the Hylebos Waterway and its adjacent shorelines, Marine View Drive, the steep slope north of Marine View Drive, and residential areas above the steep slope northwest of Marine View Drive. Although the context and character of each of these areas is slightly different, as are the types of people who would potentially view the Project, the maritime industrial character of the Blair-Hylebos peninsula and Hylebos Waterway is the same regardless of the location from which it is viewed. Large-scale facilities and vast areas used for storage are seen across the Blair-Hylebos peninsula, and the Hylebos Waterway is lined with piers, bulkheads, barges, and ships. These features reinforce the maritime industrial character of the landscape that is viewed from areas northwest of the Blair-Hylebos peninsula.

The Hylebos Bridge connects East 11th Street and the Blair-Hylebos peninsula with Marine View Drive (State Route 509), the Northeast Tacoma neighborhood, and Browns Point. The northwest end of the bridge and portion of East 11th Street beyond it are surrounded by mud flats (at low tide), some of which are being restored with native vegetation. This area (particularly the northwest side of the bridge) has a somewhat natural appearance. There are no formal public viewing areas near the bridge that provide views of the Hylebos Waterway, Tacoma LNG Facility site, or TOTE Marine Vessel LNG Fueling System site. The public can see both sites while driving, riding, or walking on the Hylebos Bridge.

Views toward the Tacoma LNG Facility site from shoreline areas, uplands, and the parts of Marine View Drive east of the Hylebos Bridge are restricted by shoreline development, the marina, and the Hylebos Bridge. Several small commercial, construction, and industrial properties on the north side of the waterway, as well as a large tank farm that contains approximately 30 tanks of varying types, colors (white and gray), heights (some approximately 85 feet high), and widths (several up to approximately 100 feet in diameter), block views toward the Tacoma LNG Facility site from this section of Marine View Drive. These tanks, which are generally metal in construction, are shown in the character photographs on page G-7 in Appendix G. The closest of the tanks to the Tacoma LNG Facility site is approximately 2,000 feet away.

West of the Hylebos Bridge and East 11th Street, Marine View Drive heads toward Browns Point on a narrow shelf of level land located between the waterway and the steep vegetated slope to the north. Along its way, the drive passes by two large marinas, one of which is abandoned. Several parking areas and pullovers are located along this portion of Marine View Drive. Views of part of the Tacoma LNG Facility site are possible from these areas, although parts of the site are screened by moored boats, boat storage sheds, and other marina facilities. The Tacoma LNG Facility site is located approximately 370 feet southeast of the closest moored boats and is clearly seen from parts of the marinas and the Hylebos Waterway.

The vegetated slope northwest of Marine View Drive is a generally undeveloped greenbelt that has few views to the south and east. There are one or two undeveloped and unpaved pullover areas on McMurray Road NE, but with these exceptions, there are few opportunities for the public to see the Blair-Hylebos

peninsula, the Hylebos Waterway, the Tacoma LNG Facility site, or the TOTE Marine Vessel LNG Fueling System site.

Areas northwest of the slope that Marine View Drive parallels include the neighborhoods of Northeast Tacoma and Browns Point (in unincorporated Pierce County). The only parts of these neighborhoods from which the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System components would potentially be visible are residences located next to the top of the slope and a segment of Browns Point Boulevard located near McMurray Ravine. The single-family residences (and at least one multifamily complex) located near the top of the slope have extensive views to the south that, depending on location, encompass Commencement Bay, the maritime industrial area (including the Tacoma LNG Facility site) located between Commencement Bay on the west and Interstate 5 on the east, downtown Tacoma, the Hilltop neighborhood, and areas beyond (including Mount Rainier). Maritime and industrial land uses dominate the viewed landscape from these residences. Viewed elements that can be clearly seen include large-scale maritime industrial buildings (most of which are single-story, metal-frame structures), asphalt and gravel-covered storage yards, parking areas, roads, railroad tracks, tall light standards, electrical transmission lines, storage containers, and cranes of various types and sizes. Along the waterways (primarily the Hylebos and Blair waterways) are features that can be seen such as piers, riprap shorelines, bulkheads, and ships and barges of varying sizes and types. Nighttime views of the industrial area include numerous building lights, lights for loading and unloading containers, lights for parking and outdoor storage areas, security lights, streetlights, and lights from trucks, automobiles, trains, and ships. Daytime and twilight (to depict existing lighting) photographs of the Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, and surrounding areas were taken from several locations along the edge of the slope (Appendix G).

Blair-Hylebos Peninsula

The Blair-Hylebos peninsula is located between the Blair Waterway, which is generally located to the south, and the narrower, longer, Hylebos Waterway located generally to the north. The peninsula has a strong maritime industrial character. Properties near the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites that abut Alexander Avenue East or East 11th Street (both of which pass by the site) comprise extensive areas used to store containers and materials, industrial uses, vacant areas awaiting redevelopment, and utilities. Large features that can be seen throughout the peninsula are cranes, tall storage structures, and large-scale buildings. Glimpses of the Blair and Hylebos waterways and the slope north of Marine View Drive are possible from some locations. Views toward the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites from within the flat peninsula tend to be blocked or screened by existing buildings and facilities.

The Tacoma LNG Facility site contains several buildings (one and two stories in height), including one exceptionally large (approximately 258,000-square-foot) building. The Tacoma LNG Facility site also contains extensive paved areas surrounding the buildings, a small dock, an approximately 590-foot-long timber pier, and a series of wood bulkheads adjacent to the Hylebos Waterway. The southwest corner of the Tacoma LNG Facility site currently has approximately 20 deciduous trees, planted as landscaping to line the existing parking area. Two to three trees also occur along the shoreline of the Hylebos Waterway. Edging the facility site are numerous utility transmission lines following both Alexander Avenue East and East 11th Street. The existing facility site is similar in appearance and character to areas near it and has a strong maritime industrial character.

The TOTE Marine Vessel LNG Fueling System site is proposed within the existing developed footprint used for TOTE's shipping operations. The entire site is paved and used for storage, loading, and offloading of cargo containers. The Blair Waterway includes five separate existing in-water structures, and the shoreline is entirely armored with riprap.

Areas Southeast of the Blair-Hylebos Peninsula

Areas southeast of the Blair-Hylebos peninsula include portions of the Blair Waterway, its shoreline, and the industrial area immediately south of the Blair Waterway. The Blair Waterway is used to load and unload container ships. Large cranes, bulkheads along the shorelines, and extensive paved areas where containers are stored are prominent visual features. The waterway, its shoreline, and adjacent lands have a strong maritime industrial character. There are no marinas along the waterway that cater to recreational boaters, no public boat launches for recreational boats, and no parks in the area. Consequently, public views toward the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are limited to roads such as Port of Tacoma Road that provide access into the interior of this area.

PSE Natural Gas Distribution System

Improvements to the PSE Natural Gas Distribution System associated with the Proposed Action would involve constructing two new distribution pipeline segments, constructing the new Golden Given Limit Station, and upgrading the existing Frederickson Gate Station. Both pipeline segments would be located within, or underneath, existing streets. The segments would be located in areas that have a variety of land uses (see Section 3.7 [Land Use]).

Golden Given Limit Station

The Golden Given Limit Station would be built south of the intersection of East 99th Street and East 10th Avenue near Golden Given Road East in unincorporated Pierce County. The limit station would be located on a previously disturbed and developed parcel near the north end of Pipeline Segment B. The limit station parcel is currently developed with an existing building and paved parking lot. Figure 2-19 in Chapter 2 (Description of Proposed Action) shows the location of the proposed new limit station.

Frederickson Gate Station

PSE operates existing equipment at the Frederickson Gate Station that provides natural gas and pressure regulation to the local distribution system. The Project would require facility changes to the existing Fredrickson Gate Station in order to provide sufficient gas supply to the Tacoma LNG Facility while maintaining operational reliability of the existing distribution system into Pierce County. Figure 2-20 in Chapter 2 (Description of Proposed Action) shows the location of the gate station.

3.8.3.2 Light and Glare

Surrounding Area Lighting

The land use designation of Port Maritime and Industrial District allows 24-hour operations to accommodate regional and international shipping and distribution schedules. As a result, many of the properties in the Blair-Hylebos peninsula contain extensive lighting systems. Appendix G contains several photographs from within the assessment area that were taken during twilight to show existing features and existing sources of light. The storage area on the TOTE property to the immediate southeast of the Tacoma LNG Facility site (across Alexander Avenue East) has a number of high, bright security lights. They appear to be metal-halide or mercury-vapor lights (which generally have a bluish-white appearance) and are visible from many viewing areas. Other storage container–loading and unloading facilities southeast of the Blair Waterway also have bright lights, as do most of the associated large cranes.

On-site Lighting

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites currently contain widely scattered overhead lights located above storage and parking areas, as well as a limited number of lights on the side of, or within, buildings. The existing large, approximately 258,000-square-foot building on the Tacoma LNG Facility site has a bank of lights near its southwestern corner to illuminate areas used for loading and unloading. The site appears to contain both metal-halide (or mercury-vapor) lights that produce intense white light and sodium-vapor lights that produce a yellowish-pinkish color.

Existing Glare Conditions

Glare is defined as "a harsh uncomfortably brilliant light" (Merriam-Webster, Inc. 2014). By this definition, most of the existing features in the viewed landscape of the Tacoma LNG Facility site and nearby areas do not produce glare. Although, as discussed in the previous subsection, high-intensity lights are located on properties in the vicinity of the Project site, their presence is consistent with maritime and industrial land uses and is not sources of glare to residences northwest of the Blair-Hylebos peninsula or to nearby motorists (which could be a safety issue if the glare were to distract motorists). Reflection of the sun can also be a source of glare. Few, if any, surfaces found within the existing site or on nearby properties are reflective enough of the sun to create uncomfortable glare conditions to residences northwest of the Blair-Hylebos peninsula or to nearby motorists.

3.8.4 Impacts of the Proposed Action

3.8.4.1 Construction Impacts

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would require activities such as demolition of existing site features, partial/limited vehicle access on nearby roads, materials and equipment deliveries and storage, pile driving, the presence of construction equipment, dust, and construction lighting. At the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites, construction staging, laydown, and material and equipment storage would occur within the sites themselves. No additional areas outside the limits of the sites would be needed.

The activities related to construction would occur in an industrial area visible from several locations with high viewer sensitivity in the surrounding area, including residential viewers above the slope adjacent to Marine View Drive and northeast of the Hylebos Waterway and recreationists using the Chinook Landing Marina areas along Marine View Drive north of the site. Although temporary and limited to the duration of construction, some construction activities would be long term, extending for over three years. During this time, construction activities are unlikely to obstruct views or produce substantial light or glare that would create a safety hazard; however, these activities are likely to be noticeable to and attract the attention of sensitive viewers. Demolition of existing buildings would require approximately three months; civil preparation, including removal of existing trees, soil improvement, grading, and installation of below-grade utilities, would take approximately seven months. Actual plant construction would require approximately 42 months, and construction of the fueling platform in the Blair Waterway would require approximately seven months. Some of these timeframes overlap, but in general, site preparation and construction are expected to begin in the third quarter of 2015 and end by the fourth quarter of 2018.

Other construction activities related to the Project include those associated with pipeline segments and with the limit and gate stations. Construction staging and laydown areas for pipeline work would be located within areas zoned for commercial and industrial uses. These areas would be used temporarily during construction. Constructing these facilities would result in temporary, localized impacts that would not substantially alter or obstruct views or produce light or glare that would create a safety hazard or interfere with views. Construction activities at the limit and gate stations would be completed within approximately three months. Pipeline Segment A would require approximately seven months for construction activities. Horizontal directional drilling may be constructed independently from standard pipeline trenching construction. Construction of Pipeline Segment B would require an estimated three months.

Because aesthetic impacts of construction activities and construction-related light and glare during the construction of the Tacoma LNG Facility has the potential to be substantial due to the long-term temporary duration and effects on sensitive viewers, mitigation measures have been identified that would reduce these impacts to less than significant levels (see sections 3.8.6.1 [Aesthetics] and 3.8.6.2 [Light and Glare]).

3.8.4.2 Operations Impacts

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The potential visual impacts associated with the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System are presented in Table 3.8-1 and discussed in the following text.

Table 3.8-1 Tacoma LNG Facility Components With the Most Potential to Be Noticeable

Components	Description	Notes
LNG Storage Tank	Tank would be approximately 140 feet high by 130 feet in diameter.	Similar in industrial appearance to storage tanks in the tank farm northeast of the Hylebos Bridge on the northeast side of the Hylebos Waterway (the closest tanks are approximately 2,000 feet away from the LNG Facility site), but the LNG tank would be substantially taller and more massive in form.
Pipeline from Tank to Hylebos Pier	Approximately 600-foot-long, above-ground pipeline that extends across the Hylebos pier.	Would be similar to the existing industrial appearance of the surrounding area.
Elevated Flare for Upset Conditions	Approximately 80 feet in overall height (as measured from ground level) and 1 foot in diameter.	The elevated flare would not be used during normal operations; the only time flame would be visible is during an extreme emergency when a rapid evacuation of the process and/or refrigerant system is required. In this type of emergency situation, the flame is estimated to be 70 feet tall. A pilot flame for the upset flare may be visible, but its visibility would be minimal compared to other lights in the general vicinity and given its size and distance to viewers.
Enclosed Ground Flare System	Approximately 40 feet in overall height and 10 feet in diameter.	Flames would not be seen from the flare in the surrounding area. The ground flare is an enclosed system, and visible flame would be contained within the flare enclosure.
Pretreatment System: Amine Towers	Each of the two structures is approximately 80 feet in overall height and 4 feet in diameter.	These are components necessary as part of the pretreating the natural gas prior to liquefaction.
Control Building	An existing two-story office/shop building would be repurposed for administration, maintenance, and control room purposes. The building is approximately 26 feet in height at the peak of the roof.	Appearance of the building would not change significantly.
Storage Building	An existing 110-foot by 200-foot sheet metal building in the northwest corner of the site would be kept and maintained for material during construction.	Appearance of the building would not change significantly.
Compressor Building	New single-story, metal-frame building would be 100 feet by 60 feet. The building would be approximately 35 feet in height at the peak of the roof.	Would be similar in appearance to other utilitarian buildings in the immediate vicinity.
Power Distribution Center	New single-story, pre-manufactured building.	Would be similar in appearance to other utilitarian buildings in the immediate vicinity.
Hylebos Concrete Pier	New pier would be 60 feet long by 25 feet wide with a 68-foot-wide by 33-foot-long concrete access trestle and four 15-foot by 15-foot (225	Would replace existing creosote timber pier; fewer pilings and newer materials improve the aesthetic appearance over existing pier.

Table 3.8-1 Tacoma LNG Facility Components With the Most Potential to Be Noticeable

Components	Description	Notes
	square feet each) dolphins, positioned at either end of the pier.	
Cryogenic Pipeline	Approximately 1,200-foot-long underground pipeline that extends over water up to an approximately 20-foot-high fueling platform.	Would be similar to the existing industrial appearance of the TOTE facilities.
Fueling Barge	Approximately 200 feet in length and 52 to 58 feet wide.	Would be similar in appearance to barges currently providing bunkering services with other fuels.
Blair LNG Loading Platform	Concrete piling-supported concrete platform, approximately 81 feet by 33 feet, to support the pipeline to the ship's fueling flange; accessed by a ramp of adequate width to support fire response vehicle.	Would be similar in appearance to piers and other industrial structures within the Port of Tacoma.
Landscaping	Landscape buffers along East 11th Street and Alexander Avenue East.	If required, landscaping would follow City of Tacoma Land Use Regulatory Code Requirements for landscaping.

Aesthetics

Areas Northwest of the Blair-Hylebos Peninsula

The industrial maritime character of views of the Tacoma LNG Facility and its associated components, once operational, generally would be similar to the character of the existing views seen from the areas north and northeast of the Blair-Hylebos Peninsula, as described above.

The applicable zoning and development standards for the Port Maritime and Industrial District and the Shoreline District (S-10) - Port Industrial Area (HI) designation, which encompass the Tacoma LNG Facility site, do not establish a requirement or standards for the uniform appearance of structures. Nevertheless, the LNG storage tank proposed at the Tacoma LNG Facility would be an industrial vertical cylindrical structure set on a flat landform with adjacent buildings, utility infrastructure, and smaller vertical elements surrounded by waterbodies and a variety of structures with similar forms in the vicinity. The form of the single LNG storage tank would be similar to but substantially taller and more massive than tanks in the tank farm 2,000 feet northeast of the Hylebos Bridge on the northeast side of the Hylebos Waterway.

From KOP 1 (Browns Point Boulevard north of McMurray Ravine): The appearance of the existing Tacoma LNG Facility site seen from this elevated location would change when viewed from residential areas north of the slope above Marine View Drive such as KOP 1 (see photographic simulation in Appendix G). However, the site would retain its current maritime industrial character. From most elevated locations north of the slope above Marine View Drive, the roof of the 258,000-square-foot building, stored materials near the building, and the vacant lot to the east of the building are the primary features that are now seen. The large building would be removed, and within part of its footprint would be the LNG storage tank, buildings, the cryogenic pipeline and tanker truck loading area, and extensive areas of paving and gravel. The rebuilt piers, shoreline, and barges would remain visible.

The replacement of the large building and adjacent storage areas with the facilities previously described would change the appearance of the Tacoma LNG Facility site. The primary change would be that the existing wide (approximately 325 feet) 258,000 square-foot, 40-foot-tall building would be replaced with the narrower (approximately 130 feet wide), taller (140 feet) LNG storage tank and areas of paving and gravel. The existing building and its light-colored and reflective roof (which attracts attention when viewed from above) would be removed and replaced with the tall cylindrical concrete tank structure with a smaller

footprint. Tacoma LNG Facility components would be seen from areas north and northeast of the slope above Marine View Drive in foreground views by sensitive viewers (residents and recreationists).

Although the visual character of the area would not be significantly altered, views of the site would be somewhat degraded by introducing the large LNG storage tank. The tank would be similar in form to other storage tanks in the vicinity, but it would be substantially taller (140 feet versus 85 feet for the tallest tanks in the vicinity), greater in diameter (130 feet versus 100 feet), and more massive, with a volume more than twice that of similar tanks nearby. The contrast produced by the new, tall, cylindrical form and light gray color would be substantial. The LNG storage tank would be a dominant element that would attract attention and be highly noticeable in foreground views by residential and recreational viewers with high viewer sensitivity. Although tanks of similar form are located in the vicinity approximately 2,000 feet east of the site, they do not appear to be visible in views of the site from residences, the marina, and other sensitive viewing areas along Marina View Drive and the contrast produced by the LNG storage tank would be strong for views from this KOP.

For these reasons, the aesthetic impact of the LNG storage tank would be adverse for views from this area. Although the contrast produced by the form of the LNG storage tank would remain substantial, the overall aesthetic impact of the tank would be reduced by implementing mitigation measures identified in Section 3.8.6.1 (Aesthetics) that would use darker colored finishes to help blend it with its surroundings and reduce its strong vertical contrast and Section 3.8.6.2 (Light and Glare) that would minimize light reflection and help reduce its noticeability.

From KOP 2 (a parking area near a marina adjacent to Marine View Drive): The appearance of the Tacoma LNG Facility site when viewed from areas of similar elevation such as KOP 2 along the Hylebos Waterway and Marine View Drive would change compared to the existing condition, but would retain the current maritime industrial character (see photographic simulation in Appendix G). The existing low, wide (approximately 325 feet) 258,000-square-foot building would be replaced by the narrower (approximately 130 feet in diameter), but taller (140 feet) LNG storage tank. The tall cylindrical storage tank would add an additional vertical industrial element to tall elements (cranes and light standards) that are currently silhouetted against the sky.

Although the visual character of the area would not be significantly altered, views of the site and area would be somewhat degraded by introducing the large new LNG storage tank. The contrast produced by the tall, cylindrical form and light gray color would be substantial. Although other tall, vertical industrial elements are silhouetted against the sky, the LNG storage tank would be substantially more massive in form, and it would be a dominant element that would attract attention and be highly noticeable in foreground views by recreational viewers with high viewer sensitivity for views from the marina and other areas along Marine View Drive.

From KOP 3 (the Hylebos Bridge [East 11th Street]): Several Tacoma LNG Facility site components would be clearly visible from KOP 3, which is located on the Hylebos Bridge and East 11th Street (see photographic simulation in Appendix G). The LNG storage tank would be taller and more massive than the tallest current site features, but the site would retain its maritime industrial character. When viewed from the north end of the bridge, the LNG storage tank would appear in the foreground and intrude upon views of parts of the distant background including the hills beyond downtown Tacoma. The structural components of the two flares would be seen in front of the LNG storage tank. Rebuilt piers, offshore structures, shoreline structures, and barges being loaded would also be visible, and would be similar in appearance and character to features that are currently seen at the site and at other properties along the Hylebos Waterway. These proposed Tacoma LNG Facility site components would somewhat obstruct views of maritime industrial facility areas behind them and the hills beyond downtown Tacoma. The tall and massive form of the LNG storage tank would be silhouetted against the sky and low background hills and introduce a dominant and highly noticeable element in views from this area. Although some recreational viewers may use this area for boating and fishing, most viewers would consist of local workers and people commuting to or from work or

traveling for personal business along East 11th Street with low to moderate viewer sensitivity. Although the tall and massive LNG storage tank would produce strong contrast, viewer sensitivity would be low to moderate in views from this area, and therefore aesthetic impacts would be less than significant. Although overall aesthetic impacts of the Project would be less than significant for views from this area, impacts would be somewhat reduced by implementing mitigation measures identified in Section 3.8.6.1 that would use darker colored finishes to help blend it with its surroundings and reduce its strong vertical contrast and Section 3.8.6.2 that would minimize light reflection and help reduce the noticeability of the tank.

Blair-Hylebos Peninsula

Public views within the Blair-Hylebos peninsula are generally confined to the several streets that pass through the peninsula. The two streets that front the Tacoma LNG Facility site (East 11th Street and Alexander Avenue East) are lined with buildings and facilities that support industry and maritime operations. The viewers would see different structures, but the site's industrial character would not change.

From KOP 4 (the corner of East Alexander Avenue and East 11th Street): Some existing buildings seen from this KOP would be retained and repurposed. Others would be demolished and replaced with the infrastructure described above (see photographic simulation in Appendix G). The appearance of the Tacoma LNG Facility site would be consistent with the existing maritime industrial character of most of the Blair-Hylebos peninsula. Removal of several existing buildings would somewhat open up views of the slope north of Marine View Drive. The tall, massive LNG storage tank would be the most prominent site feature in views from this area and would intrude upon part of the hillside behind it. However, no sensitive or important views within the Blair-Hylebos peninsula would be significantly altered or obstructed by the LNG storage tank or other features associated with the Tacoma LNG Facility because most viewers would consist of local workers and people commuting to or from work or traveling for personal business with low to moderate viewer sensitivity.

Existing perimeter vegetation would be retained if allowed by regulators and some additional planting may be used to collect and treat stormwater. Both of these situations could have minor benefits to the visual setting of this corner. Infiltration of stormwater typically used to water plantings is discouraged by the Washington Department of Ecology and United States Environmental Protection Agency on contaminated sites. Additional plantings also create additional safety, security, and maintenance issues. Much of the existing site is covered by asphalt or gravel and would remain so to address maritime and LNG site security and safety regulations. Although the tall, massive LNG storage tank would produce strong contrast, viewer sensitivity would be low to moderate in views from this area, and therefore aesthetic impacts would be less than significant. Although overall aesthetic impacts of the Project would be less than significant for views from this area, the impacts would be somewhat reduced by implementing mitigation measures identified in Section 3.8.6.1 that would use darker colored finishes to help blend it with its surroundings and reduce its strong vertical contrast and Section 3.8.6.2 that would minimize light reflection and help reduce the noticeability of the tank.

Areas Southeast of the Blair-Hylebos Peninsula

The top of the LNG storage tank may be seen from some locations in the area south of the Blair-Hylebos peninsula and from the Blair Waterway. Because of the presence of large-scale buildings and other facilities between these areas and the Tacoma LNG Facility site, the LNG tank would be an additional industrial feature seen within this maritime industrial landscape. The LNG loading platform proposed within the Blair Waterway would be the visible feature from areas to the southeast as part of the TOTE Marine Vessel LNG Fueling System. However, the entire Blair Waterway, and the TOTE site specifically, already include numerous in-water features as seen within this maritime industrial landscape. The tall, massive LNG storage tank would be a dominant site feature in views from this area and would intrude upon part of the hillside to the north. However, no sensitive or important views within the Blair-Hylebos peninsula would be significantly altered or obstructed by the LNG storage tank or other features associated with the Tacoma

LNG Facility because most viewers would consist of local workers and people commuting to or from work or traveling for personal business with low to moderate viewer sensitivity. Because no sensitive or important views within the Blair-Hylebos peninsula would be significantly altered or obstructed by the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System features, aesthetic impacts would be less than significant for views from this area. Although overall aesthetic impacts of the Project would be less than significant for views from this area, the impacts would be somewhat reduced by implementing mitigation measures identified in Section 3.8.6.1 that would use darker colored finishes tank to help blend it with its surroundings and reduce its strong vertical contrast and Section 3.8.6.2 that would minimize light reflection and help reduce the noticeability of the tank.

Light and Glare

Safety and security lighting associated with the Tacoma LNG Facility would not be expected to produce more light or be brighter than existing lights on the site owing to the reduced overall footprint compared with existing development. The lighting would include downcast lighting on 30-foot poles, which is generally consistent or shorter than the lighting included with most existing industrial land uses on the Blair-Hylebos peninsula. Lighting associated with the Proposed Action would be visible from the residential area along the top of the slope north of Marine View Drive; however, the light produced by the Tacoma LNG Facility would not interfere with views from the residential area along the top of the slope north of Marine View Drive because it would be pointed downward and shielded as described in Section 3.8.6 (Mitigation Measures). A fully developed lighting plan would require the review and approval by the United States Coast Guard for maritime security regulations and by the Washington Utilities and Transportation Commission to meet Pipeline and Hazardous Materials Safety Administration regulations for lighting.

None of the materials or surfaces of the features at the Tacoma LNG Facility would be conducive to glare. Implementing mitigation measures identified in Section 3.8.6.2 that would use dark gray finishes on roofs and prominent features and minimize stray light and light reflection would ensure that impacts of light and glare would not be significant.

LNG Fueling Operations

The two methods for fueling TOTE's ships are described in Chapter 2 (Description of Proposed Action). Impacts from the first or barging method are discussed below. The second method involves an underground cryogenic pipeline from the LNG storage tank to the TOTE terminal. Owing to its underground nature, the pipeline would have no potential impacts on aesthetics and would not be a source of light or glare. The Tacoma LNG Facility would also have the capability of loading tanker trucks with LNG for transport to other places. This operation would be limited to the tanker truck loading area at the south end of the site near Alexander Avenue East and away from areas external to the Blair-Hylebos peninsula. Thus, the tanker truck loading would not be expected to impact aesthetics or light and glare.

The barge that would be used to transfer LNG to the TOTE terminal and to other customers and locations in Puget Sound would be similar in character to barges that currently service the TOTE terminal, TOTE vessels, and other industrial barges used in the Port of Tacoma. When in use, the barge would be docked at the PSE facility. The presence of the barge when active or moored would be consistent with the maritime/industrial facilities, activities and any associated lighting already occurring in the Blair-Hylebos peninsula and the Hylebos and Blair waterways. The barge would not impact views or the aesthetic setting of areas near these locations.

PSE Natural Gas Distribution System

Pipeline Segments. The pipeline segments would be installed below finished grade and covered by existing paved streets, and no lighting would be required. Therefore, the pipeline segments would result in no visual impacts once in operation.

Gate Station and Limit Station. The existing Frederickson Gate Station operates with equipment similar to what would be installed as part of the Proposed Action. Proposed upgrades to the existing gate station would maintain the general appearance of the gate station. The upgrades would not result in new impacts on views or the aesthetic setting of adjacent areas.

The site where the Golden Given Limit Station is proposed is currently occupied by a building and paved parking lot. Those would be demolished, and a new limit station of smaller footprint would be constructed. The limit station would include a heater, a remote terminal unit, and pigging facilities, likely within a building or behind a noise wall to mitigate noise and comply with noise regulations. Native vegetation would be added after construction to aesthetically improve the site. Therefore, the Golden Given Limit Station would result in a changed visual setting, but smaller new structures surrounded by native vegetation would be an improvement to the viewscape over that which currently exists.

3.8.4.3 Decommissioning Impacts

The estimated total design life of the Proposed Action is 50 years. Decommissioning of the Tacoma LNG Project components would generate impacts similar to those discussed in Section 3.8.4.1 (Construction Impacts). Potential impacts associated with decommissioning activities would be temporary and would not alter or obstruct views or produce light or glare that would create a safety hazard or interfere with views. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Project components.

3.8.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action-related impacts on aesthetics, light, and glare would not occur. However, a new and consistent supply of cleaner fuel with fewer air emissions than traditional fuels, as would be provided by the Proposed Action for marine and land transportation, would remain unavailable in the Proposed Action area. Further, the peak shaving capability of the Proposed Action would be unavailable to augment natural gas service to PSE customers.

3.8.6 Avoidance, Minimization and Mitigation

3.8.6.1 Aesthetics

The LNG storage tank would be a large-scale component of the Tacoma LNG Facility site similar in character to, but substantially taller and more massive than, storage tanks located in the tank farm approximately 2,000 feet northeast of the site and east of the Hylebos Bridge and East 11th Street. To somewhat reduce the dominance and noticeability of the LNG storage tank in views from the marina and residential areas to the north, it is recommended that the tank have a non-reflective concrete finish and a dark gray color that would be similar to the dark gray colors of adjacent asphalt paving areas and rooftops and walls of new buildings. The normally light gray color of the concrete could be darkened using integral color or other appropriate means to darken the finish surface of the tank. By having a non-reflective surface and a dark gray color, the concrete LNG storage tank would not contrast as much with the nearby areas as would a lighter-colored concrete or more reflective painted tank when viewed from the marina and elevated locations to the north. The roofs and walls of other buildings that would be constructed within the Tacoma LNG Facility site should also have non-reflective finishes and dark gray colors.

To further minimize the potential visual impacts associated with the Tacoma LNG Facility site, the following measures would be implemented during construction and operations:

- PSE would maintain all construction and operations sites viewable from residences, state and county highways and roads, parks, trails, and other public recreation areas and sensitive viewing receptors clean and orderly and shall ensure that materials, equipment, and vehicles are as inconspicuous as possible (i.e., screened or stored away from public view).

- To minimize visual impacts from residential neighborhoods looking down on the project area PSE would include landscaping around the LNG storage tank with a combination of gravel, larger boulders, and intermittent stands of drought resistant trees and shrubs. PSE would also keep this area free of invasive and noxious plants.
- To minimize impacts from street views along 11th Street and Alexander Way, to the degree possible, existing trees should be retained and additional landscaping provided.

3.8.6.2 Light and Glare

To minimize the potential nighttime visibility of lights associated with the Tacoma LNG Facility site, the following measures would be implemented (subject to safety and navigation-related regulations): PSE would use the minimum lighting necessary for safety and security during construction and operate and orient lighting required for safety and security at all construction areas, including storage and laydown areas, to mostly or fully eliminate off-site light spill at all times when the lighting might be in use and minimize the effect of increasing light pollution in the surrounding area.

- During construction, lighting for safety and security will be shielded and oriented downward, bare bulbs will be fully screened from view from sensitive viewing receptors such as residences, and on-demand lighting and/or timers will be used to minimize visual impacts of lighting.
- Exterior lighting fixtures would be attached to 30-foot-tall poles, which would be similar in height, or shorter than, most poles used for lighting in the area. Fixtures at the site would employ a full-cutoff design. A full-cutoff design means that the lamps are located inside the light fixture and a series of properly situated internal reflectors is used to direct the light in the desired direction and prevent the light from radiating out horizontally, or shade and shield accessories to prevent light spillover.
- Exterior nonpole (attached to buildings and other facilities) lighting would point downward and be shielded.
- Lighting would be provided with switches or automatic controls that would turn off lights when not required for Proposed Action operations. Photocells or timers would be considered to automatically control the use of light during daytime hours (lights can be quite visible during the times of the year when the hours of daylight are limited and dark conditions are common).
- The LNG storage tank could be unpainted dark gray concrete and any light reflection from it would be minor or nonexistent. The nonreflective, unfinished surface of the tank and the downward shielding of lighting would prevent most light spillover to off-site areas, and would result in minimal, if any, reflective visual impacts to sensitive viewers. The unfinished concrete surface of the tank would be less reflective than the existing tanks northeast of the site and Hylebos Waterway.

As a result of the reduced footprint of the Proposed Action compared to the existing site, the Proposed Action is not expected to produce more or brighter light than the existing lights at the site. Mitigation measures would minimize the potential nighttime visibility of lights at the site for lights associated with refueling, particularly from the residential area to the north where viewers are anticipated to be most sensitive to changes in the visual landscape. Several mitigation measures were devised specifically to reduce the visibility of light and glare to the residential areas to the north.

3.8.7 Conclusion

The existing site contains a variety of industrial structures of differing materials, sizes, and uses. The Proposed Action would replace those industrial structures with fewer but taller structures than the existing structures that are shorter, wider, and have a larger footprint. The site would remain industrial in use and character, as would surrounding areas. However, the LNG storage tank would be substantially taller and

more massive than other Project elements and existing features in the vicinity and would produce strong contrast in form. Compared to the previous site use, the tank would introduce a dominant new element that would be highly noticeable and attract attention in some foreground views for residential and recreational viewers with high viewer sensitivity. For these reasons, the overall visual impact of the Project would be significant and unavoidable. With implementation of design and other measures to avoid, minimize, and mitigate aesthetic impacts, the magnitude of these adverse impacts would be reduced. With implementation of design and other measures to avoid, minimize, and mitigate impacts of light and glare, the Proposed Action would not produce significant or unavoidable adverse impacts from light and glare.

3.9 Cultural Resources

Cultural resources are generally categorized as the historic-era built environment (buildings, structures, and modified landscapes) or archaeological resources (historic and prehistoric). This section describes existing cultural resources in the area of potential effect (APE) associated with the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and identifies the potential for impacts on these resources under the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). No eligible or potentially eligible historic-era resources were identified in the APE, and no eligible or potentially eligible archaeological resources are known or likely to be present within the APE.

3.9.1 Study Methodology

A site reconnaissance was conducted on December 6, 2012, to obtain a firsthand view of existing site conditions on the Blair-Hylebos peninsula, including the Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System sites and the Proposed Action APE.

Research for both the historic-era built environment and archaeological resources in the Proposed Action APE was conducted between December 26, 2012, and January 11, 2013, using the Washington Department of Archaeology and Historic Preservation's (DAHP) online Washington Information System for Architectural and Archaeological Records Data (WISAARD) database. The background research for historic-era resources encompassed an area extending 300 feet from the site boundary of the Proposed Action APE. Background research included a review of pertinent site distribution maps, site form files, and reports on previous archaeological research for the Proposed Action APE and for an area within 0.25 mile of the APE.

The Tacoma LNG Facility site has been previously investigated. A total of 20 archaeological investigations (surveys and site testing) have been carried out within 0.25 mile of the Proposed Action APE (Cultural Resources, Inc. 2009). Construction of the two new distribution-pipeline segments and the Golden Given Limit Station, and upgrades to the existing Frederickson Gate Station, would take place underneath existing surface streets or within paved and developed areas. Because is not practicable to conduct archaeological surveys under or within paved surfaces, no additional field surveys were conducted. However, an Unanticipated Discovery Plan, prepared by PSE, contains procedures for the unanticipated discovery of cultural resources and human skeletal remains and includes provisions for cultural resources sensitivity training for all construction personnel. DAHP staff and individuals from the Puyallup Tribe of Indians will be invited to contribute to this training. Letters of introduction and requests for a meeting regarding the proposed Project were sent to Bill Sterud, Chairman of the Puyallup Tribe of Indians, on August 8 and September 19, 2014, and to Virginia Cross, Chairwoman of the Muckleshoot Tribal Council on September 18, 2014. These letters are provided in Appendix H.

Table H-1 of Appendix H lists previous investigations carried out within 0.25 mile of the Proposed Action APE.

3.9.2 Regulatory Framework

Cultural resources in the Proposed Action area are protected by local, state, and federal regulations. Adherence to the City of Tacoma's Standard Operating Procedures for cultural resource surveys are required for projects subject to SEPA review and for projects within the 1873 Puyallup Tribe of Indians survey area. The Proposed Action is currently undergoing environmental review under Washington's SEPA and under the jurisdiction of Washington's statutory provisions found at Revised Code of Washington 68.60, 27.44, and 27.53 and in regulations contained in WAC 25.48. In addition to city and state requirements, the Proposed Action must comply with regulations of the City of Fife and the Pierce County charter because the Puget Sound Energy (PSE) Natural Gas Distribution System improvements are located in these areas. Both cities refer to state regulations (WAC 197-11-960) for implementation of SEPA rules. Pierce County addresses protection of cultural resources in the Pierce County charter, Chapters 19.40-60. The DAHP oversees regulatory compliance. Historic properties and criteria for evaluation are defined by Section 106 of the

National Historic Preservation Act. Traditional Cultural Properties are generally defined as properties that are eligible for listing in the National Register of Historic Places (NRHP) because of their association with cultural practices or beliefs of a living community that are rooted in that community's history.

3.9.3 Affected Environment

This section analyzes the potential for historic-era and archaeological resources in the Proposed Action APE.

3.9.3.1 Area of Potential Effects

The APE for the Proposed Action comprises the Tacoma LNG Project components. Project components associated with the Proposed Action are summarized as follows and further described in Chapter 1 (Purpose, Need, and Alternatives Considered) and Chapter 2 (Description of Proposed Action):

- **Tacoma LNG Facility**: Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System. The Tacoma LNG Facility APE is delimited by the facility site boundary (see Figure 2-1 in Chapter 2,"Description of Proposed Action").
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The TOTE system APE is delimited by the site boundary (see Figure 2-1 in Chapter 2).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments, a new limit station (the Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. The pipeline segments and their APEs are defined by the roadways on which they are centered, which are roughly 25 feet wide. The limit station and gate station APEs are defined by their site boundaries (see Figures 2-18 through 2-20 in Chapter 2).

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the city of Tacoma. The two new distribution pipeline segments would be located in the city of Tacoma and the city of Fife (Pipeline Segment A) and in unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County.

3.9.3.2 Site History

The Tacoma LNG Facility, TOTE Marine Vessel LNG System, and a majority of new distribution pipeline (Pipeline Segment A) would be located at the Port of Tacoma in an area that was zoned for industrial use more than 75 years ago and has been used consistently for intense maritime and industrial purposes since that time. Industrial development on the property and vicinity has substantially altered the delta, marsh, and tidal environments of Commencement Bay over the last century. The Port of Tacoma and private facilities occupy the upland portion of the area on the peninsula between the Hylebos and Blair waterways, on the west side of Blair Waterway, and south of the Blair Waterway turning basin. Since its initial construction, the Blair Waterway has been actively operated, managed, maintained, and improved as an industrial and commercial navigable waterway and is currently used for commercial cargo transport associated with the Port of Tacoma shipping facilities and other private commercial and industrial users. Between the 1920s and the 1960s, Hylebos Waterway was constructed by dredging a channel through the tidal marsh and using the dredged material to create the adjacent peninsula and the uplands on the east side of the waterway.

Cultural Resources Overview for the Blair-Hylebos Terminal Redevelopment Project, Tacoma, Pierce County, Washington (Cultural Resource Consultants, Inc. 2009) provides a detailed archaeological, historic, and ethno-historic contextual account of the area.

3.9.3.3 Results of Historic and Archaeological Resources Investigation

Historic-era Resources

Twelve structures within the Proposed Action APE were previously recorded and recommended as not eligible for listing on the NRHP (Cultural Resource Consultants, Inc. 2009). Three additional historic-era buildings have since been identified within the Proposed Action APE; these buildings are associated with former activities of the United States Navy. All were recorded and recommended as not eligible for listing on the NRHP. The buildings are described as follows:

- **Berthing Warf (Building 40)** is a 591-foot wood pier on the Hylebos Waterway. The berthing wharf was built in 1942 when the federal government acquired part of the Seattle-Tacoma Shipbuilding Corporation's shipyard for its Naval Industrial Shipyard. The wharf was used during World War II to berth naval vessels during the war years, and the Naval Reserve continued to use the wharf after the war. Substantially reconstructed in 1971, the wharf was recommended as not eligible for listing on the NRHP (Moore 2008a).
- **Berthing Wharf (Building 60)** was constructed at the same time and served the same function as the Building 40 berthing wharf. The T-shaped structure is situated on the Hylebos Waterway and features an approach ramp. It was recommended as not eligible for listing on the NRHP (Moore 2008b).
- **Boat Mooring Float (Building 61)** was built in 1953 for Naval Reserve use and consists of several timber mooring dolphins. It was recommended as not eligible for listing on the NRHP (Moore 2008c).

In addition to the properties described above, 17 properties meeting the NRHP 50-year minimum age requirement are located within 300 feet of the Proposed Action APE. Of those properties, one has been formally evaluated and determined not eligible for listing on the NRHP. The remaining 16 properties are unevaluated. All 17 properties are outside of the APE for the Proposed Action.

The list of historic-era resources within the 300-foot-wide search area is provided in Table H-2 of Appendix H.

Archaeological Resources

No archaeological sites of any kind have been recorded on WISSARD within the Proposed Action APE. Six previously recorded pre-contact and historic-era archaeological sites have been recorded within 0.25 mile of the Proposed Action APE. Of these six, one (45PI488) has been determined eligible for inclusion on the NRHP. The remaining five have not been evaluated. The complete list of archaeological sites within 0.25 mile of the Proposed Action APE is provided in Table H-3 of Appendix H, and Figure 3.9-1 (privileged and confidential—not for public distribution) depicts site locations.

3.9.4 Impacts of the Proposed Action

This section discusses potential impacts on any existing historic and cultural resources or potential resources in the Proposed Action area, related to construction and operation of the Proposed Project.

3.9.4.1 Construction Impacts

Historic-era Resources

The Proposed Action APE contains no properties determined or recommended as eligible for listing on the NRHP. Therefore, the Proposed Action would have no impact on the built environment.

Archaeological Resources

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are historic constructed landforms and therefore are unlikely to contain archaeological resources. No archaeological sites have been recorded in or directly adjacent to either of the two new pipeline segments, the Golden Given Limit Station site, or the existing Frederickson Limit Station. It is possible that currently undetected archaeological resources could be present under the current roadway surfaces proposed for pipeline construction and that

such construction, including directional drilling beneath those road surfaces, could result in adverse impacts on those sites.

3.9.4.2 Operations Impacts

Historic-era Resources

No eligible or potentially eligible historic-era resources are present in or directly adjacent to the Proposed Action APE; therefore, operations of the facility would not result in adverse impacts on any currently known historic-era resources.

Archaeological Resources

Operation of the Proposed Action would not result in adverse impacts on archaeological resources because no archaeological resources have been recorded in or directly adjacent to the APE of the Proposed Action and because no new land would be disturbed during operations.

3.9.4.3 Decommissioning Impacts

No eligible or potentially eligible historic-era resources were identified in the APE, and no eligible or potentially eligible archaeological resources or Traditional Cultural Properties are known or are likely to be present within the APE. Because decommissioning would occur within the APE developed for the Proposed Action, no decommissioning impacts on the historic-era built environment or on archaeological resources are anticipated.

3.9.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action-related impacts on historic and archaeological resources would not occur. However, a new and consistent supply of cleaner fuel with fewer air emissions than traditional fuels, which would be provided by the Proposed Action for marine and land transportation, would remain unavailable in the Proposed Action area. In addition, the opportunity to provide PSE's natural gas customers with peak shaving capability would not occur with the No Action Alternative.

3.9.6 Avoidance, Minimization, and Mitigation

3.9.6.1 Construction

Historic-era Resources

Because no properties eligible or recommended for the NRHP of the built environment are present in the APE of the Proposed Action, no mitigation measures are recommended.

Archaeological Resources

The following measures will be implemented to avoid impacts to archaeological sites or artifacts.

- Given that it is not practicable to conduct archaeological surveys for all areas that are to be excavated or are under paved surfaces, PSE will prepare an Unanticipated Discovery Plan. An Unanticipated Discovery Plan specifies key tasks and procedures for construction personnel and the Project Manager, outlines procedures in the event of a discovery, and identifies key contacts in the event of a discovery. The Unanticipated Discovery Plan for the Proposed Action is provided in Appendix H.
- Pipeline construction in areas near the base of the Blair-Hylebos peninsula at or near the natural shoreline that are deemed likely to have cultural importance would be monitored by a trained and experienced cultural resource expert.
- PSE will provide training in identifying cultural artifacts according to a training protocol developed by PSE and approved by the City after consultation with the Puyallup Tribe. In addition, PSE will ensure that crews involved in ground disturbing activities are familiar with the Unanticipated Discovery Plan. If suspected cultural artifacts are found, construction will be halted in the vicinity of the find until the

status of the artifact can be determined. In addition, PSE will notify a contact person provided by the Puyallup Tribe prior to commencement of ground breaking and the expected duration of any excavation.

3.9.6.2 Operations

Because no properties eligible or recommended eligible for listing on the NRHP are present in the Proposed Action APE, no mitigation is proposed.

3.9.7 Conclusion

3.9.7.1 Historic-era Resources

No historic-era resources of the built environment are present within the APE of the Proposed Action APE. Therefore, no significant unavoidable adverse impacts would be expected.

3.9.7.2 Archaeological Resources

No archaeological resources are known or are likely to be present within the APE of the Proposed Action. Therefore, no significant unavoidable adverse impacts are expected. It is possible that construction of pipeline segments could result in adverse impacts on currently undetected archaeological resources. As noted in Section 3.9.6 (Mitigation Measures), the Unanticipated Discovery Plan will help minimize the potential for, and degree of, impacts. Appropriate mitigation actions would be implemented if currently undetected sites were discovered during construction activities.

Figure 3.9-1 Archaeological Sites Recorded within 0.25 Mile of the Tacoma LNG Project Area of Potential Effect

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3.10 Transportation

This section describes the existing transportation network serving the area surrounding the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on the local and regional roadway system that may result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). Although the Project is primarily focused on LNG bunkering operations for Totem Ocean Trailer Express (TOTE) and an LNG barge loading facility, it also includes an LNG two-bay truck loading facility to truck LNG for off-site uses.

This section analyzes both potential impacts to land-based transportation and traffic and potential impacts to maritime traffic in the Hylebos and Blair waterways, which surround and would be used as part of the Proposed Action. It also proposes mitigation measures to offset these potential impacts.

3.10.1 Study Methodology

For the purposes of this analysis, the study area for transportation included roadways immediately adjacent to or crossed by the Project. A desktop analysis was performed that relied on existing data and transportation studies at or near the proposed Project site. Daily traffic volumes on state highways were gathered from the most recent version of the *Annual Traffic Report* published by the Washington State Department of Transportation (WSDOT 2014). Traffic volumes on local roadways were collected from the *Transportation Discipline Report—Blair-Hylebos Peninsula Terminal Redevelopment Project* (Transportation Discipline Report; DEA 2009) and the *Tideflats Area Transportation Study (TATS) Final Report* (Fehr and Peers 2011); the Washington State Department of Transportation (WSDOT) provided additional information related to traffic safety. In addition, information from the Tacoma Tideflats Emergency Response Study (Fehr and Peers 2015) was reviewed in assessing access and egress issues at the Hylebos peninsula (see also Section 3.11 (Public Services and Utilities).

This analysis estimated the maximum number of construction vehicle trips per day that may travel on public roadways within the traffic and transportation study area. Construction-related trips were estimated based on the anticipated construction material needs, construction workers, and support staff for the three main Project components described in Section 3.10.3 (Affected Environment). Information regarding construction material was provided by Puget Sound Energy (PSE) and supplemented with trips scaled from similar LNG facility studies. During operation, trip estimates were based on the number of expected employees and necessary deliveries or maintenance.

PSE developed assumptions regarding the distribution of trips generated by the Proposed Action on surrounding roadways based on existing traffic patterns. The estimated number of trips generated by the Proposed Action were compared to the most recent traffic volumes available. The resulting traffic operations were then compared with the level of service (LOS) estimates from the Transportation Discipline Report and congestion data from the Tideflats Area Transportation Study to assess the effects of the Proposed Action on traffic and, where appropriate, consider mitigation measures.

To assess potential impacts to maritime traffic, existing data were collected on vessel trips within the Hylebos and Blair waterways, including deep-draft vessel, tugboat, and barge operations. The data for existing conditions were then compared against the maritime trips that would be generated during construction and operation of the Project to assess the level of potential impact.

3.10.2 Regulatory Framework

This section describes plans, policies, and regulatory requirements that are relevant to the development of the Project in relation to traffic and transportation.

3.10.2.1 Growth Management Act 2013 Update

All cities within Pierce County are subject to the planning and regulatory requirements of the Growth Management Act, 2013 update (Revised Code of Washington 36.70A.070). The transportation requirements

specified in this act include adopting local comprehensive plans and their transportation elements, and ensuring that developments are consistent with these local plans. Transportation systems should be coordinated with local plans and priorities to appropriately support developments.

3.10.2.2 Pierce County Comprehensive Plan

The Pierce County Comprehensive Plan provides direction for the siting of public facilities, including transportation facilities. Countywide policies related to transportation include addressing concurrency (by providing transportation facilities to adequately accommodate new development) and managing roadway operations (through effective use of existing transportation facilities). (Pierce County 2012)

3.10.2.3 City of Tacoma Comprehensive Plan (amended 2013)

The transportation element of the City of Tacoma Comprehensive Plan (amended 2013) contains general goals and policies for the overall transportation system in Tacoma over the next 20 years (City of Tacoma 2013).

3.10.2.4 City of Fife Comprehensive Plan

The City of Fife Comprehensive Plan contains an assessment of current traffic operations, a summary of future projected traffic conditions, and recommended solutions to address expected deficiencies. It also provides community transportation goals and strategies to implement them. (City of Fife 2013)

3.10.2.5 Tideflats Area Transportation Study

The Tideflats Area Transportation Study looks at major roadway corridors and intersections near the Port of Tacoma. Transportation conditions in the study area were forecasted for the year 2030 and indicate that traffic conditions will deteriorate substantially by 2030. This study provides recommendations for improving transportation to better serve freight traffic in the area. (Fehr and Peers 2011)

3.10.2.6 Tideflats Area Emergency Response and Intelligent Transportation System Study

The City of Tacoma's Tideflats Area Emergency Response (ER) and Intelligent Transportation System (ITS) Study, currently underway, serves as a supplement to the Port of Tacoma's Tideflats Area Transportation Study. The ER/ITS study identifies the impacts from traffic congestion on emergency services, along with proposed mitigation measures. As explained by the City of Tacoma:

> *The proposed ER/ITS study is an outgrowth of concerns raised by the City and others resulting from proposed and previous Port area development as well as information contained in the Port of Tacoma's Land Use and Transportation and Strategic Plans and the Container Port Element of the City Comprehensive Plan. Existing development within the Tacoma Tideflats has significantly impacted emergency response capability.*
>
> *Using the ER/ITS study, the City proposes to model the impacts of known, planned and potential additional increases in business activity to measure the future impact to emergency response. The study also is expected to provide potential options for mitigation as well as recommendations for implementation of an ITS intended to enhance the capability of the existing and future transportation network in the Port area to inform and safely manage emergency response.* (City of Tacoma, not dated).

3.10.2.7 Port of Tacoma Land Use & Transportation Plan

The Port of Tacoma Land Use & Transportation Plan serves as a guide for future development at the Port of Tacoma and recommends infrastructure improvements for road, rail, and waterways (Port of Tacoma 2014).

3.10.3 Affected Environment

The transportation study area encompasses the following main Project components, which are further described in Chapter 2 (Description of Proposed Action):

- **Tacoma LNG Facility:** Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System.
- **Totem Ocean Trailer Express (TOTE Marine Vessel LNG Fueling System)**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges.
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), a new limit station (the Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station.

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the city of Tacoma. Local access to this area is obtained by arterial and collector roads under the jurisdiction of WSDOT, the City of Tacoma, and the City of Fife.

The two new distribution pipeline segments would be located in the City of Tacoma and the City of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County.

3.10.3.1 Roadway System

The Proposed Action would be served by an existing network of hierarchal, functionally classified roads consisting of principal arterials, minor arterials, and collector roads.

Principal Arterials. Principal arterials are typically of regional importance and are intended to serve high volumes of traffic traveling between major generators or population centers. These arterials can have a high degree of access control. Within the cities of Tacoma and Fife, principal arterials serving the Proposed Action study area are Interstate 5 (I-5), State Route (SR) 509, SR-99 (Pacific Highway East), Port of Tacoma Road, Marine View Drive, East 11th Street, and 54th Avenue East.

Minor Arterials. Minor arterials provide access between principal arterials and lower functioning roadways and typically have less access control than principal arterials. Taylor Way is the only functionally classified minor arterial providing site access.

Collector Roads. Collector roads provide for traffic movement between arterials and local streets and may also provide direct access to abutting properties. Collector roads serving the Proposed Action study area include East Alexander Avenue South and Lincoln Avenue.

Figure 3.10-1 shows the roadway network serving the Proposed Action study area. A description of this network is provided in the Transportation Discipline Report (DEA 2009) in Appendix I.

3.10.3.2 Traffic Volumes

Table 3.10-1 shows the existing average daily traffic (ADT) volumes on access roadways near the proposed Tacoma LNG Facility site. Traffic volumes were not available for the entire length of the proposed pipeline. Traffic volumes were obtained from several different sources, and the most recent traffic volume for each roadway is presented below. Traffic volume on different portions of I-5 has increased by 4 to 9 percent between 2008 and 2014, while volumes on different portions SR-509 have increased between 0 and 8 percent.

The 2008 ADT volumes on local roads were obtained from the Transportation Discipline Report (DEA 2009) while 2011 ADT volumes were obtained from the Tideflats Area Transportation Study (Fehr and Peers 2011). Table 3.10-1 shows that traffic volumes on local roads have generally decreased where data were available for both 2008 and 2011.

Table 3.10-1 Average Daily Traffic Volumes On Proposed Alternative Roadways

Roadway	2008 ADT	2009 ADT	2010 ADT	2011 ADT	2012 ADT	2013 ADT	2014 ADT
I-5 (west of 54th Avenue East Interchange)[a]	179,000	182,000	179,000	182,000	180,000	184,000	187,000
I-5 (east of 54th Avenue East Interchange)[a]	171,000	174,000	171,000	175,000	172,000	182,000	186,000
SR-509 (west of Port of Tacoma Road)[a]	26,000	24,000	25,000	25,000	27,000	27,000	28,000
SR-509 (east of Port of Tacoma Road)[a]	31,000	29,000	29,000	30,000	30,000	30,000	31,000
Marine View Drive /SR-509 (west of Norpoint Way)[a]	20,000	21,000	21,000	20,000	20,000	20,000	21,000
Marine View Drive /SR-509 (east of Norpoint Way)[a]	9,100	9,300	9,400	9,400	9,400	9,400	9,600
Pacific Highway East (between East Alexander Avenue and 54th Avenue East)[b]	N/A	N/A	N/A	19,700	N/A	N/A	N/A
Pacific Highway East (between 54th Avenue East and 62nd Avenue)[b]	N/A	N/A	N/A	19,600	N/A	N/A	N/A
Port of Tacoma Road (between Marshall Avenue and SR-509)[b]	N/A	N/A	N/A	8,500	N/A	N/A	N/A
Port of Tacoma Road (between East 11th Street and SR-509)[b]	9,900	N/A	N/A	8,500	N/A	N/A	N?A
Port of Tacoma Road (between SR-509 and Pacific Highway East)[b]	12,400	N/A	N/A	11,300	N/A	N/A	N/A
East 11th Street (between Taylor Way and East Alexander Avenue)[b]	3,500	N/A	N/A	N/A	N/A	N/A	N/A
54th Avenue East (between SR-509 and 8th Street East)[b]	18,100 – 19,300	N/A	N/A	16,400	N/A	N/A	N/A
Taylor Way (between Lincoln Avenue and SR-509)[b]	8,900	N/A	N/A	6,700	N/A	N/A	N/A
East Alexander Avenue (between Lincoln Avenue and SR-509)[b]	3,600	N/A	N/A	N/A	N/A	N/A	N/A
Lincoln Avenue (between Taylor Way and East Alexander Avenue)[b]	4,400	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
[a] Source: WSDOT 2013, 2014.
[b] Source: DEA 2009 (2008 ADT), Fehr Peers 2011 (2011 ADT).
Key:
ADT = average daily traffic
Ave = Avenue
I-5 = Interstate 5
N/A = data are not available
SR-509 = State Route 509

The Tacoma LNG Facility site currently is used by PCC Logistics, a logistics, warehousing, trucking, distribution, and freight services company. PCC Logistics distributes cargo to and from the site. Existing cargo operations contribute up to 50 trucks and 15 employee vehicles to daily traffic surrounding the Port of Tacoma.

The Transportation Discipline Report identified 2008 peak-hour traffic volumes at select intersections surrounding the Proposed Action study area (see Figures 8A and 8B in Appendix I). The Transportation Discipline Report also estimated 2013 peak hour traffic volumes, based on the actual 2009 volumes (see

Figures 11A and 11B in Appendix I). Per the Transportation Discipline Report, the p.m. peak hour is the most concentrated traffic period of the day, making it the critical peak for analysis and occurred approximately between 4:15 and 5:15 p.m. (DEA 2009)

3.10.3.3 Level of Service

LOS generally describes traffic conditions at an intersection based on delay and perceived levels of congestion. Six LOS classifications, designated from "A" to "F," indicate various traffic conditions. LOS A indicates the best operating condition; vehicles are able to move through an intersection with little to no delay. LOS F generally indicates the worst operating condition; drivers are likely to experience long delays and, at signalized intersections, may have to wait more than one cycle before moving through.

The most recently available p.m. peak hour LOS at key intersections in the vicinity of the Proposed Action were obtained from the Transportation Discipline Report and are presented in Table 3.10-2. The Transportation Discipline Report used the methodology described in the 2000 Highway Capacity Manual (Reilly 1998). The Transportation Discipline Report estimated the 2013 peak-hour LOS based on 2008 peak-hour traffic volumes and LOS, and assumed an increase in traffic volumes on local roads to estimate the 2013 LOS. More recent data have shown that daily traffic volumes have actually decreased on some local roads. Table 3.10-2 also notes intersections identified in the Tideflats Area Transportation Study as congestion hotspots.

Table 3.10-2 Estimated 2013 p.m. Peak Hour Level of Service

Int. No.	Intersection	Traffic Control	Jurisdiction	Level of Service	Delay (seconds)
1	Port of Tacoma Road/North Frontage Road	Signal	Tacoma	C	33
2	Port of Tacoma Road/12th Street	Signal	Tacoma	D	40
3	Port of Tacoma Road/Pacific Highway East	Signal	Fife	**E***	**69**
4	Port of Tacoma Road/I-5 Southbound	Signal	Fife	C*	22
5	Port of Tacoma Road/I-5 Northbound	Stop	Fife	B*	14
6	Port of Tacoma Road/20th Street	Stop	Fife	**F***	**> 100**
7	Alexander Avenue East/SR-509 Southbound	Signal	Tacoma	C	33
8	Alexander Avenue East/SR-509 Northbound	Signal	Tacoma	B	19
9	Taylor Way/East 11th Street	Stop	Tacoma	A	8
10	Taylor Way/Lincoln Avenue	Signal	Tacoma	B	11
11	Taylor Way/SR-509	Signal	Tacoma	**E**	**56**
12	54th Avenue East/4th Street	Stop	Fife	**F**	**55**
13	54th Avenue East/8th Street	Signal	Fife	A	7
14	54th Avenue East/12th Street	Signal	Fife	B	13
15	54th Avenue East/Pacific Highway East	Signal	Fife	**F***	**> 100**
16	54th Avenue East/I-5 Southbound	Signal	Fife	C*	27
17	54th Avenue East/I-5 Northbound	Stop	Fife	C*	31
18	54th Avenue East/20th Street	Signal	Fife	D*	48

Source DEA 2009.
Notes:
Bold shaded results indicate intersections that exceed the LOS D standard for the city of Tacoma and city of Fife.
*Identified as a congestion hotspot (Fehr Peers 2011)
Key:
Int. No. = intersection number
I-5 = Interstate 5
SR-509 = State Route 509

The City of Tacoma stipulates that at least 85 percent of the arterial lane miles within the Port of Tacoma area must operate at LOS D or better. Within the city of Fife, the acceptable LOS standard is LOS D for all local roads. Four study intersections within the city of Fife and one intersection within the city of Tacoma exceed the LOS D threshold under existing conditions. Three intersections operate over their capacities at LOS F, including the intersection at 54th Avenue East/Pacific Highway East, which operates with more than 2.5 minutes of delay on average on all approaches. Taylor Way at SR-509 within the city of Tacoma operates at LOS E, which indicates that the intersection may be nearing its capacity threshold. Both intersections are located between I-5 and the main access to the Port of Tacoma.

Three of the intersections estimated in the Transportation Discipline Report as having a low LOS are also identified in the Tideflats Area Transportation Study as congestion hotspots: Port of Tacoma Road/Pacific Highway East, Port of Tacoma Road/20th Street, and 54th Avenue East/Pacific Highway East. The Tideflats Area Transportation Study identified five additional intersections as congestion hotspots and are noted in Table 3.10-2. Two of the congested intersections are located along the proposed route for Pipeline Segment A, at Taylor Way /SR-509 and 54th Avenue East/4th Street. (DEA 2009; Fehr and Peers 2011)

3.10.3.4 Traffic Safety

Safety conditions are typically described by the number of crashes at a certain location or area. Vehicular crash histories at intersections and corridors in the Proposed Action study area between January 1, 2011, and December 31, 2013, were collected from WSDOT and include accidents on city and county roads reported by local police.

No fatality crashes occurred within these three years at the specified locations, but some incidents occurred that involved speeding or following too closely, negligent driving, and other improper lane maneuvers, resulting in personal injury. Collision statistics are provided in Appendix I.

The Port of Tacoma ER/ITS study found no fire stations or emergency response units deployed in the Tideflats area and determined that response times were above recommended standards. Poor roadway surfaces in the study area require emergency vehicles to travel at lower speeds, which contributes to the longer response time. Total average response time has increased from 8.2 minutes in 2012 to 9 minutes in 2014. Historic response time to locations near the Tacoma LNG Facility site is even longer, at 12.7 minutes. It was also determined that evacuation due to an emergency at the proposed Project site would be difficult due to route limitations and traffic congestion (Fehr and Peers 2015; TriData 2015).

A number of non-gated at-grade rail crossings are located in the study area and are discussed in Section 3.10.3.8 (Rail Facilities). These present potential safety concerns from collisions between vehicles and rail cars and the potential for rail cars crossing or stopped at an at-grade crossing to increase response time and limit access for emergency vehicles.

As discussed in Section 3.10 (Public Services and Utilities), emergency response times in the Tideflats have been found to exceed the performance objectives of the Tacoma Fire Department. Traffic incidents occurring and requiring the intervention of emergency services may therefore experience longer response times than in other parts of the city of Tacoma.

3.10.3.5 Transit

The Port of Tacoma peninsula is not currently served by transit. A portion of proposed Pipeline Segment A would run north-south within 62nd Avenue East, which intersects both Pacific Highway East and 20th Street East. Pierce Transit Route 500 runs east-west along Pacific Highway East, and Route 501 runs east-west along 20th Street East. Proposed Pipeline Segment B would run north-south within Golden Given Road, which intersects with East 112th Street at the south end of the pipeline. Pierce Transit Route 410 runs east-west along East 112th Street.

3.10.3.6 Nonmotorized Facilities

Sidewalks are limited on the street networks within the Proposed Action study area. Sidewalks are present on the east side of Alexander Avenue East along the frontage of the proposed Tacoma LNG Facility site, but no sidewalks are adjacent to the remaining areas of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. No sidewalk improvements are expected on the Blair-Hylebos peninsula at this time.

Sidewalks are limited along portions of Taylor Way where Pipeline Segment A would be located. Sidewalks are present on the west side of Taylor Way between East 11th Street and Lincoln Avenue, but not along Taylor Way between Lincoln Avenue and SR-509. Sidewalks are present along the city of Fife's street network where the remaining portions of Pipeline Segment A would be located. Sidewalks are intermittent and discontinuous along the portion of Golden Given Road East where Pipeline Segment B would be located. Sidewalks are not present along the frontage of the proposed site for the Golden Given Limit Station, nor along the portion of 192nd Street East where upgrades to the Fredrickson Gate Station would occur.

Dedicated bicycle lanes and shared nonmotorized facilities do not exist in the immediate Proposed Action area (Pierce County 2013). Additional information on nonmotorized facilities and an inventory of existing sidewalk locations are included in Appendix I, the Transportation Discipline Report (DEA 2009).

3.10.3.7 Freight Movement

Taylor Way and Port of Tacoma Road between East 11th Street and SR-509 are designated as Heavy Haul Industrial Corridors by the City of Tacoma in Tacoma Municipal Code 11.55.020. The City of Tacoma has also applied this designation to portions of East 11th Street and Alexander Avenue in the vicinity of the Project. Heavy Haul Industrial Corridors are intended to provide access for large heavy haul trucks within the Port of Tacoma and the surrounding area. Fife has designated 54th Avenue East as a truck route. See Figure 9 in Appendix I-1 for the designated truck routes within the city of Fife. See Figure 4 of the Tideflats Area Transportation Study for approved truck routes within the city of Tacoma (Fehr and Peers 2011).

From I-5, trucks serving the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be directed to use the 54th Avenue East interchange to Taylor Way.

Although the peak-hour for overall vehicle traffic is during the afternoon, truck volumes generally peak in the morning when the port opens (Fehr and Peers 2011).

3.10.3.8 Rail Facilities

Multiple rail lines and facilities operate at the four intermodal rail yards at the Port of Tacoma. The Burlington Northern Santa Fe Railway Company and the Union Pacific Railroad offer services from Tacoma across North America. From the Port of Tacoma's rail yards, goods are transported throughout the region through three highway interchanges along I-5.

Multiple rail lines in the transportation study area cross the local street network at grade. Three existing rail lines run parallel to the road right-of-way (ROW) along Alexander Avenue East adjacent to the proposed TOTE Marine Vessel LNG Fueling System site and directly across Alexander Avenue East from the Tacoma LNG Facility site. One of these three rail lines includes two separate spur lines, which extend across Alexander Avenue East and into the Tacoma LNG Facility site.

Rail lines also intersect a portion of the proposed PSE Natural Gas Distribution System along the proposed alignment of Pipeline Segment A. However, no rail lines or facilities are located near Pipeline Segment B, the proposed Golden Given Limit Station, or the Fredrickson Gate Station.

Trains crossing or stopped at an at-grade crossing can create traffic delays and prevent emergency vehicles from accessing a site. The following at-grade crossings are located near the proposed Project sites:

- Alexander Ave crossings:
  - Northwest of the intersection with East 11th Street (three locations)
- East 11th Street crossings:
  - Immediately southeast of the intersection with Alexander Avenue East
  - Immediately northwest of the intersection with Taylor Way
- Taylor Way crossings:
  - Southeast of the intersection with East 11th Street (two locations)
  - Approximately halfway between East 11th Street and Lincoln Avenue
  - Northwest of the intersection with Lincoln Avenue
  - Southwest of the intersection with Lincoln Avenue
  - Approximately halfway between Lincoln Ave and SR-509 (two locations)
  - Approximately 1,000 feet northwest of the intersection with SR-509 (two locations)
  - Northwest of the intersection with SR-509

3.10.3.9 Parking

Based on aerial imagery, ample parking within the Proposed Action study area appears to be available within the individual parcels. Parking does not appear to be allowed or accommodated on area streets such as Alexander Avenue East or Taylor Way/54th Avenue on the peninsula.

3.10.3.10 Potential Future Transportation Improvement Projects

Potential transportation projects in the vicinity of the Proposed Action that are expected to be constructed after 2015 were obtained from the WSDOT Statewide Transportation Improvement Program (TIP), the City of Tacoma TIP, and the City of Fife TIP. A TIP is a prioritized list of transportation improvement projects, identified at the local level and consistent with regional plans; projects must be included in the Statewide TIP to be approved for federal transportation funds. The following projects near the proposed Project were included in the 2015–2018 Statewide TIP and could impact access and egress from Project components (WSDOT 2015):

- **Modifications at the Port of Tacoma Road interchange with I-5**: An interchange justification report was completed in 2012 for the Port of Tacoma Road interchange with I-5. This report describes the future interchange with a realigned I-5 southbound off-ramp to 34th Avenue East. Port of Tacoma Road and 34th Avenue East would also be modified to operate as a couplet with the new interchange configuration. However, no funding has been identified and no date has been set to start construction.
- **High-occupancy vehicle (HOV) lanes on I-5**: The portion of I-5 that passes through the study area would be widened to include HOV lanes in both directions between M Street and Port of Tacoma Road. The northbound HOV lane currently is under construction, as is the southbound HOV lane south of Portland Avenue. Construction of the remaining portion of the southbound HOV lane (from Port of Tacoma Road to Portland Avenue) is expected to begin when the northbound HOV lane is complete.
- **Puyallup River Bridge Replacement**: Two segments of the Puyallup River Bridge on the west shore of the Puyallup River would be replaced. An additional connecting bridge segment would also be replaced. The new structures would increase the existing three lanes to four.
- **SR 167 Extension Project:** The Tacoma to Puyallup-New Freeway received funding recently through the Connecting Washington transportation bill. Design of the SR 167 extension, six-lane facility (two general purpose, one HOV lane each direction) in Puyallup from SR 161 to I-5, and four lane facility (two general

purpose lanes each direction) from I-5 to SR 509, is about 15 percent complete. There is a new 70th Ave structure crossing over I-5. Currently, the project is preparing a NEPA Re-Evaluation for the Federal Highway Administration's approval. Design Documentation and Plans for Approval will be the next milestone document for this project. WSDOT is beginning efforts of scheduling an access hearing for spring 2016, which will result in new ROW plans for continued acquisition by September 2016. WSDOT has been allocated funds over the next four biennia (2015–2023) for the project, the key piece of which is completion of ROW acquisition throughout the corridor. Relocation of businesses once ROW is acquired will take approximately three years to complete. Construction of portions of the project (e.g., wetland mitigation or riparian restoration or stream relocation) could starts at early as 2017.

The most recent version of the City of Tacoma Six-Year Transportation Improvement Program dated November 12, 2013, includes the following potential projects in the vicinity of the Project that are not included in the Statewide TIP (City of Tacoma 2013):

- Improve the SR-509/Taylor Way/54th Avenue East intersection by adding a separate right-turn lane on northbound 54th Avenue East and incorporating double left-turn lanes in both directions of SR-509.
- Construct a half-diamond interchange at the interchange of SR-509 at East D Street. This public/private partnership project currently is on hold.
- Rehabilitate the east spans of the Puyallup River Bridge over Pacific Highway East.

The most recent version of the City of Fife TIP was adopted in August 2013 and includes the following potential projects that are not included in the Statewide TIP near the proposed Project Site (City of Fife 2013):

- Interconnect traffic signals on Pacific Highway East Signal between Willow Road East to 59th Avenue East.
- Improve the intersection of Pacific Highway East and 54th Avenue East, including adding a second westbound left-turn lane.
- Rebuild the interchange of 54th Avenue East with I-5.
- Reconstruct 20th Street East between 50th Avenue East and 59th Avenue East to include five lanes with sidewalks and bike lanes.
- Reconstruct 12th Street East between 62nd Street East and Alexander Avenue East.
- Reconstruct the north side of Pacific Highway East between 54th Avenue East and 65th Avenue East to include curbs, gutters, sidewalks, and bike lanes.
- Reconstruct 62nd Avenue East between Pacific Highway East and 12th Street and extend over I-5 from Pacific Highway East to 20th Street East.

In addition to projects identified in current TIPs, the ER/ITS study has identified a number of likely road projects in the vicinity of the Tideflats that would be anticipated by 2020 and 2035. These include, among others, the reconstruction of Taylor Way. (Fehr and Peers 2015)

Maritime Traffic

The Captain of the Port controls and adjusts maritime traffic in the waterways. The Port of Tacoma has advised that volumes of maritime traffic in 2015 are down from historically higher volumes. Furthermore, the imminent opening of the widened Panama Canal is expected to further reduce ship volumes in West Coast ports. Lower shipping costs available through the Panama Canal and United States East Coast ports would allow them to reroute cargo now being moved through West Coast ports (USDOT Maritime Administration 2013).

The Hylebos and Blair waterways are both used for commercial vessel traffic of various types. Large ships that use the Hylebos Waterway primarily carry logs and scrap metals, and tallow and finished lumber are loaded at the Manke and Northwest Terminals, Inc., docks. The Hylebos Waterway is most often traveled by commercial vessels outbound at the highest high tide (slack tide), when the chance of hitting the bottom of the waterway is reduced, while inbound vessels are able to traverse the waterway at any time, as they are lighter and sit higher in the water. The Blair Waterway primarily supports travel by commercial vessels such as container shipping and automobile import industries, as the navigable depth of the waterway is suitable for transit by the largest shipping vessels (McCollough et al. 2004).

The Hylebos and Blair waterways are generally divided between channels (managed by the United States Army Corps of Engineers) and berthing areas (generally managed by the Port of Tacoma), which include some private berthing areas (Warfield pers. comm., 2014). Each deep-draft vessel, or ship containing 300 gross tons or more of cargo that is usually piloted and includes all foreign-flagged vessels, is accompanied by two tugboats, one fore and one aft (Moffatt & Nichol, pers. comm. 2013).

Appendix I describes the deep-draft traffic on the Hylebos and Blair waterways according to available data. These tables reflect data that are recorded and available, but the actual number of deep-draft vessels using the waterways may be higher. Table O-2 shows that deep-draft vessels used some portion of the Hylebos Waterway for a monthly average of 4.1 arrivals between 2010 and 2014. As described above, each deep-draft arrival is supported by two tugboats; therefore, the 4.1 deep-draft arrivals in the Hylebos Waterway were supported by a monthly average of 8.2 tugboats. The tugboat data associated with deep-draft vessels on the Hylebos Waterway are not included in Table O-2. Table O-3 shows that deep-draft vessels used some portion of the Blair Waterway at a monthly average of 62.8 arrivals in 2014. The deep-draft arrivals in the Blair Waterway were supported by a monthly average of 125.6 tugboats. The tugboat data associated with deep-draft vessels on the Blair Waterway are not included in Table O-3.

Barge and associated tugboat traffic occurs almost daily in the Hylebos and Blair waterways related to many operations within the Port of Tacoma. Barge and tugboat traffic rates in the Hylebos and Blair waterways are shown in Appendix I, according to available data from the Foss Maritime Company (Wolf, pers. Comm. 2015). These tables reflect data that are recorded and available, but the actual number of barges and tugboats using the waterways is higher because multiple companies operate barges and tugboats in the waterways besides Foss Maritime Company. Table O-4 shows that 322 barges and 367 tugboats used some portion of the Hylebos Waterway in 2014 for monthly averages of 26.8 barges and 30.6 tugboats. Table O-5 shows that 410 barges and 415 tugboats used some portion of the Blair Waterway in 2014 for monthly averages of 34.2 barges and 34.6 tugboats.

Appendix I contains data for medium and large vessels that use the Hylebos and Blair waterways in support of commercial operations within the Port of Tacoma. Smaller vessels are not reflected in the tables. Thus, the actual number of total vessels, including smaller vessels, is larger and difficult to estimate.

Commercial Fishing

Both the Hylebos and Blair waterways are closed to commercial fishing (Lothrop, pers. comm., 2013). Tribal commercial fishing vessels do moor at the Chinook Landing Marina, which is located on the northern side of the Hylebos Waterway (Chinook Landing Marina, pers. comm., 2013).

Recreational Use

As described in Section 3.7.2.2 (Existing Recreational Resources), minimal recreational boating and fishing occur on the Hylebos and Blair waterways.

3.10.4 Impacts of the Proposed Action

This section presents potential transportation impacts that could result from construction, operation, and decommissioning of the proposed Project.

3.10.4.1 Construction Impacts

Potential impacts from construction could include an increase in daily and peak hour traffic volumes and a temporary closure of up to two lanes of specific roadway segments for pipeline construction, resulting in a temporary increase in traffic delays and change in traffic patterns. Heavy and oversized construction vehicles would also cause more damage to road surfaces than lighter passenger vehicles, shortening the life of the pavement and eventually leading to rutting and cracking. Additionally, some increase in maritime traffic in the Hylebos and Blair waterways may occur, but vessels would largely remain stationary near the site. Construction would begin in the second quarter of 2015. Peak truck traffic would occur within the first five months of construction, as cement/grout trucks are necessary for soil improvement and site preparation. The peak of general construction is expected to occur in the summer of 2016 and represents the combined peak of construction trucks, delivery vehicles, and workforce/personnel vehicles.

Traffic Volumes

The Proposed Action is expected to result in an increase in traffic on roadways surrounding the proposed LNG facility and pipeline. As described in Section 3.10.1 (Study Methodology), construction trips were estimated based on the preliminary construction schedule. During the peak of construction, traffic would likely increase within and around the Tacoma LNG Facility and TOTE sites and would include trucks with oversized loads, heavy-duty and light-duty delivery trucks carrying machinery and large equipment, and construction workers' vehicles. Assuming approximately 24 workdays per month of construction, 139 vehicles (including cars and small or light-duty delivery vehicles) associated with construction could be used on a typical day during the peak of construction. This traffic includes personnel entering or exiting the site at the beginning or end of a work shift.

Approximately 11 large or heavy-duty vehicles associated with construction could be used during a typical day of peak construction. These large vehicles would arrive at and leave the site throughout the day. Conservatively assuming that half of these large vehicles enter and exit the construction area during the peak hour, up to five vehicles would visit the site during the afternoon peak hour (resulting in five inbound trips and five outbound trips).

During construction of the pipeline segments, approximately 15 cars or small vehicles (carrying workforce personnel) and approximately 20 heavy vehicles or large trucks (transporting pipeline segments, large equipment, and materials) could be generated for each mile of pipeline on a typical day at the peak of construction. This estimated number of construction vehicles could be expected at each of the two pipeline segment locations.

Construction vehicles for Pipeline Segment A would likely use the same roadways as Tacoma LNG Facility construction vehicles. Pipeline construction could occur at night; therefore, pipeline construction trips would not overlap with Tacoma LNG Facility construction vehicles. Pipeline Segment B, the Golden Given Limit Station, and the upgraded Frederickson Gate Station would not be located in the same area as the Tacoma LNG Facility; therefore, trips associated with pipeline construction would not likely overlap with construction trips destined for the Tacoma LNG Facility.

The number of anticipated trips associated with construction of the proposed Project is shown in Table 3.10-3.

Table 3.10-3 Anticipated Trips Associated with Construction of the Proposed Project

	PM Peak Hour Trips (directional)		Daily Traffic Volumes	
	Cars/Small Vehicles	**Trucks/Heavy Vehicles**	**Cars/Small Vehicles**	**Trucks/Heavy Vehicles**
Tacoma LNG Facility	0 inbound, 139 outbound	5 inbound, 5 outbound	139 vehicles	11 vehicles
Pipeline Segment A[a]	0 inbound, 0 outbound	0 inbound, 0 outbound	15 vehicles	20 vehicles
Total	**0 inbound, 139 outbound**	**5 inbound, 5 outbound**	**154 vehicles per day**	**31 vehicles per day**

Note:
[a] Construction of the pipeline could occur at night; therefore, no vehicle trips are expected during the PM peak hour.
Key:
LNG = liquefied natural gas

The preferred route for construction-related trips to the Tacoma LNG Facility site is yet undetermined. This analysis conservatively looked at the total 154 daily construction trips on each roadway to identify the maximum potential change in daily traffic volumes. Table 3.10-4 shows the maximum increase in ADT on each roadway in the study area during construction. All of the roadways in the study area would experience less than a 5 percent increase in daily traffic volumes during construction. Eleventh Street East and Alexander Street East would see an increase in over 4 percent during construction. However, when the existing trips taken by PCC Logistics personnel that would cease once construction begins are taken into consideration, all roadways would experience less than a 3 percent increase in daily traffic volumes (see Table 3.10-4).

With the exception of Taylor Way, it is unlikely that construction vehicles would rely on a single road to access the site, and the change in daily traffic volumes would be less than what is presented in Table 3.10-4. Trucks and passenger vehicles would likely arrive from both directions of I-5 and SR-509. From I-5, construction-related trips would use both the Port of Tacoma Road interchange and the 54th Avenue East interchange to access the site. Trips generated by the Proposed Action are assumed to access the site via the intersection of Taylor Way and SR 509. Roughly 70 to 80 percent of trips would use 54th Avenue via I-5 to access the site, approximately 10 to 20 percent of trips would use Port of Tacoma Road via I-5, and up to 10 percent would use SR 509 (either via I-705 or I-5) to access the site.

Table 3.10-4 Average Daily Traffic Volumes on Proposed Alternative Roadways During Construction

Roadway	Existing ADT (no. of vehicles)	ADT During Construction (no. of vehicles)	Percent Change in ADT	ADT During Construction (no. of vehicles)[a]	Percent Change in ADT
I-5 (west of 54th Avenue East Interchange)[b]	187,000	187,154	0.1%	187,089	0.0%
I-5 (east of 54th Avenue East Interchange)[b]	186,000	186,154	0.1%	186,089	0.0%
SR-509 (west of Port of Tacoma Road)[b]	28,000	28,154	0.6%	28,089	0.3%
SR-509 (east of Port of Tacoma Road)[b]	31,000	31,154	0.5%	31,089	0.3%
Marine View Drive /SR-509 (west of Norpoint Way)[b]	21,000	21,154	0.7%	21,089	0.4%
Marine View Drive /SR-509 (east of Norpoint Way)[b]	9,600	9,754	1.6%	9,689	0.9%
Pacific Highway East (between East Alexander Avenue and 54th Avenue East)[c]	19,700	19,854	0.8%	19,789	0.5%

Table 3.10-4 Average Daily Traffic Volumes on Proposed Alternative Roadways During Construction

Roadway	Existing ADT (no. of vehicles)	ADT During Construction (no. of vehicles)	Percent Change in ADT	ADT During Construction (no. of vehicles)[a]	Percent Change in ADT
Pacific Highway East (between 54th Avenue East and 62nd Ave)[c]	19,600	19,754	0.8%	19,689	0.5%
Port of Tacoma Road (between SR-509 and Pacific Highway East)[c]	11,300	11,454	1.4%	11,389	0.8%
East 11th Street (between Taylor Way and East Alexander Avenue)[c]	3,500	3,654	4.4%	3,589	2.5%
54th Avenue East (between SR-509 and 8th Street East)[c]	16,400	16,554	0.9%	16,489	0.5%
Taylor Way (between Lincoln Avenue and SR-509)[c]	6,700	6,854	2.3%	6,789	1.3%
East Alexander Avenue (between Lincoln Avenue and SR-509)[b]	3,600	3,754	4.3%	3,689	2.5%
Lincoln Avenue (between Taylor Way and East Alexander Avenue)[c]	4,400	4,554	3.5%	4,489	2.0%

[a] Project-related construction trips minus existing PCC Logistics trips
[b] Source: WSDOT 2013, 2014.
[c] Source: DEA 2009 (2008 ADT); Fehr Peers 2011 (2011 ADT).

Poor roadway surface has been identified as an issue along Taylor Way, and it is possible that traffic from oversize and overweight construction trucks could cause additional damage to roadway surface conditions.

Level of Service

During construction of the Tacoma LNG Facility, the temporary increase in traffic volumes may result in some decrease in LOS during the afternoon peak hour. These construction trips would be dispersed throughout the peak hour and could result in slight increases to average vehicle delay times. Any effects would be minor and temporary and would only be expected during the peak of construction of the Tacoma LNG Facility.

Within the study area, five intersections currently operate at LOS E or F during the afternoon peak hour, three of which were identified as congestion hotspots: Port of Tacoma Road/Pacific Highway East, Port of Tacoma Road/20th Street, and 54th Avenue East/Pacific Highway East. Estimated daily traffic volumes on these roadways near these intersections (accounting for existing trips generated by PCC Logistics at the site), represent less than a 1 percent increase over existing daily traffic volumes. Therefore, Project construction would be unlikely to significantly affect LOS.

Construction of Pipeline Segment A would occur at night, when traffic volumes are typically low. This would be necessary in order to avoid traffic delay impacts along Taylor Way and 54th Avenue East, particularly near intersections with LOS E and F, including Taylor Way/SR-509 and 54th Avenue East/4th Street.

Construction of Pipeline Segment B may result in localized traffic impacts. Where the pipeline alignment coincides with an existing roadway, construction activities would be limited to one travel lane, but lane closures, detours, and reduced travel speeds would also be expected. During construction, traffic along certain segments may be directed to alternate routes, and delay times and congestion in the area would likely increase temporarily as a result. Where the ROW permits and traffic is allowed to proceed adjacent to the construction area, flaggers, and appropriate buffer zones would be implemented as necessary, resulting in lower operating speeds.

Safety

Total traffic volume on streets near Project components would increase slightly and temporarily during Project construction. Therefore, the marginal increased risk of additional transportation incidents from increased traffic in the area would be minimal. Nonetheless, the temporary closure of traffic lanes for pipeline construction may result in an increase in response time for emergency vehicles or prevent direct access of emergency vehicles to emergency sites.

Nonmotorized Facilities

Project construction would not significantly impact existing sidewalks along street networks within the Proposed Action area. Construction and temporary construction staging and storage areas would only occur within the Tacoma LNG Facility site, TOTE Marine Vessel LNG Fueling System site, the paved ROWs needed to construct the pipeline segments, and the existing developed areas where the limit station construction and gate station upgrades would occur. Sidewalks affected by construction of the proposed Project would be restored to their original condition. Dedicated bicycle lanes and shared nonmotorized facilities do not exist in the immediate Proposed Action area and would not be impacted by construction of the Project.

Rail Facilities

Construction of the Project may disrupt rail traffic temporarily along the Blair-Hylebos peninsula, particularly where construction of Pipeline Segment A would intersect active railroad spurs crossing Taylor Way. Construction of Pipeline Segment A would occur underneath these rail lines. Mitigation measures to prevent construction activities along Taylor Way from impacting existing rail lines are provided in Section 3.10.6 (Mitigation Measures).

Construction of the Tacoma LNG Facility would remove one of the two rail spur lines on site, and the other spur line would be maintained for Proposed Action–related use. Removal of the one spur line on the Tacoma LNG Facility site would not impact existing rail service elsewhere in the Port of Tacoma.

Construction of the proposed TOTE Marine Vessel LNG Fueling System site would not alter the existing three rail lines adjacent to the site and parallel to Alexander Avenue East. Any potential construction-related delays to rail service along the three rail lines adjacent to Alexander Avenue East would be temporary and would not occur outside of the construction period for the TOTE Marine Vessel LNG Fueling System.

Maritime Traffic

The capacity of the Hylebos and Blair waterways to handle any additional water traffic should not be impacted to an appreciable level. TOTE vessels are now fueled by barges carrying bunker fuel. Those trips would stop and would be replaced by LNG barges fueling the TOTE vessels. No additional barging trips to the TOTE site are proposed beyond the bunker trips that are being replaced. PSE is communicating with the United States Coast Guard (USCG), Port of Tacoma, and TOTE regarding the proposed Project, and these parties have raised no concerns regarding the capacity of either waterway to handle additional water traffic. The Port of Tacoma has extensive capacity for existing and future water traffic.

Temporary vessel navigation impacts could occur during construction of in-water structures in both the Hylebos and Blair waterways as construction barges, equipment, and supplies are being transported to and from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. However, these impacts would be short term and limited to the duration of construction. Once the construction barges, equipment, and supplies arrive at either site, they would largely remain stationary and not restrict vessel movement up and down the remainder of the waterways. Any restricted vessel navigation during construction would be communicated through a notice to mariners by the USCG and posted by the Harbor Master at marinas in the vicinity of the Tacoma LNG Facility.

Construction of the in-water components in both the Hylebos and Blair waterways is anticipated to require a barge-mounted crane (derrick), a support barge, a diesel or hydraulic impact hammer, and various small

workboats. A tugboat may also be used to position the barges. Construction materials staging on barges would occur in the vicinity of the existing pier in the Hylebos Waterway and in the vicinity of the existing TOTE facilities in the Blair Waterway and would not impede surrounding vessel traffic in the rest of the waterway. Construction in the Hylebos and Blair waterways is estimated to result in two tug/barge roundtrips (in and out) of each waterway on a daily basis, and up to four small workboats would be working 10 to 12 hours per day. Due to constraints imposed by TOTE vessel operations, construction in the Blair Waterway would likely be limited to four days per week. Although these additional trips would increase the combined monthly average of the approximately 69.7 deep-draft vessels, barges, and tugboat arrivals that occurred on the Hylebos Waterway during 2014 (see Appendix I), and approximately 257.2 deep-draft vessels, barges, and tugboat arrivals that occurred on the Blair Waterway during 2014 (see Appendix I), these trips would be temporary and would not occur outside the construction period.

3.10.4.2 Operations Impacts

The Tacoma LNG Facility is expected to be complete and in operation by the fourth quarter of 2018. Impacts could result from workers and heavy trucks using local roads; however, the total daily trips generated would be fewer than what is currently generated at the site by PCC Logistics.

Traffic Volumes

Trips generated by the Tacoma LNG Facility after completion would likely include personnel vehicles (including passenger vehicles and light-duty trucks) and occasional delivery trucks. Personnel vehicles and truck volumes were estimated using the projected staffing and equipment required during operation.

During operations, up to 18 staff members would be employed by the facility 24 hours a day, 365 days per year. In addition, one delivery and one maintenance truck could each be expected to visit the site twice daily. Conservatively assuming that one visit would occur during the afternoon peak, coinciding with personnel shift changes, four large truck trips (two inbound, two outbound) during the afternoon peak hour would result.

Occasionally, merchant trucks carrying LNG would leave the Tacoma LNG Facility to deliver LNG using the existing roadway network. Up to two tanker trucks per day would arrive empty at the Tacoma LNG Facility and leave carrying LNG to market. Estimating conservatively, there would be one inbound and one outbound trip during the afternoon peak hour. The transport of the LNG by truck is regulated by the Federal Motor Carriers Safety Administration that requires a Hazardous Materials Safety Permit (49 CFR Part 385, Subpart E).

During the afternoon commute peak hour, up to 42 vehicle trips would be added to the traffic network during operations (18 inbound and 18 outbound personnel trips, two inbound and two outbound delivery/maintenance truck trips, and one inbound and one outbound tanker truck trips).

Per day, up to 60 vehicles would be added to the traffic network during operations, representing less than 1 percent of existing traffic volumes. As compared to daily traffic volumes on roadways in the vicinity of the Project (see Table 3.10-1), the addition of 60 vehicles would be insignificant.

The number of anticipated trips associated with operation of the proposed Project components is shown in Table 3.10-5.

Table 3.10-5 Anticipated Trips Associated with Operation of the Proposed Project

	PM Peak Hour Trips (directional)		Daily Traffic Volumes	
	Cars/Small Vehicles	**Trucks/Heavy Vehicles**	**Cars/Small Vehicles**	**Trucks/Heavy Vehicles**
Personnel	18 inbound, 18 outbound		54 vehicles	
Delivery/Maintenance		2 inbound, 2 outbound		4 vehicles
LNG Tankers		1 inbound, 1 outbound		2 vehicles
Total	**5 inbound, 9 outbound**	**3 inbound, 3 outbound**	**18 vehicles per day**	**6 vehicles per day**

Key:
LNG = liquefied natural gas

Level of Service

Traffic operations at the year of opening (2018) would likely remain unchanged as a result of Project operations. Background conditions are assumed to be similar to the existing conditions shown in Table 3.10-2 because relatively flat area-wide growth in traffic is predicted.

Up to 42 vehicle trips would be generated by operation of the Tacoma LNG Facility during the afternoon peak hour. These trips would likely access the site from Pacific Highway East and both directions of I-5 via 54th Avenue East. During the afternoon peak hour, traffic volumes on 54th Avenue East would increase by approximately 1 percent.

This small increase in peak hour traffic would be unlikely to impact the current LOS at the study intersections. Average vehicle delay times at study intersections would not likely increase as a result of operation of the Tacoma LNG Facility, and no adverse impacts to vehicle queues or congestion are expected during the afternoon peak hour.

Operation of the facility would add up to 60 vehicles daily to the roadway network surrounding the Port of Tacoma. These vehicles would increase daily traffic by less than 0.5 percent on 54th Avenue East. Based on this nominal increase, no impacts to traffic outside the peak hour are expected.

Operation of the two pipeline segments would not result in adverse traffic impacts. The pipeline would be located underground and would not require personnel to operate or interfere with traffic operations. Similarly, operation of the Golden Given Limit Station and upgraded Frederickson Gate Station would not result in adverse traffic impacts. The limit and gate stations would not result in the additional of daily traffic trips. Both stations would only generate traffic trips as part of periodic maintenance activities.

Safety

The number of vehicle collisions and the type of collisions within the Tacoma LNG Facility site are not expected to change as a result of the Proposed Action. The nominal increase in traffic volume would not be expected to cause increased traffic incidents, and no changes in traffic patterns are anticipated.

Introduction of LNG tank trucks on the roadways near the Tacoma LNG Facility site would not significantly affect safety. The Port of Tacoma currently experiences heavy truck traffic, and any new LNG tank trucks associated with the Proposed Action would be fewer than the number currently generated at the Tacoma LNG Facility site by PCC Logistics.

Site Improvements

Adequate parking for staff and visitors would be provided as part of Tacoma LNG Facility site development. Areas for arriving and departing operation-related trips would be designated and clearly signed to allow safe, efficient on-site truck maneuvers and prevent off-site queuing. Delivery vehicles would be given adequate queuing and maneuvering areas on site to prevent vehicles from backing up onto public roadways.

Safe on-site transport corridors with adequate sight distance and limited obstructions would be provided for all internal vehicle traffic. Any driveways providing access between the Tacoma LNG Facility site and the public roadway network would be designed to safely accommodate large, heavy trucks related to LNG deliveries.

Off-site improvements are not proposed or warranted as a result of Tacoma LNG Facility operation. Although some intersections in the study area exceed the current LOS threshold, traffic resulting from the Project's operations would be an insignificant addition to existing traffic levels.

Change in Traffic Patterns

No significant changes in traffic patterns on the roadway network surrounding the Tacoma LNG Facility site are expected to result from Project operations. Passenger vehicle and truck access to and from the Port of Tacoma would remain the same as it is currently. No new roads or intersections are suggested, and all existing roads would remain in place.

Non-motorized Facilities

Operation of the Project would not impact sidewalks along street networks within the Proposed Action area. Dedicated bicycle lanes and shared nonmotorized facilities do not exist in the immediate Proposed Action area and would not be impacted by operation of the Project.

Rail Facilities

Operation of the Project would not impact the various rail lines present along the Blair-Hylebos peninsula on the proposed Tacoma LNG Facility site. Although operation-related trips are expected to use Taylor Way and Lincoln Avenue to access the Tacoma LNG Facility site, rail would maintain ROW and would proceed ahead of passenger vehicles and trucks at these locations.

Roadway blockages caused by rail are not expected to increase at completion of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. Blockages would likely remain similar to those occurring under existing conditions, as increases in rail traffic are not anticipated, because Project operations would add only minimal traffic to the rail network. In addition, operation of the proposed PSE Natural Gas Distribution System improvements would occur underground and would not impact rail line traffic in the vicinity of the Proposed Action.

Maritime Traffic

The new LNG barge and tugboat trips introduced to the Hylebos and Blair waterways during operation of the proposed Project would not significantly impact commercial shipping. The new maritime activity resulting from Project operation would be limited to LNG barge and tugboat assists in the Hylebos and Blair waterways. Operation of the barge and tugboat assists to and from the Tacoma LNG Facility and TOTE sites would be consistent with federal marine safety regulations and USCG marine safety programs provided in the waterway suitability assessment described in Chapters 3.5 (Health and Safety) and 3.11 (Public Services and Utilities).

TOTE vessels would be fueled twice per week via the Project's bunkering barge. The bunkering barge and associated tugboats would travel from the Tacoma LNG Facility pier within the Hylebos Waterway, around the tip of the Blair-Hylebos peninsula, to the proposed LNG loading platform proposed within the Blair Waterway as part of the TOTE Marine Vessel LNG Fueling System. Under the Proposed Action, only one LNG bunkering barge is expected to be in use. The bunkering barge would travel back and forth to the TOTE site twice per week, for approximately eight to ten trips per month. The additional trips would be minor in comparison to existing maritime traffic on the two waterways. Although the data do not account for all commercial traffic on the two waterways, Appendix I shows that there are currently at least 69.7 deep-draft vessels, barges, and tugboat arrivals on the Hylebos Waterway per month and 257.2 on the Blair Waterway per month.

As a result of the limited commercial fishing and recreational vessel use in either the Hylebos or Blair waterways, the Proposed Action would have minimal, if any, impact on these uses during operation. Analysis of recreational boat use on the Hylebos and Blair waterways is provided in Section 3.7.2.5 (Existing Recreational Resources).

3.10.4.3 Decommissioning Impacts

This section describes the various procedures used to address potential decommissioning impacts associated with the end of the design life of the proposed Project. Accounting for each Project component, the estimated total design life of the proposed Project is 50 years. Decommissioning of the Project components would likely generate impacts comparable to those resulting from construction, as discussed in Section 3.10.4.1 (Construction Impacts), though the in-water and shoreline improvements would not likely be decommissioned. Potential impacts to transportation and traffic would be temporary and would end upon completion of the decommissioning activities. Specific arrangements would be made with the Port of Tacoma, City of Tacoma, and other relevant agencies to address any future decommissioning efforts associated with the Project components.

3.10.5 Impacts of No Action

Under the No Action Alternative, the proposed Project would not be built, current conditions would remain unchanged, and Proposed Action–related impacts to transportation would not occur.

3.10.6 Avoidance, Minimization, and Mitigation

3.10.6.1 Construction

During construction of the proposed Project, mitigation measures would be considered where appropriate and when necessary. While safety-related impacts are not expected during construction, temporary, minor impacts to traffic delay could occur. Potential mitigation measures that could be implemented by the applicant and that would alleviate temporary impacts to local traffic could include the following:

- A detailed traffic management plan would be developed prior to construction activities. PSE would meet with staff from appropriate jurisdictions (including the City of Tacoma, City of Fife, Pierce County, Tacoma Rail, and Port of Tacoma) to identify potential traffic conflicts and outline traffic management measures to minimize construction-related traffic impacts. The traffic management plan would, at minimum, include specific designated routes for construction-related vehicles, as well as any measures related to procedures for traffic control, lane closures detours, and use of flaggers.
- Applicable governmental permits or approvals would be obtained, including, but not limited to, those for access to state, county, or city roads as needed; construction within appropriate ROWs; overweight and oversize loads; use of weight-restricted bridges and structures; and haul route agreements.
- Public involvement and outreach efforts, including communications and notices to adjacent landowners, would be undertaken prior to construction to help minimize access disruptions.
- Carpooling among construction workers and personnel would be encouraged to reduce traffic volume to and from the Tacoma LNG Facility site.
- Where Pipeline Segment A is proposed to cross active rail lines, it would be constructed without disturbing the tracks, using a horizontal drill or bore construction technique. PSE would coordinate Segment A construction in the vicinity of existing tracks with the applicable rail owner/operator. If horizontal drill or bore construction is not possible or would cause any damage to rail lines, PSE would restore impacted rail segments to their original condition.
- All roads and other transportation infrastructure impacted by construction would be videotaped prior to construction to document pre-construction conditions.

- Following installation of the pipeline, roads would be restored by repaving the travel lane impacted by the pipeline construction pursuant to the appropriate plans and specifications adopted by Tacoma Public Works, City of Fife Public Works, and Pierce County Public Works.
- For the 2 miles of Taylor Way from SR 509 to the Project site, an approach that results in rebuilding of Taylor Way to "heavy haul" stands has been agreed upon by PSE, the Port of Tacoma, and the City of Tacoma. Utility conflicts, utility separation requirements, and subsurface soils conditions will determine the alignment of the gas main within the Taylor Way roadway.

3.10.6.2 Operations

Project operations are not likely to have an adverse impact on vehicle delay times, vehicle queues, or congestion during the afternoon peak hour. Impacts on traffic outside the peak hour are not expected based on the Project operation's nominal effect on traffic volumes. However, the Project does add a new and health and safety risk to an area of the City that currently does not meet the City's standard for emergency services' response time. The following mitigation measures would help improve emergency services' ability to respond to emergencies on the Blair/Hybelos peninsula and the Project site. Section 3.5 (Public Health and Safety) also addresses the increased public health and safety risks.

- The ER/ITS Study concluded that improving Taylor Way to meet current City standards will improve emergency response travel time. PSE, the Port of Tacoma and the City has agreed to an approach to assist the City in upgrading Taylor Way to heavy haul standards.
- Construction of Phase I of the planned ITS Infrastructure is needed for basic information sharing among stakeholders, as defined in the ER/ITS study.

3.10.7 Conclusion

With the implementation of the construction mitigation measures identified in Section 3.10.6.1 (Construction), construction of the proposed Project is not likely to result in significant and unavoidable adverse traffic impacts.

Unavoidable adverse impacts on traffic and transportation are also not expected as a result of operating the Project. The need for additional access for emergency services to a site with increased public health and safety needs during operation of the Tacoma LNG Facility would be addressed by the mitigation measures defined in Section 3.10.6.2.

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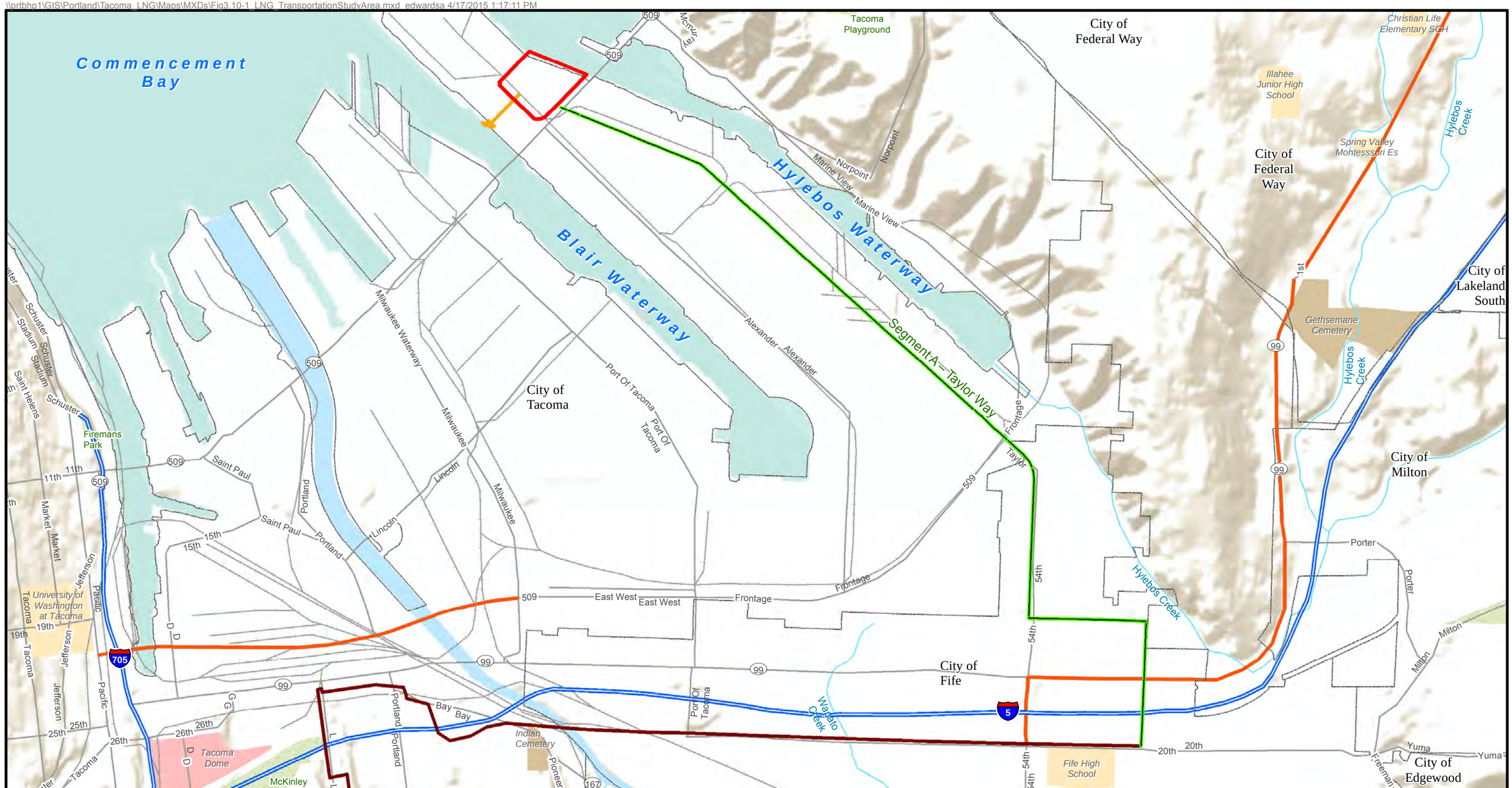
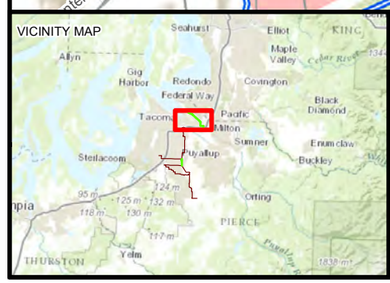




Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Frederickson Gate Station
- Golden Given Limit Station
- TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary

N W E S

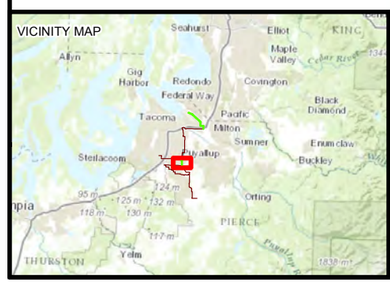
0 1,000 2,000 Feet

Tacoma

City of Tacoma

Figure 3.10-1A
Tacoma LNG Project
Transportation Study Area

Tacoma LNG Project



Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Frederickson Gate Station
- Golden Given Limit Station
- TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary

N W E S

0 1,000 Feet

City of Tacoma

Figure 3.10-1B
Tacoma LNG Project
Transportation Study Area

Tacoma LNG Project

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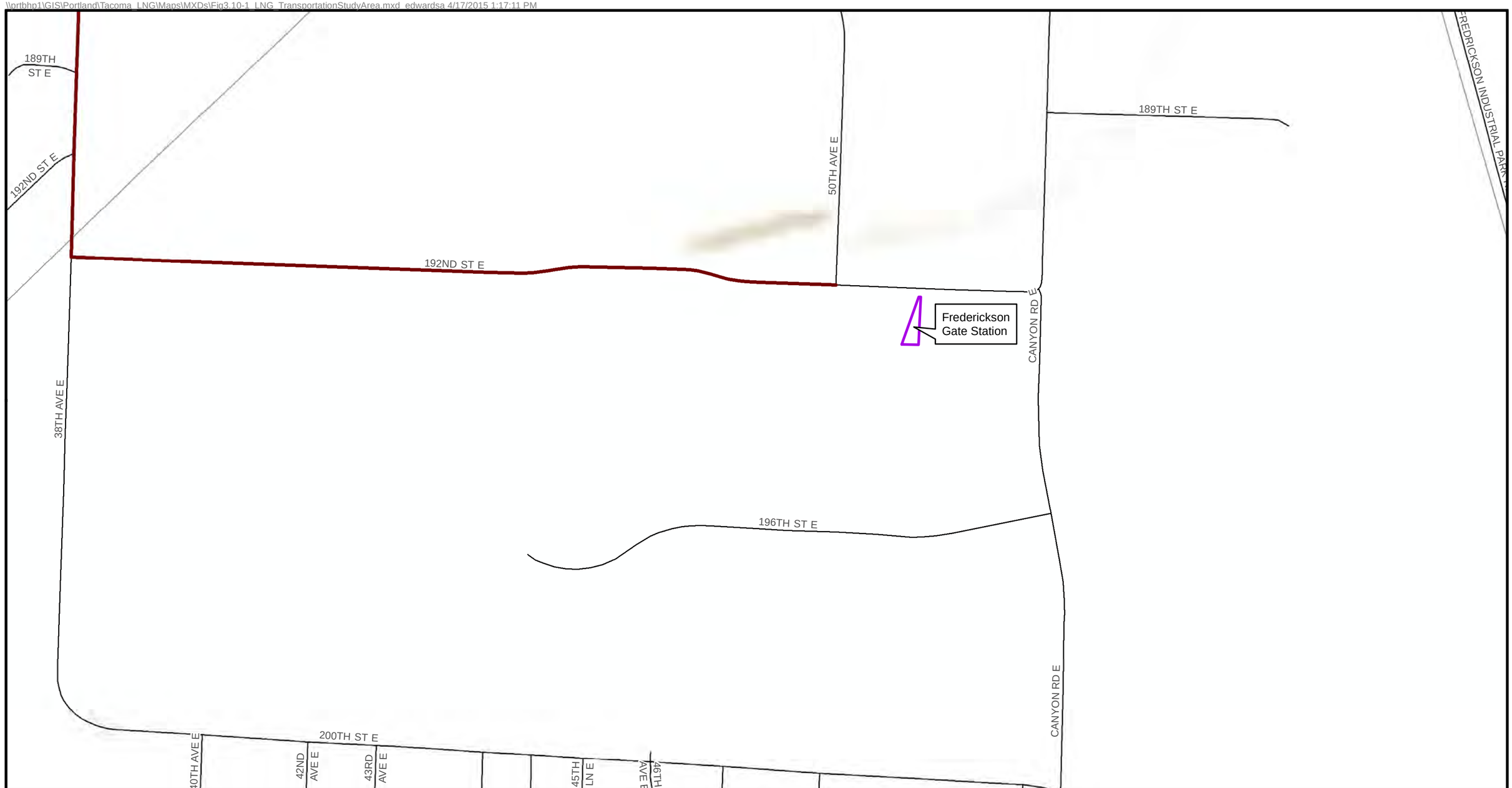

Sources: ESRI 2012, Puget Sound Energy 2015

Legend

- Proposed Tacoma LNG Facility Site Boundary
- Frederickson Gate Station
- Golden Given Limit Station
- TOTE Marine Vessel LNG Fueling System
- Proposed New Pipeline
- Existing Pipeline
- City Limit Boundary

N W E S

0 510 Feet

City of Tacoma

Figure 3.10-1C
Tacoma LNG Project
Transportation Study Area

Tacoma LNG Project

3.11 Public Services and Utilities

This section describes existing public services and utilities in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on public services and utilities that could result from the construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). The following public services and utilities are evaluated: fire protection, law enforcement, medical services, schools, public transit, telecommunications, electricity, natural gas, sewer services, solid waste services, stormwater, and water supply services. Where appropriate, mitigation measures are identified to reduce or avoid potential impacts. The impacts of no action are discussed as an alternative to the Proposed Action.

3.11.1 Study Methodology

This section describes the methodology used to determine potential impacts to public services and utilities that may result from the Proposed Action. For descriptive purposes, the Project has been divided into three components: the Tacoma LNG Facility, the Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System, and the Puget Sound Energy (PSE) Natural Gas Distribution System (see Section 3.11.3 [Affected Environment] for more details). The components would be located across three separate jurisdictions: the City of Tacoma, the City of Fife, and unincorporated Pierce County, Washington.

The study area for each public service and utility evaluated herein is defined as the portion of the relevant provider's service area within the limits of these three jurisdictions. Thus, the study areas may differ and are dependent upon the boundaries of the service area for each public service and utility. For example, the City of Tacoma Fire Department provides fire protection services for the city of Tacoma and city of Fife, while various other fire departments and districts provide fire protection services in the remainder of Pierce County. In contrast, water supply services are provided throughout Tacoma, Fife, and portions of unincorporated Pierce County by Tacoma Water, a division of Tacoma Public Utilities. The analysis of potential impacts to fire protection therefore includes Tacoma Fire and Pierce County Fire Districts No. 6 and No. 10, while the analysis of potential impacts to water supply service includes only Tacoma Water.

City of Tacoma, City of Fife, and Pierce County public web sites and other relevant public sources were consulted to identify and quantify public services and utilities that have designated service areas or respond to public needs within the area of the Proposed Action. This information was then used to determine expected impacts of the Proposed Action.

3.11.2 Regulatory Framework

Use of public services and utilities during construction, operation, and decommissioning of the Project would comply with applicable federal, state, and local regulations, and applicable permits would be procured.

3.11.2.1 Federal

Pursuant to Navigation and Vessel Inspection Circular 01-11 (NVIC 01-11) *Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities*, dated January 24, 2011, and the *Code of Federal Regulations* (CFR) Title 33, Part 127 (33 CFR 127), new LNG waterfront projects must perform a waterway suitability assessment (WSA) in collaboration with the United States Coast Guard (Coast Guard), prior to the Coast Guard issuing a Letter of Recommendation to operate. In accordance with 33 CFR 127, the WSA must consist of a Preliminary WSA and a Follow-on WSA. (Coast Guard 2014)

PSE has developed a Preliminary WSA (PSE 2014a) that initiates the process of analyzing the safety and security risks posed by operations of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. The Preliminary WSA describes the analysis and coordination that would be undertaken to ensure the proposed LNG loading, transits, unloading, and barge-to-ship bunkering operations are appropriately safe and secure.

The Coast Guard, in coordination with PSE, would use the Preliminary WSA to develop a detailed Follow-on WSA. The Follow-on WSA would provide:

- Specific details concerning the safety and security of the transit routes and LNG vessel operations, including safety and security risk assessments at the PSE facility dock and the bunkering site as specified in NVIC 01-11;
- Safety and security risk mitigation strategies;
- Documentation of resource needs for safety, security, and response activities; and
- General conclusions and recommendations for introducing LNG vessel transits, transfers, and bunkering operations on the waterway (PSE 2014a).

The Preliminary WSA and Follow-on WSA support the Final WSA, which would describe the coordination undertaken to ensure that the proposed LNG loading, transits, unloading, and barge-to-ship bunkering operations are appropriately safe and secure (PSE 2014c). The WSA also commits PSE to providing updates to relevant Coast Guard Maritime Security and Safety Committees (PSE 2014a).

3.11.2.2 State

The laws of the State of Washington define the appropriate authorities, governance, and regulating structures for public services and utilities. Based on the affected environment for the proposed Project as described in Section 3.11.3 (Affected Environment), the following titles and chapters apply:

- **Washington State Constitution, Article 10.** Provides counties and cities with local police and sanitary authority.
- **Revised Code of Washington (RCW), Title 28A and associated notes.** Establishes the public school system. Chapter 315 (RCW 28A.315) provides for the organization of school districts.
- **RCW 35, Cities and Towns.** Provides for the establishment of and rules regarding the conduct of business by incorporated cities, including police, fire, and utilities. RCW 35.92 provides cities with authority to acquire and operate utilities, including gas, electricity, water, sewer, solid waste, stormwater, and transportation.
- **RCW 36, Counties.** Provides for the establishment of counties and various special purpose districts. RCW 36.28 establishes the office and responsibilities of the county sheriff. RCW 36.57 and 36.57A authorize the establishment of county public transportation authorities and benefit areas. RCW 36.58 and 36.58A, respectively, authorize counties to establish a system of solid waste handling for unincorporated areas and provide for the establishment of solid waste districts in unincorporated areas.
- **RCW 57, Water-Sewer Districts.** Provides for the organization of public water-sewer districts.
- **RCW 70, Public Health and Safety.** Establishes public health and safety standards, including provisions governing numerous aspects of public service and utility provision, such as laws regarding healthcare facilities, health departments, hospital districts, solid and hazardous waste management, water supply systems, and water quality.
- **RCW 80, Public Utilities.** Establishes the Washington Utilities and Transportation Commission and standards governing the provision of natural gas, electric power, water, and telecommunications services.

In general, public services and utilities that belong to a city or county are regulated by the respective City Council or County Council. Public services and utilities that are established through a special purpose district are generally governed by a separate elected board. The Washington Utilities and Transportation Commission regulates private investor-owned natural gas, electricity, water, and telecommunications utilities. (Washington Utilities and Transportation Commission 2015).

3.11.2.3 Local

Each component of the Proposed Action would comply with code provisions relevant to use and development of public services and utilities contained in the applicable jurisdiction's municipal or county code. Applicable codes are the City of Tacoma Municipal Code (City of Tacoma 2015a), the City of Fife Municipal Code (City of Fife 2015a), and the Pierce County Code (Pierce County 2015a).

3.11.3 Affected Environment

This section describes existing fire protection, law enforcement, medical services, schools, public transit, communications, electricity, natural gas, sewer, solid waste, stormwater, and water supply services within the study area for each public service and utility. The main components of the Project are the following:

- **Tacoma LNG Facility:** Would liquefy natural gas, store LNG, and include facilities to transfer LNG to the adjacent TOTE Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. Would also include facilities to regasify stored LNG and inject natural gas into the PSE Natural Gas Distribution System.
- **TOTE Marine Vessel LNG Fueling System**: Would convey LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and include transfer facilities and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges.
- **PSE Natural Gas Distribution System**: Would convey natural gas to and from the Tacoma LNG Facility. Would include two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), a new Golden Given Limit Station, and an upgrade to the existing Frederickson Gate Station.

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the city of Tacoma. The two new distribution pipeline segments would be located within the city of Tacoma and city of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and Frederickson Gate Station would be located within unincorporated Pierce County. A detailed description of the proposed Project components is provided in Chapter 2 (Description of Proposed Action).

3.11.3.1 Fire Protection

This section describes the existing fire protection services available within the service areas of the Proposed Action. An analysis of health and safety issues concerning the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System is provided in Section 3.5 (Health and Safety).

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The City of Tacoma Fire Department serves the city of Tacoma, including the entire Port of Tacoma where the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located, and provides contract fire services to the city of Fircrest, city of Fife, and Pierce County Fire District No. 10.

Tacoma Fire Department Stations 3 and 12 are the fire stations closest to the Project components. Station 3, located at 206 Browns Point Boulevard in the city of Tacoma, would be the closest station to the Project, at a distance of approximately 2.5 driving miles from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Station 12, located at 2015 54th Avenue East, would be approximately 3.7 driving miles from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. The next closest fire station would be Station 2, which would be located approximately 6.9 driving miles from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. (City of Tacoma 2015b)

Of these stations, Station 12 has the most extensive capabilities, including engine, ladder, medic, hazardous material and water tender units, and permanent staffing of eight response personnel. The capabilities of Stations 2 and 3 are more limited, including an engine unit, battalion unit, and four staff at Station 2, and an engine unit with three staff at Station 3. (Fehr and Peers 2015)

Overall, the City of Tacoma Fire Department has a total of 357 commissioned personnel, and approximately 69 firefighters and 16 frontline engines are on duty at any given time across its 72-square-mile service area, with the support of two on-call paramedics. Tacoma firefighters are cross-trained as emergency medical services technicians (EMTs). In addition, the Tacoma Fire Department also operates three fire boats. Boats are not staffed full time but are cross-staffed with Fire Station 14, and typically have longer response times than land-based operations (30 to 45 minutes). (Tacoma Fire Department 2013; Fehr and Peers 2015)

The closure of major manufacturing establishments in the Tideflats in the 2000s has caused the Tacoma Fire Department to significantly reduce the service provided at the Port of Tacoma by removing Fire Stations no. 6 and no. 15. The Tacoma Fire Department has expressed that the recent resurgence in manufacturing and increase in hydrocarbon-related development in the Tideflats may lead to the need to re-establish a permanent presence at the Port of Tacoma. (Fitzgerald 2015)

As a result, the response times to incidents in the Tideflats have been shown to exceed Tacoma Fire Department objectives by several minutes. For example, the 90th-percentile response time for fire incidents in the Tideflats was measured at 10.5 minutes, more than 3 minutes longer than Fire Department recommended standards. Because of the low connectivity of the local road network, the prevalence of multiple at-grade railroad crossings, poor road and railroad crossing conditions, and the relative isolation of the Blair-Hylebos peninsula from other parts of the Tideflats, response times would be even longer at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. The same study found that the historical performance of the first unit on scene at the location of the proposed Tacoma LNG Facility is actually 12.7 minutes. (Fehr and Peers 2015; TriData 2015)

Fire suppression water is provided to the Blair-Hylebos peninsula through an existing municipal firewater main by Tacoma Water, a division of Tacoma Public Utilities. An underground municipal firewater system is present along both East Alexander Avenue and East 11th Street to provide firewater to both the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Existing underground 6- and 8-inch dedicated firewater loops are present on the proposed Tacoma LNG Facility site. The Project would likely install a completely new firewater system on the site after consultation with the Tacoma Fire Department and Tacoma Public Utilities. (Tacoma Public Utilities 2015f)

PSE Natural Gas Distribution System

The City of Tacoma Fire Department provides fire protection, emergency medical services (EMS), and paramedic services in the areas of the city of Tacoma and the city of Fife where Pipeline Segment A would be located (City of Tacoma 2015c).

Pipeline Segment B, the newly proposed Golden Given Limit Station, and improvements to the Fredrickson Gate Station would be located within the service area of Pierce County Fire District No. 6 serving central Pierce County. Pierce County Fire District No. 6 provides fire protection support at 12 fire stations. Stations 61 and Station 63 would both be located within 2 driving miles of Pipeline Segment B and the Golden Given Limit Station. Station 61 operates one fire engine, one ladder truck, one paramedic unit, and one command (Battalion Chief) vehicle, and Station 63 operates one fire engine and one paramedic unit. Station 64 would be located approximately 3.4 driving miles south of the proposed improvements to the Fredrickson Gate Station. Station 64 operates one fire engine. (Central Pierce Fire and Rescue 2015a,b)

Fire suppression water is provided by Tacoma Water to areas near the PSE Natural Gas Distribution System through existing municipal firewater main. An existing underground municipal firewater system along Golden Given Road East would provide firewater to both the proposed Pipeline Segment B and Golden Given Limit Station sites. An existing underground municipal firewater system along 192nd Street East would provide firewater to the Fredrickson Gate Station. The portion of proposed Pipeline Segment A within the city of Fife would be served by the City of Fife municipal water system. The City of Fife municipal firewater system and potable water system share the same mains and the water supply is purchased from Tacoma Water. (Tacoma Public Utilities 2015f)

3.11.3.2 Law enforcement

The City of Tacoma Police Department, City of Fife Police Department, Pierce County Sheriff's Department, Port of Tacoma Port Patrol, Washington State Patrol District 1, Coast Guard, United States Customs and Border Protection, and United States Department of Homeland Security provide law enforcement services within the area of the proposed Project.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be located within the City of Tacoma Police Department Sector 1 policing area, which serves the Tideflats. Both the Central Substation and the Northeast Substation support Sector 1 service areas and would be located within approximately 7.3 miles and 3.2 miles of the Project components, respectively (City of Tacoma 2015d). The City of Tacoma Police Department's Marine Services and Dive Unit also operates a harbor patrol vessel to assist in Port of Tacoma security along Tacoma's approximately 46 miles of shoreline and throughout Commencement Bay. The Marine Services and Dive Unit works collaboratively with the Coast Guard and Port authorities to protect and provide security to Port waterways and shipping lanes within Commencement Bay. (City of Tacoma 2015e)

The Pierce County Sheriff's Department also operates a Dive Team consisting of nine Pierce County deputies who collaborate with two City of Tacoma police officers to conduct approximately 60 to 70 missions annually. The Dive Team is trained to handle Port security missions in the Puget Sound (Pierce County 2015b).

The Port of Tacoma's Port Patrol is a group of trained officers who protect the safety of Port-operated facilities and surrounding communities. The Port Patrol has the authority to access all marine terminals and cargo at the Port and works closely with the Coast Guard and United States Customs and Border Protection agencies to maintain protection of Port facilities, operations, and employees (Port of Tacoma 2015a).

The Port of Tacoma is a certified member of the United States Customs and Border Protection agency's Customs-Trade Partnership Against Terrorism coalition (Port of Tacoma 2003). This collation is an antiterrorism partnership of government and businesses that sign an agreement to work with the United States Customs and Border Protection agency to protect the trade supply chain, identify security gaps, implement security measures and best practices, and share security measures (United States Customs and Border Protection 2015a). The Port of Tacoma also requires Transportation Worker Identification Credentials (TWICs) for entry into restricted areas. The United States Department of Homeland Security oversees the TWIC identification program and ensures that people accessing secure terminals have received a thorough security background check. A TWIC is required for all Port of Tacoma employees, terminal operators, longshore workers, truckers, and others who require access to restricted areas. (Port of Tacoma 2015a)

The Coast Guard Port Security Unit 313 consists of five active duty personnel, 126 reserve personnel, and six transportable security boats that operate out of the Port of Tacoma to maintain the port's security (Coast Guard 2003). The Coast Guard is also responsible for ensuring that shipping operations are safe and secure and comply with federal marine safety regulations and Coast Guard marine safety programs (Coast Guard 2014). As explained in Section 3.11.2.1 (Federal), Coast Guard and other federal marine safety programs are described in NVIC 01-11 and in 33 CFR 127.

United States Customs and Border Protection, an agency of the United States Department of Homeland Security is responsible for monitoring cargo security operations at the Port of Tacoma through a field office in Seattle, Washington, and at the local port of entry office located at 2202 Port of Tacoma Road in Tacoma, Washington (United States Customs and Border Protection 2015b).

PSE Natural Gas Distribution System

Portions of the PSE Natural Gas Distribution System would be located in the city of Tacoma, city of Fife, and unincorporated Pierce County jurisdictions. Pipeline Segment A would be located within the city of Tacoma Police Department Sector 1 policing area and within the city of Fife Police Department service area. The City of Fife Police Department Headquarters, located at 3737 Pacific Highway East, would be located within 2 miles of all points along Pipeline Segment A (City of Fife 2015b).

The Pierce County Sheriff's Department serves all unincorporated areas of Pierce County. The Pierce County Sheriff's Department is the second-largest sheriff's agency in the state of Washington and provides law enforcement, jail, court, security, civil processing services to all areas of unincorporated Pierce County and the contract cities of Edgewood and University Place. The department consists of 300 commissioned officers that specifically serve the approximately 372,545 residents of unincorporated Pierce County. The Pierce County Sheriff also operates the county jail facility located in the city of Tacoma. Pipeline Segment B and the Golden Given Limit Station would be located approximately 3.5 miles from the Pierce County Sheriff's Parkland/Spanaway precinct. The Fredrickson Gate Station would be located approximately 5 miles from the Pierce County Sheriff's South Hill precinct. (Pierce County 2015c,d)

The Washington State Patrol serves state highways and responds to emergencies in Pierce County. The Washington State Patrol District 1 Headquarters is located in Pierce County and would be approximately 1 mile east of Pipeline Segment B. The District 1 Headquarters has a staff of approximately 200 employees assigned to traffic law enforcement, administrative support, electronic services, deputy fire marshals, communications, and traffic auto theft and narcotics investigations duties. (Washington State Patrol 2015)

3.11.3.3 Medical Services

Multiple hospitals and medical centers are located within Pierce County and provide routine and emergency medical services to greater Pierce County, including the City of Tacoma and City of Fife. Four of these facilities are or belong to Level II trauma centers that support the Harborview Hospital in Seattle, the region's closest Level I trauma center (Washington State Department of Health 2014). The City of Tacoma Fire Department and Pierce County Fire Districts provide EMS and paramedic services throughout the areas where the Proposed Action would occur. The city of Tacoma, city of Fife, and unincorporated Pierce County are served by a number of public and private ambulance and air ambulance service providers. Ambulance services follow Ambulance and Aid Service Rules and Regulations provided by the Tacoma-Pierce County Board of Health and the Pierce County Emergency Medical Services department (Pierce County 2012). These rules and regulations are designed to ensure the operation of qualified and efficient ambulance services throughout Pierce County.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Three of the four Level II trauma centers operating in Pierce County would be located in the city of Tacoma within approximately 7 to 8.5 miles driving distance of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites: Mary Bridge Children's Hospital and Health Center, St. Joseph Medical Center, and Tacoma General Hospital. The Tacoma General Hospital is the largest hospital in the city of Tacoma, with 437 beds. The St. Joseph Medical Center is a 361-bed facility that also supports the medical service needs of the city of Tacoma and Pierce County. The Allenmore Hospital, although not a Level 2 trauma center, provides additional EMS and would be located in central Tacoma within approximately 8.5 miles driving distance of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites.

The Tacoma General Hospital and St. Joseph Medical Center also partner with Madigan Army Medical Center at Fort Lewis to form the Tacoma Trauma Center partnership. This partnership has provided uninterrupted Level II trauma care to the City of Tacoma and the greater South Sound for over 14 years. The Tacoma Trauma Center provides round-the-clock trauma care throughout South Puget Sound, and each hospital has a trauma surgeon on site when the facility is on trauma duty. Cardiologists, cardiac surgeons,

neurosurgeons, and other medical specialists can respond within 20 minutes of being called. Madigan Army Medical Center is located approximately 19 miles from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. (Multicare 2014; Washington State Department of Health 2014)

As described in Section 3.11.3.1 (Fire Protection), the City of Tacoma Fire Department Stations 3 and 12 would be located within 4 miles driving distance to the proposed Tacoma LNG Facility, the TOTE Marine Vessel LNG Fueling System. All Tacoma firefighters are cross-trained as EMTs or paramedics and provide on-call paramedic support. The Tacoma Fire Department also has five dedicated paramedic units in addition to the basic EMS response provided by the rest of their units cross-trained as EMTs (City of Tacoma 2014).

PSE Natural Gas Distribution System

Saint Joseph Medical Center is located within approximately 7 miles driving distance of all points along proposed Pipeline Segment A. Tacoma General Hospital and Mary Bridge Children's Hospital would both be located within approximately 8.5 miles of all points in Pipeline Segment A. These facilities are Level II Trauma Centers, as described in Section 3.11.3.3 (Medical Services).

Three other medical centers would be located in proximity to components of the proposed PSE Natural Gas Distribution System. St. Clare Hospital, a Level IV Trauma Center, would be located within approximately 6 miles driving distance of Pipeline Segment B and Golden Given Limit Station. Multicare Good Samaritan Hospital, a Level III Trauma Center, would be located approximately 8 miles driving distance east of Pipeline Segment B in Puyallup, Washington. (Washington State Department of Health 2014)

The MultiCare Frederickson Clinic provides a comprehensive set of medical services and would be located approximately 1.2 miles north of the proposed improvements to the Fredrickson Gate Station in Pierce County.

As stated in Section 3.11.3.1 (Fire Protection), Pierce County Fire District No. 10, under contract with the Tacoma Fire Department, provides EMS and paramedic support in the city of Fife where portions of Pipeline Segment A would be located (City of Tacoma 2015c). Pierce County Fire District No. 6 provides 24-hour EMS support at 12 fire stations (Central Pierce Fire and Rescue 2015a). Both Station 61 and Station 63 operate one paramedic unit, respectively. Station 64 does not operate a paramedic unit but is available for 24-hour EMS support (Central Pierce Fire and Rescue 2015b).

3.11.3.4 Schools

Project components would be located across four school districts in Pierce County: Tacoma School District, Fife School District, Franklin Pierce School District, and Bethel School District.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be located in the Tacoma School District. The Tacoma School District serves approximately 30,000 students through the operation of 50 schools, and 14 alternative learning sites. No schools would be located within 1 mile of the Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System. The closest three schools would be located within 2 miles of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Both Meeker Middle School and Crescent Heights Elementary School would be located across the Hylebos Waterway approximately 1.5 miles north of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Northeast Tacoma Elementary School would be located approximately 1.3 miles northeast of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. (Tacoma Public Schools 2013, 2015)

PSE Natural Gas Distribution System

PSE Natural Gas Distribution System components would be located in each of the four Pierce County school districts described above. Pipeline Segment A would cross both the Tacoma School District and the Fife School District. The interconnect of Pipeline Segment A to the Tacoma LNG Facility and TOTE Marine Vessel

LNG Fueling System would be located within approximately 2 miles of the three schools in the Tacoma School District, as described in Section 3.11.3.4 (Schools).

The portion of Pipeline Segment A proposed within the city of Fife would cross the Fife School District. The Fife School District serves approximately 3,400 students at seven schools. Two schools in the Fife School District would be located within 1 mile of Pipeline Segment A. Fife High School would be located approximately 0.25 mile west of Pipeline Segment A, and Columbia Junior High School would be located approximately 0.6 mile southwest of Pipeline Segment A. (Fife School District 2015a,b)

Pipeline Segment B and the proposed Golden Given Limit Station would be located within the Franklin Pierce School District. The Franklin Pierce School District serves approximately 7,500 students at 15 schools. Four schools would be located within 1 mile of Pipeline Segment B and the proposed Golden Given Limit Station. Harvard Elementary School would be located approximately 1 mile northeast of the proposed Golden Given Limit Station. Ford Middle School and Franklin Pierce High School would be located approximately 0.3 and 0.4 mile east of Pipeline Segment B, respectively. Midland Elementary School would be located approximately 0.8 mile east of Pipeline Segment B. (Franklin Pierce School District 2015a,b)

Proposed improvements to the existing Fredrickson Gate Station would occur within the Bethel School District. The Bethel School District serves approximately 18,000 students across 30 schools. No schools in this district would be located within 1 mile of the Fredrickson Gate Station. Six schools would be located within 2 miles of the proposed Fredrickson Gate Station: Clover Creek Elementary School, Fredrickson Elementary School, Naches Trail Elementary School, Shining Mountain Elementary School, Bethel Middle School, and Bethel High School, as well as the Pierce County Skills Center. (Bethel School District 2014, 2015)

3.11.3.5 Public Transit

An evaluation of existing public transit services operating throughout the area where the Proposed Action would occur is provided in Section 3.10 (Transportation).

3.11.3.6 Communications

The communication services addressed in this section include telecommunications and Internet service in the vicinity of the proposed Project. These services are provided by multiple providers across all jurisdictions that would be crossed by the Project. Cellular service is available from a variety of carriers, including T-Mobile, Verizon, AT&T, Sprint, and Metro PCS (OpenSignal 2015). Broadband Internet service is available from many different providers in Tacoma, Fife, and Pierce County (National Broadband Map 2015). In addition, telephone service is also provided by at least seven carriers throughout the vicinity of the Project (Washington Utilities and Transportation Commission 2014). PSE has identified Comcast, CenturyLink, Frontier Communications, FHS Telecom, and Prince Telecom, Inc. as potential carriers. PSE would contract with one or more of these providers to install and maintain telecommunications services as needed. Comcast, CenturyLink, Frontier Communications, and Prince Telecom, Inc., also offer high-speed Internet services.

3.11.3.7 Electricity

Electricity in the vicinity of the Proposed Action area is provided by Tacoma Power—a division of Tacoma Public Utilities—and the Parkland Light & Water Cooperative (PL&WCo).

With the exception of a small portion of Pipeline Segment B that would be located south of State Route (SR) 512, electrical power in the vicinity of the Project is provided by Tacoma Power. Tacoma Power provides electrical power to a 180-square-mile service area, which encompasses the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites, proposed Pipeline Segment A, the majority of proposed Pipeline Segment B, the newly proposed Golden Given Limit Station, and the improvements to the Fredrickson Gate Station (Tacoma Public Utilities 2015a). Tacoma Power serves over 160,000 customers through 2,341 miles of transmission and distribution lines and 45 transmission substations (Tacoma Public

Utilities 2015b). In 2013, Tacoma Power's customers used approximately 7 million megawatt-hours of electric energy (Tacoma Public Utilities 2013).

The portion of Pipeline Segment B that would be located south of SR 512 would likely be located in the PL&WCo electrical utility service area, which serves 4,400 households and distributes 0.1 million megawatt-hours of power per year. PL&WCo currently purchases 100 percent of its power from the Bonneville Power Administration (BPA) but distributes the power through its own substation and transmission lines. (PL&WCo 2015)

The Bonneville Power Administration (BPA) also operates 23 customer substations throughout the Tacoma Power service area (Tacoma Public Utilities 2015b) and five transmission lines in the immediate vicinity of the proposed Project. Specifically, BPA operates 230-kilovolt (kV) and 500-kV transmission lines that would cross Pipeline Segment A approximately near the intersection of Taylor Way and SR 509. Pipeline Segment B would be located approximately 2.1 miles west of an existing 230-kV BPA transmission line, and the Frederickson Gate Station would be located approximately 0.9 mile southeast of an existing 230-kV BPA transmission line.

3.11.3.8 Natural Gas

Natural gas service is provided by PSE in the vicinity of the Project. PSE is Washington State's oldest energy company and provides natural gas services to approximately 770,000 natural gas customers across six counties, including Pierce County (PSE 2014b). The City of Tacoma, City of Fife, and unincorporated Pierce County are located within PSE's Pierce County service area. PSE's natural gas supply is delivered to Washington via interstate transmission pipelines owned and operated by third parties, and the natural gas is provided by suppliers in Alberta, British Columbia, and the Rocky Mountain states. The natural gas supply conveyed through to PSE is then distributed to customers through approximately 21,000 miles of PSE-owned gas distribution mains and service lines (PSE 2015).

3.11.3.9 Sewer Services

Sanitary sewer system services in the vicinity of the proposed Project are provided by the City of Tacoma's Wastewater Management division (in the Environmental Services department) and by Pierce County's Sewer Division of the Public Works and Utilities department.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Sewage in the vicinity of the proposed Tacoma LNG Facility is directed into the existing sanitary sewer system provided for the Blair-Hylebos peninsula by the City of Tacoma. Gravity sewer mains are located in Alexander Avenue (one 24-inch-diameter pipeline) and Taylor Way (two 12-inch-diameter pipelines). Wastewater is treated at wastewater treatment plants before being released to Commencement Bay. The Central Wastewater Treatment Plant is located in the Tideflats along the Puyallup River near the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. This treatment plant recycles biosolids and serves approximately 20,000 customers, which include industrial customers, from the city of Tacoma, the city of Fife, and unincorporated areas of Pierce County (City of Tacoma 2015f). Industrial customers in the City of Tacoma's Wastewater Management division service area may also be subject to the Industrial Pretreatment Program, which removes industrial wastewater pollutants before reaching the wastewater system (City of Tacoma 2015g).

PSE Natural Gas Distribution System

Sewage in the vicinity of the proposed Golden Given Limit Station and improved Fredrickson Gate Station components of the PSE Natural Gas Distribution System is directed into Pierce County's sanitary sewer system. Gravity sewer mains are located in the vicinity of the proposed PSE Natural Gas Distribution System components in Pierce County. The sewer mains collect wastewater for treatment at the Chambers Creek Regional Wastewater Treatment Plant. The Chambers Creek Regional Wastewater Treatment Plant serves central areas of unincorporated Pierce County and the Fredrickson Industrial area. (Pierce County 2015e)

3.11.3.10 Solid Waste Services

Solid waste collection services in the vicinity of the Project are provided by the City of Tacoma, Murreys Disposal Company, Inc., and Pierce County Refuse.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be located in the city of Tacoma. All businesses located in the city of Tacoma are required to set up a garbage collection account with the Solid Waste division of the Environmental Services department. The City of Tacoma also provides assistance to businesses that produce hazardous waste, including outlining disposal options, best practices, notifications to the Department of Ecology, working with private contractors to arrange for disposal, and information on avoiding excess waste. However, the City of Tacoma does not provide hazardous waste disposal services directly to commercial customers. (City of Tacoma 2015h,i,j)

PSE Natural Gas Distribution System

The portions of Pipeline Segment A that would be located in the city of Tacoma would be subject to the same solid waste regime as described above in Section 3.11.3.10 (Solid Waste Services).

For the portions of Pipeline Segment A that would be located in the city of Fife, Murreys Disposal Company, Inc. provides solid waste collection. The remainder of the PSE Natural Gas Distribution System components located in unincorporated areas of Pierce County would receive waste collection services from Pierce County Refuse, a private waste collection company operated by LeMay Transportation Services. (Pierce County 2015f)

3.11.3.11 Stormwater

Impervious surfaces, which include buildings, paved areas, and areas of compacted gravel and soil, cover approximately 99 percent of the upland portion of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. Stormwater on the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites drains through Port of Tacoma conveyance systems that discharge to outfalls at the Blair and Hylebos waterways. Stormwater infrastructure (catch basins, lines, and outfalls) generally occurs under and parallel to the roadway along the proposed components of the PSE Natural Gas Distribution System. A more detailed description of existing stormwater near proposed Project components is provided in Section 3.3.3.2 (Wetlands and Waterbodies).

3.11.3.12 Water Supply Services

The Project would be located entirely within the City of Tacoma's water supply and distribution area. The City of Tacoma water supply originates from sources in the Green River watershed and from 24 groundwater wells located around Tacoma. The majority of the wells are located in the South Tacoma well field. The water system has the capacity to supply up to 292 million gallons per day. The system maintains approximately 140 million gallons in additional storage. The Tacoma Water distribution system supplies an area encompassing approximately 150 square miles in the city of Tacoma and portions of Pierce County. (Tacoma Public Utilities 2014; 2015c,d,e,f)

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potable water for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be supplied by the existing water supply and distribution system provided to the Blair-Hylebos peninsula by Tacoma Water, a division of Tacoma Public Utilities. Water mains are located directly adjacent to the site under Alexander Avenue, Taylor Way, and East 11th Street. Tacoma Water has indicated that the mains in the area have a current capacity of 11,500 gallons per minute (gpm) at 20 pounds per square inch (psi), and that a hypothetical demand of 2 million gallons per day at the proposed site would only cause a reduction of 2 psi in system water pressure. (Tacoma Public Utilities 2015f)

PSE Natural Gas Distribution System

Tacoma Water also provides potable water to the areas near the PSE Natural Gas Distribution System. Although the City of Fife serves potable water to the area in which the Pipeline Segment A would be located within the city of Fife, the entire City of Fife water supply is currently purchased from Tacoma Water (Tacoma Public Utilities 2015f; City of Fife 2015c).

3.11.4 Impacts of the Proposed Action

This section identifies public services and utilities impacts that would potentially be associated with construction, operation, and decommissioning of the Project.

3.11.4.1 Construction Impacts

This section discusses the primary construction activities and impacts that could occur to public services and utilities as a result of the Proposed Action. The construction schedule for activities required to complete each component of the proposed Project is as follows:

- 10/15 – 1/16: Building Demolition
- 11/15 – 7/16: Civil preparation (soil improvement, grading, and below grade utilities)
- 3/16 – 10/18: Plant construction
- 7/16 – 2/17: Blair waterway fueling platform construction

As described in Section 3.12.4.1 (Construction Impacts), the Proposed Action would support an average of 401 total jobs per year over the thee-year construction period. These jobs are classified as direct, indirect, or induced jobs (see Appendix J). The peak of general construction is expected to occur in 2016 and represents the combined peak of construction trucks, delivery vehicles, and workforce/personnel vehicles.

Fire Protection

This subsection addresses potential impacts to fire protection services that would result from the construction of the Project. There is an increased risk of an emergency event requiring fire protection services during the construction period, which would require the application of mitigation measures listed in Section 3.5.6 (Avoidance, Minimization, and Mitigation), as well as Section 3.11.6 (Avoidance, Minimization, and Mitigation).

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could result in an emergency event and an increase in emergency calls to fire stations in the vicinity of the Project as described in Section 3.11.3.1 (Fire Protection).

The increased level of activity on site during demolition and construction would increase the likelihood of a fire or hazardous material incident. The use of construction machinery would likely result in the increased presence and use of potentially hazardous materials on site (including diesel, fuel oil, lubricant and others), as well as an increase in potential sources of ignition. In addition, because the initial stages of construction for the Tacoma LNG Facility would involve the decommissioning and/or demolition of existing industrial facilities, there could be an additional increased risk of hazardous materials incident during this period.

Based on traffic modeling in the vicinity of the Project, temporary increases in traffic due to construction would not significantly impact the ability of fire protection services to access the Port of Tacoma.

Construction traffic is expected to arrive at the proposed sites via 54th Avenue East and Taylor Way. Tacoma Fire Department Stations 3 and 12 operate approximately 2.3 miles and 3.6 miles, respectively, from the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. The most direct route for fire protection vehicles arriving from those stations to these sites would be the 11th Avenue bridge over the Hylebos Waterway and 54th Avenue East, respectively. Construction of the Tacoma LNG Facility would

increase average daily traffic volumes on 54th Avenue East nominally by approximately 2 percent. This minor increase in traffic would not be expected to affect fire prevention services' access to the Port. Per Figure 11A of the *Transportation Discipline Report—Blair-Hylebos Peninsula Terminal Redevelopment Project*, provided as Appendix I to this draft environmental impact statement, average PM peak hour background volumes on southbound Taylor Way are approximately 470 vehicles per hour approaching SR 509. Approximately 145 peak hour outbound construction trips could be added, for a total of 615 vehicles, which represents a temporary increase of roughly 30 percent in the afternoon peak hour. Background traffic volumes on southbound 54th Avenue East range between roughly 700 and 850 vehicles per hour during the PM peak. Approximately 100 trips could be added to this total during the afternoon peak hour as construction vehicles leave the site and head towards Interstate 5. Total traffic volumes could be increased temporarily by between 10 and 15 percent. Per Section 3.10 (Transportation), this added level of traffic would not be expected to impact travel times and level of service significantly.

Nevertheless, as discussed in Section 3.11.3.1 (Fire Protection), existing response times to this area are already several minutes longer than Tacoma Fire Department recommended standards. In addition, because there are relatively few alternatives to using units from Stations 3 and 12 while maintaining acceptable response times, other portions of the Tacoma Fire Department's service area covered by those stations (such as Northeast Tacoma or other parts of the Port of Tacoma) could be left temporarily unprotected during responses to potential incidents at the Tacoma LNG Facility or TOTE Marine Vessel LNG Fueling System.

Finally, construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would have limited impact on fire risk to adjoining properties due to the materials present on site and the methods and materials involved in construction. Construction would begin with demolition and removal of the various existing structures, including any hazardous materials that may pose fire hazards. The existing ground surfaces within the construction footprint are either paved or covered with gravel. Existing concrete, asphalt, and gravel located outside the proposed footprint would remain in place. The primary materials used to construct the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System components would be steel and concrete, which are essentially nonflammable. These components would be installed over the requisite concrete ground improvements and associated foundations. Furthermore, the Project site is abutted by the Hylebos and Blair waterways, and the nearest structures are located south of East 11th Street at least 300 feet from the proposed development footprint of the Tacoma LNG Facility.

PSE Natural Gas Distribution System

Construction of the PSE Natural Gas Distribution System could result in an emergency event and an increase in emergency calls to fire stations in the vicinity of the PSE Natural Gas Distribution System. However, this increase would likely be temporary in nature and of limited significance.

Furthermore, construction of the PSE Natural Gas Distribution system is not expected to impact the ability of fire protection services to access areas in the vicinity of Project components. Construction of Pipeline Segment A would occur at night within portions of 54th Avenue East. This nighttime construction is not expected to affect fire prevention services' access to the Port of Tacoma because at least one travel lane would remain open at all times on 54th Avenue East. For other components, construction activities would be limited to one travel lane where the pipeline alignment coincides with an existing roadway (e.g., along Golden Given Road and 99th Avenue).

Post-construction hydrostatic testing of Pipeline Segments A and B would draw water from nearby fire hydrants. Total water demand for hydrostatic testing is expected to be 220,000 gallons for Pipeline Segment A and 31,000 gallons for Pipeline Segment B. According to Tacoma Water, existing water pressure in firewater mains along Taylor Way near Segment A is modeled at 9,000 gpm at 20 psi, and drawing water at a rate of 2 million gallons per day would cause a decrease. The minimum water pressure in firewater mains near Golden Given Road is estimated to be 4,900 gpm at 20 psi. It is therefore possible that the availability

of fire suppression water in the vicinity of Pipeline Segments A and B could be temporarily impacted, depending on the rate at which water would be drawn from the main. (Tacoma Public Utilities 2015f)

Law Enforcement

Project construction could result in increased service calls to law enforcement related to theft, vandalism, and unwanted intrusion into work areas. In addition, the number of road transportation-related accidents and calls for service in locations with traffic increases related to Project construction could increase.

Nonetheless, the increase in traffic related to construction of the Tacoma LNG Facility described above in "Fire Protection" is not expected to affect law enforcement services' access to the Port of Tacoma. The increase in traffic volume would be limited to the Project construction period and would not significantly affect existing traffic operations on local roadways. Construction-related traffic would not be expected to decrease response times for law enforcement agencies as the mitigation measures described in Section 3.10.6.1 (Construction) would be implemented to accommodate increased construction movements and emergency vehicles would be given the right-of-way required by local, state, and federal regulations.

Nighttime construction of Pipeline Segment A would occur within portions of 54th Avenue East. This nighttime construction would also not be expected to affect law enforcement services' access to the Port of Tacoma because at least one travel lane would remain open at all times on 54th Avenue East. A detailed discussion of potential impacts to traffic resulting from the Proposed Action is presented in Section 3.10 (Transportation).

During the period needed to complete construction, PSE expects that approximately 92 percent of construction workers would be hired locally or would commute from within the Puget Sound region. This workforce would not increase residential occupancy within the area surrounding the Project and therefore would not require additional police services. Accordingly, no additional police personnel, holding facilities, vehicles, or equipment would be required during Project construction.

Medical Services

Demand for EMS could increase due to construction-related accidents that could occur during Project construction. Potential hazards at construction sites that could cause injury include equipment failure, human error, and natural disasters. In addition, because the majority of construction workers would be hired locally or would commute from within the Puget Sound Region, it is not expected that an influx of construction workers would significantly increase general medical services demands in the area. Although a slight increase in demand for emergency and trauma medical services could occur, the potential increase would be within the capacity of the multiple hospitals and trauma facilities described in Section 3.11.3.3 (Medical Services). The increase would further be tempered by implementation of the mitigation measures described in Section 3.11.6.1 (Construction).

Schools

The majority of the anticipated construction labor positions would be hired locally or regionally. Workers would commute to the Project from the surrounding Pierce County and Puget Sound region on a daily or weekly basis as needed. Few construction workers from outside the region would relocate their families during the limited construction period. Project Construction would therefore not significantly increase the population in local school districts. The minimal resulting population growth would not significantly impact the school districts and schools mentioned in Section 3.11.3.4 (Schools).

Communications

Construction could impact telecommunications infrastructure located in the public right-of-way, where the proposed pipeline would also be located. This would potentially include infrastructure located along Alexander Avenue East (connecting the Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System) and along all road segments collocated with or intersecting Pipeline Segments A and B.

PSE would coordinate with the telecommunication and Internet service providers described in Section 3.11.3.6 (Communications) to locate existing facilities and limit potential construction-related impacts through the mitigation measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

Electricity

Project construction could also impact electrical infrastructure located in the public right-of-way. As for telecommunications infrastructure, this would potentially include electrical infrastructure located along Alexander Avenue East (connecting the Tacoma LNG Facility and the TOTE Marine Vessel LNG Fueling System) and all road segments collocated with or intersecting proposed Pipeline Segments A and B.

In addition, Project construction would require substantial amounts of energy, potentially drawing strongly on the electrical network at times. However, the anticipated peak electrical load during construction would be small in comparison with system capacity. The majority of the construction equipment for the Project would be powered by gasoline or diesel fuels without direct need for electrical power.

In order to limit any potential impact to existing residential, commercial, or industrial customers in the Tacoma Power, PL&WCo, and BPA service areas, PSE would coordinate with those agencies and local government to minimize impacts to electrical utility lines and substations according to the mitigation measures discussed in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

Natural Gas

Construction of the Project components would not require natural gas, and PSE would be able to coordinate internally to avoid any disruption to existing natural gas lines or service over the course of construction. Therefore, construction would not limit PSE's ability to provide natural gas to existing residences or businesses in PSE's service area, and no impact is expected.

Sewer Services

Sewage would be collected in portable toilets during construction and disposed of on a regular basis to maintain sanitary conditions.

Post-construction hydrostatic testing would be required both for the tank to be constructed at the Tacoma LNG Facility and for Pipeline Segments A and B. In addition, hydrostatic test water used for Pipeline Segments A and B would be discharged to the local sanitary sewer systems. Such discharge would be metered to gradually discharge consistent with the batch discharge and wastewater discharge requirements of each jurisdiction. Accordingly, discharge of hydrostatic test water to the sanitary sewer systems would not exceed the capacity of the sanitary sewer system.

Existing sewer utilities, with the mitigation measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), would therefore not be significantly impacted by construction of the PSE Natural Gas Distribution System.

Solid Waste Services

The primary waste generated during construction would result from the demolition of existing buildings and solid construction debris such as scrap metal, concrete, creosote-treated wood and piles, cable, wire, wood pallets, plastic packing materials, and cardboard. The construction contractor would recycle useable materials and coordinate the transport of this waste to appropriate licensed disposal sites.

Creosote-treated wood and piles that would be removed during the demolition of existing in-water structures would be disposed of at an appropriate upland facility that meets the liner and leachate standards of the Minimum Functional Standards, WAC 173-304. Hazardous materials such as fuels, oils, and lubricants required to safely operate and maintain construction equipment would be disposed of in accordance with applicable state and federal regulations, including WAC 173-303. These materials would be stored in a centralized construction staging area. Excess overburden and soil would be trucked to a permitted location capable of accepting them. Furthermore, contaminated media (groundwater, subsurface

soil, or sediment) that could result from construction activities are regulated by federal, state, and local regulatory programs.

As described in Section 3.5.6.1 (Construction), a contaminated media management plan (CMMP) would be developed and implemented during construction. The CMMP would describe the proper characterization of media disturbed during construction, provide procedures for segregating contaminated media from clean fill, and outline on-site and off-site management of affected media based on the levels of contamination present. To the extent possible, recycling would be considered for applicable items.

The City of Tacoma notes that PSE has not provided estimated amounts for the different types of solid waste that may be generated over the course of construction. The information provided by PSE suggests that commercial providers of waste services will have sufficient capacity regardless of the amount of material and that no impact would therefore be expected for public service providers. However, considering the magnitude of demolition involved in the construction of the Tacoma LNG Facility, it is determined that the impact to solid waste services provided by the City of Tacoma is unknown. However, this issue does not affect construction of other Project components. Therefore, the impact on solid waste services provided in unincorporated areas by Murreys Disposal Company, Inc., or Pierce County Refuse would not be significant.

Stormwater

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

During construction, stormwater best management practices (BMPs) would be implemented to minimize potential impacts to the existing stormwater infrastructure in the form of increased runoff and erosion from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites. On-site stormwater infrastructure, including catch basins, conveyance pipes, and outfalls, would be largely retained and modifications made as part of construction only where needed to improve performance of the system and comply with conditions provided in the SWPPP and BMPs described in Section 3.3.6.1 (Construction). Existing off-site stormwater infrastructure, with the mitigation measures described in Section 3.3.6 (Avoidance, Minimization, and Mitigation), would not be significantly impacted by construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System.

The 5 million gallons of water used for hydrostatic testing of the LNG storage tank would be discharged to the on-site stormwater system to the Hylebos Waterway over a specified period of time in coordination with the Port and City of Tacoma. No impact is therefore expected to adjacent municipal stormwater systems.

PSE Natural Gas Distribution System

The two new distribution pipeline segments would be constructed entirely within the paved portion of existing road rights-of-way. The Golden Given Limit Station and upgrades to the Frederickson Gate Station would both be constructed on previously developed sites. PSE would contact local public works departments and utility agencies to identify the presence of existing stormwater systems in the road rights-of-way. PSE would coordinate with the appropriate utility providers to resolve potential conflicts between proposed PSE Natural Gas Distribution System improvements and existing stormwater infrastructure. Any impacted infrastructure would be restored to preexisting conditions. During construction, BMPs would be implemented to minimize potential impacts to the existing stormwater infrastructure such as increased runoff and erosion. Therefore, existing stormwater infrastructure, with the BMPs described in Section 3.3 (Water), would not be significantly impacted by construction of the PSE Natural Gas Distribution System.

Water Supply Services

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would require approximately 9 million gallons of water. This water is most likely to be drawn from the municipal potable water supply described in Section 3.11.3.12 (Water Supply Services) for the installation of concrete ground improvements and foundations. In addition, Tacoma Water has also indicated very significant volumes of

fire suppression water in adjacent water mains (11,500 gpm at 20 psi). Water for construction purposes such as dust suppression is typically drawn from fire hydrants. (Tacoma Public Utilities 2015f)

The post-construction commissioning of the LNG storage tank would require the primary inner container of the LNG storage tank to be filled and hydrostatically tested in accordance with the requirements of American Petroleum Institute Standard 620. Approximately 5 million gallons of water would be required to perform the test. The hydrostatic test water would be supplied by the Tacoma potable water system at a proposed rate of 1,000 gpm as stated in Section 2.3.1.1 (Upland Construction). This hydrostatic test would occur only once and would be performed in accordance with approvals from Tacoma Water.

Based on available water supplies in this area as described in Section 3.11.3.12 (Water Supply Services), the water supply that would be needed to complete construction and post-construction hydrostatic testing would not significantly impact the water supply within the vicinity of the proposed Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites or in the service area of Tacoma Water in general.

PSE Natural Gas Distribution System

During construction, water for dust suppression, water incorporated into concrete, and water used for fire control would be provided by the pipeline construction contractor. Typically, water is provided from a truck or via a fire hydrant through a portable meter. Based on the available supply through the firewater mains as described in this section under “Fire Protection,” above, existing water supply utilities would not be significantly impacted by construction of the PSE Natural Gas Distribution System. Further mitigation measures are described in in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

3.11.4.2 Operations Impacts

This section addresses potential impacts to public services and utilities associated with operation of the Project.

Fire Protection

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be conducted by trained personnel in accordance with the applicable requirements of 49 CFR 193 (and National Fire Protection Association [NFPA] 59A as adopted therein) and 33 CFR 127. In the event of an emergency or fire during operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, facility emergency response procedures would be acted upon, first responders from the Tacoma Fire Department would be notified, and plant fire suppression systems would be deployed, if necessary.

If the emergency were related to a release of LNG or refrigeration fluids, LNG or refrigerant would flow to a containment sump, where it would be allowed to boil off. In the case of a fire, it would be extinguished with portable dry chemical extinguisher carts or, alternatively, the fire would be allowed to burn out. Water is not used for extinguishing LNG fires and is only used to protect exposures (buildings and other equipment) on site from the heat produced by fire.

Details of the health and safety elements, emergency response procedures, and containment systems at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites are provided in Section 3.5 (Public Health and Safety).

In addition, the existing underground municipal firewater system along both East Alexander Avenue and East 11th Street has a very high capacity, estimated at 11,500 gpm at 20 PSI by Tacoma Water (Tacoma Public Utilities 2015f). Any potential emergency event that demands municipal water supply and that would occur during operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would therefore be highly unlikely to exceed the capacity of the existing underground municipal firewater system. As described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), hydrant and monitor connections would be compatible with local municipal fire department equipment.

Major traffic impacts are not expected as a result of Project operation. However, when taken together with cumulative impacts from projected build-out of vacant and underdeveloped lands, it is anticipated that fire services access to the Tideflats will be significantly reduced below current levels unless a comprehensive mitigation strategy is phased in. Details regarding road conditions, speeds, response times and cumulative needs and impacts are provided in Section 3.10 (Transportation) and Section 3.13 (Cumulative Impacts).

The primary safety hazard in an LNG liquefaction facility is a release of LNG or refrigerant from process equipment or tanks. A spill could result in a potentially flammable vapor cloud that must be monitored as the spilled product evaporates, or a fire on the surface of the liquid pool that would be either extinguished or monitored as it burns out (with appropriate protection of nearby structures, if necessary, with water streams to mitigate heat damage). Training of first responders would be required as a mitigation measure described in Section 3.11.6 (Avoidance, Minimization, and Mitigation).

Most operational incidents would likely not require direct intervention of fire protection services due to the safeguards described above. However, demand for fire protection services would nevertheless likely be increased as a result of Project operations, for the following reasons:

- Reopening of fire Station 15 is a recommended mitigation measure that places EMS responders in close proximity for a timely response.
- Facility emergency response procedures involve notification of first responders from the Tacoma Fire Department who would be obligated to respond;
- Even if no direct fire response is necessary by fire protection services, an operational incident would likely require the intervention of auxiliary services provided by the Tacoma Fire Department, such as EMS or hazardous materials response;
- Those rare incidents that would require direct intervention of fire response services are likely to be very severe and require significant amounts of Tacoma Fire Department staff and equipment for both direct fire response and auxiliary services; and
- As noted in Section 3.11.4.1 (Construction Impacts), the relative lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident.

The operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would therefore need to include mitigation measures to address these impacts, as listed in Section 3.11.6 (Avoidance, Minimization, and Mitigation) and Section 3.5 (Health and Safety).

Natural Gas Distribution System

The primary fire hazard and potential impact to fire protection services associated with operation of the PSE Natural Gas Distribution System components would be an accidental rupture of the pipeline segments caused by outside sources, such as earth moving and excavation equipment related to other activities adjacent to the location of the pipelines. However, the likelihood of an operation-related pipeline accident with current pipeline technology and adherence to existing regulation is minimal.

Traffic impacts are not expected as a result of Project operation and would not affect fire prevention services' access in the vicinity of the PSE Natural Gas Distribution System components. Furthermore, the proposed addition of approximately 5 miles of new distribution line to PSE's total system of approximately 21,000 miles of natural gas distribution mains and service lines (PSE 2014b), including many miles throughout Pierce County, does not represent a significant change to the overall system.

Operation of the PSE Natural Gas Distribution System facilities would be implemented with the mitigation measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation) and would not significantly impact fire protection services in unincorporated Pierce County.

Law Enforcement

This subsection addresses potential impacts to law enforcement services that would result from operation of the Project components. With the mitigation measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), operation of the Project components would not significantly impact law enforcement services in the vicinity of the Project sites.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Police respond to theft, vandalism, or trespassing at public and private properties. The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites include security procedures for the operation and maintenance (O&M) of the facility, protective enclosures, secure communications, a security monitoring system, and warning signs. The O&M team, consisting of the plant manager, plant engineer, O&M supervisor, maintenance planner, controls technician, office administrator, and 10 represented gas operators, would be responsible for implementing the facility security procedures described in Chapter 2 (Description of Proposed Action).

The TOTE Marine Vessel LNG Fueling System's cryogenic pipeline would be located below grade and would be inaccessible to the public. The portion of the TOTE Marine Vessel LNG Fueling System located aboveground, including the LNG loading platform and access trestle, would be enclosed by a chain-link security fence as described in Section 3.11.6.2 (Operations). The facility would have limited access, and only authorized personnel would be allowed access. PSE would contract for security service as required to meet regulatory requirements and to control access and prevent unauthorized access at the Project site.

Traffic impacts are not expected as a result of Project operation and would not affect law enforcement services' access to the Port of Tacoma. Thus, operations of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would not significantly impact local law enforcement services.

Furthermore, PSE has developed a Preliminary WSA to address how operation of the marine components of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would comply with federal and Coast Guard marine safety programs described in in NVIC 01-11 and 33 CFR 127 (PSE 2014a). The Preliminary WSA, described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), shows the analysis and coordination that would be undertaken to ensure the proposed LNG loading, transits, unloading, and barge-to-ship bunkering operations are appropriately safe and secure. The Coast Guard would then use the Preliminary WSA and coordinate with PSE to develop a Follow-on WSA, as described in Section 3.11.6 (Avoidance, Minimization, and Mitigation), to provide all details concerning the LNG transfer terminals, LNG vessel transit, and LNG bunkering information required, along with the safety and security risk assessments specified in the NVIC 01-11 (PSE 2014a). Completion of the Follow-on and Final WSA would ensure safe and secure LNG operations and would further minimize potential security risks to the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, as well as to the Port of Tacoma Manufacturing/Industrial Center generally.

PSE Natural Gas Distribution System

The new Golden Given Limit Station would be constructed entirely within one previously developed parcel and improvements to the existing Fredrickson Gate Station would occur entirely within the existing developed footprint of the site. Both stations would include security fencing.

Traffic impacts are not expected as a result of the operation of either Station, nor are they expected as a result of the operation of Pipeline Segments A and B. Therefore, there would be no impact on law enforcement services' access in the vicinity of the PSE Natural Gas Distribution System components.

Medical Services

Operation of the Project would have limited impacts to medical services. The Project's operations workforce would include approximately 16 employees at all times, and all employees would receive regular emergency response and safety training to reduce the likelihood of emergencies at the Project sites. If an emergency event were to occur and require EMS, there are adequate medical facilities in the vicinity, including multiple Level 2 trauma centers, as described in Section 3.11.3.3 (Medical Services). Furthermore, the workforce needed to construct the Project would be hired locally or would commute from within the Puget Sound region and would not significantly increase residential occupancy or associated medical service demands in the Tacoma Trauma Center service area.

Schools

New jobs for workers at Project facilities would have limited direct impacts to area schools. Workers would commute to their jobs from the surrounding Pierce County and Puget Sound region. Relocation of families to the county and region would be minimal, creating little additional demands on teachers or school facilities.

Communications

Operation of the Project would not significantly increase demand for telecommunications and Internet services in the vicinity of the Project and is very unlikely to have any adverse impact on service providers. Where appropriate, PSE would coordinate with the telecommunication and Internet service providers described in Section 3.11.3.6 (Communications) to limit operations-related impacts to these utilities.

Electricity

Electricity would be used for electrical systems within the Tacoma LNG Facility, indoor and outdoor lighting, and other support equipment. Power to serve the facility would be transmitted across lines owned and operated by Tacoma Power, a division of Tacoma Public Utilities, which has sufficient capacity to serve the facility as an added customer. The TOTE site is already served by electrical systems. There are no significant direct impacts affecting the local utility distribution system.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Electrical service would be provided to the Tacoma LNG Facility site by Tacoma Power. Transmission lines are located throughout the Blair-Hylebos peninsula. The nearest electrical substation to the site would be the Tacoma Power Arkema/Atofina Substation and switching station located on the southeastern side of East 11th Street.

The Tacoma LNG Facility would require approximately 15 megawatts while operating at peak load. The facility would be served through existing Tacoma Power transmission lines. At PSE's request, Tacoma Power conducted the *Interconnection Study – Puget Sound Energy – Liquefied Natural Gas Project*, which is a preliminary interconnection study for connecting a 15-megawatt facility to the existing 115-kV electrical system in the vicinity of the Port of Tacoma. The purpose of the interconnection is to accommodate the transmission of power to the proposed Tacoma LNG Facility (Tacoma Public Utilities 2012). The interconnection study concludes that the existing 115-kV system in the area has sufficient capacity to accommodate the power to the Tacoma LNG Facility over Tacoma Power's existing transmission system. A new substation is proposed within the Tacoma LNG Facility, which PSE would own and operate.

PSE Natural Gas Distribution System

The proposed Golden Given Limit Station would be located on a site with an existing 4,000-square-foot structure. That structure would be removed and the smaller limit station structures erected. The proposal at the Fredrickson Gate Station would be to modify existing on-site natural gas infrastructure. Operation of the proposed PSE Natural Gas Distribution System improvements would require electrical power obtained from the local distribution systems. The amount of power consumed would be similar to that currently consumed

by similar facilities and would not change regional consumption. There would be no significant impacts to the local distribution system.

Natural Gas

Project operations would provide a new natural gas peak-shaving resource, thereby strengthening the existing natural gas distribution system and providing more reliable service to existing PSE natural gas customers, especially during periods of peak winter demand. The new pipeline segments, new limit station, and improvements to the gate station would supply the Tacoma LNG Facility with the requisite quantity of natural gas, while also connecting this peak shaving resource to the local natural gas service distribution system. Therefore, the Proposed Action would improve the local natural gas service distribution system.

Sewer Services

No direct sewage-related impacts would be expected as a result of Project operations. The TOTE Marine Vessel LNG Fueling System and improvements to the PSE Natural Gas Distribution System would not generate sewage during operation. Sewage from the Tacoma LNG Facility would result from showers, toilets, and sinks in the existing Control Building. These same sources of sanitary sewage occur in existing buildings on the site and discharge to the existing sanitary sewer systems described in Section 3.11.3.9 (Sewer Services). All other liquid waste from Project operations (including process water used for gas vaporization, facility cooling, and natural gas pretreatment) would be trucked from the facility to an approved waste disposal site and disposed of in accordance with state and local regulations. Thus, operation of the Project would not significantly impact sewer services.

Solid Waste Services

Solid waste generated during operation of the Project components would be consistent with industry standards for facilities of their proposed size. The primary waste generated during operation of the Tacoma LNG Facility would be office-related waste such as plastic packing materials and cardboard and food waste from the 16 employees working on the site. PSE would coordinate with City of Tacoma Solid Waste Management to determine the type of requisite garbage service for the site. To the extent possible, recycling would be considered for applicable items.

Operation of the TOTE Marine Vessel LNG Fueling System site would not result in the generation of solid waste. Operation of the PSE Natural Gas Distribution System components, including the proposed Golden Given Limit Station and improvements to the Fredrickson Gate Station, would not require staff stationed on site and would not result in the generation of solid waste. Furthermore, solid waste pickup service is available at all Project component locations as discussed in Section 3.11.3.10 (Solid Waste Services). Accordingly, Project operations would not significantly impact solid waste services provided by the City of Tacoma, Murreys Disposal Company, Inc., or Pierce County Refuse.

Stormwater

This subsection shows that operation of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System is not anticipated to significantly impact existing stormwater infrastructure or services.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Operation of the Tacoma LNG Facility would include stormwater treatment and improve the quality of stormwater discharged from the site to the Hylebos Waterway. The Tacoma LNG Facility stormwater management system would be designed to meet the water quality requirements of the Port of Tacoma's 2014 *Stormwater Management Plan* (Port of Tacoma 2014b) and any additional applicable requirements from the Western Washington Stormwater Manual. Existing stormwater infrastructure potentially impacted during construction would benefit from changes required by code in the final stormwater design for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. Existing on-site stormwater infrastructure on the Tacoma LNG Facility site, including catch basins, conveyance pipes, and outfalls would be largely

retained and modifications made only where needed to improve performance of the system. Site conditions at the TOTE Marine Vessel LNG Fueling System site, including existing stormwater infrastructure, would be restored as closely as possible to preexisting conditions following construction. The operational effects of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System on stormwater are described in greater detail in Section 3.3.4.2 (Operations Impacts).

PSE Natural Gas Distribution System

During operations, impacts from stormwater runoff would be unchanged along Pipeline Segments A and B and at the upgraded Fredrickson Gate Station. Site conditions, including existing stormwater infrastructure, along the pipeline segments would be restored as closely as possible to preexisting conditions following construction.

Furthermore, the proposed site for the Golden Given Limit Station is at present almost entirely impervious, with a building and paved parking lot. Portions of the existing impervious surface at this location would be removed and dense native vegetation added. Low-Impact Development stormwater features would be implemented in accordance with Pierce County Code Title 17A to promote on-site infiltration and reduce stormwater runoff. Thus, any impervious surfaces used on the site as part of the limit station would, at a minimum, not differ from existing conditions, and may instead improve them. The surface at the upgraded gate station would remain gravel, which matches existing conditions.

Water Supply Services

Potential impacts to water supply services resulting from the operation of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System are described below. Potable water needs for operations of Project components would not significantly impact the ability of relevant providers to deliver water supply services.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Potable water for the Tacoma LNG Facility would be supplied by the existing water distribution system provided to the Blair-Hylebos peninsula by Tacoma Water. The Tacoma LNG Facility would reuse existing potable water infrastructure on site as much as possible. The infrastructure of the proposed facility Control Building would be reused, but some reconfiguration might be necessary. Makeup water for the pretreatment system would be provided by a demineralized water system located in the Control Building. The demineralized water system would use approximately 6 gallons per minute. The only other water demand would be for sinks and toilets used by the O&M team, consisting of the plant manager, plant engineer, O&M supervisor, maintenance planner, controls technician, office administrator, and 10 represented gas operators. Furthermore, the addition of a 16-employee facility is negligible in the context of the overall Tacoma Water service area, which serves nearly 100,000 customers, including nearly 6,000 commercial/industrial customers (Tacoma Public Utilities 2015e).

PSE Natural Gas Distribution System

Water needs for operation of PSE Natural Gas Distribution System components would be minimal. Potable water would not be required for the operation of Pipeline Segments A and B. Potable water use for the newly proposed Golden Given Limit Station and improvements to the Fredrickson Gate Station would potentially be used for incidental maintenance needs.

3.11.4.3 Decommissioning Impacts

This section describes the various procedures used to address potential decommissioning impacts associated with the end of the design life of the Project. Accounting for each component of the Project, the estimated total design life of the Project is 50 years. Decommissioning of Project components would generate public services and utilities impacts similar to those discussed in Section 3.11.4.1 (Construction Impacts) with the exception of impacts to solid waste services.

Decommissioning would likely result in the removal of solid wastes. The primary waste generated during decommissioning would be solid construction debris such as scrap metal, concrete, wood, cable, wire, wood pallets, plastic packing materials, and cardboard. The construction contractor would coordinate the transport of this waste to appropriate licensed disposal sites. To the extent possible, recycling would be considered for applicable items such as steel scrap metal.

3.11.5 Impacts of No Action

Under the No Action Alternative, the Project would not be built, current conditions would remain unchanged, and Proposed Action–related impacts to public services and utilities would not occur

3.11.6 Avoidance, Minimization, and Mitigation

This section describes avoidance, minimization, and mitigation measures proposed to address potential impacts during construction and operation of the Project.

PSE would minimize potential impacts to public services and utilities by providing police, fire, and emergency personnel with emergency response procedures for the facility in accordance with the requirements of 49 CFR 193 and NFPA *59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)* (as adopted by 49 CFR 193). Furthermore, PSE would implement measures to plan for and minimize emergencies, such as safety and emergency response training to raise the level of preparedness in the event of an emergency. As described further in Section 3.11.6.1 (Construction), impacts that could not be avoided would be minimized through implementation of specific measures.

In addition to the various mitigation measures described in this section, increased demand for public services or utilities during construction and operation of the Project would be partially mitigated by an increase in City tax revenue generated by the Proposed Action through the process described in Section 3.12.4.2 (Operations Impacts). Nonetheless, new City tax revenues generated by the Proposed Action would only offset projected impacts to public services and the cost of required mitigation to a limited extent.

3.11.6.1 Construction

The following mitigation measures would be implemented to minimize potential impacts to public services and utilities that would result from the construction.

<u>Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System</u>

Fire Protection

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to fire protection and related EMS through the following:

- PSE would provide emergency response agencies with regularly updated maps of the facilities and current access points, relevant contact information, and site procedures for fire protection and rescue operations.
- A new unit of the Tacoma Fire Department with fire response and EMS response capabilities and hazardous materials awareness would be stationed in proximity to the site of the Tacoma LNG Facility for the duration of construction. This would address the increased risk of incidents requiring fire protection and EMS, reduce response times to potential incidents and avoid impacts to fire protection in other parts of the Tacoma Fire Department if an incident occurs on site.
- The emergency preparedness, emergency access, and construction health and safety measures proposed by PSE and described in Section 3.5 (Health and Safety) would reduce potential impacts to fire protection and EMS throughout the construction period for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System.
- Construction of the Tacoma LNG Facility would meet the safety requirements of the Pipeline and Hazardous Materials Safety Administration (PHMSA) as specified in PHMSA Form 18 titled *Evaluation of*

LNG Facility Siting, Design, Construction, and Equipment (PHMSA 2014) and detailed in Section 3.5.2.1 (Siting and Design of LNG Facilities). These requirements, administered and enforced by the Washington Utilities and Transportation Commission, address Title 49 of CFR Part 193—*Liquefied Natural Gas Facilities: Federal Safety Standards* (49 CFR 193) and are primarily based on NFPA *59A: Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)* (as adopted by 49 CFR 193).

Law Enforcement

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to law enforcement through the following:

- Security would be provided throughout the construction period for each separate component of the Project.
- Temporary security fencing would be erected around the construction sites to prevent trespassing and vandalism.

Solid Waste Services

- PSE would prepare a demolition plan and submit it to the City for review. The plan would describe the sequencing of the demolition; provide estimates of the volumes and types of expected demolition waste; describe proposed efforts to recycle as much material as possible, and describe the arrangements that have been made to dispose of material not recycled and their compliance with applicable local, state, and federal laws and regulations.

Communications, Electricity, Sewer Services, Stormwater, and Water Supply Services

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to communications, electrical, and other infrastructure potentially located in the right-of-way of East Alexander Avenue by conducting a utility location survey prior to initiating work in the right-of-way and coordinating with all relevant service providers to protect existing infrastructure.

PSE Natural Gas Distribution System

Fire Protection

Construction of the PSE Natural Gas Distribution System would minimize potential impacts to fire protection services through the following measures:

- PSE or its selected contractor would notify the relevant fire department or district prior to initiating work within that department or district's service area.
- PSE would obtain permits before hydrostatic testing of Pipeline Segment A and Segment B begins, in accordance with the provisions of local codes for the use of fire hydrants. Per Tacoma Municipal Code 12.10.305, the use of hydrants in the city of Tacoma requires a hydrant use permit through Tacoma Public Utilities. Per City of Fife Municipal Code 13.04.140, the use of hydrants in the city of Fife requires a hydrant use permit through the City of Fife Public Works Department. Hydrant use in unincorporated Pierce County must comply with the applicable provisions of the building and fire code provided in Pierce County Code 17C.60. In compliance with the requisite approvals, use of firewater from nearby hydrants for hydrostatic testing would not significantly impact pressure in the firewater system or the ability to use it as needed.
- During post-construction hydrostatic testing, the contractor would communicate with fire protection services prior to drawing water from any fire hydrant.

Communications, Electricity, Sewer Services, Stormwater and Water Supply Services

Construction of the PSE Natural Gas Distribution System would limit impacts to all types of linear public service infrastructure located in the right-of-way, by conducting a standard utility location survey prior to

initiating construction to identify existing utility lines where new pipeline segments and connections to the Golden Given Limit Station and Fredrickson Gate Station are proposed. Existing utilities would be protected in coordination with the applicable local jurisdictions and service providers.

3.11.6.2 Operations

The following mitigation measures would be implemented to minimize potential impacts to public services and utilities that would result from the operation of the Project.

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Fire Protection

Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to fire protection services through the following measures:

- A new unit of the Tacoma Fire Department with fire response, EMS, and hazardous materials operations capabilities would be stationed in proximity to the site of the Tacoma LNG Facility. This would address the increased likelihood that fire protection, EMS or hazardous materials response would be called to the area, reduce response times to potential incidents and avoid impacts to fire protection in other parts of the Tacoma Fire Department's service area if an incident occurs on site.
- PSE would provide regular orientation to the site to relevant responders at the Tacoma Fire Department, and operations personnel and the Fire Department would consult to develop and implement an ongoing training regime that integrates best practices for responding to fire and emergencies at the Tacoma LNG Facility. The response methods would specifically include handling LNG fires, taking into consideration the properties of LNG.
- Operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would meet the safety requirements described above in Section 3.11.4.2 (Operations Impacts) and detailed in Section 3.5 (Health and Safety).
- The Tacoma LNG Facility would contain fire and hazardous gas detectors, fire-extinguishing systems, and an extensive firewater system, as well as new pier and access trestles that would provide firetruck access to the loading platform, as described in detail in Chapter 2 (Description of the Proposed Action). Hydrant and monitor connections would be compatible with local municipal fire department equipment.

Law Enforcement

Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would minimize potential impacts to law enforcement services through appropriate facility security features and appropriate Project employee training, including the following:

- Procedures for the O&M of the facility would be developed to comply with 49 CFR 193 Subpart J, "Security," and NFPA 59A (2001 edition) Appendix C – Security. This would include policies for security procedures, protective enclosures, security communications, security monitoring, and warning signs. PSE would contract for security service as required to meet regulatory requirements.
- The intrusion detection system would monitor the perimeter for the facility and alarm when the perimeter is disturbed.
- Security cameras would be installed along the perimeter and other select locations for maximum viewing coverage.
- Closed-circuit television system components would be powered by an uninterruptible power system.
- The perimeter of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System sites would be enclosed by a chain-link security fence to ensure public safety, welfare, and site security. The facility would be equipped with a page/party phone and intercom system, which would also be used for the

facility emergency alarm system. Emergency party-to-party personnel communications within the facility would be by radios.

- Permanent Project personnel as well as temporary personnel would receive the following security training as appropriate to their position: 33 CFR 105.205, "Facility Security Officer (FSO)," 33 CFR 105.210, "Facility Personnel with Security Duties," and 33 CFR 105.215, "Security Training for all Other Facility Personnel."

Medical Services and Emergency Response

The workforce required to operate the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would include approximately 16 employees, and all employees would receive regular emergency response and safety training to reduce the likelihood of emergencies at the Project sites. See Section 3.5 (Public Health and Safety) for more information. The following measure would improve the flow of traffic in the vicinity of the proposed Project:

- Implementation of Phase I of the Intelligent Transportation System study.

PSE Natural Gas Distribution System

Fire Protection

The design of the PSE Natural Gas Distribution System components would incorporate specific features to reduce the risk of pipeline incidents and to provide a means to shut off the flow of natural gas, if necessary, when responding to control an emergency, including the following:

- The PSE Natural Gas Distribution System would be designed and constructed to specifications exceeding the requirements of 49 CFR Part 192 for systems in the most densely populated areas.
- The pressures at the end of the line and the flow rate of natural gas into the Tacoma LNG Facility would be constantly monitored through PSE's Supervisory Control and Data Acquisition system.
- Valves would be installed at approximately 1-mile intervals along Pipeline Segments A and B.

Law Enforcement

The perimeter of the gate and limit stations would be enclosed by a security fence to enhance public safety, welfare, and site security.

3.11.7 Conclusion

With the exception of fire protection services, the Proposed Action would result in no significant or unavoidable impacts to public services and utilities potentially associated with construction, operation, and decommissioning of the Project, so long as the appropriate measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation) are implemented.

However, the Proposed Action would result in significant impacts to fire protection services, for the following reasons:

- Proposed Action–related activities, during both the construction and operations phases, would result in increased risk of incidents requiring fire protection, EMS and hazardous materials response.
- The lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident. For example, Station 3 is the only station serving Northeast Tacoma. Station 12 serves the entire Port of Tacoma, which includes other high-risk sites.

The mitigation measures described in Section 3.11.6.1 (Tacoma LNG Facility) and Section 3.11.6.2 (Operations) would reduce these risk to a less than significant level, in particular through the addition of new firefighting, EMS and hazardous materials capacity in the vicinity of the Project, and through the

implementation of health and safety and emergency protocols detailed in Section 3.5 (Public Health and Safety).

Nonetheless, City of Tacoma management, after reviewing the preliminary analysis in the 2015 Emergency Response/Intelligent Transportation System Study has concluded that:

- The reintroduction of a staffed fire station in the Tideflats is necessary and should occur in advance of the planned opening of the Project in late 2017. New revenue from the Project may allow for initial station staffing and can be expanded as additional new projects come on-line in the Tideflats. The Project's contribution to the capital costs of reopening a Tideflats fire station is also under consideration.
- Opening of the LNG plant will also trigger the need for implementation of Phase I of the Tideflats Intelligent Transportation System structure.
- The Taylor Way road upgrades necessary for improved emergency response times has been agreed upon by PSE, the Port of Tacoma, and the City of Tacoma through an approach that results in a rebuilding of Taylor Way to "heavy haul" standards.

3.12 Socioeconomics

This section describes the existing socioeconomic environment in the area of the proposed Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project) and evaluates potential impacts on local population levels, housing, employment, and tax revenues, as well as potential regional economic impacts, that may result from construction, operation, and decommissioning of the Project (referred to herein as the Proposed Action). As described in this section, the Project would provide positive local and regional economic impacts and is not expected to result in any significant local or regional negative socioeconomic impacts. Accordingly, no socioeconomic avoidance, minimization, or mitigation measures are required and, therefore, none are included in this section.

3.12.1 Study Methodology

This section describes the methodology used to analyze potential impacts on socioeconomic resources within the Proposed Action area. The analysis assesses the Project's anticipated local impacts to population, housing, and local government tax revenues, as well as its potential impact on employment and economic conditions in the entire Puget Sound region. These two separate geographic areas form the boundary of this analysis, as follows: (1) the boundary of the local area includes Pierce County and the cities of Tacoma and Fife, as appropriate, and (2) the boundary of the regional analysis includes the entire Puget Sound region, including King, Snohomish, Pierce, Thurston, Kitsap, Mason, Skagit, and Island counties.

The analysis of potential population, housing, and local government tax impacts is limited to Pierce County and the cities of Tacoma and Fife because the majority of the Project components would be constructed and operated within this area (see Chapter 2 [Description of Proposed Action]). Statewide data for Washington and Pierce counties are provided throughout the affected environment discussion. Data for the cities of Tacoma and Fife are provided where available. The economic conditions and potential economic impacts that could result from the Proposed Action are likely to extend outside of Pierce County boundaries and affect communities on a regional level (ECONorthwest 2014a). Therefore, the study area for economic impacts encompasses the entire Puget Sound region. The data and analysis presented in this section are derived from information provided by the United States Census Bureau, the State of Washington Office of Financial Management (OFM), United States Bureau of Labor Statistics, and other relevant public sources used to assess current socioeconomic trends associated with population, housing, and employment. The regional economic impact analysis was developed by ECONorthwest using IMPLAN modeling software to estimate the direct, indirect, and induced upstream and downstream impacts of the Proposed Action on the Puget Sound regional economy. The complete ECONorthwest report, titled *Economic Impact Analysis of a Natural Gas Fuels Facility in Tacoma* (2014a), contains a description of these terms. This report is included as Appendix J-1 (ECONorthwest Economic Impact Study).

3.12.2 Regulatory Framework

No federal regulations related to socioeconomic factors (population, housing, employment, and the economy) were identified within the relevant analysis areas described above in Section 3.12.1 (Study Methodology). The following city, county, and regional documents are relevant to the Proposed Action:

- *City of Tacoma Economic Development Plan* (City of Tacoma 2001);
- *City of Tacoma Comprehensive Plan Container Port Element* (City of Tacoma 2014);
- *City of Fife Comprehensive Plan* (City of Fife 2013);
- *Pierce County Comprehensive Plan* (Pierce County 2012);
- Port of Tacoma *Strategic Plan 2012 – 2022: People. Partnership. Performance* (Port of Tacoma 2014); and

- Puget Sound Regional Council *Regional Economic Strategy for the Central Puget Sound Region: Strategy* (PSRC 2012).

The regulatory guidance provided in these documents generally supports and encourages economic development activities resulting from targeted industrial and maritime development at the Port of Tacoma, throughout Pierce County, and in the Puget Sound region. These goals and policies are consistent with the purpose of the Proposed Action.

3.12.3 Affected Environment

This section describes baseline existing conditions for population, housing, and employment within the Pierce County study area and for the economy within the Puget Sound region study area for the Proposed Action. These study areas include the three jurisdictions where the following main components of the Proposed Action would occur:

- **Tacoma LNG Facility:** Liquefies natural gas, stores LNG, and includes facilities to transfer LNG to the Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System (described below), bunkering barges in the Hylebos or Blair waterways, or tanker trucks on site. It also includes facilities to regasify stored LNG and inject natural gas into the Puget Sound Energy (PSE) Natural Gas Distribution System. The study area for the Tacoma LNG Facility is defined by the facility site boundary (see Figure 2-1 in Chapter 2 [Description of Proposed Action]).
- **TOTE Marine Vessel LNG Fueling System**: Conveys LNG by cryogenic pipeline from the Tacoma LNG Facility to the TOTE site and includes transfer facilities, and an in-water trestle and loading platform in the Blair Waterway to fuel vessels or load bunker barges. The study area for the TOTE system is defined by the site boundary (see Figure 2-1 in Chapter 2).
- **PSE Natural Gas Distribution System**: Conveys natural gas to and from the Tacoma LNG Facility. It includes two new distribution pipeline segments (Pipeline Segment A and Pipeline Segment B), a new limit station (the Golden Given Limit Station), and an upgrade to the existing Frederickson Gate Station. The study area for the pipeline segments is defined by the roadways on which they are centered. The limit station and gate station Areas of Potential Effect are defined by their site boundaries (see Figures 2-18 through 2-20 in Chapter 2).

The Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would be located in the Port of Tacoma within the City of Tacoma. The two new distribution pipeline segments would be located in the City of Tacoma and the City of Fife (Pipeline Segment A) and unincorporated Pierce County (Pipeline Segment B). In addition, the Golden Given Limit Station and upgraded Frederickson Gate Station would be located in unincorporated Pierce County. A detailed description of the Project components is provided in Chapter 2 (Description of Proposed Action).

3.12.3.1 Population

Data obtained from the Washington State OFM show that the Pierce County population was 795,225 residents in 2010. Historical, current, and projected population trends for Pierce County, the cities of Tacoma and Fife, and Washington State are summarized in Table 3.12-1. Washington State's population estimates provide a reference for comparison between Pierce County and statewide population trends. The OFM does not provide city level projected population data within Washington State. The increase in the county's population (13.5 percent) between 2000 and 2010 is consistent with statewide population growth over the same period (14.1 percent) (see Table 3.12.2). The city of Tacoma's population increase between 2000 and 2010 (2.5 percent) is smaller than the population increase that occurred in the state and county, while the City of Fife's population increase (91.7 percent) during the same period was substantially larger than the state, county, and city of Tacoma (see Table 3.12.2). Estimated county population growth between 2010 and 2014 (3.3 percent) remains consistent with statewide growth over the same period (3.4 percent), while the city of Tacoma (1.3 percent) and the city of Fife (2.5 percent) experienced a lower rate of

population growth during the same time period (see Table 3.12.2). The county and state populations are projected to increase by approximately 7 and 10 percent, respectively, over the next two decades (see Table 3.12.2).

Table 3.12-1 Historical, Current, and Projected Population

Area	2000 (actual)	2010 (actual)	2014 (estimated)	2020[a] (projected)	2030[a] (projected)
Washington State	5,894,143	6,724,540	6,951,785	7,404,391	8,153,740
Pierce County	700,818	795,225	821,300	876,565	967,601
City of Tacoma[b]	193,556	198,397	200,900	N/A	N/A
City of Fife[b]	4,784	9,173	9,405	N/A	N/A

Sources: OFM 2013,2014a,b,c
Notes:
[a] The OFM provides low, medium, and high projected population estimates for 2020 and 2030. In accordance with Section 19A.20.100 of the *Pierce County Comprehensive Plan* (Pierce County 2012). This table presents the medium population projection estimates for 2020 and 2030.
[b] The OFM does not provide population projections at the city level.
Key:
N/A = not applicable
OFM = Washington Office of Financial Management

Table 3.12-2 Population Change (in percent)

Area	2000-2010	2010-2014	2014-2020	2020-2030
Washington State	14.1%	3.4%	6.5%	10.1%
Pierce County	13.5%	3.3%	6.7%	10.4%
City of Tacoma[a]	2.5%	1.3%	N/A	N/A
City of Fife[a]	91.7%	2.5%	N/A	N/A

Sources:
Calculations are rounded and based on data provided in OFM 2013, 2014a,b,c.
Notes:
[a] The OFM does not provide population projections at the city level.
Key:
N/A = not applicable
OFM = Washington Office of Financial Management

3.12.3.2 Housing

To assess the potential impacts of temporary and permanent workforce migration to the region during the construction and operational phases of the Proposed Action, it is necessary to know the quantity and quality of existing housing in the vicinity of the Proposed Action area, particularly the availability of temporary accommodations near the site.

As described previously, the Project would be located entirely within Pierce County, with portions in the city of Tacoma and the city of Fife. According to the *2009–2013 American Community Survey*, there were approximately 326,854 existing housing units in Pierce County in 2013 (U.S. Census Bureau 2013). Approximately 86,195 of these housing units are located in the city of Tacoma, and approximately 3,954 are located in the city of Fife. The majority (61.5 percent) of Pierce County housing units are owner occupied, while the remaining 38.5 percent are renter occupied. Approximately 8.0 percent of all housing in Pierce County is vacant (26,231 units), slightly more than one quarter (7,237 units) of which would be available for rent (U.S. Census Bureau 2013). The vacancy rate of rental housing in Pierce County was 5.8 percent in 2013. The majority (51.5 percent) of city of Tacoma housing units are owner occupied, while the majority (57.9

percent) of city of Fife housing units are renter occupied (U.S. Census Bureau 2013). Approximately 8.7 percent (7,514 units) of housing in the city of Tacoma and 8.0 percent (318 units) of housing in the city of Fife is vacant (U.S. Census Bureau 2013). The vacancy rate of rental housing in the City of Tacoma (6.3 percent) is higher than the Pierce County (5.8 percent), and the city of Fife (6.2 percent) (U.S. Census Bureau 2013). In addition to the 7,237 housing units available for rent in Pierce County, there are also numerous hotels/motels that provide temporary accommodations in the Project area. A desktop analysis of current lodging resources in Pierce County revealed that more than 30 existing hotels and motels with over 300 available rooms are located within a 3-mile radius of the Port of Tacoma, mostly concentrated along the Interstate 5 and Interstate 705 corridors through the cities of Fife and Tacoma (Pierce County 2014).

3.12.3.3 Employment

Employment estimates are based on the civilian labor force, which counts employment by "place of residence" rather than "place of work" and includes the self-employed, employees on unpaid leave of absence, unpaid family workers, and household workers. Individuals with more than one job are counted only once in civilian labor force data.

The United States Bureau of Labor Statistics estimated that Pierce County's average annual civilian labor force was 383,905 workers during 2014, while the average annual unemployment rate was 7.2 percent during the time period (BLS 2015b). In 2014, Washington State's average annual civilian labor force was 3,488,183 workers, and the state's average annual unemployment rate was 6.2 percent (BLS 2015a). Table 3.12-3 summarizes 2012, 2013, and 2014 annual average civilian labor force data for the city of Tacoma, Pierce County, and Washington State. The table shows that Pierce County's unemployment rate exceeded that of the State of Washington each year over the three-year timeframe and the City of Tacoma's unemployment rate exceeded that of both the county and the state for each of the three years.

Table 3.12-3 Civilian Labor Force Data (Annual Averages from 2012, 2013, and 2014)

Area	Civilian Labor Force			Employment			Unemployment			Unemployment Rate (in percent)		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
City of Tacoma	97,595	96,286	96,519	88,351	88,076	89,320	9,244	8,210	7,199	9.5	8.5	7.5
Pierce County	386,176	382,950	383,905	351,028	351,273	356,233	35,148	31,677	27,672	9.1	8.3	7.2
Washington State	3,471,158	3,460,038	3,488,183	3,190,015	3,216,966	3,270,362	281,143	243,072	217,821	8.1	7.0	6.2

Source: BLS 2015 a,b,c.
Note:
Unemployment and labor force data are not available for the city of Fife. The United States Bureau of Labor Statistics does not collect labor force statistics for cities with less than 25,000 residents.

Three businesses currently operate at the Port of Tacoma within the proposed Tacoma LNG Facility site. These three businesses are EHW Constructors Joint Venture; Safe Boats International, LLC; and PCC Logistics. EHW Constructors Joint Venture is using the southeast corner of the proposed Tacoma LNG Facility site as a pipe laydown and welding area while building an explosives handling Wharf No. 2 at Naval Base Kitsap – Bangor near Silverdale, Washington. The company has approximately six employees working on site at any given time. Work at Naval Base Kitsap – Bangor is expected to be complete by August 30, 2015. Safe Boats International, LLC, is an aluminum boat manufacturer that uses the larger existing pier at the proposed Tacoma LNG Facility site as a staging area to test their vessels and launch new vessels. Between tests and vessel launches, there are no employees at the site; when a vessel is in the water (roughly 50 percent of the time) there are six to ten employees on site. PCC Logistics is a logistics, warehousing, trucking, distribution,

and freight services company that has approximately 15 employees and leases the existing warehouse on the proposed Tacoma LNG Facility site.

3.12.3.4 Economy

Pierce County and the cities of Tacoma and Fife are part of the Seattle-Tacoma combined statistical area (CSA). The CSA includes all of the counties in the regional economic impact area (King, Snohomish, Pierce, Thurston, Kitsap, Mason, Skagit, and Island counties), as well as Lewis County. The economy in Pierce County is best characterized as predominantly middle-income with a concentration of working-age households, including military families. It is less affluent than neighborhoods of Seattle and some of its suburbs where major, high-paying corporate office employers such as Costco, Boeing, Amazon, Genzyme, Starbucks, Weyerhaeuser, and Nordstrom are located. Per capita income in Pierce County was $28,223 in 2013, compared to $34,199 in the CSA. Likewise, 2013 median household income in Pierce County ($59,204) was less than the total median household income in the CSA ($65,596). The cities of Tacoma and Fife were less affluent than Pierce County as a whole. In 2013, per capita income in the city of Tacoma was $26,147, and $25,735 in the city of Fife. Median household income was $50,503 in the city of Tacoma and $57,275 in the City of Fife (U.S. Census n.d. (b))

The gross domestic product (GDP) of Pierce County, an indicator of overall size of the economy, was $35.2 billion in 2012, which represents roughly 19 percent of the $190 billion GDP for the entire Metropolitan Statistical Area(MSA) (ECONorthwest 2014b).

By providing approximately one-fifth of the total GDP to the MSA, Pierce County is an important contributor to the region. Primary employers in the county are the Lewis/McChord joint base (approximately 56,600 employees) and the Port of Tacoma marine/rail operations (approximately 18,900 employees). Military employment provides the county economic stability, while the Port of Tacoma provides economic diversity through its ties with Asian markets. In addition to the economic benefits of military and port employment, earnings from individuals who live in Pierce County but commute to work in neighboring counties provide a major source of overall revenue for the County. Approximately $4 billion annually is brought back to Pierce County by residents who work in Seattle and elsewhere.

3.12.4 Impacts of the Proposed Action

This section identifies potential socioeconomic impacts that could result from the construction, operation, and decommissioning of the Project. The Proposed Action is not anticipated to significantly impact population or the demand or supply of housing in Pierce County. The Proposed Action is anticipated to positively affect the local and regional economies by creating additional employment, income, and output in Pierce County and throughout the Puget Sound region.

3.12.4.1 Construction Impacts

Site preparation and construction of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and PSE Natural Gas Distribution System would take place over an approximately three-year construction period. Potential construction-related impacts on population, housing, employment, and the economy that would result from the Proposed Action are described in this section.

Population

As discussed in “Employment,” below, construction of the Project would create an average of 271 direct construction jobs per year during the three-year construction period (ECONorthwest 2014a). The peak construction workforce would be an estimated 150 people in the summer of 2016. The average construction workforce is estimated at approximately 75 people, including 40 to start, 150 at peak, and 30 at commissioning. The majority of the positions would be hired from within the local or regional economy. Workers are expected to commute to the Proposed Action area from the surrounding Pierce County and Puget Sound region on a daily or weekly basis as needed. No substantial in-migration is expected to occur as a result of the Project; only a minimal portion of the construction workforce with specialty skills would be

hired from outside region. Owing to the short-term and temporary nature of construction and use of local and regional labor, the Proposed Action would not result in substantial population growth, cause a concentration of population, or displace people throughout Pierce County. In addition, as described in Chapter 3.11 (Public Services and Utilities), any temporary increase in construction workforce within the city of Tacoma or surrounding area would not have a significant impact on existing public services.

Housing

Construction of the Project would not directly increase the supply of housing units, displace or remove existing housing units, or increase the demand for permanent housing in Pierce County. The Proposed Action would directly create an average of 271 construction jobs per year during the construction period. (ECONorthwest 2014a)

The majority of the skilled labor force would be hired locally or within the region and, therefore, would not require temporary short-term housing during the Project construction period. Remaining short-term housing needs for workers hired outside of the region would be met by local motel or hotel rooms or through leasing available housing stock. As described in Section 3.12.3.2 (Housing), in 2013 there were an estimated 7,237 rental housing units in Pierce County that were vacant and available for rent. The relatively small number of construction employees expected to be hired from outside of the region would not significantly impact this available housing stock. Because of the relatively short duration of construction (three years) and the availability of temporary skilled labor and temporary housing at the local and regional level, construction of the Project is not expected to increase the demand for permanent housing or adversely affect availability and cost of temporary housing.

Employment

The Proposed Action would directly support an average of 679 direct, indirect, and induced jobs during the 2015–2018 construction period (ECONorthwest 2014a). As described in Appendix J-1 (ECONorthwest Economic Impact Study), these jobs were estimated using the IMPLAN Input-Output model. Throughout this discussion, jobs are defined as the number of full-year-equivalent jobs, consistent with the official definition provided by the United States Census Bureau, which counts one job as 12 months of work. During construction (2015–2018), the Proposed Action would annually support an average of 271 jobs directly related to the construction of the Project components and approximately 200 indirect construction-related jobs resulting from business interactions with other suppliers (ECONorthwest 2014a). Construction of the Project would also annually support approximately 208 induced jobs resulting from “consumption-driven” impacts that would occur as construction employee earnings ripple through the economy (ECONorthwest 2014a). Employment and labor incomes generated through construction of the Project would benefit both the Pierce County and Puget Sound region labor markets, thus benefiting the local and regional economies.

The entire Project construction would be bid out to regional contractors. The only area that would require specialized labor is the LNG storage tank, and approximately 12 personnel from the boilermakers union would be brought in from outside the region to augment the local boilermakers and other trades constructing the tank. These 12 individuals represent about 25 percent of the boilermakers on the Project, and they work for the tank manufacturer throughout the world on these types of tanks. All other trade labor personnel (pipefitters, ironworkers, electricians, carpenters, masons, operators, and laborers) are expected to come from regional firms.

Construction of the Tacoma LNG Facility would require the demolition and removal of the various existing structures on the proposed Tacoma LNG Facility site, as shown in Figure 2-21 in Chapter 2 (Description of Proposed Action). These structures currently house two tenants, PCC Logistics and EHW Constructors Joint Venture. Safe Boats International, LLC, uses only the larger existing pier at the proposed Tacoma LNG Facility site. PCC Logistics conducts business at several Port of Tacoma locations and would likely relocate to another location within the port. No reduction of the 15-employee PCC work force is anticipated to result from the relocation. EHW Constructors Joint Venture’s approximately six employees would not be displaced

because their use of the site is expected to be complete on or before August 30, 2015, which is when construction of the Tacoma LNG Facility is scheduled to begin. The lease for the Tacoma LNG Facility site between PSE and the Port of Tacoma calls for Safe Boats International, LLC, to operate off site by July 31, 2015. No other businesses or employment would be directly affected by construction or operation of the Project. No other existing employers would be relocated or impacted by construction of the Project.

Accordingly, the overall impact on employment resulting from construction of the Project would be a net increase of approximately 679 direct, indirect, and induced jobs during the three-year construction period. Appendix J-2 presents anticipated construction costs for each calendar year. The three-year construction window would be anticipated to spread over four different calendar years. The Proposed Action would result in a beneficial impact on local and regional employment.

Economy

Construction of the Project would generate direct, indirect, and induced upstream economic impacts resulting from construction spending for services bought within the region and through worker payrolls. These impacts would continue moving upstream through supplier and employee household spending, which would trigger more spending and employment to benefit the regional economy (ECONorthwest 2014a). The total amount of output, or economic value, produced by construction of the Project would amount to an average of $120.4 million each year over the length of the construction period. Of this estimated total, $75.4 million would be generated from direct output (e.g., purchase of goods and services related to construction), and $45.0 million would be generated from a combination of indirect and induced output during each year of construction (ECONorthwest 2014a).

The labor income paid to construction workers over the three-year construction period would also generate direct, indirect, and induced upstream economic benefits to the Puget Sound region. As described in "Employment," above, the Proposed Action would support an average of 679 total jobs per year between 2015 and 2018 (ECONorthwest 2014a). Labor income paid directly to workers during construction is approximately $23.8 million during each year. When indirect and induced effects are accounted for in labor income spending ($22.6 million), the total labor income is expected to be $46.4 million per year in economic benefits to the Puget Sound region. Additional information on the effect of construction spending on the local economy is provided in Appendix J-1.

Tax Revenues and Local Governments

Construction of the Project would also result in tax revenues for the affected local jurisdictions through the collection of sales tax during the construction period. Sales tax during construction consists of taxes paid for equipment and services during the construction of both the Tacoma LNG Facility and the associated gas distribution upgrades. Some of the equipment at the facility (components related to liquefying and storing LNG) qualifies for a manufacturing sales tax exemption. The construction costs associated with the gas distribution system would occur in Tacoma, Fife, and unincorporated Pierce County, and each of those jurisdictions would benefit from sales tax related to the equipment and activities during construction. PSE has estimated these taxes, as shown in Appendix J-2 (Local Government Tax Analysis); however, the total taxes paid during construction would be tied directly to construction costs, which are not knowable at this time. In addition to sales taxes paid on construction equipment and activities, PSE has agree to pay the City of Tacoma $4.25 million over 2017–2019, which would serve as another incremental source of revenue.

Appendix J-2 provides an estimate of the sales tax to be collected by the local jurisdictions.

3.12.4.2 Operations Impacts

This section addresses potential socioeconomic impacts on population, housing, the economy, employment, and income, as well as the effects on local government tax revenue generation, associated with operation of the proposed Project.

Population

As described in greater detail in "Employment," below, operation of the Project would create a total of131 direct, indirect, and induced jobs annually (ECONorthwest 2014a). These new jobs are expected to be filled by workers who currently live in Pierce County or the Puget Sound region. No significant in-migration is anticipated into the county or the region as a result of these new jobs. Because the majority of permanent employees are expected to be hired locally, any remaining employees hired from outside Pierce County would only marginally increase the size of the local population. Therefore, no long-term impacts on population growth are anticipated to result from Project operations.

Housing

Operation of the Project would have only negligible impacts on the demand and supply of housing in Pierce County. Given the total number of vacant housing units (26,231 available units) in the county in 2013 (U.S. Census Bureau, n.d.), the existing housing supply would be more than adequate to provide housing for any permanent employees who relocate. As described previously, a total of 131 direct, indirect, and induced jobs are expected to be created during the operations phase of the Proposed Action. The majority of these staff are expected to be hired locally so would not require new permanent housing. Thus, far fewer than 131 employees would actually seek new permanent housing in the vicinity of the Proposed Action. Therefore, no long-term impacts on the Pierce County housing stock would be anticipated as a result of Project operations, and no new housing would be required.

Employment

As described in Appendix J-1 (ECONorthwest Economic Impact Study), operation of the Project would result in an increase of 131 direct, indirect, and induced permanent jobs.

During operations, PSE expects to directly hire 16 employees to work at the LNG facility. These employees would be responsible for the day-to-day operations of the Project. Approximately 72 indirect jobs would also be created as a result of business-to-business interactions associated with facility operations (ECONorthwest 2014a). Indirect jobs employed by different companies supporting the Proposed Action would also work on site or within the vicinity of the Proposed Action. Contracted businesses that employ their own workers are counted as indirect jobs, as are hires at the Port of Tacoma, municipal utilities, and companies under contract to maintain facilities and equipment. In addition, the Proposed Action would also support an estimated 43 induced jobs resulting from "consumption-driven" impacts that would occur as the salaries of operations employees' earnings move through the economy (ECONorthwest 2014a). Employment and labor incomes generated through operation of the Project would benefit the Pierce County and Puget Sound region labor markets, thus benefiting the local and regional economies by increasing employment opportunities in the area.

Economy

Similar to the economic benefits of construction described above, operation of the Project would generate beneficial direct, indirect, and induced economic impacts. The total amount of output, or economic value, produced by operation of the Proposed Action is estimated to be $78.9 million for each year of operation (ECONorthwest 2014a). Of this total, $58.0 million would be generated from direct output, and $20.9 million would be generated from a combination of indirect and induced output during each year of construction (ECONorthwest 2014a).

The annual labor income paid to operations workers would also generate direct, indirect, and induced upstream economic benefits for the Puget Sound region. As described above, the Proposed Action would directly support a total of 16 jobs annually. Labor income paid to these operations workers would amount to approximately $2.2 million (ECONorthwest 2014a). When indirect and induced effects are accounted for in operational labor income spending ($7.6 million), the total labor income for operations amounts to $9.8 million per year in economic benefits to the Puget Sound region.

This analysis also accounts for the downstream regional economic impacts associated with the Proposed Action. As described in Appendix J-1, downstream economic impacts would result from the accumulation of economic efficiencies, cost savings, and the value of social benefits gained through the reduction of emissions. For example, the Proposed Action would allow for a more efficient, cleaner-burning fuel to be purchased by marine and trucking companies, which would in turn reduce these companies' fuel costs. As a result, the Proposed Action would generate an annual net savings of $40.1 million related to fuel efficiencies associated with the marine cargo and trucking industries (ECONorthwest 2014a).

Another example of a downstream economic impact comes from the proposed peak shaving component of the Proposed Action. As a result of natural gas peak shaving, the Proposed Action would save PSE's ratepayers and LNG transportation fuel consumers approximately $43.1 million per year combined, resulting in the generation of an additional estimated $14.9 million in economic output (ECONorthwest 2014a). This additional economic output generated from peak shaving activities is estimated to support an additional $3.8 million in labor income for 74 additional jobs in the region. Furthermore, the substitution of diesel and marine fuels with cleaner-burning LNG would reduce annual carbon dioxide, nitrogen oxide, sulfur dioxide, and particulate emissions. The total estimated economic value of these reductions equates to approximately $5.7 million in social benefits for the region annually (ECONorthwest 2014a). Additional information related to the downstream economic benefits of the Proposed Action is provided in Appendix J-1.

Fixed operating costs for the Tacoma LNG Facility include maintenance, operations staff, contracted security, lease payments to the Port of Tacoma, and demand charges for electric power. In total, these operating costs are estimated to be between $6 million and $11 million (not including property tax) in 2019 and would generally grow with inflation. The variable costs at the facility would be substantially higher and include natural gas and electric power. In 2019, these costs could range between $16 million and $50 million.

Tax Revenue for Local Governments

Operation of the Project would increase tax revenues in jurisdictions crossed by the Project, i.e., the City of Tacoma, City of Fife, and unincorporated Pierce County. Local government tax revenue sources that would be affected by operation of the Project can be broadly categorized into four categories: utility and sales tax paid by PSE for operational expenses of the Project, property taxes, business and occupation tax, and increased utility tax from Tacoma ratepayers. A high-level estimate of the incremental tax revenue streams for local governments can be found in Appendix J-2 (Local Government Tax Analysis).

Taxes paid on operating costs include the tax revenues that governments would receive from the sale of goods or services during operations. The primary source of tax revenue in this category would be utility tax related to electric sales that would be collected by Tacoma Public Utilities. This tax stream would vary depending on facility output and utilization. Annual revenue from this source is estimated to range between $420,000 and $545,000 annually. In addition, PSE would pay sales tax on maintenance items and services, as well as plant consumables. Sales tax on these items are expected to generate approximately $30,000 per annum.

The Washington Department of Revenue (DOR) assesses operating property of interstate and intrastate public utilities, such as PSE, in order to assure uniformity in valuations throughout the state. PSE meets the definition of a public utility company operating in the state of Washington under Revised Code of Washington 84.12.200. When assessing property values, the total system value of the utility is determined regardless of where its property is located. Thus, PSE's operating properties are assessed en masse by the DOR and PSE's property tax bill is not determined on a per parcel basis.

As a result, each year the DOR arrives at an overall value for all of PSE's operating property. This value accounts for the historical cost of a property, incorporates an analysis of incomes and expenses of income-producing properties in estimating value, and values the debt and equity components of the company in an effort to determine the value of PSE's assets. Once the overall value has been calculated, the DOR

apportions the tax revenue to each county and tax code area based on the original, historical cost of PSE's assets. The annual property tax revenue from the Project is expected to range between $3.6 million and $4.5 million annually (including revenues generated for the state). Appendix J provides property tax estimates for Pierce County, the City of Tacoma, the City of Fife, and other local tax jurisdictions by Project component. Annual property tax receipts are projected to be approximately $319,000 in Pierce County; $732,000 in the City of Tacoma; $19,000 in the City of Fife; and $2.4 million to other local taxing jurisdictions while the Proposed Action is operational. These figures are only estimates and would be subject to the DOR's central assessment tax policy. Therefore, the funds distributed by DOR to Pierce County could be apportioned to tax code areas in the city of Tacoma, city of Fife, and unincorporated Pierce County to support public services and utility costs within these jurisdictions.

The city of Tacoma would also collect business and occupation taxes associated with the revenues generated by the Proposed Action. Tax receipts from this source are estimated to be approximately $75,000 per year. Finally, gas customers across PSE's service territory would experience a small rate increase associated with the portion of the Project that would provide peak-day gas service. This rate increase would in turn raise the utility taxes receipts associated with PSE's gas utility in the city of Tacoma by approximately $60,000 per annum.

3.12.4.3 Decommissioning Impacts

Decommissioning of Project components would generate socioeconomic impacts similar to those discussed in Section 3.12.4.1 (Construction Impacts). Potential impacts include those related to temporary job creation, labor income, and construction output, but would likely be shorter in duration than those experienced during Project construction.

3.12.5 Impacts of No Action

Under the No Action Alternative, the Proposed Action would not be built, current conditions would remain unchanged, and Proposed Action–related employment, economic, and tax benefits would not occur. A new and consistent supply of cleaner fuel with fewer air emissions than traditional fuels, as would be provided by the Proposed Action for marine and land transportation, may remain unavailable in the Proposed Action area. Alternatively, supplies to meet the market need would likely come from outside of the region. Further, the peak shaving capability of the Proposed Action would be unavailable to augment natural gas service to PSE customers. Social benefits resulting from reduced air emissions within the air shed would not occur. The jurisdictions crossed by the proposed Project (including city of Tacoma, city of Fife, and unincorporated Pierce County) would not receive an increase tax revenues resulting from Project operations.

3.12.6 Avoidance, Minimization, and Mitigation

The Proposed Action would result in beneficial employment and economic impacts for Pierce County and the Puget Sound region and would not result in significant adverse impacts on population or housing. Specifically, the Proposed Action would generate a total of approximately 671 construction-related jobs and 131 annual jobs during operation, while contributing $102.4 million in construction-related economic output and $78.9 million in operations output annually. Accordingly, no avoidance, minimization, or mitigation measures are required or proposed.

3.12.7 Conclusion

The Proposed Action would result in significant beneficial impacts on employment and the economy both at a local and regional level and would likely increase property tax revenue allocations to the jurisdictions crossed by the Proposed Action. As stated above, the Proposed Action would generate construction-related economic benefits for Pierce County and the Puget Sound Region by annually supporting 671 jobs, $46.4 million in labor income, and $120.4 million in economic output over a three-year construction period. The Proposed Action would also generate operations-related economic benefits for Pierce County and the Puget

Sound region that would support 131 jobs annually and include $9.8 million in labor income and $78.9 million in economic output for each year of operation.

In addition, the Proposed Action would save PSE's ratepayers and LNG transportation fuel consumers approximately $43.1 million per year, resulting in the generation of an additional estimated $14.9 million in economic output and supporting an additional $3.8 million in labor income for 74 more jobs (ECONorthwest 2014a). The Proposed Action would have no significant or unavoidable adverse impacts on other socioeconomic factors such as population or housing.

3.13 Cumulative Impacts

3.13.1 Introduction

The Washington State Environmental Policy Act (SEPA) requires that agencies evaluate cumulative impacts, which include impacts resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions in the action area (Ecology 1998). In the context of the Tacoma Liquefied Natural Gas (LNG) Project (referred to herein as the Project), cumulative impacts are identified on the basis of proposed and reasonably foreseeable significant future developments.

The Puget Sound Regional Council (PSRC) recently completed a study of the manufacturing industrial centers (MIC) in the central Puget Sound region. The Port of Tacoma MIC is located in the city of Tacoma, along the waterfront and on lands adjoining the waterways on Tacoma's Commencement Bay. It is one of the largest MICs in the region, with a total area of 5,160 acres, including port and marine terminals, marine cargo, on-dock intermodal rail yards, container terminals, roll-on/roll-off facilities, non-containerized cargo, automobile import facilities, shipyards, boat building, and dry docks. Overall, the Tacoma-Puyallup subarea represents 11 percent of the region's industrial land. Based on the PSRC, demand for industrial land is strong within this subarea, but adequate capacity exists in most areas to accommodate future growth given proper management strategies. (PSRC 2015)

Based on the PSRC analysis, strong demand is anticipated at the Port of Tacoma MIC. However, for the purpose of this analysis, two formally proposed projects on the Blair-Hylebos Peninsula have been identified as major, reasonably foreseeable developments near the Tacoma LNG Project (herein referred to as the Project) that could contribute to cumulative impacts: (1) the Puyallup Tribal Terminal (PTT) project, a three-berth container terminal (City of Tacoma 2012), and (2) the Northwest Innovation Works (NWIW) methanol facility, a methanol manufacturing facility announced for possible development on property owned by the Port of Tacoma (Washington Ports 2013). Construction of the Tacoma LNG Project would begin prior to the PTT and the NWIW projects, and this Draft Environmental Impact Statement contains the first comprehensive review of potential cumulative impacts of all three proposed projects.

In addition, the Tacoma Industrial Properties (TIP) and Stericycle are two other pending proposals within the Port of Tacoma. However, neither the TIP nor Stericycle projects would constitute a major development that could contribute to cumulative impacts, with the exception of increased daily truck and employee trips per day in the operations phase of the Stericycle project. A description of these proposals is provided below.

- TIP, at 1801 and 1851 Taylor Way, seeks two permits to convert an industrial site to a mooring/transload site for construction cargo. The City of Tacoma SEPA Responsible Official has issued a final, non-appealable SEPA Determination of Non-Significance for these improvements. (City of Tacoma 2014)
- Stericycle, located at 1224 Taylor Way, proposes to improve its container management area at a site used for hazardous materials management. The work would initially include approximately 20,000 cubic yards of grading activity. The second phase would include approximately 35,000 square feet of new structures (enclosed and canopies), as well as pavement, stormwater improvements, and other site improvements. The Stericycle project would add two new types of traffic to the Project Area—trucks and employee trips. Truck traffic is estimated at two inbound and two outbound trucks per day upon completion. Peak inbound truck traffic would occur between 12:00 noon and 3:00 p.m., and 7:00 a.m. to 9:00 a.m. for outbound trucks. Additionally, each new facility employee would generate two trips per day, one in the morning and one in the evening. The 20 new employees at the Stericycle expanded facility would generate 40 new employee trips per day, 20 in the morning and 20 in the evening. (City of Tacoma 2015)

Puyallup Tribal Terminal Project

In 2009, SSA Marine, Inc. proposed the development of the PTT project, a new three-berth container terminal on approximately 200 acres on the eastern shore of the Blair Waterway. The site lies to the south and west of the Tacoma LNG Project site. The PTT project would include widening the Blair Waterway by approximately 200 feet and constructing a wharf with approximately 555 pre-cast concrete piles. The widening of the Blair Waterway would removing approximately 1.75 million cubic yards of soil. The entire site would be paved and developed as a container yard with associated support and accessory facilities.

The PTT project is planned to proceed in three phases. Phase I includes dredging and widening the Blair Waterway, activating two ship berths, and constructing 100 acres of container yard. The second phase includes constructing a third berth and an additional 50-acre container yard. Finally, in the third phase, an additional berth would be built and an additional 58-acre container yard would be located in the uplands. This project has completed its environmental review and obtained various necessary project permits, but construction has not started. (City of Tacoma 2012)

3.13.1.1 Northwest Innovation Work Methanol-Manufacturing Facility

In May 2014, NWIW executed a 30-year lease with the Port of Tacoma, which included an 18-month feasibility period (renewable for up to 24 additional months) to conduct due diligence on the viability of developing and operating a methanol-manufacturing facility on an approximately 90-acre site on the eastern shore of the Blair Waterway. The goal of this facility is to manufacture and ship methanol to global markets for use in producing olefins, which is a feedstock for industrial applications. This site, like the PTT project site, also lies to the south and west of the Tacoma LNG Project site. (Port of Tacoma 2015)

NWIW has not yet submitted permit applications for the Tacoma methanol-manufacturing facility, and no environmental review has been initiated. In the absence of information that might be contained in such documents that could inform this cumulative impacts discussion, natural gas to the Tacoma methanol facility would likely be delivered to the site via a new 24-inch natural gas transmission pipeline, and methanol would be manufactured through four production lines, each capable of producing 5,000 metric tons of methanol per day. The original proposal by NWIW included two production lines, but, according to a news release by NWIW, an increase in production is made possible by the use of an innovative technology called ultra-low emissions reforming technology, which reduces both the physical footprint and the CO2 emissions of the facility, (NWIW 2015a). The methanol would be stored in non-pressurized tanks with a total capacity of approximately 200,000 metric tons within a containment area. The methanol would be transferred from storage to vessels calling on the East Blair 1 Terminal at a rate of three to six vessels per month. There is currently no information available for the NWIW project regarding the proposed construction, operations, or anticipated impacts; however, this expanded plant size will most likely increase the previous activity levels and impacts, but no details are available at this time.

3.13.2 Project Comparison

The availability of baseline environmental information for the three projects (Tacoma LNG, PTT, and NWIW) varies, as they are currently in different stages of environmental review and permitting. Programmatic environmental review of the proposed redevelopment of the entire Blair-Hylebos industrial lands was completed in 2009 (Port of Tacoma 2009). There is considerable baseline information regarding the PTT project, as SSA Marine, Inc. submitted a Shoreline Substantial Development Permit, Wetland/Stream/Fish and Wildlife Habitat Conservation Area permit, and SEPA Environmental Checklist to the City of Tacoma in 2009, and a Joint Aquatic Resource Permit Application was submitted at the same time to the United States Army Corps of Engineers in regard to Section 10/404 permitting. A Mitigated Determination of Nonsignificance (MDNS) for the PTT was issued by the City of Tacoma in May 2012 and became final the following month (City of Tacoma 2012).

As indicated above, no permit applications have been submitted for the proposed NWIW methanol facility, and environmental review has not yet begun. However, the Port of Kalama and Cowlitz County, as SEPA co-lead agencies, are presently preparing an environmental impact statement (EIS) for the KMMEF proposal. Information gathered from available sources, including the Determination of Significance and Request for Comments on the Scope of the EIS (Port of Kalama 2014) regarding the KMMEF, the Notice of Application filed with the Department of Energy's Federal Energy Regulatory Commission regarding the gas line extension (FERC 2012), and publicly available documents regarding the KMMEF, provide some baseline information for the potential NWIW methanol facility in the Port of Tacoma. The basic features of the projects that would have cumulative impacts are summarized in Table 3.13-1.

Table 3.13-1 Summary of Proposed Industrial Facilities in the Port of Tacoma/Greater Tacoma Area

Feature	Tacoma LNG	PTT	methanol facility
Air emissions (operations)	1.03 tons/year PM_{10} 1.03 tons/year $PM_{2.5}$ 13.8 tons/year NO_X 20.1 tons/year CO 5.50 tons/year SO_2 85.7 tons/year VOC 0.27 tons/year H_2SO_4 20,751 metric tons/YEAR CO_2e	5.3 metric tons/year $PM_{2.5}$	Unknown
Noise emissions	Construction – 80 to 90 dBA at 50 feet, with possibility of limited 100 dBA when pile driving. Operations – Will comply with noise rules in the WAC and TMC.	Will comply with noise rules in WAC and TMC	Unknown
Added vehicle traffic (construction)	Construction – 139 cars/small vehicles and 11 trucks/heavy duty vehicles per day at peak	Not known	Aggregate 1,000 construction workers over the two--year construction period
Anticipated Construction Dates	Q2 2015 through Q3 2017	Not known	Mid- to late 2016 through mid- to late 2018[d]
Added vehicle traffic (operations)	Up to 60 vehicles per day, including up to 6 heavy duty trucks per day	475 employee/1,030 truck trips at project open; 950 employee trips, 4,244 truck trips at buildout	Unknown; over 200 permanent employees

Sources: Tacoma LNG Project Draft Environmental Impact Statement, Sections 3.2 (Air Quality), 3.6, and 3.10; City of Tacoma 2012; NWIW 2015b

Key:

CO	carbon monoxide
CO_2e	carbon dioxide equivalent
dBA	A-weighted decibels
H_2SO_4	sulfuric acid
LNG	liquefied natural gas
NO_X	oxides of nitrogen
$PM_{2.5}$	particulate matter 2.5 microns in diameter or less
PM_{10}	particulate matter 10 microns in diameter or less
SO_2	sulfur dioxide
TMC	Tacoma Municipal Code
VOC	volatile organic compound
WAC	Washington Administrative Code

The construction schedules for the PTT and NWIW methanol facility are uncertain at this time. The PTT received a permit from the City of Tacoma in 2012, after initially submitting an application in 2009. Based on information available from the Port of Tacoma, operations for the PTT project were intended to commence in 2015; however, construction has not yet started. (City of Tacoma 2012; Port of Tacoma 2013)

The NWIW methanol facility is proposed for construction from 2016 to 2018, assuming that feasibility studies, environmental review, and all permits are completed by 2016. The lease between the Port of Tacoma and NWIW provides for an extension of the feasibility period for up to 24 months as necessary, which could delay start of construction of the NWIW methanol facility to as late as 2018. (Longview Daily News 2014; Port of Tacoma 2015)

Puget Sound Energy (PSE) proposes a construction window from the second quarter of 2015 through the third quarter of 2017 for the Tacoma LNG Project. While unlikely, it is possible that all three facilities could be under construction simultaneously. Accordingly, for the purposes of this Draft Environmental Impact Statement, it is assumed that foreseeable impacts are concurrent.

3.13.3 Earth Resources

Significant cumulative impacts on soil, topography, and geology resulting from construction and operation of the three proposed projects on the Blair-Hylebos industrial lands are not anticipated. The general character of the Tacoma LNG Project site reflects previous and ongoing industrial activity. The upland portion of the site is developed, paved, or graveled. Undeveloped areas total less than 1 percent of the entire site. The shoreline along the Blair and Hylebos waterways is developed with wharves, piers, and armored slopes containing riprap, concrete and asphalt pieces, and various debris.

The general character of the PTT site and the NWIW methanol facility similarly reflect previous or ongoing industrial activity. The upland portion of the NWIW methanol facility has been developed, paved, or graveled to varying degrees. The shoreline along the Blair Waterway is developed with wharves, piers, and armored slopes containing riprap, concrete and asphalt pieces, and various debris. Impacts on earth resources from new industrial development on these sites would be localized to the sites and would not be significant, either alone or cumulatively when combined with development of the Tacoma LNG Project on the Hylebos side of the Blair-Hylebos Peninsula.

3.13.4 Air Quality

The construction and operation of the three proposed projects would not have significant cumulative impacts on air quality in light of the nonsignificant air quality impacts of the construction, operation, and decommissioning of the proposed Project (referred to herein as the Proposed Action), the limited foreseeable emissions of all three projects, and the existing federal and state regulatory frameworks. Potential air quality impacts would further be limited because, where required, project proponents would employ mitigation measures to control air emissions. Potential impacts on air quality during Project construction and operation are discussed in greater detail below.

3.13.4.1 Construction Impacts

Construction would generate air emissions temporarily resulting in air quality degradation on a short-term basis while construction is taking place. PSE would implement emission-control measures specified by the Washington State Department of Ecology (Ecology) and Puget Sound Clean Air Authority (PSCAA) guidelines and regulations to reduce impacts associated with construction, as described in Section 3.2.2.7 (Air Quality Permitting Requirements). Anticipated emissions during each year of construction activities are well below the minimum level stated in 40 Code of Federal Regulations (CFR 93.192).

The construction of the PTT would foreseeably result in emissions from marine vessels during transit and at berths; construction, excavation, and grading equipment; haul vehicles; and container-handling equipment and vehicles. The amount of emissions that these activities would generate has not been quantified but is not deemed of concern within the MDNS or supporting documents. (City of Tacoma 2012)

No data are currently available on the likely air emissions that would result from the construction of the NWIW methanol facility. It is reasonable to anticipate that those emissions would be of similar nature and would have effects similar to the Proposed Action (combustion of fuel-burning equipment and vehicles, fugitive dust from travel on paved and unpaved roads, foundation work). To the extent that air quality could be degraded on a short-term basis while construction was taking place, emission-control measures specified by Ecology and PSCAA guidelines and regulations would be available to reduce impacts associated with construction.

3.13.4.2 Operation Impacts

As listed in Section 3.2 (Air Quality), some air pollutant emissions would result from the operation of the Project. This section lists total potential emissions and shows that emissions from the Project would be low enough that the facility would not be subject to Prevention of Significant Deterioration or Title V permitting but would require a Notice of Construction permit from PSCAA. The Proposed Action would also be subject to Ecology's greenhouse gas reporting requirements (see Washington Administrative Code 173-441).

Vessels in the vicinity of the Proposed Action are fueled at this time with bunker fuel and diesel brought in by diesel-fueled tractor trailer trucks. Beneficial impacts of the Proposed Action include a significant reduction in both vessels' use of bunker fuel, and diesel and trailer trucks' use of diesel, which would significantly reduce air pollutant emissions in the vicinity of the Proposed Action. These potential air emission benefits were not estimated or incorporated into the air emission analyses presented herein but are a driving purpose of the Proposed Action.

The operation of the PTT would foreseeably result in additional emissions from marine vessels during transit and at berths, facility operations, and vehicles transiting to and from the terminal. The amount of emissions that these activities would generate has not yet been fully quantified. Available data indicate that at full operations (projected to be in 2020), trucks used to transport containers from ships to train yards, ships berthing at the site, and on-site equipment usage may contribute 5.3 metric tons of fine particulates (particulate matter less than or equal to 2.5 micrometers in diameter; $PM_{2.5}$) to the air in the surrounding area. The PSCAA has requested that conditions be placed upon the PTT project, including annual emission reports and an emissions cap for $PM_{2.5}$. (City of Tacoma 2012)

The PTT project proposes to implement the following mitigation measures to reduce or control air emissions during operations:

- Use of ultra-low sulfur fuel in land-based equipment;
- Use of lower-than-average sulfur fuel in vessel hotelling ship engines;
- Use of new cargo handling equipment (CHE) with engines that comply with the lowest applicable emission requirements;
- Use of electricity to power refrigerated container units while they are being filled; and
- Use of zero-emissions electrical equipment for both the ship-to-shore cranes and the rubber-tired gantries used to stack shipping containers.

No data are currently available on the likely air emissions that would result from the operation of the NWIW methanol facility. In its lease with the Port of Tacoma, NWIW agreed to assist the Port of Tacoma in meeting the goals and objectives of the Northwest Ports Clean Air Strategy by implementing programs, policies, plans, or procedures to meet action and performance targets. NWIW also agreed, "at reasonable request," to participate in small-scale emission-reduction pilot projects and to provide equipment data, terminal activity data, and air testing results. NWIW also agreed to post anti-idling signs, develop an anti-idle policy, and mutually explore technical idle-reduction technology.

Impacts on air resources from development of the Tacoma LNG, PTT, and NWIW projects would include temporary emissions during construction and ongoing emissions during the facilities' operations. Each facility will be subject to mitigation measures to reduce the impacts during construction and operations and to ongoing regulatory requirements, including procurement of air permits as necessary to further reduce and mitigate emissions. With the application of mitigation measures, and the ongoing oversight of the facilities by regulatory agencies with jurisdiction, the cumulative effect of all three projects on air resources is not anticipated to be significant.

3.13.5 Water Resources

As discussed in detail in the following section, the construction and operation of the Tacoma LNG Project, the PTT, and the NWIW methanol facility would not have significant cumulative impacts on water resources.

3.13.5.1 Construction Impacts on Water Resources

Creosote-treated Piling Removal. As described in Section 3.3.4.1 (Construction Impacts), approximately 508 creosote-treated timber piles would be removed from the Hylebos and Blair waterways Project-wide (the majority from the Hylebos) as part of the Proposed Action. This removal would temporarily disturb sediment on the seafloor and has the potential to re-suspend background concentrations of polyaromatic hydrocarbons (PAHs). However, any increase is expected to be short term, and elevated concentrations are likely to be greatly diminished within one or two tide cycles after the completion of the removal and installation activities. Moreover, the long-term consequence of this action would be qualitatively beneficial, improving sediment and water quality, by removing the creosote source from the environment.

PTT construction would require dredging 1.75 million cubic yards of soil and installing a wharf with approximately 555 pre-cast concrete piles (City of Tacoma 2012). These activities have the potential to re-suspend sediment containing pre-existing PAHs, but that re-suspension would likely be generally localized to the Blair Waterway and so would have limited cumulative effects combined with the Proposed Action's piling removal/installation activities, as they would primarily occur in the Hylebos waterway. If any re-suspension of PAHs from the Tacoma LNG and PTT projects were to occur at the same time, increased concentrations would be expected to be short term and to greatly diminish within one or two tide cycles. Any cumulative impacts associated with this re-suspension would not be significant.

Publicly available documents do not confirm the nature of in-water work at the proposed NWIW methanol facility. However, were the NWIW methanol facility's activities to include in-water work similar to the Tacoma LNG and PTT projects, cumulative impacts relating to the re-suspension of background contaminant concentrations would be short term and would rapidly decrease following the conclusion of in-water work. Accordingly, cumulative impacts associated with this re-suspension are not anticipated to be significant.

Turbidity. Cumulative turbidity impacts are not expected to be significant with the implementation of best management practices (BMPs) and tidal exchanges and potential timing of the projects. During Project construction, impacts from temporary increases in turbidity would be relatively minor and would last only a matter of hours or a few days because tidal exchange quickly disperses turbid water.

Construction of the PTT would require dredging 1.75 million cubic yards of soil, which has the potential to impact water turbidity. Additionally, and closer to PSE's in-water work, the PTT project plans to beneficially reuse dredge spoils to build juvenile salmon habitat in the Hylebos Waterway. Such activities, even if concurrent with the Tacoma LNG Project's in-water work, are reasonably expected to cumulatively increase turbidity, but such impacts would not be significant as they are short term due to regular tidal exchanges. (City of Tacoma 2012)

Publicly available documents do not analyze the nature and extent of NWIW's in-water activities for the construction of the methanol facility. It is reasonable, however, to assume that cumulative impacts on turbidity would not be significant, as they would be short term and would rapidly decrease following the conclusion of in-water work.

Spills. Water quality impacts from spills of materials such as oil, gasoline, and hydraulic fluids may occur during construction. Impacts would be limited by the implementation of spill-containment plans and BMPs. Specifically, PSE, the PTT, and NWIW would be required to maintain spill response plans in accordance with federal, state, and local laws and permits.

Construction Water Use. Approximately 9 million gallons of water would be required during the entire construction phase of the Proposed Action and would be supplied by Tacoma Public Utilities. Construction water inadvertently discharged could temporarily impact water quality in the Hylebos and Blair waterways by fluctuating water temperature and pH. Given their respective primary construction locations, inadvertent discharges associated with the Tacoma LNG Project would likely pass into the Hylebos Waterway, and inadvertent releases from the PTT and NWIW methanol facility would likely pass into the Blair Waterway. As such, significant cumulative impacts are not reasonably foreseeable at this time.

Available documents do not indicate the quantity of water required for the construction of the PTT and NWIW methanol facility. Reasonably assuming that any water required would be obtained from Tacoma Public Utilities, it is unlikely that there would be significant cumulative impacts even if all of the construction activities associated with all three projects were to occur simultaneously, in light of the relatively negligible amount of water required for the Proposed Action (peak use of 1.25 million gallons per day expected immediately prior to post-construction hydrostatic testing) as compared with Tacoma Public Utilities' water delivery capacity (up to 11,500 gallons per minute in the vicinity of the Tacoma LNG Project and 292 million gallons per day total system capacity).

Stormwater. During construction, temporary introductions of pollutants to the Hylebos or Blair waterways could occur from rainstorm runoff at all three project sites. The Project would implement code-required temporary erosion and sedimentation control measures or BMPs to mitigate or prevent such events from occurring.

Data on potential stormwater impacts during construction for the PTT and NWIW methanol facility are limited. However, it is reasonable to assume that, as required by the National Pollutant Discharge Elimination System (NPDES) Stormwater General Permit, BMPs would be implemented prior to the construction of all three proposed projects to prevent erosion and sedimentation and to identify, reduce, eliminate, or prevent stormwater contamination and water pollution from construction activity. Additionally, it is reasonable to assume that demolition and construction activities occurring in the Hylebos and Blair waterways would occur during the in-water work window for Commencement Bay. Based on these factors, significant cumulative impacts are unlikely.

Groundwater. With respect to the Project, shallow groundwater could experience a minor disturbance from changes in overland flow and/ or changes caused by grading and trenching on the proposed site. Degradation of water quality would be unlikely and, but in the event that any temporary degradation were to occur, it would be limited to the immediate vicinity of the construction activity or borehole; thus, no significant impact on groundwater resources would occur during construction activities.

The environmental checklist for the PTT project indicates that groundwater would not be withdrawn and water would not be discharged to groundwater. As noted above, there is no publicly available information regarding the NWIW methanol facility. As the PTT and NWIW methanol facility would not reasonably be expected to impact groundwater differently than the Proposed Action, any localized and limited impacts potentially caused by the construction of the Tacoma LNG Project would not be cumulatively significant.

Wetlands. The Project was sited specifically to avoid construction in wetlands. See Section 3.3.3.2 (Water). The PTT project would permanently fill approximately 0.8 acres of wetlands and 5.7 acres of wetland buffer areas but would provide compensatory mitigation through the creation 1.48 acres of new category II wetland area in the city of Fife (City of Tacoma 2012). The former Kaiser Aluminum site where the proposed NWIW methanol facility would be constructed if approved contains no jurisdictional wetlands, although there are wetlands on adjacent sites, so some mitigation may be required to avoid impact to neighboring

areas (Port of Tacoma 2011). Based on this information, the construction of the Project in conjunction with the construction of the PTT and NWIW methanol facility would not be expected to have any cumulative impacts on wetlands.

3.13.5.2 Operation Impacts on Water Resources

Surface Waters. During the processing and transmission of LNG, the potential exists for spills. The Tacoma LNG Facility and Totem Ocean Trailer Express (TOTE) Marine Vessel LNG Fueling System would include secondary containment for LNG and various other chemicals on site as required by federal and state law and described in Chapter 2 (Description of Proposed Action). Although highly unlikely, any LNG spill would be directed to spill containments consisting of below-grade open top concrete sumps.

Vessel operations as part of the Proposed Action could include vessels being fueled twice per week via the Project's bunkering barge, as is currently done to fuel these vessels with bunker oil and/or diesel or via a direct pipeline. If the direct LNG pipeline is not available, only one LNG bunkering barge is expected to be in use, which would make the trip back and forth to TOTE twice per week, for approximately eight to ten trips per month. The trips would not add to the current maritime traffic on the two waterways (because the vessels are currently fueled by barge); the vessels would not require ballast discharges and would present minimal risk of fuel spills. Tugs would be fueled at other locations and would be subject to spill-prevention plans at those facilities. In the unlikely event of leakage of LNG from a barge, the LNG would vaporize and not affect water quality. When exposed to ambient heat sources such as water or soil, LNG vaporizes rapidly.

The Mitigated Determination of Nonsignificance for the PTT does not assess the potential that vessels calling on the marine container terminal could have in-water fluid spills that could negatively impact surface waters (City of Tacoma 2012). It is unclear whether the added vessel traffic in the Blair Waterway from the PTT would pose a significant increase relative to current risks.

Based on information for similar facilities, the NWIW methanol facility would be called on by vessels between three and six times per month (Port of Kalama 2014). While no data are available regarding whether and to what extent the operation of these vessels would increase spill risks associated with facility operations, the additional trips would be minor in comparison with existing maritime traffic and are not likely to constitute a significant change to the risk of spills in the Blair and Hylebos waterways or in Commencement Bay more generally.

Stormwater. The Proposed Action would not require an Industrial NPDES stormwater permit, but it would bring the site into compliance with current stormwater management requirements, including, but not limited to, the Port of Tacoma's 2015 Stormwater Management Plan, City of Tacoma Stormwater Management Manual, and applicable Ecology Secondary Permittee requirements. This would result in improved stormwater quality in the Hylebos Waterway because the stormwater discharge from the Tacoma LNG Project site would be properly treated according to the most current standards, as compared with no treatment under existing conditions.

One hundred percent of the proposed PTT would be covered in impervious surfaces, which would drain into a new stormwater treatment system; the stormwater would be treated for probable contamination from vehicle traffic prior to release. This would constitute an improvement over current conditions, in which stormwater from the proposed site is discharged directly into the City of Tacoma's stormwater system (City of Tacoma 2012). As both the Tacoma LNG and PTT projects would likely have beneficial stormwater impacts, no significant adverse cumulative impacts are anticipated.

In its lease, NWIW agrees to use the Port of Tacoma's stormwater system and to satisfy all requirements of Ecology's NPDES General Municipal Stormwater Permit to the extent applicable and to obtain (and comply with) an Industrial Stormwater General Permit. In light of these concurrent permitting processes, the NWIW methanol facility's stormwater management is not anticipated to have a cumulative adverse impact on

stormwater when considered in combination with the positive net effects of the Tacoma LNG Project and PTT.

Groundwater. During operation of the Tacoma LNG Project, the likelihood for spills to reach groundwater and affect groundwater quality is very low due to the planned spill impoundments and the volatile nature of LNG as it warms from its cryogenic state. In addition, it is reasonable to assume that the PTT and NWIW methanol facility would also operate in compliance with local, state, and federal water quality laws and would also have spill prevention control and countermeasure plans in place to address any accidental spill. Cumulative impacts would, therefore, be anticipated to be insignificant.

Although unlikely, assuming concurrent construction, foreseeable cumulative impacts on water resources from the three proposed projects (e.g., increase in water use, potential increases in turbidity, and re-suspension of contaminants during in-water work) are likely to be temporary, localized, and insignificant. Cumulative impacts associated with Project operations are limited to increases in stormwater collection and treatment and an unquantifiable, but qualitatively low risk associated with potential spills of petroleum or hazardous substances to surface or groundwater. As potential cumulative impacts are either remote or limited in scale and duration, the Proposed Action would have no significant cumulative impacts on water resources.

3.13.6 Plants and Animals

The Tacoma LNG Project, PTT, and the NWIW methanol facility would be sited primarily on existing industrial sites that are largely paved or graveled. Accordingly, the current upland sites offer little, if any, habitat that would support significant plant or animal populations. Potential impacts on aquatic and marine plant and animal life would be localized to the shoreline adjacent to the proposed project areas and would be associated with temporary impacts from construction and long-term impacts from additional piers over the nearshore habitat. Given appropriate mitigation, cumulative impacts from the three projects are unlikely to be significant.

3.13.6.1 Plants

There are no anticipated cumulative impacts on plants because construction and operation of the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and Natural Gas Distribution System would take place on industrial sites that were previously paved or graveled.

PTT includes the proposed filling of 0.80 acres of wetlands, which could have adverse impacts on vegetation. PTT has committed to complying with the landscaping and buffering requirements found in Tacoma Municipal Code 13.06.502 and would mitigate any loss through habitat enhancement and plantings that ensure habitat function, soil stabilization, and the successful creation of new wetland areas at an identified location in Fife.

The potential impact of the NWIW methanol facility on plants is unknown. However, in its lease, NWIW has committed to “prevent or control invasive species,” which ostensibly could include measures relating to Scotch broom and Himalayan blackberries.

3.13.6.2 Animals

Impacts on terrestrial and avian wildlife from the Proposed Action would be mostly avoided or minimized because construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would take place on existing paved industrial sites and because no habitat of value has been identified.

There is no information currently available on the potential impacts of the PTT and NWIW methanol facility on terrestrial and avian species. However, the PTT MDNS has determined that it is not likely to adversely affect any listed species (City of Tacoma 2012). Because the Project’s potential impacts on terrestrial and avian wildlife would be negligible and consistent with current uses, it is unlikely that there would be

significant adverse cumulative impacts when construction and operation of the Project is considered cumulatively with the potential impacts of the PTT and NWIW methanol facility.

Aquatic Species. In-water work for pile-driving would take place as part of the Proposed Action during a period when the numbers of juvenile Chinook salmon, steelhead, and bull trout are low. Assessment of pile-driving impacts on fish and wildlife and proposed mitigation is provided in Chapter 3.4 (Plants and Animals). To minimize the potential for harm, the Proposed Action would incorporate mitigation specified and required by the applicable permitting agency (i.e., National Marine Fisheries Service and Washington Department of Fish and Wildlife). Temporary turbidity would occur during pile removal and pile-driving activities, as well as during re-grading of 600 feet of shoreline in the Hylebos waterway. Increased suspended sediment loads would be minimal and expected to be well below levels associated with direct mortality and sublethal effects on salmonids and other fish. Turbidity impacts would be relatively minor and would last only a matter of hours or a few days because tidal exchange quickly disperses turbid water. Potential construction-related impacts on designated critical habitat for the Chinook salmon and bull trout would be short term and limited to temporary effects on water quality from piling removal, pile driving, accidental spills, and general construction-related turbidity.

The PTT would permanently impact the entire 50-foot fish and wildlife habitat marine buffer area adjacent to the PTT project site and 0.80 acres of on-site wetlands. As a result, PTT's mitigation plan includes off-site planting, habitat restoration, and creation of new category II wetlands. PTT would also mitigate for unavoidable shading impacts on nearshore environments through restoration and enhancement of habitat for juvenile salmon in the Inner Hylebos.

While there are no publicly available data on the potential construction impacts of the NWIW methanol facility on aquatic species, it is reasonable to assume that NWIW's construction activities will comply with federal, state, and local regulations concerning fish and wildlife. In addition, the proposed site for the NWIW plant is located inland from shore and would not include any on-site wetlands (Port of Tacoma 2011; NWIW 2015b). As a result, no significant impacts on this resource is expected.

While there is a potential for impacts on aquatic species during the construction and operation of the three proposed projects, any cumulative impacts would occur when the risk of an adverse impact is lowest (e.g., during salmon work windows), temporary (e.g., increases in turbidity during construction), and would be mitigated. Commensurate with federal and state law, limited permanent impacts (here only PTT's filling of 0.80 acres of wetlands) would be fully mitigated. Accordingly, the concurrent build-out and operation of the Tacoma LNG Project, the PTT, and the NWIW methanol facility would not have significant adverse impacts on aquatic species.

Impacts on Marine/Aquatic Habitat. The Proposed Action and PTT would likely result in some shading impacts over the Hylebos and Blair waterways. Shading is associated with reduced productivity and habitat for predatory fish. Although there are foreseeable cumulative impacts arising from increases in shading, impacts could be mitigated by using grating on catwalks or removing decrepit creosote pilings and overwater structures.

The construction of the Tacoma LNG Project would also result in the loss of a 33-foot-wide strip of federally listed rockfish habitat. However, the Project's installation of concrete and steel piers would increase fish productivity because it encourages encrusting organisms more than the existing wood piers. No data are available as to the potential impacts of the PTT on rock fish habitat. Any potential impact would be subject to the federal Endangered Species Act and, where determined necessary by federal wildlife agencies, fully mitigated. Accordingly, concurrent build-out and operation of the Tacoma LNG Project, PTT, and NWIW methanol facility would not likely cause significant cumulative impacts on rock fish habitat.

No cumulative impacts are associated with the increase in artificial lighting in aquatic areas adjacent to the Tacoma LNG Project and PTT. Tacoma LNG Facility lighting that affects water surfaces would be at lower intensities than those associated with impacts on migrating juvenile salmon. No data are available on the

potential lighting impacts of the PTT. However, it is reasonable to assume that any such impact would be subject to required mitigation consistent with that implemented for the Tacoma LNG Project.

Increases in vessel traffic resulting from the Proposed Action would be minimal in light of existing vessel traffic in Commencement Bay. No data on vessel traffic associated with the build-out of the PTT are available. However, based on a comparable project at the Port of Kalama, vessel traffic associated with the NWIW methanol facility is likely to be limited to three to six vessels per month (Port of Kalama 2015). Given the existing levels of vessel traffic, cumulative impacts on wildlife (aquatic, avian or terrestrial) and prey species are not likely to be significant.

As the three proposed projects are consistent with the industrial, maritime facilities in and around Commencement Bay, potential impacts on plants and animals associated with project build-out would be anticipated to be temporary, localized, and not significant in light of existing uses and required mitigation.

3.13.7 Health and Safety

The construction and operation of the Project, PTT, and NWIW methanol facility could have significant cumulative impacts on health and safety. Although available information as to the construction and operational plans of the PTT and NWIW methanol facility is limited, it is reasonable to assume that these facilities, as well as the Project, would comply with applicable local, state, and federal safety regulations and implement plans and measures to limit safety risks. However, the addition of both the Project and the NWIW methanol facility does present a cumulative higher risk of fire and explosion.

3.13.7.1 Construction Impacts

During construction of the Project, environmental health measures would be taken to ensure that certified hazardous materials contractors would remove asbestos-containing material or lead-based paints in the buildings that would be demolished as part of the Proposed Action. Any contaminated material found during construction would be handled in a manner consistent with the terms of the work plan in Section 3.1.3.4 (Existing Contaminated Sites and Remedial Actions). This plan would address necessary characterization of impacted media, protection of worker health and the environment, temporary storage of impacted media, and proper reuse or off-site disposal of contaminated soil in accordance with local, state, and federal regulations. An additional layer of safety measures would be implemented during construction of the Project, as all PSE contractors and subcontractors are required to develop and implement safety plans prior to being contracted.

Environmental hazards associated with the construction of the PTT include general risks associated with the use of heavy machinery during construction and operation and site contamination from prior uses, including a contaminated groundwater plume. PTT would use “appropriate controls” to ensure that remediation is ongoing and that human exposure to any site contamination is minimized. PTT reports that the site will be “clean for industrial uses” prior to the start of construction. (City of Tacoma 2012)

Data on the potential health and safety impacts of the construction of the NWIW methanol facility are limited to statements in their lease that NWIW will not use, store, treat, generate, sell, or dispose of any hazardous substances in violation of any local, state, or federal law.

Adherence to local, state, and federal laws concerning health and safety during construction by all three proposed project proponents would prevent significant cumulative impacts.

3.13.7.2 Operation Impacts

Potential safety hazards at the Tacoma LNG Project relate to the specific characteristics of LNG and the conditions under which it would be handled and stored and to associated operations that involve the use of other hazardous materials. Operation of the proposed facility would not pose a potential public hazard because PSE would adopt and implement strict design and operational measures to control potential accidents. Stringent requirements would be put into place for the design, construction, operation, and

maintenance of the facility as well as extensive safety systems to detect and control potential hazards. More specifically, design, construction, and operation of the Tacoma LNG Project would meet the safety requirements of the Pipeline and Hazardous Materials Safety Administration, the United States Coast Guard (USCG), and the Washington Utilities and Transportation Commission. (See, e.g., 33 CFR 127 [Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas]; 49 CFR 193 Subpart F [Liquefied Natural Gas Facilities: Federal Safety Standards]; and National Fire Protection Association 59A. Additionally, PSE would adopt and implement strict emergency protocols and health and safety mitigation measures as set forth in Section 3.5.(Human Health and Safety)

No data on the potential health and safety impacts associated with the operation of the PTT are available. It is reasonable to assume that the PTT project would adhere to all applicable local, state, and federal health and safety laws. Nonetheless, certain health and safety risks can reasonably anticipated. For example:

- Risks typically associated with container operations (e.g., cranes) can be anticipated on site;
- Significant increases in truck traffic volume on the Blair-Hylebos peninsula associated with the PTT may increase potential for road incidents in the vicinity of PTT; and
- If sufficient to cause road congestion, these increases in truck traffic could hamper emergency vehicles' access to incidents on the peninsula, particularly if congestion affects Taylor Way.

Similarly, no data on the health and safety impacts of the operation of the NWIW methanol facility are available. It is reasonable to assume that the NWIW would adhere to all applicable local, state, and federal health and safety laws in the operation of its methanol facility. However, methanol is known to be highly flammable harmful if ingested, and easily dissolvable in water (Caltech 2009; EPA 2000). In addition, there is likely to be a constant inventory of methanol stored on site. As such, there will be an ongoing environmental health and safety risk from the presence of methanol, particularly related to its potential for combustion.

As all three of the proposed projects will be required to meet the strict health and safety protocols of local, state, and federal laws, the construction and operation of the proposed projects should not have significant adverse cumulative impacts. However, the presence of these facilities (particularly the Tacoma LNG Facility and NWIW methanol facility) does significantly raise the risk of fire and explosion on the Blair-Hylebos peninsula. In addition, the added truck traffic caused by the operation of the PTT may impede the ability of the Tacoma Fire Department to respond to incidents on the Blair-Hylebos peninsula.

3.13.8 Noise

The construction and operation of the Tacoma LNG Project, the PTT project, and the NWIW methanol facility would not have significant cumulative noise impacts during because cumulative impacts are limited by the physics of sound.

As discussed in Section 3.6.1 (Fundamentals of Acoustics), the physics of sound level addition dictates that the maximum cumulative sound level increase over the Tacoma LNG Project would be 3 A-weighted decibels (dBA). That is, when adding the sound level of the Tacoma LNG Facility to a baseline sound level that includes, for example, both the PTT and the NWIW methanol facility, the maximum increase resulting from adding the Tacoma LNG Facility to the existing environment would be 3 dBA. If the Tacoma LNG Facility's sound level differs from the baseline level by 2 dBA or more (either louder or quieter), the resulting increase would be less than 2 dBA. Therefore, the Tacoma LNG Project would not present probable significant adverse cumulative noise impacts when considered with the other reasonably foreseeable projects known in the area.

3.13.9 Land Use and Recreational Resources

The three proposed projects are consistent with the historical use of industrial parcels in the Port of Tacoma and current land use designations and the City of Tacoma Comprehensive Plan. Recreational resources in the area may be temporarily impacted during construction of the proposed projects, but impacts would be

less likely during project operation. Foreseeable impacts during construction would be temporary and would not impede vessel traffic in the waterways. Any waterway access impacts are most likely to be caused by the PTT, and not by the facilities associated with the Proposed Action. Accordingly, no cumulative impacts on land use or recreational resources are anticipated from the construction and operation of the three proposed projects.

3.13.9.1 Land Use

The Tacoma LNG Project site would be in an area zoned as Port Maritime Industrial (PMI). The site is primarily developed for industrial maritime use and has been in industrial use for at least 75 years. The Project would not change the land use or character of existing industrial lands, and impacts would not exceed the extent of the site boundaries. The Proposed Action would also be consistent with comprehensive plan designations, zoning districts, and critical areas criteria.

Although available data on the PTT and NWIW methanol facility are limited, both projects reflect previous or ongoing industrial activity, and it is reasonable to assume that proposed uses would be consistent with both PMI zoning and the “high intensity” designation in the City of Tacoma’s Comprehensive Plan.

The PTT facility would not comply with shoreline access requirements (City of Tacoma 2012). However, this impact would occur independently of any impact associated with the Project, and no associated cumulative impacts would be expected as a result.

3.13.9.2 Recreational Resources

Temporary impacts to recreational boating may be experienced in the Blair and Hylebos waterways during the in-water construction activities associated with the Tacoma LNG Facility, TOTE Marine Vessel LNG Fueling System, and the Puyallup Tribal Terminal. Because in-water construction activities are likely to take place at similar times (to avoid impacts to migrating fish as described in Section 3.13.6, above), there would potentially be a temporary cumulative impact from simultaneous in-water construction at the TOTE Marine Vessel LNG Fueling System and the PTT.

Future increased marine vessel traffic volume and increased marine vessel size serving the PTT may also have a permanent impact on recreational boating in the Blair Waterway. However, the relatively limited amount of traffic generated at the Tacoma LNG Facility and TOTE Fueling System sites is unlikely to generate additional cumulative impacts.

The NWIW methanol facility would most likely rely on breakbulk operations at the currently operating East Blair One terminal for shipping (Port of Tacoma 2014). Associated marine vessel traffic is expected to be limited to three to six vessels per month, based on similar projects (Port of Kalama 2015). Therefore, cumulative impacts from the Tacoma LNG Project and NWIW Methanol facility are unlikely.

In addition, the PTT and NWIW methanol facility would be located on the Blair-Hylebos facility, and neither construction nor operation of these projects would be expected to take place in other locations. Therefore, it is unlikely that there would be any cumulative impacts on any other recreational resources in the vicinity of the Tacoma LNG Project.

3.13.10 Aesthetics/Light and Glare

The construction and operation of the Tacoma LNG Project, PTT, and NWIW methanol facility are likely to cumulatively impact aesthetics, light, and glare, but would still be within the existing industrial character of the port of Tacoma and minimized by appropriate mitigation.

The existing site of the proposed Tacoma LNG Project contains a variety of industrial structures. The Proposed Action would replace those structures with fewer, taller, and narrower structures. The site would remain industrial in use and character, as would the surrounding areas. Considering the size and scale of the LNG tank compared with other surrounding facilities, the visual impact would be significant and unavoidable. However, incorporating the mitigation measures contained in Sections 3.8.6.1 (Aesthetics) and

3.8.6.2 (Light and Glare) would reduce the aesthetic impacts. The Proposed Action would have no significant or unavoidable adverse impacts on impacts from light and glare.

The lighting and structural aesthetics of the proposed PTT would likely be consistent with existing uses and character of the existing industrial portions of the site. There are no foreseeable significant adverse impacts based on currently available information, and thus no cumulative impacts with the Tacoma LNG Project are currently anticipated. (City of Tacoma 2012)

No information is currently available as to how the NWIW methanol facility will (or will not) impact aesthetics and light/glare. However, it is reasonable to assume that, as an industrial facility, the methanol facility's appearance would remain industrial in character and be consistent with the surrounding industrial uses. Based on a highly preliminary and schematic conceptual rendering of the site, it is possible that certain tall structures may pose a significant and unavoidable impact. However, it is not possible at this time to determine whether this impact would be adverse to any sensitive receptors (NWIW 2015b).

3.13.11 Cultural Resources

The construction and operation of the Tacoma LNG Project, the PTT, and the NWIW methanol facility are not anticipated to cumulatively impact cultural resources in light of the sites' existing industrial character, limited foreseeable impacts, proposed mitigation, or adherence to state and federal laws protecting cultural resources.

Because no historic-era resources of the built environment are present within the area of potential effects of the Proposed Action, no significant unavoidable adverse impacts are expected. Additionally, there are no archaeological resources known or likely present within the area of potential effect of the Proposed Action, and no significant unavoidable impacts on archaeological resources are expected.

A cultural resource study of the PTT project area in 2008 reported no findings. Historic debris was found at the Inner Hylebos Site, but it was determined to be ineligible for listing on the National Register of Historic Places. Accordingly, no significant adverse impacts are anticipated, and so no adverse cumulative impacts on cultural resources are anticipated.

No information is available about the impacts of the NWIW methanol facility on cultural resources. However, it is reasonable to assume that the site's historic use was as an operational port. In light of the nature of the site and adherence to state and federal laws protecting cultural resources, it is unlikely that there would be significant adverse unavoidable impacts on such resources.

3.13.12 Transportation and Traffic

Construction of the Tacoma LNG Project, the PTT, and NWIW may cause cumulative impacts to road traffic and roadway surface damage due to construction vehicles traveling along Taylor Way. In addition, operation of the PTT would cause significant adverse impacts to the City's street system and would result in increased congestion at key intersections providing access to the Blair-Hylebos peninsula. Cumulative impacts to marine vessel traffic are unclear: the Tacoma LNG Project and NWIW methanol facility would not generate significant traffic, but no information is available regarding the potential generation of marine traffic by the PTT.

3.13.12.1 Vehicle and Rail Traffic

Construction of the Project would result in a temporary increase in daily and peak hour traffic volumes. In addition, up to two lanes of specific roadway segments may be closed at times due to pipeline construction. As a result, the Proposed Action may cause temporary increases in traffic delays and changes in traffic patterns. However, these temporary increases would have limited impacts and would not be expected to significantly increase roadway congestion or decrease the level of service at key intersections near the Blair-Hylebos peninsula.

Nonetheless, the use of heavy and oversized vehicles during construction may cause some damage to the road surface along Taylor Way. The poor quality of roadway surface along Taylor Way has been identified as an issue by the City of Tacoma (Fehr and Peers 2015). Construction may also cause temporary rail traffic disruptions, particularly at the intersection of proposed Pipeline Segment A and rail spurs along Taylor Way. This impact would be mitigated by the use or horizontal drill or bore construction to limit the length of traffic disruption and avoid damage to rail spurs.

Operation of the Tacoma LNG Project would generate very limited vehicle traffic, and would typically only minimal rail traffic. No impact on road or rail facilities, congestion, or level of service is expected as a result.

Table 3.13-2 Anticipated Trips Associated with Construction of the Tacoma LNG Project

	PM Peak Hour Trips (directional)		Daily Traffic Volumes	
	Cars/Small Vehicles	**Trucks/Heavy Vehicles**	**Cars/Small Vehicles**	**Trucks/Heavy Vehicles**
Tacoma LNG Facility	0 inbound, 139 outbound	5 inbound, 5 outbound	139 vehicles	11 vehicles
Pipeline Segment A[a]	0 inbound, 0 outbound	0 inbound, 0 outbound	15 vehicles	20 vehicles
Total	**0 inbound, 139 outbound**	**5 inbound, 5 outbound**	**154 vehicles per day**	**31 vehicles per day**

Note:
[a] Construction of the pipeline could occur at night; therefore, no vehicle trips are expected during the PM peak hour.

The available documents do not forecast the traffic impacts of the construction phase of the PTT. Based on the large scale of the Project and considerable grading activities, it is likely that construction of the PTT would generate daily truck traffic in a comparable or larger amount than what would be expected for the Tacoma LNG Project. Thus, it is possible that concurrent construction of the Tacoma LNG Project and PTT would have a cumulative impact on damage to the road surface along Taylor Way. This impact would likely be further exacerbated by concurrent construction of the proposed NWIW methanol facility.

It is projected that PTT operations will generate 475 employee and 1,030 truck total trips daily upon opening and 950 employee and 4,244 truck trips daily by full project build-out. The City of Tacoma has determined that this would cause significant adverse impacts to the City's street system, and traffic impacts at key intersections. A combination of applicant commitments and mitigation requirements imposed by the city would include:

- Optimization of signal timing, cycle length, and phasing at the four most impacted intersections (Taylor Way/State Route [SR]-509; SR-509/Alexander Avenue; Pacific Highway East/Port of Tacoma Road; and Lincoln Avenue/Portland Avenue); and
- Geometric improvements at the intersection of Taylor Way and SR-509.

More specifically, when the building permit to construct the ship berth on PTT is granted, the PTT would implement the following traffic mitigation measures:

- Contribute $300,000 to the City of Tacoma for an Interchange justification report to study the SR 509 D Street ramp project;
- Provide the City of Tacoma with a copy of the short-term and long-term rail operations agreement that defines where intermodal cargo would be handled. This agreement would define whether intermodal cargo will be drayed to a new off-dock Burlington Northern Santa Fe intermodal rail yard near D Street or to a new on-dock intermodal transfer facility;
- Improvements to the SR-509/Taylor Road intersection, including widening eastbound SR-509 to provide dual left-turn lanes; widening of westbound Marine View Drive (SR-509) to provide dual left turn lanes;

the widening of Taylor Way north of SR-509 to extend the two land northbound section by an additional 300 feet, and the re-timing of the signal at the intersection of SR-509/Taylor Road to optimize cycle lengths and phase splits;

- Retime the traffic signal at Lincoln Avenue/Portland Avenue to optimize cycle length and phase splits; and
- Retime signals on Port of Tacoma Road between Interstate 5 and SR-509 to optimize cycle lengths and phase splits.

The implementation and timing of such mitigation should be coordinated to ensure that there is no interference between activities associated with the Tacoma LNG Project and activities associated with PTT traffic mitigation. In addition, the mitigation measures proposed should be reviewed for consistency with the medium- and long-term road and traffic management improvements prescribed in the current Emergency Response/Intelligent Transportation System commissioned by the City of Tacoma (Fehr and Peers 2015).

No specific information is available on the traffic impacts of the NWIW methanol facility. In its lease with the Port of Tacoma, NWIW agreed to develop, maintain, and comply with a traffic control plan reviewed by the Port of Tacoma and Washington State Department of Transportation if an approved traffic plan is required. I

3.13.12.2 Vessel Traffic

During construction of the Tacoma LNG Project, temporary vessel navigation impacts could occur in both the Hylebos and Blair waterways as construction barges, equipment, and supplies are being transported to and from the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System. These impacts would be short term and limited to the duration of construction. Once the construction barges, equipment, and supplies arrive at either site, they would largely remain stationary and would not restrict vessel movement up and down the remainder of the waterways. Any restricted vessel navigation during construction would be communicated through a notice to mariners by the USCG and posted by the Harbor Master at marinas in the vicinity of the Tacoma LNG Project.

In-water construction in both the Hylebos and Blair waterways is anticipated to require the use of barge-mounted cranes, a support barge, a diesel or hydraulic impact hammer, and various small workboats. A tugboat may also be needed to position the barges. Construction activities would be localized in the vicinity of the existing TOTE facilities and would not impede vessel traffic in the rest of the Blair waterway.

Construction in both waterways is estimated to result in two tug/barge roundtrips (in and out) of the waterway every day, and up to four small workboats would be working 10 to 12 hours per day. These additional trips would increase the combined monthly average of the approximately 69.7-foot deep-draft vessels, barges, and tugboat arrivals that occurred on the Hylebos Waterway during 2014 (see Tables I-2 and I-4 in Appendix I-2 (Supporting Transportation Tables), but these trips would be temporary and would not occur outside the construction period. These additional trips would also increase the combined monthly average of the approximately 257.2-foot deep-draft vessels, barges, and tugboat arrivals that occurred on the Blair Waterway during 2014 (see Tables I-3 and I-5 in Appendix I-2). Again, these trips would be temporary and would not occur outside the construction period.

The new LNG barge and tugboat trips introduced to the Hylebos and Blair waterways during operation of the Project would not significantly impact commercial shipping. The new maritime activity resulting from Project operation would be limited to LNG barge and tugboat assists in the Hylebos and Blair waterways. Operation of the barge and tugboat assists to and from the Tacoma LNG Facility and TOTE sites would be consistent with federal marine safety regulations and USCG marine safety programs provided in the waterway suitability assessment described in Chapter 3.11 (Public Services and Utilities). As discussed in detail in Section 3.10 (Transportation), TOTE vessels would be fueled twice per week via the Project's bunkering barge; these vessels are currently fueled by barges carrying bunker diesel.

The PTT project would use water transportation as an essential component of the operation of the shipping terminal. Water transportation would consist of container vessels docking at the completed project's berths to collect and deliver containers. No data are available within the environmental permits and MDNS for the PTT describing anticipated volumes of marine vessel traffic (City of Tacoma 2012).

Based on the similar project proposed at the Port of Kalama, the NWIW methanol facility would likely generate three to six vessel trip per month in the Blair Waterway when operating (Port of Kalama 2015). These three to six trips per month in the Blair Waterway would be an insignificant contribution to the 257.2 foot vessel arrivals currently on the waterway. No cumulative impacts would be expected as a result.

3.13.13 Public Services

Although available information is limited, the construction and operation of the Tacoma LNG Project, PTT, and NWIW methanol facility would likely have a cumulative impact on fire protection and law enforcement services. Impacts on other public services and utilities would be limited, and would likely be specific to each project and not cumulative.

As described in detail in Section 3.11 (Public Services and Utilities), construction of the Project would increase demand for fire protection and law enforcement services in the vicinity of the Tacoma LNG Project, due to construction hazards and increased activity in the area. Furthermore, operation of the Tacoma LNG Project would place an increased burden on the Tacoma Fire Department, for the following reasons:

- Facility emergency response procedures involve notification of first responders from the Tacoma Fire Department, who would be obligated to respond;
- Even if no direct fire response by fire protection services is necessary, an operational incident would likely require the intervention of auxiliary services provided by the Tacoma Fire Department, such as emergency medical services or hazardous materials response;
- Incidents that would require direct intervention of fire response services are likely to be very severe and require significant amounts of Tacoma Fire Department staff and equipment for both direct fire response and auxiliary services; and
- As noted in Section 3.11.4.1 (Construction Impacts), the relative lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident.

No direct data on the potential impacts of the construction and operation of the PTT on public services are available. Data on the potential impacts of the PTT on fire services is limited to stating that build-out of the facility would not increase demands on public services and would comply with emergency vehicle circulation requirements. However, because operation of the PTT would cause significant increases in road traffic, it is likely that increased road congestion would result in increased delays in emergency vehicle access to the Blair-Hylebos Peninsula (City of Tacoma 2012). This would result in a cumulative impact on fire protection and law enforcement services, when combined with the increased demand for these services caused by all the proposed projects.

There are no publically available data on the potential impact of the NWIW methanol facility on fire services. However, due to the volatile and highly flammable nature of methanol, it is reasonable to anticipate that the presence of such a facility would increase the risk of incidents requiring the intervention of the Tacoma Fire Department.

In addition, the combined added presence of a new container terminal, LNG facility, and methanol facility would pose significant cumulative security risks likely to require additional law enforcement presence on the Blair-Hylebos peninsula. Certain security risks directly attributable to the Tacoma LNG Facility would be addressed within the waterway suitability assessment detailed in Section 3.11.2.1 (Federal), but a

cumulative analysis of security risk is required in order to ascertain the full extent of additional law enforcement presence required by the presence of all three proposed projects.

3.13.14 Socioeconomics

The construction and operation of the Tacoma LNG Project, the PTT, and the NWIW methanol facility are not anticipated to have adverse cumulative impacts on socioeconomic resources in Tacoma. Rather, any cumulative impact would likely be beneficial in terms of job growth and direct, indirect, and induced economic growth impacts.

3.13.14.1 Construction Impacts

Construction of the Project would create an average of 401 jobs per year during the three-year construction period, with the majority of skilled labor positions hired locally or regionally. In light of the short-term (three-year) construction window, the Proposed Action would not result in substantial population growth, cause an increase or concentration of population or new housing, nor displace people throughout Pierce County.

Employment and labor incomes generated through construction of the Project would result in an overwhelming benefit to the Pierce County and Puget Sound region labor markets, thus benefiting the local and regional economies. Of the 401 jobs created, approximately 159 would be directly created by the construction activities, 118 would be indirectly created via business interactions with suppliers, and 124 jobs would be induced through consumption-driven impacts. Additionally, no jobs would be displaced or eliminated as a result of the construction of the Project because existing Port of Tacoma tenants would either relocate (PCC Logistics and Safe Boats, International, LLC) or are planning to leave the site (EHW Constructors Joint Ventures) before the proposed start of construction.

Construction of the Project would generate direct, indirect, and induced upstream economic impacts resulting from construction spending for services brought within the region and through worker payrolls. The total amount of output, or economic value, produced by construction of the Tacoma LNG Project would amount to an average of $71.1 million during each year of construction. Of this, an estimated $44.5 million would be generated from direct output and $26.6 million would be generated from a combination of indirect and induced output. Additionally, labor income during construction is estimated to be $14.1 million annually. When direct and induced effects are accounted for in labor income spending, the total labor income amounts to approximately $27.5 million per year in economic benefits to the Puget Sound region.

No data on the socioeconomic impacts of the construction of the PTT and the NWIW methanol facility are available. However, in light of current unemployment rates and the high population of Pierce County and the wider Puget Sound region, it is reasonable to assume that the vast majority of non-specialized construction jobs would be locally sourced and thus beneficially impact the local economy.

3.13.14.2 Operation Impacts

Operation of the Project would create approximately 16 jobs annually and would support 115 indirect or induced jobs. These jobs would most likely be filled by persons already living in Pierce County, and so it is not reasonably foreseeable that the Proposed Action would only marginally increase local population and housing demand (see Section 3.12 [Socioeconomics]).

Similar to the economic benefits of construction, operation of the Project would generate beneficial direct, indirect, and induced upstream economic impacts. The total amount of economic value produced by operation of the Project would average $78.9 million annually. This analysis also accounts for downstream regional impacts (accumulation of economic efficiencies, cost savings, and value of social benefit gained through reduction of emissions) associated with the Proposed Action. A particularly significant downstream impact of the Tacoma LNG Project is a result of natural gas peak shaving, which would save PSE ratepayers and LNG transportation fuel consumers approximately $43.1 million per year combined, resulting in the generation of an additional $14.9 million in economic output. Furthermore, the substitution of diesel and

marine fuels with cleaner-burning LNG could reduce annual greenhouse emissions (including carbon dioxide, nitrogen oxide, sulfur oxide, and particulate emissions), which annually generates approximately $5.7 million in social benefits. Finally, PSE estimates that the annual property taxes assessed on the Tacoma LNG Facility would be approximately $4.2 million to $4.9 million. These tax revenues would support public services and utility costs within the City of Tacoma, City of Fife, and unincorporated Pierce County.

No detailed data on the potential socioeconomic impacts of the PTT project are available at this time. However, as stated in Section 3.13.12 (Transportation and Traffic), the Project would be expected to generate up to 950 employee trips daily. In addition, construction would proceed in three phases and would involve large amounts of grading, paving, dredging, restoration, and other work. It is therefore likely that the PTT project would have significant positive socioeconomic impacts during both the construction and operations phases.

Similarly, no data exist on the potential socioeconomic impacts of the NWIW Methanol facility project. However, NWIW expects that the project could generate up to 1,000 jobs during construction and 200 permanent jobs (NWIW 2015b). It is therefore equally likely that the NWIW methanol facility project would have significant positive socioeconomic effects.

4 Comments and Responses

The City of Tacoma initiated environmental review of the Tacoma Liquefied Natural Gas (LNG) Project in September 2014. Following a scoping period and several months of detailed review, the City issued a Notice of Availability for the draft Environmental Impact Statement (DEIS) on July 7, 2015. This was followed by a 30-day public comment period ending on August 6, 2015.

During this period, the following meetings were held:

- An agency meeting was held on July 9, 2015, at 2:00 PM to explain the nature of the Project and the contents of the DEIS. Eleven persons attended this meeting, including representatives of City, state, and federal permitting authorities.
- A public meeting was held on July 16, 2015, 5:30 p.m., at the Port of Tacoma's Fabulich Center, for community members to learn more about the Project and the DEIS, and to provide comments. This meeting was attended by 28 people, including community members as well as representatives of the City and Puget Sound Energy (PSE).

In all, the City received 27 written comments from a variety of stakeholders, including neighboring residents, local businesses and business groups, union members, current and former City of Tacoma and Pierce County officials, the Washington State Department of Ecology (Ecology), the United States Environmental Protection Agency (EPA), PSE, the Port of Tacoma, and the Puyallup Tribe of Indians.

The majority of comments were in favor of the Project, with particular emphasis on the perceived economic benefits associated with the development of the Tacoma LNG Facility. Nonetheless, certain concerns were expressed regarding the Project and the content of the DEIS, for example:

- The Puyallup Tribe of Indians expressed concern regarding potential health and safety hazards related to an LNG facility and potential impacts on the Tribe and wider communities.
- Ecology and EPA expressed concern regarding certain construction methods and environmental monitoring protocols, particularly in sensitive areas along the Blair and Hylebos Waterways.
- PSE and the Port of Tacoma expressed concern that certain proposed mitigation requirements were unwarranted or disproportional to the Project’s stated impacts.

A full summary of all comments, as well as the City’s detailed responses, is included in the following pages. As indicated in the response, a number of areas of the final Environmental Impact Statement (EIS) were edited to take into account the received comments.

Shirley:

Thank you for our conversation this week about the proposed LNG project and associated Draft Environmental Impact Statement. EPA has been working with U.S. Army Corps of Engineers Project Manager Olivia Romano to complete CERCLA coordinations for three permits currently being considered at the site to support the proposed upland LNG facility. The three Corps permits are:

1) NWS-2014-1128 Port of Tacoma and Puget Sound Energy (for LNG structures and mitigation in the Hylebos and Blair Waterways)
2) NWS-2015-0114 Port of Tacoma and TOTE (for dolphins in the Blair and mitigation in the Hylebos Waterway)
3) NWS-2015-0550 Port of Tacoma and Puget Sound Energy (stormwater outfalls to Hylebos Waterway)

As context, the applicants are correct that the Blair Waterway was deleted from the NPL list, and with notable exceptions (like the ongoing TBT cleanup at Blair Waterway Pier 4), it has been assumed that Blair Waterway sediment is cleaner than within the Hylebos Waterway. EPA's main concerns with the project proposals described in the permit applications above are components in the Hylebos Waterway.

In the Hylebos Waterway, some areas have been dredged as part of the CERCLA cleanup to remove all contaminated sediment. Other areas were not dredged and instead selected as "no action" or "monitored natural recovery" areas based upon the quality of surface sediment (0-10 cm deep). The quality of sediment deeper than 10 cm below the mudline has not been well characterized in many "no action" and "monitored natural recovery" areas. These areas were expected to remain relatively undisturbed so that clean sediment could settle on them long-term and contaminated subsurface sediment remain isolated in place. Relatively new (since 2013) sediment quality data have found dioxin/furan compounds, for which Hylebos Waterway sediments have not historically been tested, within areas which were not dredged as part of the CERCLA remedial action.

As part of EPA's CERCLA coordination with the Corps, the project applicants have been asked to provide a summary of the existing Hylebos Waterway sediment characterization data in the project vicinity, identify data gaps, and develop a draft Sampling and Analysis Plan (SAP) needed to characterize sediment quality. A teleconference about this was held between EPA, the Corps, PSE, and the Port of Tacoma June 25, 2015. As of today, EPA and the Corps has not received the information requested.

The final DEIS should describe the uncertainty about embankment soil and sediment quality in the project area, and the need for site characterization to occur prior to project design. The DEIS should also state that the construction sequencing and design of the replacement dock, bulkhead, and other structures proposed along the Hylebos Waterway will depend upon the soil and sediment quality characterization within the project area. In some places, soil and/or sediment removal may need to precede construction. 0004-1 0004-2

EPA and the Corps are also concerned that, as part of the project, the applicants have proposed parts of the Blair Waterway be shaded by docks in exchange for removing an equivalent amount of dock shading 0004-3

on the Hylebos Waterway. It should be acknowledged that the two waterways have different levels of sediment contamination, and the difference in habitat mitigation value between them discussed.

0004-4

EPA's understanding from discussion with the Corps project manager is that the permit applicants are pulling together a new mitigation strategy for the various interconnected elements of the project(s). This may involve changes in the sequencing of the different elements of the project – perhaps moving ahead with Blair Waterway components while allowing more time to gather/collect information on sediment quality in the Hylebos, and plan construction there accordingly. The final EIS should describe this updated approach.

0004-5

Thanks again for the discussion yesterday. In summary, EPA is supportive of the proposed project if environmental characterization work, including that described above, is conducted as needed to inform all aspects of project design and subsequent construction.

Justine Barton
Office of Environmental Assessment
U.S. Environmental Protection Agency
Seattle, WA

Number	Issue	Response
0004-1	Earth	The commenter states that the final EIS "should describe the uncertainty about embankment soil and sediment quality in the project area, and the need for site characterization to occur prior to project design." **Response: The final EIS will include a statement about the uncertainity of embankment soil and sediment quality and the need for further site charaterization.**.
0004-2	Earth	The commenter states that the EIS should "state that the construction sequencing and design of the replacement dock, bulkhead, and other structures proposed along the Hylebos Waterway will depend upon the soil and sediment quality characterization within the project area." **Response: The EIS will include a statement that final construction sequencing and design of structures along the Hybelos Waterway will depend on further sediment characterization.**
0004-3	Water Resources	The commenter notes that the applicant has proposed mitigating new dock shading on the the Blair Waterway in exchange by removing docks on the Hylebos Waterway. The commenter states that the Blair and Hylebos Waterways have different levels of sediment contamination and that the difference in habitat mitigation value between the two waterways should be discussed in the EIS. **Response: It is noted that because there are different levels of sediment contamination between the Hybelos and Blair Waterways, there may also be a difference in habitat mitigation value between the two waterways. However, the actual difference in mitigation, if any, will be determined through the U.S. Army Corps of Engineers permitting process.**
0004-3 cont'd	Water Resources	See previous response.
0004-4	Mitigation	The commenter understands that the Applicant is "pulling together a new mitigation strategy for the various interconnected elements of the project" and that "the final EIS should reflect this approach". **Response: The EIS will include a statement that as the project moves closer to construction mitigation may involve changes in the sequencing of the different elements of the project – such as moving ahead with Blair Waterway components while allowing more time to gather/collect information on sediment quality in the Hylebos, and plan construction there accordingly.**
0004-5	General	The commenter is supportive of the Proposed Action "if environmental characterization work, including that described above, is conducted as needed to inform all aspects of project design and subsequent construction." **Response: Comment noted.**

August 4, 2015

Ms. Shirley Schultz, Principal Planner
Planning and Development Services Dept.
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Dear Ms. Shultz:

As the former director of Citizens for a Healthy Bay, I have had the opportunity in recent years to be actively involved in the cleanup, restoration and protection of Commencement Bay, surrounding waters and our natural habitat. It is from this perspective that I'm writing to express my personal support for the Draft Environmental Impact Statement (DEIS) for the liquefied natural gas (LNG) facility proposed by Puget Sound Energy in the Port of Tacoma. 0005-1

We are fortunate to have a very environmentally responsible shipping company in the Port of Tacoma, Totem Ocean Trailer Express (TOTE). This company has worked hard for years to reduce the environmental impact of its facilities and its operations through its ongoing efforts to reduce greenhouse gas emissions, recycle and eliminate waste, conserve energy and water and protect against storm water pollution. TOTE's decision to seek a cleaner fuel alternative, liquid natural gas, to power its large vessels that travel to and from Anchorage Alaska represents a remarkably positive opportunity to improve our community's environment. The completion of PSE's liquid natural gas facility is crucial to TOTE's ability to follow through in its commitment to switch to much cleaner fuel.

I believe that the proposed PSE facility not only represents a very significant benefit to the environment health of Tacoma and the entire South Sound area, but also a substantial economic development benefit through the creation of numerous, permanent family wage jobs. TOTE's successful conversion to LNG will also set a very positive example for other shipping companies.

I fully support the thorough review this project is receiving and I urge you to move forward and approve the DEIS for this project. Thank you for your consideration.

Yours truly,

Bill Anderson
3803 N. 22nd Street
Tacoma, WA 98406

Number	Issue	Response
0005-1	General	Commenter supports project. Comment noted.

City of Tacoma
Planning and Development Services

Comment Sheet: Public DEIS Meeting

July 16, 2015

Proponent: Puget Sound Energy, Inc.
Project Name: Tacoma LNG Project
SEPA Lead Agency: City of Tacoma – File No. SEP2014-40000230810

Comments regarding Draft Environmental Impact Statement: I am very much in support of this project it will create needed jobs and is a good fit for the port. I really hope this project can be built as soon as possible 0006-1

Contact information:

Name: Clint Bryson
Address: 3049 S 36th St 101 Tacoma
Email: clintb@ibew76.org

Please return this sheet to staff at tonight's meeting. Comments may also be mailed to. Shirley Schultz, Planning and Development Services, City of Tacoma, 747 Market Street Rm 345, Tacoma, WA 98402-3701 or emailed to shirley.schultz@cityoftacoma.org.

Number	Issue	Response
0006-1	General	Comment noted

City of Tacoma
Planning and Development Services

Comment Sheet: Public DEIS Meeting

July 16, 2015

Proponent: Puget Sound Energy, Inc.
Project Name: Tacoma LNG Project
SEPA Lead Agency: City of Tacoma – File No. SEP2014-40000230810

Comments regarding Draft Environmental Impact Statement:

0007-1

GREAT PROJECT, LOOKING FOWARD TO HELPING AND PROVIDE MANPOWER TO CONSTRUCT THIS PROJECT.
DENNIS CALLIES

Contact information:

Name: DENNIS R. CALLIES / BUSINESS MANAGER / FINANCIAL SECRETARY
Address: 3049 SO 36TH ST IBEW LOCAL 76
Email: TACOMA, WA 98409 dennisc@ibew76.ORG

Please return this sheet to staff at tonight's meeting. Comments may also be mailed to: Shirley Schultz, Planning and Development Services, City of Tacoma, 747 Market Street Rm 345, Tacoma, WA 98402-3701 or emailed to shirley.schultz@cityoftacoma.org.

Number	Issue	Response
0007-1	General	Commenter supports project. Comment noted.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

August 6, 2015

Peter Huffman, Director
City of Tacoma Planning and Development
747 Market Street, Room 345
Tacoma, WA 98402

RE: Tacoma LNG DEIS

Dear Mr. Huffman:

Thank you for the opportunity to provide comments on the Draft Environmental Impact Statement (DEIS) for the Tacoma Liquefied Natural Gas (LNG) Project located at the Port of Tacoma, north of East 11th Street, east of Alexander Avenue, south of Commencement Bay, and on the west shoreline of the Hylebos Waterway as proposed by Tacoma LNG, Puget Sound Energy. The Department of Ecology (Ecology) reviewed the information provided and submits the following comments for the Draft Environmental Impact Statement (DEIS).

Toxic Cleanup

2.2.1.3, Liquefaction: This describes underground storage tanks. PSE has since informed us that the tanks will not be underground. This section should be corrected, and include a description of spill controls and containment for the tanks. The tanks should be identified on the map of site facilities. 0008-1

2.2.1.7, Heavy Hydrocarbon Collection and Storage System: The section on heavy hydrocarbon collection and storage should include a discussion of spill controls and containment measures. 0008-2

2.2.1.7, Buildings: The storage building overlies groundwater containing benzene above levels considered safe for potentially causing vapors at harmful levels. This building should not contain office space or other locations where people will regularly present, without first testing air quality. 0008-3

2.3.1.1, Site Preparation: This section describes that contamination from neighboring sites may extend to locations within the construction footprint of the LNG facility and pipelines. The final EIS should include maps showing the location of the contaminant plumes compared to the construction footprints. This information will be needed by permitting agencies as the project plans are further developed. To my knowledge the construction footprint itself does not contain significant contaminated soils, and the petroleum-affected groundwater plumes in the vicinity largely do not encroach onto the subject property (however there were some exceedances of metals in groundwater from the 2014 investigation report). Ecology can assist PSE with contacts to get the most up to date information about the Occidental and Alexander Avenue Petroleum Tank Facilities plumes, and can assist with identifying the potential for contaminated sites to be in the path of the proposed pipelines. There are a multitude of cleanup sites and potential for contaminated soil and groundwater to be present in the pipeline pathway along Taylor Way and through Fife. 0008-4

2.3.1.1, Demolition of in-water structures: This states that piles that break off during removal with the vibratory hammer would be cut off two feet below the mudline. PSE should consult with DNR and EPA about the best approach in this situation. Disturbing sediments 2 feet deep could potentially release buried contaminated sediments. In general, EPA should be consulted about all in-water construction in the Hylebos Waterway problem area. 0008-5

2.3.1.1, Shoreline Improvements: Care must be taken when removing materials above existing timber bulkhead, and work should occur during low tides. It is not uncommon for debris and industrial fill to be present within and beneath historic shoreline rip-rap, so PSE should be prepared to remove such materials before placing the new backfill below the sheet pile wall. 0008-6

The EIS should state how deep the sheet pile is planned and whether or not it will extend along the entire shoreline of the site.

2.3.3.1, General Pipeline Construction Techniques: Because of the potential for the pipeline to intersect with contaminated groundwater plumes on Taylor Way and in Fife, it may be necessary to consider special practices regarding how the trench is backfilled (to prevent creating a preferential pathway for groundwater pollution), worker training and certification to work in contaminated areas, and stormwater management. 0008-7

3.1.1, Study Methodology: This section mentions a document titled "Geotechnical Engineering Services, Tacoma LNG Project (GeoEngineers 2015)." Ecology requests a copy of that report. 0008-8

3.1.2, Model Toxics Control Act: A mechanism must be in place as part of the LNG facility development to be sure that cleanup considerations are included in site planning and that cleanup (if needed) would be conducted as a part of the site development. Furthermore, if any visual or 0008-9

olfactory signs of contamination are detected during construction, Ecology must be notified, and measures taken to prevent releases to the environment and to clean up contamination. 0008-9 Continued

3.1.3.2, Sea Level Rise: This section describes potential sea level rise in the vicinity of the LNG facility, but it does not indicate what the effects of sea level rise might be on the facility. 0008-10

3.1.3.3, Groundwater: Refer to site investigation documents for the Occidental and Alexander Avenue Petroleum Tank facilities sites for more information on tidal influence on groundwater in this area. 0008-11

3.1.3.4, Existing Contaminated Sites and Remedial Actions: It is not clear how, in the fourth paragraph, the Port's cleanup actions in the vicinity of Blair Hylebos peninsula specifically relates to this site. 0008-12

3.1.3.4, Tacoma LNG Facility: It is recommended that the sites be referred to by the Ecology site names in addition to Port parcel numbers, and Include the facility-site ID (FSID) numbers for the contaminated properties, so that the reader could find them on Ecology's database (Naval Reserve Center, FSID 93581722; Tacoma Port Parcel 4, FSID 3831; Port Parcel 2 (aka Alexander Avenue Petroleum Tank Facilities –FSID 1377); Occidental Chemical Corp. FSID 1212; PRi (aka Glenn Springs Holdings – FSID 1246). 0008-13

3.1.3.4, Ongoing Investigation and Cleanup Actions: To be more useful for the purposes of the EIS and future permitting/planning, specific information about contamination on neighboring properties, *as it affects the subject site,* should be included. The general discussion of what is occurring on neighboring cleanup sites is not that helpful in terms of understanding potential environmental issues at the development site. Throughout these sections, please refer to the bulk petroleum facilities at the former PRI site and within Port Parcel 2 as the "Alexander Avenue Petroleum Tank Facilities" site. 0008-14

3.1.3.4, Completed Cleanup Actions: This section should be more specific about what was done to clean up the releases for the USTs, whether confirmation sampling indicated the site was clean, and status of the site on Ecology's list of contaminated sites. For clarity, the discussion about the Hylebos Waterway cleanup in the vicinity of the site should be separate. Ecology is not aware of any 'ongoing' groundwater sampling for the Occidental site taking place in this area. 0008-15

Also, there are several incorrect statements throughout section 3.1.3.4. It is recommended that the writers of the EIS contact Joyce Mercuri at 360-407-6260 to ensure correct references are made in the final EIS. 0008-16

Water Quality

SEPA Fact Sheet, Required Approval and/or Permits: Indicate how many Construction Stormwater General Permits (CSWGP) will be applied for? Based on review, there are pipeline distribution systems that go beyond the Port of Tacoma. Will these be separate CSWGPs? 0008-17

2.3.1.1, Stormwater Management: It is important to clearly identify areas where construction activities will overlap potential contamination. The EIS should include a map that shows the contaminated areas within the footprint of all ground disturbing activities, including staging areas, wheel washes, equipment storage, parking for construction workers, internal haul roads, etc. The EIS should also include a map that shows contaminated areas within the footprint of the excavation. A map should show contamination, concentrations of contaminants, any boring locations, and an overlay of the excavation proposed. 0008-18

3.1.6.1, Erosion and Sediment Control: This section does not provide enough detail to understand how the stormwater will be managed. If there are both clean and contaminated soils onsite, will they segregate the clean from the contaminated stormwater? A map should show which Best Management Practices (BMPs) will be utilized on site to create this stormwater segregation (including flow paths to baker tanks for contaminated stormwater and/or dewatering water). Indicate whether or not any catch basins will be plugged during construction? 0008-19

3.1.4.1, Groundwater: Discuss the potential effects on pH in groundwater with the installation of 4-6,000 grout columns. 0008-20

3.3.4.1, Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System, Groundwater: In the third paragraph, this section talks about the use of a vibratory hammer during installation of the grout columns and that it wouldn't have any negligible effect on groundwater. Using a vibratory hammer on the shoreline could potentially displace sediments in waters. Address the potential effects of causing turbidity in nearby waters from using a vibratory hammer on and close to the shoreline. 0008-21

3.3.6.1, Turbidity Minimization: This section is not consistent with table 3.3-1, turbidity. Figure out the appropriate waterbody classification and be consistent throughout the document. 0008-22

Ecology's comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various issues that may still need to be addressed in order to carry out the proposed action.

If you have any questions, please contact me at 360-407-7503 or kerry.carroll@ecy.wa.gov.

Sincerely,

Kerry Carroll

Kerry Carroll
Environmental Review and Transportation Section

ecc: Joyce Mercuri, Ecology
Carol Serdar, Ecology
Sonia Mendoza, Ecology
Brenden McFarland, Ecology
Shirley Schultz, City of Tacoma

Number	Issue	Response
0008-1	Description of Proposed Action	The commenter notes that underground storage tanks are described in draft EIS section 2.2.1.3, but that the Applicant has since indicated the tanks will not be underground. Commenter states that the location of the tanks should be corrected in the final EIS and that spill controls and containment systems should be described. **Response: There are no underground tanks proposed. The tanks in question would be above ground in a concrete containment area (a “bathtub”), which would subsequently be filled with sand for fire protection purposes. The proposed tanks are shown in Figure 2-3 in the purple rectangle to the west of the LNG storage tank. There would be three refrigerant storage tanks for propane, isopentane, and ethylene.** **In addition to the three tanks listed above, there would be two additional tanks. – a “heavies” tank and a refrigerant storage tank. The “heavies” tank would be used to store heavy hydrocarbons that are removed during the liquefaction process. The tank would be emptied as needed and the hydrocarbons hauled off site and recycled. The storage tank would not normally contain product; it would be used for temporary storage of refrigerant when sections of the refrigeration system are drained for maintenance.** **This information is described in Chapter 2 of the draft EIS in subsection 2.2.1.2 (Natural Gas Delivery and Pretreatment Systems) and 2.2.1.3 (Liquefaction). The latter subsection will be edited in the FEIS in response to the comment.**
0008-2	Description of Proposed Action	With regard to draft EIS section 2.2.1.7, the commenter notes that "the discussion on heavy hydrocarbon collection and storage should include information on spill controls and containment measures." **Response: Design includes secondary containment for the heavy hydrocarbon storage tank. Specific spill controls and containment measures will be addressed in the facility spill control plan to be implemented for operations. No edits will be made to the final EIS in reference to this comment.**
0008-3	Description of Proposed Action	With regard to draft EIS section 2.2.1.7, the commenter notes that "the storage building overlies groundwater containing benzene above levels considered safe for potentially causing harmful vapor levels. This building should not contain office space or other locations where people will regularly be present, without first testing air quality." **Response: Noted. PSE will not use the storage building for office space or a regular meeting place. The structure would be used for temporary storage during construction and for longer-term storage post-construction.**

Number	Issue	Response
0008-4	Description of Proposed Action	With regard to draft EIS section 2.3.1.1, the commenter requests that the final EIS contain maps showing the locations of contaminant plumes originating from neighboring sites compared to the construction footprint of the LNG facility and pipeline. **Response: Available information from the Occidental and Alexander Avenue Petroleum Tank Facilities has been reviewed. Construction activities, including ground improvement, are located near and southeast of the southeastern fringe of the groundwater contamination. Discussions with the Port of Tacoma indicate that the planned construction activities are not expected to interfere with future remedial actions for the Alexander Avenue Petroleum Tank Facilities Site because nearly all of the facility development is located southeast of the contamination.** **PSE completed due diligence review to identify locations of potential environmental concern along the LNG pipeline alignment, including the Fife and Taylor Way segments. Based on this review, PSE is currently conducting sampling along the pipeline alignment and will prepare an environmental summary and a waste media management plan for the pipeline installation.**
0008-5	Description of Proposed Action	With regard to section 2.3.1.1, commenter requests that the Proponent consult with Washington DNR and U.S. EPA prior to cutting piles 2 feet below the mudline. The commenter notes that the Proponent should consult with U.S. EPA regarding all in-water work in the "Hylebos Waterway problem area." **Response: PSE will consult with the EPA and the Port of Tacoma to confirm appropriate steps addressing potential pile demolition and management. This section has been clarified in response to the comment.**
0008-6	Description of Proposed Action	With regard to draft EIS section 2.3.1.1, the commenter states that removal of materials above existing timber bulkhead sould be undertaken with care and during low tide. PSE should also "be prepared to remove [debris and industrial fill] before placing the new backfill below the sheet pile wall." The commenter also writes that "the EIS should state how deep the sheet pile is planned and whether or not it will extend along the entire shoreline of the site." **Response: Noted. Care will be taken when removing materials above the existing timber bulkhead, and work will occur during low tides. PSE will be prepared to remove debris and industrial fill before placing new backfill below the sheet pile wall. A minor addition will clarifies this section in the final EIS in response to the comment.** **Further design considerations indicate that there is only a need for the sheet pile wall at the location of the access point to the new Hylebos Pier. More detailed design will be required to evaluate the depth and related engineering elements. No change will be made in the final EIS regarding these specific elements.**

Number	Issue	Response
0008-7	Description of Proposed Action	With regard to draft EIS section 2.3.3.1, the commenter notes that the potential for the pipeline to intersect with contaminated groundwater may require consideration of special construction practices, including special backfilling methods, worker training and certification, and stormwater management. **Response: The results of the forthcoming pipeline alignment sampling and testing will inform the approach re: trench backfill, worker training, and stormwater management. Based on this information, PSE will consider special practices as needed to address environmental issues. No change will be made to this section in the final EIS in response to the comment.**
0008-8	Earth	With regard to draft EIS section 3.1.1, the commenter (WA State Dept. of Ecology) requests a copy of the "Geotechnical Engineering Services, Tacoma LNG Project (GeoEngineers 2015)" report. **Response: A copy of this report will be provided to Ecology.**
0008-9	Earth	With regard to draft EIS section 3.1.2, Commenter notes that cleanup considerations must be included in site planning, including the potential for cleanup to be conducted as a part of site development. Commenter further notes that "any visual or olfactory signs of contamination [...] detected during construction" must be reported to the WA State Dept. of Ecology, and measures must be taken "to prevent releases to the environment and to clean up contamination." **Response: Noted. Discussions with the Port of Tacoma indicate that the planned construction activities are not expected to interfere with future remedial actions at the Alexander Avenue Petroleum Tank Facilities Site (Alexander Site). As a result, if contaminated soil is encountered during facility construction, it will not be necessary to address contamination beyond the construction footprint to achieve cleanup of the Alexander Site.** **Contaminated materials encountered during facility construction will, however, be appropriately managed. A Materials Management Plan (MMP) and Stormwater Pollution Prevention Plan (SWPPP) will be developed that describe procedures for handling materials with visual or olfactory signs of potential contamination encountered within the construction footprint. These plans will also address reporting of construction-related releases and measures to prevent such releases. No change will be made to this section in the final EIS in response to the comment.**
0008-9 cont'd	Earth	See previous response.
0008-10	Earth	With regard to draft EIS section 3.1.3.2, commenter notes that the section "does not indicate what the effects of sea level rise might be on the facility." **Response: The LNG process area would be located at an elevation 15 to 20 feet above mean sea level. The 2012 Ecology and University of Washington study referenced in this section suggests an average global sea level rise ranging from 3 to 55 inches by 2050 as a result of rising temperatures and melting glaciers. There would be no impact to the project facilities as designed. Minor changes will be made to clarify this section in the final EIS in response to the comment.**

Number	Issue	Response
0008-11	Earth	With regard to draft EIS section 3.1.3.3, the commenter recommends refering to existing "site investigation documents for the Occidental and Alexander Avenue Petroleum Tank facilities sites for more information on groundwater in this area." **Response: the tidal influence within the 15-foot groundwater zone diminishes with distance from the shoreline, and there does not appear to be tidal influence within this zone at distances greater than approximately 100 feet from the shoreline. Groundwater within the 25-foot zone was observed to be moderately to strongly tidally influenced, and groundwater within the 50-foot zone was moderately tidally influenced. The greatest tidal influence on groundwater within the 25-foot zone was observed in monitoring wells located within approximately 60 feet of the shoreline.** **The influence of Hylebos Waterway tidal fluctuations on groundwater in the 15-foot, 25-foot, and 50-foot groundwater zones was evaluated during a 2004 hydraulic investigation at the Alexander Avenue Petroleum Tank Facilities Site (CRA 2008). The results of the evaluation indicated a minor tidal influence within the 15-foot groundwater zone near the shoreline. A moderate tidal influence was observed within the 25-foot and 50-foot groundwater zones as much as 400 feet west of the Hylebos Waterway shoreline.** **The information above was obtained from the following reference. The citation will be added to the final EIS.** **Reference: Conestoga-Rovers & Associates (CRA). Preliminary Draft Site Characterization Report, Groundwater and Sediment Remediation, Occidental Chemical Corporation, Tacoma, Washington. March 2008.**
0008-12	Earth	With regard to draft EIS section 3.1.3.4, the commenter notes that "it is not clear how, in the fourth paragraph, the Port's cleanup actions in the vicinity of the Blair Hylebos peninsula specifically relates to the site." **Response: the Port of Tacoma's cleanup actions described in the fourth paragraph do not specifically relate to the LNG Facility site. This paragraph will be deleted from the final EIS.**
0008-13	Earth	With regard to draft EIS section 3.1.3.4, the commenter notes that the sites for the Tacoma LNG Facility should "be referred to by the Ecology site names in addition to Port parcel numbers, and include the facility-side ID (FSID) numbers for the contaminated properties, so that the reader could find them on Ecology's database." **Response: This text will be revised accordingly in the final EIS.**

Number	Issue	Response
0008-14	Earth	With regard to draft EIS section 3.1.3.5, the commenter notes that it would be more useful for the EIS to include "specific information about contamination on neighboring properties, as it affects the subject site," rather than "general discussion of what is occurring on neighboring cleanup sites." In addition, the commenter requests that "the bulk petroleum facilities at the former PRI site and within Port Parcel 2" be referred to "as the 'Alexander Avenue Petroleum Tank Facilities' site." **Response: As indicated in our response to the comment for Section 2.3.1.1, construction is not expected to preclude or interfere with remedial actions associated with the Alexander Avenue Petroleum Tank Facilities Site and Occidental groundwater plumes. This is because the LNG facility/ construction footprint is outside of, or on the fringes of, the impacted areas of these sites. Text references to the bulk petroleum facilities at the former PRI site and within Port Parcel 2 will be changed to the "Alexander Avenue Petroleum Tank Facilities" site in the final EIS.**
0008-15	Earth	With regard to draft section 3.1.3.4, the commenter notes that the section on completed cleanup actions, "should be more specific about what was done to clean up the releases for the USTs, whether confirmation sampling indicated the site was clean, and status of the site on Ecology's list of contaminated sites." The commenter also recommends that "the discussion about the Hylebos Waterway cleanup [...] be separate" and that "Ecology is not aware of any 'ongoing' groundwater sampling for the Occidental site taking place in this area." **Response: Revisions will be added to this section in the final EIS to clarify UST removal and cleanup status.**
0008-16	Earth	The commenter states that there are several incorrect statements within draft EIS section 3.1.3.4, and recommends contacting Joyce Mercuri (360-407-6260) to ensure correct references in the final EIS. **Response: Ms. Mercuri provided clarification regarding the current status of previously contaminated sites in the vicinity of the Project. The final EIS will include updates to reflect her input.**
0008-17	SEPA Fact Sheet	With regard to the SEPA Fact Sheet, Required Approvals and/or Permits section of the draft EIS, the commenter asks how many Construction Stormwater General Permits (CSWGPs) will be applied for and whether pipeline systems that go beyond the Port of Tacoma will apply for separate CSGWPs. **Response: Separate CSWGPs will be completed for the LNG facility and the pipeline distribution system. PSE submitted a Notice of Intent (NOI) for the Tacoma LNG facility CSWGP on June 9, 2015, and Ecology granted coverage on July 29, 2015 (WAR303232). PSE plans to submit the NOI for the pipeline distribution project CSWGP in 2016. The two separate CWSGPs will be added to the final EIS Fact Sheet.**

Number	Issue	Response
0008-18	Description of Proposed Action	With regard to draft EIS section 2.3.1.1, the commenter notes that "the EIS should include a map that shows the contaminated areas within the footprint of all ground disturbing activities" and "a map that shows contaminated areas within the footprint of the excavation," and that "a map should show contamination, concentrations of contaminants, any boring locations, and an overlay of the excavation proposed." **Response: Please see response to the comment for Section 2.3.1.1 regarding the extent of contamination from the Alexander Avenue Petroleum Tank Facilities Site and Occidental plume. Additional information specific to construction work areas, staging, stockpiling, parking, and access is currently being developed for City of Tacoma permit applications and contract planning documents. That information will also be included in the Stormwater Pollution Prevention Plan (SWPPP), currently in progress. No changes have been made to this section in the final EIS in response to the comment.**
0008-19	Earth	With regard to section 3.1.6.1, the commenter notes that "this section does not provide enough detail to understand how the stormwater will be managed." The commenter requests that "a map should show which Best Management Practices (BMPs) will be utilized on site to create [...] stormwater segregation" between stormwater originating from clean and from contaminated soils. Commenter asks whether "any catch basins will be plugged during construction?" **Response: Stormwater management details will be addressed in the forthcoming Stormwater Pollution Prevention Plan (SWPPP) prepared pursuant to the CSWGP. The SWPPP will include a temporary erosion and sediment control plan figure, as required by the CSWGP to identify planned BMP locations. Catch basins and storm drain lines that are not needed will be removed. A key guiding concept for stormwater management is the segregation of potentially contaminated media to avoid contact with stormwater. Stormwater that inadvertently becomes contaminated will be treated as needed and stored for sanitary sewer disposal or other appropriate off-site disposal at a permitted facility. No change will be made to this section in the final EIS in response to this comment.**
0008-20	Earth	With regard to draft EIS section 3.1.4.1, the commenter requests that the EIS discuss the potential effect of installing 4-6,000 grout columns on groundwater pH. **Response: The cement grout to be used for auger cast piles will set up quickly during installation, limiting contact with groundwater and minimizing potential pH halo effects. No change will be made in the final EIS in response to this comment.**

Number	Issue	Response
0008-21	Water Resources	With regard to draft EIS section 3.3.4.1, third paragraph, the commenter notes that the EIS indicates that "the use of a virbatory hammer during installation of the grout columns [...] wouldn't have any negligible effect on groundwater." Commenter disputes this assertion, indicating that "using a vibratory hammer on the shoreline could potentially displace sediments in waters" and requesting that the EIS "address the potential effects of causing turbidity in nearby waters." **Response: Current ground improvement plans do not include the use of vibratory hammer methods during auger cast pile installation, including the planned ground improvement area near the Blair Waterway shoreline. Upland auger drilling and grout placement will not result in in-water turbidity impacts. No change will be made to this section in the final EIS in response to the comment.**
0008-22	Water Resources	With regard to draft EIS section 3.3.6.1, the commenter notes that the text in this section is not consistent with Table 3.3-1 and that waterbody classification should be corrected and consistent throughout the EIS. **Response: The turbidity minimization text in question in the EIS Section 3.3.6.1 applies to the construction activities associated with upland and in-water activities for the LNG facility and TOTE marine vessel fueling system. Table 3.3-1 will be revised to note that turbidity monitoring requirements and mixing zones will be established in the Clean Water Act Section 401 certification conditions for in-water work, as suitable for the waterbody classification. Turbidity monitoring requirements will also be described in the SWPPP monitoring plan addressing CSWGP requirements.**

City of Tacoma
Planning and Development Services

Comment Sheet: Public DEIS Meeting

July 16, 2015

Proponent: Puget Sound Energy, Inc.
Project Name: Tacoma LNG Project
SEPA Lead Agency: City of Tacoma – File No. SEP2014-40000230810

Comments regarding Draft Environmental Impact Statement: Please do not delay this project! We need sustainable living wage jobs! 0009-1

Contact information:

Name: TIM DOWNES BA PLUMBERS & PIPEFITTERS UA LOCAL 26 & WA ST. BUILDING TRDS.
Address: 8501 ZENITH CT NE
Email: LACEY WA 98516

Please return this sheet to staff at tonight's meeting. Comments may also be mailed to: Shirley Schultz, Planning and Development Services, City of Tacoma, 747 Market Street Rm 345, Tacoma, WA 98402-3701 or emailed to shirley.schultz@cityoftacoma.org.

Number	Issue	Response
0009-1	General	Commenter supports project. Comment noted.

TARGA SOUND TERMINAL

TARGA SOUND TERMINAL LLC
4130 E 11th, Tacoma, WA 98421
(253) 272-9348 1-800-426-9799

July 30, 2015

Shirley Schultz
City of Tacoma, Planning and Development Services Department
747 Market Street, Room 345
Tacoma, WA 98402

RE: LNG Project at the Port of Tacoma

I wish to express my personal support of Puget Sound Energy's liquefied natural gas project proposed to be located at the Port of Tacoma. As a long-time Tacoma businessperson and a Board Member for the Economic Development Board for Pierce County, it is encouraging to see a project that so clearly provides important economic and environmental benefits for our area. 10-1

The Tacoma LNG project will generate important economic benefits for all South Sound residents. In addition to helping local employers like TOTE remain competitive and helping to maintain hundreds of family-wage jobs, the LNG facility itself will support nearly 500 jobs during its construction and more than 120 permanent jobs during its operations. Pierce County needs new family-wage jobs and this project will help increase our County's economic base. It is likely this facility will provide a cleaner energy source for additional transportation modes, and this will also contribute to the economic health of our greater Tacoma community.

In addition to the direct and indirect job creation, the Tacoma LNG project will also generate additional tax revenues for state and local governments, helping to fund needed public services like schools, roads and Tacoma and Pierce County public safety departments.

Importantly, both the commercial and residential segments of the community will benefit from this project as it also will help ensure continued dependable natural gas service to existing PSE customers even on the coldest days of the year.

Thank you for the opportunity to provide public comment on the economic and environmental benefits of this important project.

Sincerely,

Troy Goodman
President
Targa Sound Terminal

Number	Issue	Response
0010-1	General	Commenter supports project. Comment noted.

ECONOMIC DEVELOPMENT BOARD
FOR TACOMA-PIERCE COUNTY

August 4, 2015

Shirley Schultz, City of Tacoma Planning and Development Services Department
Email: Shirley.schultz@cityoftacoma.org

Re: Draft EIS Comments on PSE Proposed Tideflats LNG Facility

Dear Ms. Schultz:

0011-1

The Economic Development Board for Tacoma-Pierce County strongly supports Puget Sound Energy's proposed liquefied natural gas (LNG) facility at the Port of Tacoma. The project is consistent with the EDB's mission of growing our economy by helping existing businesses expand and grow here. It certainly supports on-going efforts by the City of Tacoma to encourage a healthy local business climate, retaining and growing companies who already call Tacoma home.

The building and operation of the LNG facility represents hundreds of millions of dollars of private investment in a state-of-the-art facility. It will help TOTE remain competitive and provide LNG for its newly-configured marine vessels to comply with lower sulfur emission standards.

The Tacoma LNG facility will create at least 150 construction jobs and 18 permanent jobs with the economic activity from the project creating another 125 permanent jobs in the region. It will contribute millions of dollars in new tax revenues to benefit local schools, city services, and other state and local government services by making more public funds available to meet roads and public safety needs. In addition to these direct revenues, the DEIS Section 3.12.4 - **Economy**, indicates that the project's indirect effects will result in $120.4 million in added economic activity. This increased economic activity will result in further tax revenues to our local governments for the public's benefit, a figure not expressly stated in the Draft Environmental Impact Statement.

The Port of Tacoma is the right place for this facility. The Port is an established industrial area, and this project is consistent with the types of uses and aesthetic appearance of other marine-related industrial activities in the area.

The Economic Development Board for Tacoma-Pierce County fully supports the approval of the project based on an FEIS consistent with our comments, as we are confident the facility will provide great benefits to the residents and businesses of Pierce County and the Puget Sound region for years to come.

Regards,

Bruce W. Kendall

Bruce Kendall, President & CEO

Post Office Box 1555, Tacoma, Washington 98401-1555
Phone: (253) 383-4726 Fax: (253) 383-4676 Website: www.gopierce.org

Number	Issue	Response
0011-1		Commenter supports project. Comment noted.

SADLER LADENBURG
Personal Injury Attorneys

Jeffrey H. Sadler ■ Erik F. Ladenburg ■ John W. Ladenburg, Jr. ■ John W. Ladenburg, Sr.* ■ R. Randall Harrison*

July 23, 2015

Shirley Schultz, Principal Planner
City of Tacoma Planning Department
747 Market Street
Tacoma, WA 98402

RE: PSE LNG Project at Port of Tacoma

Dear Ms. Schultz:

0012-1

As a former Pierce County Executive and former chair of the Pierce Transit Board and former chair of the Sound Transit Board, I worked on many issues related to transportation, energy, conservation and the environment. In those capacities, I found great satisfaction in identifying and advancing those unique projects that provided both economic and environmental benefits to the residents of Tacoma and Pierce County.

Having reviewed the Puget Sound Energy proposal to develop a Liquefied Natural Gas (LNG) project at the Port of Tacoma, it is clear to me that this is a project that offers numerous benefits to our region. I strongly believe that LNG is going to serve an important role in our transportation systems here and across the country in the future, due to its unique physical characteristics and transport advantages, cost-benefit advantages, and environmental benefits compared to other fuels. I believe LNG will have broad applications for fueling various segments of the maritime industry, including the possibility of our state ferries in the future, as well as the trucking industry.

We are fortunate to have Totem Ocean Trailer Express (TOTE) located at the Port of Tacoma providing jobs to hundreds of local employees and paying good family wages. TOTE's decision to seek a cleaner fuel alternative for their large Alaska-bound vessels is truly a positive action that benefits Tacoma residents. In addition, the partnership that has emerged with Puget Sound Energy to build and manage the LNG facility at the Port of Tacoma should provide our region a top-quality facility for years to come. It is hard to ignore the significant environmental benefit this LNG facility will bring from fueling TOTE ships and thus reducing greenhouse gas emissions and virtually eliminating visible particulate emissions. Improved air quality and reduced health risks can be expected if this project is approved.

In addition to the environmental benefits, I fully applaud the efforts of the Port of Tacoma to facilitate a healthy local business climate to retain and grow companies who call Tacoma home.

Atrium Court 705 S 9th Street, Suite 305 Tacoma, Washington 98405 Phone (253) 573-1700 Fax (253)573-2848 *Of Counsel
www.SadlerLadenburg.com

In addition to helping TOTE remain competitive and helping to maintain its hundreds of family-wage jobs, the LNG facility itself will directly and indirectly support nearly 500 jobs during its construction and more than 120 permanent jobs during its operations.

Finally, as a former local elected official, I know all too well that the need exists for more tax revenues to meet our citizen's service demands across many issues. Good projects that generate additional tax revenues for state and local governments are important to support.

I wish to convey my personal support of this project and urge the City to convey their support by approving all necessary permits expeditiously to assure that all of the benefits of this project accrue to the citizens of Tacoma and Pierce County for years to come. As a community, we should applaud this large investment by both Tote and PSE in our community and in no way create obstacles that could jeopardize this project.

Sincerely,

John W. Ladenburg Sr.

Atrium Court 705 S 9th Street, Suite 305 Tacoma, Washington 98405 Phone (253) 573-1700 Fax: (253)573-2848 *Of Counsel
www.SadlerLadenburg.com

Number	Issue	Response
0012-1	General	Commenter supports project. Comment noted.
0012-1 cont'd	General	See previous response.

July 13, 2015

Shirley Schultz - Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

0013-1

Ms. Schultz,

Having lived in Brown's Point for 22 years, and owning the "Salon at the Point" in Browns Point, I have the opportunity to interact with a number of people in the northeast Tacoma community. I've had a chance to discuss Puget Sound Energy's proposed liquefied natural gas facility with a number of individuals. To me, LNG development on the Port can prove to be nothing but beneficial, thus my willingness to support PSE's Draft Environmental Impact Statement for the proposed LNG facility on the Port of Tacoma.

As a small business owner just up the hill from the proposed LNG site, I think it's great that the City and the Port are supporting a healthy business climate for local companies. PSE and TOTE have been active businesses for many years, and the community definitely benefits from the family wage jobs they provide.

It is also my understanding that the use of LNG as a transportation fuel significantly reduces greenhouse gas emissions. This is not only good for the local community, but good for the greater Puget Sound region.

As an area resident and business owner, I support approval of PSE's Draft Environmental Impact Statement for the proposed LNG facility on the Port. Any alternatives that can be pursued to reduce global warming must be pursued.

Thank-You for your consideration on this matter.

Sincerely,
Jeanine Lee
5205 Harborview Drive NE
Browns Point, WA 98422
Owner: Salon at the Point

Number	Issue	Response
0013-1	General	Commenter supports project. Comment noted.

August 4, 2015

City of Tacoma
Planning and Development Services Department
ATTN: Shirley Schultz, Principal Planner
747 Market Street, Room 345
Tacoma, WA 98402

0014-1

Dear Ms. Schultz,

As 22 year Brown's Point resident, and owner of two Brown's Point businesses (The Brown's Point Diner and The Sandbar) I am very much attuned with what is happening in the northeast Tacoma community. From both my home and work locations, I am lucky enough to have a front row seat for maritime traffic serving the Port of Tacoma. While I enjoy the ship traffic, I've always been interested in making sure that the Port waterways and shorelines remain clean and safe. It is from this perspective that I wish to express my support for Puget Sound Energy's proposed liquefied natural gas (LNG) facility on the Port of Tacoma.

The LNG facility will help to improve our local environment by providing a cleaner fuel alternative for TOTE (Totem Ocean Trailer Express) ships serving Alaska (berthed at the Port of Tacoma). LNG-based ships will also help to improve air quality in the Commencement Bay area by reducing greenhouse gas emissions and virtually eliminating visible particulate emissions. This is a benefit for the citizens of Tacoma and the entire South Sound region, namely better air quality with accompanying reduction in health risks and reduced risk of a potentially damaging fuel spill.

As a small business owner located in reasonable proximity to the proposed LNG site, I strongly support the Port's and City's efforts to create a healthy business climate for local companies who choose to do business in Tacoma. Both TOTE and PSE are respected, long-time area businesses, and the community definitely benefits from the family wage jobs they provide.

Additionally, I understand that PSE will be contributing millions of dollars in tax revenue for local schools, city services, and other state and local government services. I appreciate and value seeing projects that will lead to increased tax revenues to help our local schools and public safety departments.

I fully support the thorough review this project will receive and urge you to move forward with approval of PSE's proposed LNG facility, a project that will provide great benefits to the citizens of Tacoma, Pierce County, and the South Sound region for years to come.

Sincerely,
Tanja Leek
6623 Eastside Drive NE

Browns Point, WA 98422
Owner: The Browns Point Diner/The Sandbar

Number	Issue	Response
0014-1	General	Commenter supports project. Comment noted.

City of Tacoma
Planning and Development Services

Comment Sheet: Public DEIS Meeting

July 16, 2015

Proponent: Puget Sound Energy, Inc.
Project Name: Tacoma LNG Project
SEPA Lead Agency: City of Tacoma – File No. SEP2014-40000230810

Comments regarding Draft Environmental Impact Statement: I Believe Due To extreme strict regulations That Construction Should Be At High quality 0015-1

Contact information:

Name:

Address:

Email:

Please return this sheet to staff at tonight's meeting. Comments may also be mailed to: Shirley Schultz, Planning and Development Services, City of Tacoma, 747 Market Street Rm 345, Tacoma, WA 98402-3701 or emailed to shirley.schultz@cityoftacoma.org.

Number	Issue	Response
0015-1		The commenter requests that the project be built to high quality standards. **Response: Comment noted.**

Pierce County Building & Construction Trades Council AFL-CIO
3049 South 36th Street Room #220
Tacoma, Washington 98409
piercebctc@earthlink.net

August 4, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Dear Ms. Schultz,

0016-1

The Pierce County Building & Construction Trades Council, representing the interests of 16 construction craft unions and over 8,000 union construction workers living and working in Pierce County, strongly supports the Puget Sound Energy liquefied natural gas (LNG) facility proposed at the Port of Tacoma. We encourage the City of Tacoma publish an FEIS that reasonably addresses the effects of this project and reflects the interests expressed herein so that the Tacoma LNG facility may be permitted and built.

On July 16, over 20 union workers attended the public DEIS meeting who all supported this project. It will create an estimated 200 jobs during construction and 16 operations jobs at the facility. In addition, the economic activity from the project will create another 125 jobs in the region.

To quote an IBEW Local 76 official at the meeting, "I am very much in support of this project. It will create needed jobs and is a good fit for the Port." As a reminder, no opposition testimony was given at the meeting.

We strongly support the Port's efforts to create a healthy business climate for local companies who choose to do business in Tacoma. Both TOTE and PSE are respected, long-time area businesses, and the entire community benefits from both the family wage jobs they provide and the fact both are committed to utilizing the best available environmental technology to remain competitive in the world economy.

This marine fueling facility will also put the City of Tacoma at the forefront of the movement for cleaner fuels, greenhouse gas emission reductions, and elimination of visible particulate emissions.

Representing the opinions of the many working men and women in the South Sound, we fully support the timely publishing of a reasonable project FEIS for Tacoma LNG. This facility will provide great benefits to the businesses and residents of Pierce County and the Puget Sound region for years to come.

Sincerely,

Mark P. Martinez
Executive Secretary of the Pierce County Building & Construction Trades Council, AFL-CIO

Number	Issue	Response
0016-1		Commenter supports project. Comment noted.

Pierce County

Office of the County Executive

930 Tacoma Avenue South, Room 737
Tacoma, Washington 98402-2100
FAX (253) 798-6628
www.piercecountywa.org

PAT McCARTHY
Executive
(253) 798-7477
pmccarl@co.pierce.wa.us

KEVIN R. PHELPS
Deputy Executive
(253) 798-7477
kphelps@co.pierce.wa.us

August 3, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

0017-1

Dear Ms. Schultz:

I wish to express my support for Puget Sound Energy's liquefied natural gas (LNG) facility proposed at the Port of Tacoma. This is a great opportunity for Pierce County to have a major new project that will provide substantial benefits to county residents. This letter reflects my comments on the Draft Environmental Impact Statement (DEIS).

This LNG facility brings together two respected local employers, each with a strong commitment to environmental responsibility and a distinguished history of positive engagement with the community. Both TOTE and PSE are long-time area businesses, and we benefit from both the family wage jobs they provide and the fact that both companies are committed to utilizing the best available environmental technology to remain competitive in the world economy.

The building and operation of the LNG facility represents hundreds of millions of dollars of private investment for a state-of-the-art facility. It will help TOTE remain competitive by providing a needed supply of LNG for its newly-configured marine vessels.

The ready availability of LNG also helps ensure continued dependable service on the coldest days of the year and additional benefits to all PSE natural gas customers in the county. Having a stock of available LNG will also allow PSE to reduce its gas purchases at time of peak demand, reducing costs that could otherwise be passed on to customers. Limiting the use of marine diesel fuel in the Port of Tacoma will also improve air quality in our area which is a priority as we work to stay in attainment for particulate matter 2.5. PSE and TOTE's efforts could significantly improve air quality in the Port of Tacoma and make it a more viable option for other shipping lines to consider in the future.

The benefits of the LNG facility reach far beyond TOTE and PSE. One of my top priorities as County Executive is to ensure we have a strong local economy that offers good job opportunities for local residents. The project will create an estimated 125 permanent jobs in the county and will also contribute millions of dollars in new tax revenues that will benefit the City, local schools, the county, and other state and local government services. Further, it is imperative that we retain good firms in our County and I thank the City for doing all it can to help retain TOTE -- a valuable local employer and customer of the Port of Tacoma. This project is a significant economic development opportunity and we appreciate you helping this project in any way that you can.

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I encourage the City to adopt a Final EIS that reflects the very significant contributions Puget Sound Energy is making in our community – not just in the payment of significant sales tax on construction, and ongoing property tax, but as a valuable member of our business community.

I fully support timely publishing of a reasonable project FEIS for the Tacoma LNG facility.

Sincerely,

Pat McCarthy
Pierce County Executive

cc: Kevin Phelps, Deputy Director
Denise Dyer, Economic Development Director
Ryan Dicks, Sustainability Manager

Number	Issue	Response
0017-1	General	Commenter supports project. Comment noted.
0017-1 cont'd	General	See previous response.

MOSS-ADAMS LLP
Certified Public Accountants | Business Consultants

WWW.MOSSADAMS.COM
1301 A Street, Suite 600
Tacoma, WA 98402
T (253) 572-4100 F (253) 383-8085

July 16, 2015

Shirley Schultz
Project Manager
City of Tacoma, Planning Department

RE: LNG Project at the Port of Tacoma

0018-1

Dear Shirley,
I wish to express my personal support of Puget Sound Energy's liquefied natural gas (LNG) project proposed to be located at the Port of Tacoma subject. As a long-time Pierce County businessperson, resident, and former chair and board member of both the Tacoma Pierce County Chamber of Commerce and the Foss Waterway Development Authority, it is encouraging to see a project that so clearly provides important economic and environmental benefits for our area.

The Tacoma LNG project will generate important economic benefits for all South Sound residents. In addition to helping local employers like Totem Ocean Trailer Express (TOTE) remain competitive and helping to maintain hundreds of family-wage jobs, the LNG facility will also help assure that TOTE continues to be a viable part of our local businesses for the distant future. It is encouraging to see TOTE taking a leadership role in converting its vessels to LNG, a conversion that depends on this facility to be successful. It is likely this facility will provide a cleaner energy source for additional transportation modes, and this will also contribute to the economic health of our greater Tacoma community.

Pierce County needs new family-wage jobs and this project will help increase our County's economic base. In addition to the direct and indirect job creation, the Tacoma LNG project will also generate additional tax revenues for state and local governments and the Tacoma school district, helping to fund needed public services and Tacoma and Pierce County public safety departments. The City should be offering economic development support like they would to any other company they are trying to recruit.

Importantly, both the commercial and residential segments of the community will benefit from this project as it also will help ensure continued dependable natural gas service to existing PSE customers even on the coldest days of the year.

Clearly, the project will provide important environmental and economic benefits for the people of Tacoma and Pierce County as a whole.

Sincerely,

Barbara N. Mead

Barbara N. Mead CPA

Praxity
MEMBER OF
GLOBAL ALLIANCE OF INDEPENDENT FIRMS

Number	Issue	Response
0018-1		Commenter supports project. Comment noted.

Totem Ocean Trailer Express

August 6, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Dear Ms. Schultz,

As a representative for Totem Ocean Trailer Express (Totem Ocean), I wish to express Totem Ocean's support for Puget Sound Energy's liquefied natural gas (LNG) facility proposed at the Port of Tacoma. This letter reflects Totem Ocean's comments on the Draft Environmental Impact Statement (DEIS). 0019-1

As you know, Totem Ocean supports hundreds of local family wage jobs to South Sound residents. Our decision to seek a cleaner fuel alternative for our large Alaska-bound vessels is truly a positive action benefiting the region's residents. We are committed to LNG as a fuel source due to its unique physical characteristics, transport and safety advantages, and environmental benefits compared to other fuels. We have found an excellent local partner in Puget Sound Energy to build and maintain the LNG facility.

The Tacoma LNG facility also represents private investment of hundreds of millions of dollars on a state-of-the-art facility that is choosing to locate in Tacoma. **If the facility were not approved in Tacoma, Totem Ocean would need to find another location to fuel our vessels and the hundreds of millions of capital investment would go elsewhere.** 0019-2

In addition, the LNG facility will contribute millions of dollars in new tax revenues that will benefit local schools, city services, and other state and local government services by making more public funds available to meet road and public safety needs. Through the process of construction, the project will also pay a proportionate share of mitigation costs for improved infrastructure. We encourage the City to adopt a Final EIS that reflects this.

The Port of Tacoma is the right place for a facility such as Tacoma LNG. The Port is an established industrial area, and this project is consistent with the types of uses and aesthetic appearance of other marine-related industrial activities in the area.

Totem Ocean fully supports the LNG facility and urges the City to finalize environmental review consistent with the foregoing, doing everything possible to make this project financially viable.

32001 32nd Avenue South, Suite 200, Federal Way, WA 98001 | P: 253-449-8100 | F: 253-449-8225 | www.totemocean.com

Totem Ocean Trailer Express

Sincerely,

John Parrott
President
Totem Ocean Trailer Express

32001 32nd Avenue South, Suite 200, Federal Way, WA 98001 | P: 253-449-8100 | F: 253-449-8225 | www.totemocean.com

Number	Issue	Response
0019-1	General	Commenter supports project. Comment noted.
0019-2	General	The commenter notes that if this project is not constructed in Tacoma, the corresponding investment would be diverted elsewhere. **Response: Comment noted.**

Tacoma-Pierce County CHAMBER Business in Motion

August 3, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Via email: shirley.schultz@ci.tacoma.wa.us

RE: Tacoma LNG SEPA DEIS

0020-1

Dear Ms. Schultz,

On behalf of the Chamber, thank you for accepting these comments in regard to the Draft Environmental Impact Statement (DEIS) for Puget Sound Energy's liquefied natural gas (LNG) facility proposed at the Port of Tacoma, a facility for which we express our support.

The Tacoma LNG facility represents private investment of hundreds of millions of dollars on a state-of-the-art facility choosing to locate in Tacoma rather than other locations. It will help TOTE, a major shipping concern, remain competitive by providing a needed supply of LNG for its newly-configured marine vessels. If the facility were not approved, TOTE will find another location to fuel its vessels and the hundreds of millions of capital investment will go elsewhere.

The Tacoma LNG facility will create at least 150 construction jobs and 18 permanent jobs. The economic activity from the project will create another 125 permanent jobs in the region and will also contribute millions of dollars in new tax revenues to the City of Tacoma's budget. The new dollars flowing into the area as a result of the project will benefit local schools, city services, and other state and local government services by making more public funds available to meet needed roads and increased public safety.

The facility is consistent with the on-going efforts by the City of Tacoma to encourage a healthy local business climate, helping retain and grow companies who call Tacoma home. It engages the Port of Tacoma as a facilitator of economic growth in Pierce County, working with two well-known and respected local companies, to find the best available environmental technology to remain competitive.

As such, the LNG facility is a win-win for the citizens, local governments and businesses of Tacoma. The Chamber appreciates your consideration of our position in support of a Final EIS that is reflective of the significant direct and indirect economic contributions of the project and will also fund local services, and encourages the City of Tacoma to approve the project supported by such an FEIS.

Regards,

Tom Pierson
President & CEO

950 Pacific Ave; Ste. 300
P.O. Box 1933
Tacoma, Washington 98401
P 253.627.2175
F 253.597.7305
TACOMACHAMBER.ORG

Number	Issue	Response
0020-1	General	Commenter supports project. Comment noted.

Puyallup Tribe of Indians

August 6, 2015

VIA ELECTRONIC MAIL

Ms. Shirley Schultz, Principal Planner
City of Tacoma, Planning and Development Services Department
747 Market Street, Room 345
Tacoma, WA 98402

RE: Preliminary Comments on the Draft EIS for the Puget Sound Energy Tideflats LNG Facility

Dear Ms. Schultz:

The Tribe is writing to provide a summary of more technical comments we have on the Draft EIS for the Proposed LNG Facility on the Tacoma Tideflats. Our staff will forward more detailed comments next week. Review of the proposed project as described in the EIS and then subsequent research into the complexities and dangers of LNG facilities in general has taken an extensive effort of several Tribal Departments. Due to the extensive nature of our review, our detailed comments will be forthcoming next week. The City Staff however requested we provide a more general list of our comments in advance of the details. In addition, the Tribe has requested a government to government consultation with the City of Tacoma to discuss our comments and grave concerns as to the impacts this project will have on the Tribe and its members.

The Tribe is very concerned regarding the impacts this facility will have on the Tribe, its members, the community as a whole, and the environment. Several Tribal members reside within sight distance of this facility. The Tribe also owns and is developing several properties across the waterway from this facility. The Tribe maintains two mitigation sights in the vicinity, one of which is directly across the waterway. The marine waters surrounding the project are also home to many marine organisms including listed salmon species.

The following are the general areas where we have comments and concerns:

1. The Tribe is very concerned the City continues to vigorously support the siting of a LNG facility of this size in an urban and heavily populated area highly susceptible to catastrophic seismic activity without any discussion as to the safety zones nationally 0021-1

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preferred to avoid significant harm to residents, workers, and the environment in an urban heavily populated area. From our research of materials and subjects not addressed in detail in the EIS, these facilities are usually located miles from heavily populated areas due to the danger associated with failures at such facilities. The Port of Tacoma area is heavily populated, and home to many of our members. Tribal members live within sight distance of this facility on the tideflats. A significant and real potential for substantial loss of human life and property in the event of an incident at this plant is not appropriately addressed in the EIS. 0021-1 Continued

2. Adequacy of emergency response to incidents at the facility is wholly inadequate, and the EIS does not fully address the needs brought about by this facility. The EIS briefly discusses a need to increase public safety in the area to respond to incidents at this facility. It is well known that current response times at the Port are abysmal. As documented in the draft Tacoma Tideflats Emergency Response Study 2015, response times exceed 8 minutes. This facility will dramatically increase risk and must include not only reopening of the currently unmanned fire station, but additional resources must be provided to local responding agencies, including the Tribe, to train, prepare, and respond to incidents at the facility where response is even possible if the incident doesn't give rise to major destruction. In addition, road design should be evaluated and modified so that roads leading to and around the facility are designed to accommodate emergency vehicle clearance in areas already burdened with excessive traffic congestion. This is particularly critical along Taylor Way as the 11th Street Bridge could be inaccessible when boats are traveling through the Hylebos Waterway. 0021-2
3. Security required to protect this facility is not adequately addressed in the EIS. Due to the inherent dangers of LNG facilities, our research has shown that there are significant terrorism concerns with LNG facilities. The EIS does not adequately address the security required to ensure the facility remains safe from terrorist activities. 0021-3
4. The zones of risk have not been adequately addressed, modeled, or designed to minimize risk for this facility. 0021-4
5. Traffic studies have not yet been conducted and such studies are usually an integral part of evaluating impacts to many of the areas of the environment required to be analyzed. Without the Traffic Study the EIS is not taking into account the long term effects of the project as far as operations and impacts to existing routes of travel to get to the facility, nor has it appropriately analyzed impacts to air quality. While the employee level might be categorized by the applicant as minimal, construction traffic and required road closures, and additional traffic to service the facility also must be considered. An EIS cannot appropriately evaluate many of the impacts without a traffic study. The mention 0021-5

of encouraging carpooling is nothing more than a band aid, an unenforceable band aid. Appropriate mitigation for traffic impacts cannot be determined absent more detailed information. 0021-5 Continued

6. The EIS fails to address impacts to roads or needs for roads to be upgraded to allow for current heavy haul traffic (and anticipated additional traffic due to other known future development by the Port or the Port's lessees) to travel on roads safely over a natural gas pipeline. Examples include, but are not limited to, Taylor Way, 12th Street, and 62nd Avenue East. Taylor Way's condition has declined to the point where it will require total replacement the length of the pipeline to withstand, safely, the loads on the trucks that travel from the Port of Tacoma. Additional roads should also be evaluated where heavy Port truck traffic will be traveling over the pipeline. The utility corridors of the pipeline should be designed to specifications concerning liquefaction of soils to avoid systemic catastrophe after an earthquake. Furthermore, in areas wither the pipeline will be constructed on the shoulder of the road, curb should be installed to help avoid vehicular accidents from compromising the pipeline. 0021-6 0021-7
7. In addition to the mitigation to ensure the roads are in a condition to accommodate the pipeline, the railroad crossings should also be reconstructed to current specifications to accommodate freight travel in a safe and orderly manner to avoid accidents and derailments that could also impact the integrity of the pipeline. 0021-8
8. The EIS describes part of the project to include barge or boat facilities, after removal of pilings and reconstruction of new facilities, on the waterway directly across from a Tribal mitigation site and Tribal properties. The EIS does not provide final plans for how the removal of existing pilings or new construction will take place and, therefore, it is impossible to fully analyze the environmental impacts to the water, fish, or Tribal properties. Furthermore, use of the site for barges, along with the tug boats required to move those barges, could cause prop outwash to impact the waterway and Tribal properties, including a sensitive mitigation site. The EIS fails to recognize these activities or discuss the contaminated sediments of the waterways and impacts these activities and sediments will have on the environment or surrounding properties. Mitigation will be required for the environmental impacts. Such mitigation can only be determined once the plans are identified and all impacts analyzed. 0021-9
9. The EIS fails to recognize the significant and known existence that contamination of the earth and groundwater will need to be addressed at the site. The Occidental Chemical site has created a substantial groundwater plume in the area. The EIS continues to discuss "if" contamination is found, certain measures will be taken. In reality, contamination WILL be found, and appropriate testing to characterize the entire site of 0021-10

the project along with a cleanup plan should be in place prior to any construction activities. The Tribe is also very concerned with any work involving the shoreline area and potential releases to marine waters. All such activity should be delayed until characterization and cleanup plans are more firm. Furthermore, the contamination existing in sediments of the waterway have not been identified or impacts from disturbing those sediments analyzed. The EIS must include an analysis of the contaminated sediments and resulting impacts and set forth appropriate mitigation for those impacts. 0021-10 Continued 0021-11

10. The EIS fails to disclose where waste products from the processes of the plant, e.g. impurities removed to bring the natural gas to liquid, will be discharged and any impacts from such discharges. 0021-12
11. The EIS fails to identify and discuss the amount of cooling water required, the source of that water, and how such water will be disposed of. It is impossible to identify or evaluate impacts to waters based upon the lack of such information. 0021-13
12. The EIS fails to call out mitigation measures for cultural resources. The use of an inadvertent discovery plan only in some of these areas is wholly inadequate. A monitor supplied by the applicant is required for all ground disturbing activities, and the Tribe requests notification of all ground moving activities in order to assess whether the Tribe will send its own monitor, in addition to the Applicant's on site monitor. Most if not all of the locations identified for the project occur in an area of high likelihood for cultural resources. Even where the area was filled, such as on the peninsula, there is an extremely high likelihood of cultural resources as the fill was from local sources that also had very high likelihood of artifacts. These items are of great value to the Tribe and are protected cultural resources. 0021-14

Tribal Staff will provide more detailed technical comments next week and we look forward to discussing these issues with the City during a government to government consultation.

Sincerely,

Bill Sterud

Bill Sterud, Chairman
Puyallup Tribal Council

Number	Issue	Response
0021-1	Public Health and Safety	The commenter is concerned about the siting of an LNG facility in a densely populated urban area and that such a facility poses a significant potential for substantial loss of life and property, including many tribal members. The commenter states that such facilties are usually located in remote areas. **Response: Comment noted. The proposed Tacoma LNG facility is appropriately sited on a brownfield site in an existing industrial area zoned for industrial activities. To ensure public safety and comply with applicable regulations, vapor dispersion and thermal radiation analyses have been conducted for credible spill scenarios, using the methodologies and computational models prescribed by the Pipeline and Hazardous Materials Safety Administration (PHMSA) and approved on similar facilities. The modeling conclusively demonstrates that exclusion zones defined by federal regulation 49 CFR. § 193.2059 and, by reference, National Fire Protection Association (NFPA) 59A (2001), remain within the property lines of the proposed site. The EIS describes the modeling and includes mitigation measures to ensure that vapor dispersion and thermal radiation does not extend beyond the property lines of the Tacoma LNG project.**
0021-1 cont'd	Public Health and Safety	See previous response.
0021-2	Public Health and Safety	Portions of this comment apply to Public Health and Safety, and to Transportation. The commenter is concerned that emergency response at the LNG facility is "wholly inadequate" and that response times at the Port are "abysmal," exceeding 8 minutes. The commenter states that "the EIS does not fully address the needs brought about by this facilitiy". Commenter states that the facility "will dramatically increase risk" and recommends a number of measures in addition to reopening the fire station. Recommended measures include "additional resources [...] to local responding agencies, including the Tribe, to train, prepare, and respond to incidents," as well as evaluation and modification of road designs leading to and around the facility "to accommodate emergency vehicle clearance in areas already burdened with excessive traffic congestion." The commenter questions whether emergency response is even possible in certain circumstances, including events causing "major destruction" and when the 11th Street bridge is inaccessible due to boat traffic. **Response: Comment noted. To account for the ability of emergency responders to access the site and surrounding vicinity in a timely matter, mitigation measures agreed to by PSE, Port of Tacoma, and the City include reopening of Fire Station 15, implementing Phase 1 of the Emergency Response/Intelligent Transportation System, and an approach for rebuilding of Taylor Way to heavy haul standards.**

Number	Issue	Response
0021-3	General	The commenter notes that the EIS does not adequately address security at the LNG facility. Specifically, the commenter states that "the EIS does not adequately address the security required to ensure the facility remains safe from terrorist activities." **Response: Comment noted: Section 3.11 Public Services and Utilities addresses security issues, including LNG fueled vessels, the refueling facility and the liquefaction facility. The U.S. Coast Guard conducts a Waterways Suitability Assessment which assesses security concerns and as Captain of the Port can impose additional security measures such as exclusion zones. Specific security measures are confidential.**
0021-4	Public Health and Safety	Commenter states that "the zones of risk have not been adequately addressed, modeled, or designed to minimize risk for this facility." **Response: To define the extent of thermal vapor dispersion and thermal radiation exclusion zones to ensure the public’s safety requires quantitative modeling. When LNG is released from a container and comes in contact with air, it vaporizes and produces methane vapor. For any methane vapor to ignite (not only LNG, but any fuel containing methane), two conditions must simultaneously occur: (1) the methane vapor must be at a concentration of 5 to 15 percent in air and (2) an ignition source must be present. If such a methane vapor-air mixture from an LNG spill ignites, the LNG flame front will either burn back to the release location (if the vapor concentration along this path is sufficiently high to support the combustion process) or, if the vapors dissipate quickly enough, the flame burns out for lack of fuel.** **For Tacoma LNG, vapor dispersion analyses have been conducted for credible spill scenarios, using the methodologies and computational models prescribed by the Pipeline and Hazardous Materials Safety Administration (PHMSA) and approved on similar facilities. The modeling conclusively demonstrates that exclusion zones defined by federal regulation 49 CFR § 193.2059 and, by reference National Fire Protection Association (NFPA) 59A (2001), remain within the property lines of the proposed site. Keeping all spilled LNG (and any potential resulting flammable vapor clouds) within the property boundary eliminates the risk of off-site ignition.**

Number	Issue	Response
0021-5	Transportation	Portions of this comment apply to Air Quality as well as Transportation. The commenter states that traffic studies have not yet been conducted, and that without such study the EIS is not taking account the long-term effects of the project with respect to "operations and impacts to existing routes of travel", and is not appropriately analyzing air quality impacts. Commenter states that "an EIS cannot appropriately evaluate many of the impacts" without a traffic study, and that certain types of traffic and traffic impacts need to be taken into account, such as heavy construction traffic, construction-related road closures, and service trips to the facility. Commenter states that "encouraging carpooling is nothing more than an [unenforceable] band aid." and that "appropriate mitigation for traffic impacts cannot be determined absent more detailed information." **Response: The EIS incorporates information from the Blair-Hybelos Terminal Redevelopment Project (BHTRP) Final Environmental Impact Statement and information from the Transportation Discipline Report prepared for the BHTRP. In addition, traffic data were updated and included in the Tacoma LNG Draft Environmental Impact Statement. The operational project will employ approximately 18 personnel. During the afternoon commute peak hour, up to 42 vehicle trips would be added to the traffic network during operations (18 inbound and 18 outbound personnel trips, two inbound and two outbound delivery/maintenance truck trips, and one inbound and one outbound tanker truck trips).** **Per day, up to 60 vehicles would be added to the traffic network during operations, representing less than 1 percent of existing traffic volumes. Compared to daily traffic volumes on roadways in the vicinity of the Project (see Table 3.10-1), the addition of 60 vehicles per day would be insignificant relative to existing traffic.**
0021-5 cont'd	Transportation	See previous response.
0021-6	Transportation	The commenter states that "the EIS fails to address impacts to roads or needs for roads to be upgraded to allow for current heavy haul traffic (and anticipated additional traffic," referring without limitation to Taylor Way, 12th Street, and 62nd Avenue East. The commenter states that Taylor Way will require total reconstruction along the length of the pipeline. **Response: the EIS recognizes potential impacts to Taylor Way, and PSE, the Port of Tacoma, and the City have agreed to an approach in rebuilding of Taylor Way to heavy haul standards.**
0021-7	Public Health and Safety	The commenter recommends evaluation of additional roads "where heavy Port truck traffic will be traveling over the pipeline." The commenter also points out that "the utility corridors of the pipeline should be designed to specifications concerning the liquefaction of soils" and that, where "the pipeline will be constructed on the shoulder of the road, [a] curb should be installed." **Response: Comment noted. The purpose of building roads to heavy haul standards is to withstand continuous use by trucks carrying heavy loads, not because there are natural gas pipelines and other utilities buried under the road. As for liquefaction, pipelines carrying natural gas are bouyant and would tend to float in liquefaction conditions; moreover, being buried under a road surface it is unlikely they would be exposed.**

Number	Issue	Response
0021-8	Transportation	The commenter states that "railroad crossings should also be reconstructed to current specifications [...] to avoid accidents and derailments that could also impact the integrity of the pipeline." **Response: Comment noted. Railroad crossings would be taken into consideration during the rebuilding of Taylor Way to heavy haul standards.**
0021-9	Description of Proposed Action	Portions of this comment apply to Earth and to Water Resources, as well as to the Description of the Proposed Action. The commenter states that, for barge or boat facilities described on the Hylebos Waterway, "the EIS does not provide final plans for [...] the removal of exisitng pilings [and] new construction [...] and, therefore, it is impossible to fully analyze the impact to the water, fish, or Tribal properties" and to a Tribal mitigation site. The commenter further states that use of barges and tugboats "could cause prop outwash to impact the waterway and Tribal properties, including a sensitive mitigation site." The commenter states that "the EIS fails to recognize these activities" or discuss the impacts these activities and contaminated sediments would have on the environment or surrounding properties. Commenter states that mitigation for such activities "can only be determined once the plans are identified and all impacts analyzed."> **Response: Preliminary drawings for both construction on Hybelos and Blair waterways will be included as an appendix. Additional information can be found in the JARPA submitted to the Seattle District Corps of Engineers, The City of Tacoma, and the Washington Departments of Ecology and Fish and Wildlife. The EIS indicates that additional sediment testing will be required and incorporated as conditions of Federal, State, and local permits.**
0021-10	Water Resources	Portions of this comment apply to Earth as well as to Water Resources. The commenter states that "the EIS fails to recognize the significant and known existence [of] contamination of the earth and groundwater that will need to be addressed," and that it is not a question of "if" contamination will be found. Rather, commenter states that "a cleanup plan should be in place prior to any construction activities" because contamination "will" be found. **Response: The project site has been the subject of extensive testing of both the soils and groundwater. Section 3.1 Earth provides an overview of the site contamination, clean-up, and existing conditions. Additional information provided by the Department of Ecology and the Port of Tacoma hwill be included in the final EIS.**
0021-10 cont'd	Water Resources	See previous response.

Number	Issue	Response
0021-11	Water Resources	Portions of this comment may apply to Earth as well as to Water Resources. The commenter is concerned with any work involving the shoreline area and states that "all such activity should be delayed until characterization and cleanup plans are more firm." In particular, the commenter is concerned that "the contamination existing in sediments" has not been identified nor have "the impacts from disturbing those sediments." The commenter states that "the EIS must include an analysis of the contaminated sediments and resulting impacts and set forth appropriate mitigation." **Response: The Department of Ecology and the Environmental Protection Agency have also raised concerns about adequate charaterization of the sediments, specifically in the Hybelos Waterway. The final EIS will include mitigation measures including requiring that further characterization of the sediments be conducted prior to any construction.**
0021-12	Public Services and Utilities	This comment may apply to Earth, Water Resources and Public Health and Safety as well as to Public Services and Utilities. The commenter states that "the EIS fails to disclose where waste products from the processes of the plant [...] will be discharged and any impacts from such discharges." **Response: Section 3.3 Water describes how stormwater from the site will be collected and discharged, and Section 3.11 describes how sanitary and other wastes from the faciliity produced by the facility will be handled.**
0021-13	Description of Proposed Action	This comment applies to Water Resources and Public Services and Utilities as well as to the Description of Proposed Action. The commenter states that the EIS fails to discuss the amount, source, and disposal methods for cooling water, and that "it is impossible to identify or evaluate impacts to waters based upon the lack of such information." **Response: No cooling water will be produced by the Tacoma LNG project.**

Number	Issue	Response
0021-14	Cultural Resources	The commenter states that "the EIS fails to call out mitigation measures for cultural resources" and that "the use of an inadvertent discovery plan only in some of these areas is wholly inadequate." The commenter states that "most if not all of the locations identified in the project occur in an area for high likelihood for cultural resources," even areas that were filled as "the fill was from local sources that also had very high likelihood of artifacts." As a result, the commenter states, "a monitor supplied by the applicant is required for all ground disturbing activities, and the Tribe requests notification of all ground moving [...] to assess whether the Tribe will send its own monitor, in addition". Commenter states that "[artifacts] are of great value to the Tribe and are protected cultural resources." **Response: PSE has indicated that they will provide a monitor in areas near the base of the Blair-Hylebos peninsula at or near the natural shoreline that are deemed likely to have cultural importance would be monitored by a trained and experienced cultural resource expert. In addition, the final EIS will indicate that PSE would provide training in identifying cultural artifacts according to a training protocol developed by PSE and approved by the City after consultation with the Tribe. In addition, PSE will ensure that crews involved in ground-disturbing activities be familiar with the Unanticipated Discovery Plan.** **If suspected cultural artifacts are found, construction will be halted in the vicinity of the find until the status of the artifact can be determined. In addition, the final EIS will indicate that PSE would notify a contact person provided by the Tribe prior to commencement of ground breaking and for the expected duration of any excavation.**

From: Suafoa, Rumina <SuafoaR@wsdot.wa.gov>
Sent: Tuesday, July 21, 2015 8:49 AM
To: shirley.schultz@cityoftacoma.org
Cc: Davies, David (SR167)
Subject: FW: SR 167-Tacoma to Puyallup-New Freeway
Attachments: ALIGNMENT COMPARISON.PDF

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Green Category

Shirley,

I was contacted by Pete Townsend, Olympic Region Utilities Engineer. He forwarded the web address for the PSE Liquid Natural Gas plant currently in the Draft EIS review/comment stage. I have an update to Section 3.10.3.10 Potential Future Transportation Improvement Projects.

SR 167 Extension Project-Tacoma to Puyallup-New Freeway received funding recently when the Governor signed the new-law Connecting Washington transportation bill. Design of the SR 167 extension, six lane facility (two general purpose, one HOV lane each direction) in Puyallup from SR 161 to I-5, and four lane facility (two general purpose lanes each direction) from I-5 to SR 509 is about 15 percent complete, to include new interchanges at SR509/54th, SR 167/Valley Avenue and I-5/SR 167. There is a new 70th Ave structure crossing over I-5. Currently the project is preparing a NEPA Re-Evaluation for FHWA approval. Design Documentation and Plans for Approval will be the next milestone document for this project. Our Record of Decision was signed in October 2007. There have been a few a more parcels acquired, however the alignment has been refined (changed) from the FEIS to reduce right of way (ROW) costs, reduce environmental impacts, and reduce construction costs (see attached pdf). We are in beginning efforts of scheduling an access hearing for Spring 2016, which will result in new ROW plans for continued acquisition by September 2016. We have been allocated funds over the next four biennia (2015-2023). The key piece being completion of ROW acquisition throughout the corridor. Relocation of businesses once ROW is acquired will take approximately 3 years to complete. Construction of portions of the overall project (e.g. wetland mitigation or riparian restoration or stream relocation project) could starts at early as 2017. 0022-1

Please feel free to contact me if you have any questions or comments or if you need anything further.

Rumina Suafoa, P.E.
Olympic Region Project Development
SR 167 Extension Project Office
360.357.2623 Desk
253.223.2215 Mobile

Number	Issue	Response
0022-1	Transportation	The commenter proposes an update to the text in draft EIS section 3.10.3.10, concerning the SR167 Extension project. **Response: The updated information will be reflected in the final EIS.**

DRAFT
PRELIMINARY
Subject to Revision
RELOCATED HYLEBOS CREEK
REFINED ALIGNMENT
RIPARIAN
RESTORATION AREA
WEIGH STATIONS
FEIS ALIGNMENT
5
509
509
99
5
167
161
167
SCALE IN FEET

Number	Issue	Response
0023-1	Transportation	This document (0023) is a map providing a graphic representation of the changes to the SR 167 Extension Project described in an e-mail comment (0022). The map was submitted as an attachment to the e-mail. **See response 0022-1.**

From: Rick Talbert <rtalber@co.pierce.wa.us>
Sent: Thursday, August 06, 2015 4:28 PM
To: shirley.schultz@cityoftacoma.org
Subject: Puget Sound Energy's liquefied natural gas (LNG) facility

August 4, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

Dear Ms. Schultz,

0024-1

I wish to express my support for Puget Sound Energy's liquefied natural gas (LNG) facility proposed at the Port of Tacoma. I applaud the on-going efforts by the City to encourage a healthy local business climate to help retain and grow companies who call the South Sound home. This letter reflects my comments on the Draft Environmental Impact Statement (DEIS).

The LNG facility will generate important economic benefits for all South Sound residents. In addition to helping local employers like TOTE remain competitive, it will create at least 150 construction jobs and 18 permanent jobs. The economic activity from the project will create another 125 permanent jobs in the region.

The facility will also contribute millions of dollars in new tax revenues to benefit local schools and other state and local government services by making more public funds available to meet road and public safety needs.

In addition to these direct revenues, the DEIS, at Section 3.12.4 - **Economy**, provides that the project's indirect effects will result in $120.4 million in added economic activity. Not noted in the DEIS is that this increased economic activity will result in further tax revenues to our local governments for the public's benefit.

The environmental and health benefits of LNG are also very important. LNG is a cleaner alternative to conventional fuels such as diesel. Switching to LNG reduces greenhouse gas emissions by up to 30 percent and eliminates visible particulate emissions. This helps improve air quality and reduce health risks, while helping local employers like TOTE comply with new stricter low-sulfur emission standards.

I fully support the approval of the project based on a Final Environmental Impact Statement that reflects the full direct and indirect economic contributions of the project to fund local services.

Sincerely,

Rick Talbert
Pierce County Councilmember

Number	Issue	Response
0024-1	General	Commenter supports project. Comment noted.

From: John Thurlow <johnthurlow@harbornet.com>
Sent: Thursday, August 06, 2015 3:44 PM
To: Schultz, Shirley
Cc: Ian Munce; Thoms, Robert; Mason, Evette; 'Andrew Strobel'; Arill Berg; Bill Thompson; James Philp; Hayes Alexander; Jim DeJung; Dick Hayek; Sue Baldwin; Lois Cooper; Don Halabisky; Carolyn Edmonds; Jon Higley; Karen Pischel; Patti Warwick; Yvonne McCarty; Faye Teel; Leek, Sandy A; Leek, Sandy A
Subject: NETNC: Comments on Draft EIS for the PSE Tideflats LNG plant proposal
Attachments: NETNC ltr on LNG DEIS 6Aug15.pdf

August 6, 2015

Re: PSE Tideflats LNG plant DEIS

Shirley Schultz
Principal Planner
Planning and Development Services
City of Tacoma

By e-mail

Dear Ms. Schultz

The Northeast Tacoma Neighborhood Council Executive Committee has reviewed the Draft EIS for the proposed LNG plant on E Alexander Ave. in the Tideflats. We have concerns in the areas listed below and request careful attention to comprehensive and successful implementation of the mitigations cited in the DEIS. NETNC will update this letter when the full Board has had the opportunity to approve it.

1. Fire protection and emergency response

Given the introduction of additional significant fire risk, and the proximity of residences on the bluffs above the plant's site, we believe the proposed re-provisioning of fire-fighting capability on the Blair-Hylebos peninsula to be paramount. A fire station with resident crew and equipment can respond in a timelier manner to various types of industrial incidents than response from Station 12 in Fife or Station 3 in NE Tacoma. It could also provide more-effective backup when Station 3's engine is not available.

2. Traffic impact

The intersection of Taylor Way with SR509 is already over-taxed with trucks entering and leaving the Tideflats. Additional daily traffic will compound the situation. Implementing the Intelligent Transportation System under study and prioritizing the eventual improvements contemplated in the SR167 completion in this area are key to alleviating the congestion.

3. Light pollution and noise

Although we acknowledge that homes on the bluffs above the Tideflats are subject to the effects of being near legitimate business activities in the zoned Port Maritime and

Industrial area, we believe that those effects should be managed to achieve minimum practical levels. Implementing the mitigations discussed in the DEIS, for example, will help reduce the effect of increased industrial lighting and noise on the properties along the NE Tacoma bluffs in the vicinity.

We have been assured that there will be only a small increase in noise from the plant, and that it will be a steady drone, not the clanking sorts of noises generated by other industries in the neighborhood. The noise levels should be monitored at startup and following to ensure that predicted levels are being achieved.

4. Emergency Response / Intelligent Transportation System study

We await the opportunity to review the findings and recommendations from this ER/ITS study, which will likely drive related mitigation projects and priorities that affect quality of life for NE Tacoma residents. Please include the Northeast Tacoma Neighborhood Council among early reviewers of this study's results.

We appreciate the opportunity to work with PSE and City planners on this project, and look forward to comprehensive and successful implementation of the mitigations cited in the DEIS.

Sincerely,

/s/ Carolyn Edmonds
/s/ John Thurlow
Co-Chairs, Northeast Tacoma Neighborhood Council

cc: Ian Munce, PDS
Robert Thoms, Distr. 2 Councilmember
Evette Mason, Port of Tacoma
Andrew Strobel, Puyallup Tribe of Indians
Jim Hogan, PSE
NETNC Board

Number	Issue	Response
0025-1	General	The document in question (0025) is an e-mail containing identical text to a letter (0026) provided as an attachment to the same email, submitted by the same commenter. **Response: See reponses 0026-1 through 0026-5.**

Northeast Tacoma Neighborhood Council
www.netacoma.org
1000 Browns Point Town Center #180, PMB 222
Tacoma, WA 98422

August 6, 2015
Re: PSE Tideflats LNG plant DEIS

Shirley Schultz
Principal Planner
Planning and Development Services
City of Tacoma

By e-mail

Dear Ms. Schultz

The Northeast Tacoma Neighborhood Council Executive Committee has reviewed the Draft EIS for the proposed LNG plant on E Alexander Ave. in the Tideflats. We have concerns in the areas listed below and request careful attention to comprehensive and successful implementation of the mitigations cited in the DEIS. NETNC will update this letter when the full Board has had the opportunity to approve it.

1. Fire protection and emergency response 0026-1

Given the introduction of additional significant fire risk, and the proximity of residences on the bluffs above the plant's site, we believe the proposed re-provisioning of fire-fighting capability on the Blair-Hylebos peninsula to be paramount. A fire station with resident crew and equipment can respond in a timelier manner to various types of industrial incidents than response from Station 12 in Fife or Station 3 in NE Tacoma. It could also provide more-effective backup when Station 3's engine is not available.

2. Traffic impact 0026-2

The intersection of Taylor Way with SR509 is already over-taxed with trucks entering and leaving the Tideflats. Additional daily traffic will compound the situation. Implementing the Intelligent Transportation System under study and prioritizing the eventual improvements contemplated in the SR167 completion in this area are key to alleviating the congestion.

3. Light pollution and noise 0026-3

Although we acknowledge that homes on the bluffs above the Tideflats are subject to the effects of being near legitimate business activities in the zoned Port Maritime and Industrial area, we believe that those effects should be managed to achieve minimum practical levels. Implementing the mitigations discussed in the DEIS, for example, will help reduce the effect of increased industrial lighting and noise on the properties along the NE Tacoma bluffs in the vicinity.

We have been assured that there will be only a small increase in noise from the plant, and that it will be a steady drone, not the clanking sorts of noises generated by other industries in the neighborhood. The noise levels should be monitored at startup and following to ensure that predicted levels are being achieved.

Northeast Tacoma Neighborhood Council Comments on Tideflats LNG DEIS

0026-4

4. Emergency Response / Intelligent Transportation System study

We await the opportunity to review the findings and recommendations from this ER/ITS study, which will likely drive related mitigation projects and priorities that affect quality of life for NE Tacoma residents. Please include the Northeast Tacoma Neighborhood Council among early reviewers of this study's results.

We appreciate the opportunity to work with PSE and City planners on this project, and look forward to comprehensive and successful implementation of the mitigations cited in the DEIS.

Sincerely,

/s/ Carolyn Edmonds
/s/ John Thurlow
Co-Chairs, Northeast Tacoma Neighborhood Council

cc: Ian Munce, PDS
Robert Thoms, Distr. 2 Councilmember
Evette Mason, Port of Tacoma
Andrew Strobel, Puyallup Tribe of Indians
Jim Hogan, PSE
NETNC Board

* Reference to 1999-2000 Northeast Tacoma Neighborhood Strategic Action Plan items

Number	Issue	Response
0026-1	Public Services and Utilities	The commenter states that the reintroduction of firefighting capability on the Blair-Hylebos peninsula is critically important given the significant additional fire risk posed by the Proposed Action. The commenter recommends a fire station "with resident crew and equipment" on the peninsula. **Response: Comment noted. Recommended mitigation in the draft EIS includes re-opening Fire Station no. 15 on the Blair-Hylebos peninsula.**
0026-2	Transportation	The commenter states that the SR-509/Taylor Way intersection is "already overtaxed" and that additional traffic will "compound the situation." The commtenter recommends implementing the Intelligent Transportation System and prioritizing improvements to SR 167 to alleviate congestion. **Response: the final EIS will include implementing Phase I of the Emergency Response/Intelligent Transportation Systems (ER/ITS) as mitigation.**
0026-3	Noise	The commenter notes that homes above the Tideflats are subject to light and noise impacts from industrial uses but that proposed mitigation in the draft EIS will help reduce the effects of increased industrial lighting. The commenter nonetheless requests that "noise levels should be monitored at startup and following to ensure that predicted levels are being achieved." **Response: It is anticipated that with implementation of noise minimization measures, operation of the facility will not exceed the statutory noise levels. However, the final EIS will state that if noise complaints are received, PSE will take noise measurement (24 hours) at the project fence line and at the fence line of sensitive receptors.**
0026-4	General	The commenter requests that the NE Tacoma Neighborhood Council be included among early reviewers of the Emergency Response/Intelligent Transportation Systems (ER/ITS) study, as the results of this study will drive projects and priorities that affect quality of life for NE Tacoma residents. **Response: Comment noted.**

PUGET SOUND ENERGY
The Energy To Do Great Things

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734
PSE.com

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City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

RE: Tacoma LNG Draft Environmental Impact Statement

Dear Ms. Schultz:

Please find below the comments of Puget Sound Energy (PSE) in regard to the Draft Environmental Impact Statement (DEIS) published by the City on July 7, 2015.

As you know, the proposed Tacoma LNG project to be developed on the Blair-Hylebos Peninsula represents the efforts of two respected private local employers, TOTE and PSE, each with a strong commitment to environmental responsibility and a distinguished history of positive engagement with the Tacoma community. Both TOTE and PSE are long-time area businesses providing family-wage jobs to area residents and significant tax revenues to local and state agencies for public services such as roads, schools, and other public amenities. The Tacoma LNG proposal for development of a small-scale liquefied natural gas facility for use as a marine fuel to TOTE vessels and also as a peak shaving facility for PSE's natural gas customers represents the private sector's investment of several hundred millions into new facilities.

In addition, LNG offers many environmental benefits over conventional fuels, like diesel. Switching from diesel to LNG reduces greenhouse gas emissions by up to 30% and eliminates visible, particulate emissions. This helps improve air quality and reduce health risks. Use of LNG also reduces the potential for harmful fuel spills that could damage the waters of Puget Sound.

Over the past year, PSE has reached out to diverse stakeholders including federal wildlife and natural resource agencies, the U.S. Environmental Protection Agency, the Washington Department of Ecology, the Puyallup and Muckleshoot nations, the Northeast Tacoma Neighborhood Council, labor organizations, neighboring Port businesses, and multiple other interested people and entities to inform them about the Project and hear their questions. Several common themes have emerged from that outreach.

First and foremost, safety is in everyone's interest and PSE appreciates the feedback it has received in this aspect of the Project. PSE shares and supports the community's interest in ensuring there is a reopened fire station near the facility, the benefits of which will flow to the entire area. The actual properties and behavior of LNG have been the subject of many conversations. Natural gas is used in millions of homes and vehicles. When cooled, natural gas

becomes a liquid (LNG) that is one six-hundredth the volume. In its liquid state LNG is easier to store and transport. LNG is neither explosive nor flammable in its liquid state. When it returns to its gaseous state, it behaves as any natural gas found in the pipelines throughout neighborhoods, communities, commercial and industrial areas across the county and is handled accordingly. The DEIS does an excellent, exhaustive job of discussing and analyzing the behaviors of natural gas and LNG and the comprehensive regime of rules, regulations and measures that are applied to ensure facility safety.

Tacoma LNG will be a state-of-the-art facility served with utilities (water, electricity, and sanitary wastewater) provided by Tacoma Public Utilities. It will comply with new, stringent regulatory and development standards such as modern lighting ordinances that maximize the reduction of light pollution, and an enhanced stormwater treatment system.

Questions about the Project's effects on local and area traffic often arise. Although facility operations will actually generate less traffic from the site than the businesses that are there now, the Legislature has determined independently to fund the completion of new interchanges at SR 509/54th Street and SR 167, providing a contemporaneous improvement to area traffic congestion.

These stakeholder interests and many others were brought forth during the scoping of environmental review for Tacoma LNG. To that end, PSE is appreciative of the opportunity to comment and the extent and efficiency with which the City of Tacoma has engaged in the SEPA process. We are hopeful that the Final EIS will fully reflect the Project's benefits and impacts to the City, inclusive of new revenues and additional proportionate mitigation as necessary to ameliorate the Project's own impacts to the City, so that the facility can be developed in Tacoma.

PSE stipulated to the preparation of an EIS under the Washington State Environmental Policy Act (SEPA), which is intended to ensure that environmental values are considered during decision-making by state and local agencies. An EIS describes the existing environment that will be affected by the proposal, analyzes significant adverse environmental impacts of each alternative, and discusses reasonable mitigation measures. Where mitigation is imposed without the applicant's consent, SEPA's limitations on the exercise of substantive authority must be satisfied. Actions can only be conditioned to mitigate specific adverse environmental impacts that are identified in the environmental documents.

Any mitigating conditions must be based on policies, plans, rules, or regulations that the agency has formally designated as a basis for exercising its substantive authority, and must be "reasonable and capable of being accomplished." The responsibility for implementing mitigation measures may be imposed upon an applicant "only to the extent attributable to the identified adverse impacts of its proposal."[1]

SEPA substantive mitigation requirements are limited by the constitutional nexus and proportionality requirements established by the United States Supreme Court in *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987), and *Dolan v. City of Tigard*, 512 U.S. 374

[1] WAC 197-11-660(d) (emphasis added).

(1994). While *Nollan* and *Dolan* involved the exactions of land, the United States Supreme Court in *Koontz v. St. Johns River Water Management District*, 133 S. Ct. 2586 (2013) extended those holdings to financial expenditures imposed on an applicant by ruling that the government cannot condition the issuance of a land use permit on the applicant giving up a portion of his property, including financial property, unless there is a "nexus" and "rough proportionality" between the government's mitigation request and the proposed land use's specific impacts.

Washington courts similarly are clear in their instruction that any mitigation measures imposed on a project, regardless of the source of authority for the imposition, must be in rough proportion to the project's impacts. This is true even when a plan, policy or regulation exists that would obligate a developer to undertake mitigation in a proportion that is well beyond the impacts that its project contributes to the improvement.[2]

Insofar as the effects this project will have on the City of Tacoma, including impacts to services and infrastructure it provides, mitigation must be viewed relatively. The cost of new infrastructure and services must be evaluated relative to positive fiscal effects the Project will have on the City. The DEIS contains a robust discussion of the direct new revenues that would flow into the City of Tacoma's coffers (as well as those of Fife and Pierce County) as a result of the project being developed.

The DEIS correctly calculates that if Tacoma LNG is built, the City of Tacoma will receive **$5.17 million** in direct new revenue to the City's budget between 2015 and 2018 from construction. This figure is comprised of $793,980 from LNG construction-related sale taxes

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[2] This issue was squarely before the Washington Supreme Court in *Benchmark Land Co. v. City of Battle Ground*, 146 Wn.2d 685, 49 P.3d 860 (2002). As a condition of project approval, the City of Battle Ground required the Benchmark Land Company to improve an existing street adjacent to Benchmark's proposed development. The City based its condition upon a city ordinance that required developers to construct half-width road improvements to adjoining access streets as a prerequisite to permit approval. The required expenditure for street improvements was not directly or proportionately related to the traffic generated by the development. Notably, the road that the City sought to have improved by application of its pavement policy did not meet City roadway standards even before the development was proposed. Rather, the required improvements would relieve a preexisting deficiency. Studies relevant to the project indicated that Benchmark's development would cause little or no impact upon the street at issue: "[t]he increase in traffic volumes on North Parkway due to [the proposed project] "are far less than the typical day to fluctuation of traffic and would be virtually indistinguishable to the average driver in the area."" *Benchmark* at 695. Nevertheless, the City argued that its requirement was supported by substantial evidence. Division II of the Washington Court of Appeals invalidated the street improvement requirement as unconstitutionally disproportionate to the proposed subdivision's community impact. The Washington Supreme Court affirmed the lower court's conclusion regarding the invalidity of the City's development condition without even reaching the constitutional question. Instead, the *Benchmark* Court applied the "substantial evidence" test applicable to land use challenges under RCW 36.70C.130(c), and found that no evidence demonstrated that Benchmark's subdivision would measurably impact the adjacent street. The *Benchmark* decision reiterates the Washington principle of law that development conditions must be predicated on substantial evidence of the development's probable impacts. To the extent that mitigation measures for a project's own impacts are imposed under SEPA, they may not be exacted to remedy existing deficiencies. Regardless of a degraded existing condition, the addition of a new project does not render that project entirely responsible for the improvements as mitigation under SEPA, but instead, it is only responsible for its proportionate share. Were this otherwise, it would be virtually impossible for any prospective developer to know if its project was going to be the one that 'breaks the camel's back' so to speak. Imposing the entire burden for an improvement or mitigation measure on the entity that finally meets a triggering event constitutes a denial of due process and is an unconstitutional taking under the U.S. Constitution and state law.

collected in Tacoma;[3] $126,210 from gas-related construction upgrades within Tacoma;[4] and an additional $4.25 million payable in three installments triggered by construction dates under agreement with the City.[5] During operations the City will receive an additional $1.374 million per year in on-going tax collections, i.e., **an additional $13.74 million** in direct new revenue over ten years' time.[6]

In addition to these direct revenues, the DEIS, at Section 3.12.4 - Economy, provides that the Project's indirect effects will result in $120.4 million in added economic activity. This increased economic activity will result in further tax revenues to our local governments for the public's benefit, including roads, schools and other public service, in an amount not quantified in the Draft Environmental Impact Statement.

In this context, we have reviewed the DEIS. Our comments focus on five specific areas of the DEIS: Section 3.4 – Plants and Animals; Section 3.5 - Health and Safety; Section 3.8 - Aesthetics/Light and Glare; Section 3.10 - Transportation; and Section 3.11 - Public Services and Utilities. These comments will also reflect the analysis and conclusions in DEIS Section 3.12 - Socioeconomics, consideration of which should accompany the mitigation measures proposed throughout the FEIS.

0027-1

Table ES-1, Section 3.4 - Plants and Animals

The DEIS at p. 3.4-10 concludes that there is no likelihood of impacts to marbled murrelets. Consistent with the DEIS, the U.S. Fish and Wildlife Service (Service), which is responsible for Endangered Species Act evaluation regarding this species, has concluded that observers are not necessary for this project. A copy of the Service's July 6, 2015 electronic correspondence confirming this is attached hereto as Exhibit A.

Based on the foregoing, the last bulleted item in Table ES-1, Section 4 - Plants and Animals is not necessary and should be removed.

Section 3.5 - Public Health and Safety

PSE concurs with the thorough discussion in the DEIS regarding safety history of the LNG industry both in the U.S. and the world. There are over 110 functioning LNG facilities in the U.S. today.[7] In the 75-year history of their operations, there have only been two LNG safety-related incidents - in 1944 and 1979 - that have resulted in adverse effects to the public or environment.[8] Both incidents resulted in changes to the national codes under which the facilities

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[3] See Attachment J-2 to DEIS: of the $2,381,940 in construction-related taxes collected from the LNG processing facility and the pipeline segments located in the City of Tacoma, one-third ($793,980) is allocated to Tacoma.

[4] Id.

[5] Id.

[6] Id.

[7] DEIS at 3.5.3.1, p. 3.5-5.

[8] Id.

are designed, built and operated.[9] PSE will design, build and operate the proposed Project facilities in compliance with all applicable codes, including adopted fire codes, a requirement formalized in the DEIS.[10]

0027-2

The LNG facility itself will not be accessible to the public, and PSE will be providing for mitigation related to this loss of the public's access to the shoreline pursuant to the City of Tacoma's Shorelines Master Program. Additionally, strict siting requirements that keep any facility fire contained to the confines of the site and the safety measures incorporated into the design of an LNG plant further minimize the likelihood of any incident jeopardizing the environment, including the public's health and safety. Specifically, the DEIS at 3.5-1 notes that "[w]ith regard to health and safety, these regulations and their referenced codes ensure that the facility would be (1) sited to minimize risk to the general public, (2) designed, operated, and maintained to minimize the risk of inadvertent release and to implement safety mechanisms for protecting worker and public safety, and (3) secured against threats of intentional acts of destruction." The City's preliminary engineering review performed during preparation of the DEIS yielded the same conclusion: "Codes for new LNG facilities are held to a very high standard to avoid unsafe conditions within the facility and to the public. The permitting and review process is rigorous and thorough, and the stipulated requirements can be relied upon."[11]

The DEIS's thorough discussion of the health and safety implications of Tacoma LNG, along with the mitigation measures contained in Section 3.5 (as suggested for revision below), supports the conclusion that Tacoma LNG, built and operated in accordance with applicable laws, regulations and development standards, does not present a significant adverse impact to the environment, including the public health and safety. PSE concurs with the conclusion at Section 3.5 - Public Health and Safety, at p. 3.5-10:

> Operation, Maintenance, and Emergency Procedures
> Operation of the Tacoma LNG Facility would not pose a potential public hazard if strict design and operational measures to control potential accidents were applied. The primary concerns regarding public safety are events that could lead to an LNG spill of sufficient magnitude to create an off-site hazard. Stringent requirements are in place for the design, construction, operation, and maintenance of the facility, as well as the extensive safety systems to detect and control potential hazards. In addition to the operation and maintenance procedures that are required by both 49 CFR 193 Subpart F and NFPA 59A, emergency procedures are also required. All of the procedures (operation, maintenance, emergency) would be developed and documented prior to commissioning. With specific reference to the emergency procedures, elements that would be addressed include recognizing an emergency situation, responding to an emergency, and issuing the appropriate notifications to emergency responders. The overarching goal of all of these procedures would be to ensure the safety of personnel through sound operation and maintenance procedures and monitoring of the various safety systems located throughout the facility.

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[9] Id.
[10] Id.
[11] DEIS at p. 3.5-18.

> Subpart F provides prescriptive requirements for operating procedures, emergency procedures, personnel safety, operating records, and other requirements for the ongoing operation of the facility. PSE would prepare all procedures in advance of plant operation. Each procedure would be reviewed and approved by the WUTC Pipeline Safety Office as the duly-appointed delegate of PHMSA. These procedures and records would be subject to ongoing audits by the WUTC for the life of the Project.

Changes for accuracy in Section 3.5 - Public Health and Safety should include the following;

At p. 3.5-3, the citations to 40 CFR 68 - Chemical Accident Prevention Provisions and 52 NFPA should be removed as incorrect. The federal Department of Transportation has jurisdiction over this facility's accident prevention provisions, and the correct citations to the applicable regulations are shown in the DEIS as 49 CFR 193 and 59A NFPA. 0027-3

At p. 3.5-13, first bulleted mitigation measure, please revise the nomenclature to reflect the correct requirement, as follows: 0027-4

> A Fire ~~Risk Assessment (NFPA 59A)~~Protection Evaluation would be completed ~~prior to construction that evaluates the level of risk present and identifies measures to reduce risk to an acceptable level.~~per the requirements of NFPA 59A 9.1.2.

This measure has already been complied with. On July 9, 2015, PSE provided the City of Tacoma's Fire Department with the requested Fire Protection Evaluation (FPE), which is incorporated into this comment letter in its entirety by this reference. The FPE comprehensively describes the potential types of fire and emergency incidents that could arise, describes the magnitude of the potential hazard, and scrupulously details the measures and resources implemented in siting, design and operations to ensure the safety risk is less than significant. 0027-5

At 3.5-13, second bulleted mitigation measure, please correct to reflect additional risk mitigation for vapor cloud explosion, as follows: 0027-6

> To ensure evacuation routes (including Alexander ~~Way~~Avenue, 11th Street and Taylor Way) in the vicinity of the project will remain open in the event of an LNG release, the facility design will incorporate mitigation measures to ensure that thermal radiation, ~~and~~ vapor dispersion, or the effects of a vapor cloud do~~es~~ not extend ~~beyond the land portions of the PSE and TOTE property lines.~~onto any of those streets.

At 3.5-17, this section should be revised to accurately reflect each entity's respective legal rights and duties as follows: 0027-7

> As a jurisdictional state, the WUTC Office of Pipeline Safety (OPS) has been delegated PHMSA authority for siting and technical assessment of the design, construction, and operation for compliance. The Coast Guard has responsibility for a design review of the ship to shore interface, ~~and~~ marine transportation, and maritime facility security. ~~However, the process and requirements to approve and accept the terminal design are less specific and the "Authority Having Jurisdiction" (AHJ) approval steps are not~~

0027-7
Continued

~~specifically defined in the LNG code.~~

The City of Tacoma is the authority for elements of the Project not under the purview of 49 CFR 192 and 49 CFR 193 as delegated to the WUTC OPS~~ffice of Pipeline Safety~~. These elements will include fire prevention, detection, and extinguishing systems (joint with WUTC), and regulations compliant with structures, ~~building design,~~ foundations, ~~design, site~~ civil and utility construction. ~~design, and structural design.~~

The City of Tacoma may request to participate in periodic site inspections with the WUTC OPS~~ffice of Pipeline Safety~~ staff in the~~ir~~ OPS responsibilities ~~review~~ per the PHMSA-prescribed review and approval process.

~~For the Project, the WUTC and the City of Tacoma are the AHJ for evaluating the balance of plant design and operations for compliance. At this time, the design of the Tacoma LNG facility is a "work in progress" and incomplete, and therefore should receive further review and validation prior to final authorization by the AHJ for construction of LNG facilities to begin. It is recommended that further validation be performed at major milestone points as a condition for approval, as follows:~~

~~a. A FERC style "Cryogenic Review" is conducted by an independent LNG expert(s) on behalf of the AHJ as a condition of approval for the Project. A "Cryogenic Review" is the same requirement for FERC jurisdictional projects performed after the engineering design and project hazard assessment review are completed, as a condition of approval. During the review, the final design documents and drawings are reviewed to validate the final design for code compliance, operability, maintenance, and fire prevention.~~

~~b. A report of findings is prepared by an independent LNG expert(s) from the Cryogenic Review and issued with recommendations to be incorporated in the design as a condition of approval.~~

~~c. After completion of the Cryogenic Review and incorporation of recommendations, status of engineering documents and drawings can be changed to "issued for construction."~~

~~d. After the Cryogenic Review, the LNG facility design is "frozen" where material changes to the LNG facility design requires a review of the change by an independent LNG expert(s) to confirm the design change is acceptable and approved.~~

~~e. As an option, the AHJ may request periodic site inspections during construction.~~

~~f. After mechanical completion of the LNG facility, and before the start of commissioning, an independent LNG expert(s) performs a walk-down of the site. Start of commissioning is signified by the introduction of hydrocarbons to the process for the first time, known as "first gas." The walk- down is performed to confirm that the completed plant design conforms to the design, and that safety, fire protection, and fire detection systems are in place and active as a condition for approval of commissioning to begin.~~

Section 3.7 - Aesthetics/Light and Glare

0027-8

PSE takes issue with the DEIS's conclusion that the LNG storage tank constitutes an adverse environmental impact, even if insignificant. The physical infrastructure will change with the removal of several large and small sprawling structures and replacement by a smaller processing facility and large storage tank, all compliant with current applicable lighting requirements. As proposed, the project is consistent with the applicable Container Port element of the City's comprehensive plan and the industrial zoning in the area. The new facilities are entirely consistent with the industrial viewshed and maritime activities in the Port of Tacoma. The impact is entirely consistent with other tall, wide, round, square, lighted, stationary, moving, dark, reflective and non-reflective elements of the viewscape, including multiple oil storage tanks varying in size, location and siting configurations. As such, PSE does not think that the cluttered industrial maritime viewscape will experience an adverse impact with the addition of this project. New infrastructure, otherwise consistent with all other facilities in a busy industrial maritime viewshed that is planned and zoned for such uses, does not constitute an adverse environmental impact. The conclusion should be revised to conclude the Project aesthetics do not constitute an adverse environmental impact.

Section 3.10 - Transportation

Tacoma LNG's impacts to transportation, traffic and road conditions are insignificant, and any mitigation required by SEPA[12] must be proportionate to that small impact.

- Insignificant traffic impacts: PSE concurs with the DEIS's conclusion that Tacoma LNG's traffic volumes are insignificant: "[a]s compared to daily traffic volumes on roadways in the vicinity of the project (see Table 3.10-1) including the addition of 60 vehicles would be insignificant."[13] This conclusion is supported by the assessment of existing traffic volumes generated from operations at the site now as compared to the site's redevelopment and operation as an LNG facility. Specifically, the DEIS notes that there are presently businesses operating at the proposed Tacoma LNG site that are currently contributing to traffic volumes and wear and tear to the roadways in the area, including Taylor Way.[14] With displacement by this project, during construction "all roadways would experience less than a 3% increase in daily traffic volumes."[15] In fact, Table 3.10-4 demonstrates that the levels of impact during construction on area roads only range between 0.3% and 2.5%. This impact declines during operations to a less than 1% impact on area roads: "[p]er day, up to 60 vehicles would be added to the traffic network during operations, representing less than 1 percent of existing traffic volumes."[16] 0027-9

- Preexisting Condition of Taylor Way: PSE agrees with the DEIS that Taylor Way currently shows significant wear and tear. The DEIS, at p. 3.10-13, states that "[p]oor roadway surface has been identified as an issue along Taylor Way, and it is possible that 0027-10

[12] This discussion is limited to mitigation under SEPA; road restoration policies that impose obligations under a non-SEPA authority, while still subject to the nexus and rough proportionality tests of *Nollan/Dolan/Koontz*, are separate obligations.

[13] DEIS at 3.10-15.

[14] DEIS at 3.10-12.

[15] Id.

[16] DEIS at 3.10-15 to 3.10-16.

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traffic oversize and overweight construction trucks could cause additional damage to roadway surface conditions."

PSE agrees with the first clause of this DEIS statement: Taylor Way is already a poor roadway surface. Its condition is a preexisting condition meriting an upgrade, reflected by the fact that the City of Tacoma has already placed Taylor Way on its 2015-2020 Capital Facilities Program.[17]

Nonetheless, PSE does not agree with the statement, in which the DEIS provides that it is 'possible' that Tacoma LNG-related traffic from oversize and overweight construction trucks could cause additional damage to roadway surface conditions. Road wear is primarily determined by the weight on each axel, not the presence of an overly wide or tall load. As far as loads that are 'overweight', the Project description does not provide for a need for any overweight vehicles requiring special permits, evaluation of every bridge and road crossing for sufficiency, etc. Instead, PSE anticipates that it and its contractors will size all loads or pieces of equipment into standard size and weights that can be transported by a normal semi-trailer.

To the extent that Tacoma LNG construction trucks contribute to added wear and tear on any identified construction route roads, mitigation for these impacts must be proportionate to the Project's impact to the roads as they existed immediately prior to construction. The simplest and most accurate way of documenting the condition of each road prior to construction is by videotaping it before construction. This allows for assessment of the project's actual impacts via a "before and after" review. The DEIS already requires videotaping as a mitigation measure, via the sixth bulleted in 3.10.6.1.

0027-11

- Safety and Reduction of Emergency Vehicle Response Times:[18] As discussed in the DEIS itself, and further addressed by the comments regarding Section 3.5 above, Tacoma LNG does not present significant adverse environmental impacts regarding safety, regardless of the condition of Taylor Way.

  A hazard is the potential for a certain harm, damage, or adverse effect on something under certain conditions. Risk is the likelihood that the harm, damage or adverse effect will occur. LNG facilities have an exceptional safety record. The Tacoma LNG Project as proposed presents neither a significant hazard nor is there significant risk of these hazards occurring as a result of the Project's siting, design, construction or operations. The Project will be compliant with all applicable federal, state and local law, rules and regulations.

  The assessment of the hazards presented by this proposal are already included in the DEIS (Section 3.5) and supplemented by the FPE. A review of previous incidents,

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[17] http://cms.cityoftacoma.org/finance/budget/2015-2016/cfp_2015-2020/Final_CFP_2015-2020.pdf at Chapter 2, pp. II-128, 197.

[18] This discussion should also be considered a part of PSE's comments regarding Section 3.11, Public Services and Utilities

0027-11
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regulatory requirements, and chemical hazards pertaining to plant operational safety and the storage and manufacture of flammable and combustible chemicals is covered by the DEIS Section 3.5, and the FPE. This includes a review of the design and safety features of the planned operations.

Management of these hazards to ensure the risk of an incident affecting public health and safety is less than significant is thoroughly discussed in the DEIS, as supplemented by the FPE. The FPE includes a consequence and impact analysis to assess potential significant impacts from development and operations of this particular facility. A professional review of the facility siting analysis conducted by the City's consultant in the course of preparing the DEIS concluded that the preliminary LNG design, construction, and integrity testing are compliant to 49 CFR Part 193, NFPA 59A, and USCG regulations. Further WUTC OPS (and PHMSA as requested by the WUTC) and TFD review of the facility, its operations and emergency management measures suitable for the facility is already accounted for by operation of law and pursuant to discussions between the City of Tacoma and the WUTC. Pursuant to recent discussions between the WUTC and the City, including the TFD, the WUTC will be confirming the framework of the parties' roles for incorporation into the FEIS. The WUTC OPS will apply all PHMSA regulations and compliance criteria to its review and approval of the final facility. The City of Tacoma, including its fire department, construction plans, operational safety and emergency response plans, and regular operations of the Tacoma LNG Facility. Both have enforcement authority over their respective areas of jurisdiction. Review of operational worker safety at the facility, including safety and emergency operations plans to mitigate potential impacts to environmental health to workers from construction and operations of the facility are required by DEIS Section 3.5. The public is specifically excluded from the site to minimize or eliminate any public health and safety risks. Special emergency response needs at the plant, including equipment and training needed to support U.S. Coast Guard and Tacoma LNG's in-house emergency responders will also be required by the DEIS. All of these requirements and mitigation measures are what reduce the risk of a significant incident to a de minimis level.

Based on the analysis described above, we do not think the analysis contained in the DEIS supports the statement at 3.10-16,[19] "the operation of a major LNG processing facility would pose increased health and safety risks in the vicinity of the Project, as described in Section 3.5 (Public Health and Safety)."

Similarly, we do not agree with the further conclusion in Chapter 3.5 that the very small risk of any hazards to the position that the Project is now a "major new risk factor" that

[19] *See, also*, DEIS at 3.10-19 ("[t]he project does add a new and significant risk…"; DEIS ES at p. 3, ES-5: "The Project does introduce a major new risk factor into an area with one of the City's lowest emergency response times."

requires reopening of closed Fire Station 15 close to Tacoma LNG[20] and in paving all lanes of Taylor Way to cut 40 seconds off of a 12-minute emergency response time.[21]

- Fire Station Reopening: PSE supports the mitigation measure of reopening Fire Station 15. PSE also concurs with the DEIS's acknowledgment that there is no fire station currently manned within the Port to serve any of the facilities already there or those reasonably foreseeable in the future. This pre-existing situation is the culmination of a variety of financial factors, even as the industrial activity in the Port has grown unmitigated as to fire protection within the last 10 years, including more fuels facilities (e.g., new oil tanks at the Targa site) and other proposed industrial operations such as the PTT terminal. The desirability of a fire station to serve all activities in the Port of Tacoma is acknowledged. The existing deficiency detailed in the DEIS, as well as the Emergency Response/Intelligent Transportation Systems (ER/ITS) draft reports published to date and incorporated herein by this reference is similarly undisputed. 0027-12

  PSE asks that the FEIS acknowledge the new revenues to the City as a result of construction of the facility and, to the extent such funds are inadequate to offset Tacoma LNG's proportionate mitigation obligations, provide that fire station reopening mitigation be required in proportion to the impact that Tacoma LNG will have on the Port's current and reasonably foreseeable fire protection needs.

- Reducing Emergency Response Time by 40 Seconds: The DEIS does an adequate review of the existing response times for emergency response in the Port. The current situation is an existing deficiency that could conceivably affect residential fire response elsewhere if a multi-station response in the Port occurred simultaneously with a call outside the Port area. The DEIS makes it abundantly clear that the fire protection problem that needs solving is not just that of Tacoma LNG - it is that of the entire Port and beyond.

  The DEIS indicates that the 12.7 minute response time could be ameliorated by paving of Taylor Way to reduce the current 12.7 minute response time by 40 seconds, but there is no significant public health and safety risk to support this need. 0027-13

  - This state-of-the-art facility does not present an unmitigated significant risk of an adverse impact to public health and safety in the first instance. The DEIS cannot discount its own exhaustive analysis in Section 3.5 regarding the safety of LNG generally, the lengthy safety measures built into every phase of this Project and the additional mitigation measures that will continue throughout the lifetime of the project to all but eliminate risk of any identified hazard of any significant magnitude.

[20] FEIS at Section 3.10 - Transportation, last paragraph of Section 3.10.6.2 - Operations, at p. 3.10-19
[21] FEIS at Section 3.10 - Transportation, first bullet in Section 3.10.6.2 - Operations, at p. 3.10-19

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- In the unlikely instance of a catastrophic event, there is no significant hazard to the public health and safety. The public is excluded from the site by the siting, design, construction and operations measures required by federal, state and local laws and regulations, regulatory oversight and enforcement.

- The 12.7-minute response reduction argument has no nexus to the development of Tacoma LNG. The response times are not the result of roadway conditions being degraded by construction or operations of Tacoma LNG, as those impacts are only a maximum of 2.5% and less than 1% respectively. Instead, response times are the result of a variety of factors, including without limit, rail crossings that impede traffic, existing and future traffic, the elimination of fire houses manned for structural fires or emergency response within the Port, lack of other new and reasonably foreseeable industrial developments' contribution to fire response, and the conditions of roads within the Port.[22]

- The 12.7-minute response time does not account for the proposed mitigation measure of a reopened and manned fire station on Taylor Way near the facility.

- A 40-second reduction in a 12.7-minute (762 second) event is a 5.2% improvement. Conversely, the estimated cost to repave all lanes of Taylor Way ranges between $12 and $15 million per the updated June, 2015 ER/ITS report.

- The DEIS's 40-second reduction in response time through the paving of Taylor Way was based on an early 2015 version of the ER portion of the ER/ITS. In the updated ER study (dated June, 2015 and before the issuance of the DEIS) this number is refined to "*between* "15 and 40 second".[23] (Italic added).

- In regard to improved response times if all road improvements including the Taylor Way repave are completed by 2020, the City's own consultant concluded that even the "slight improvements in travel [response] time due to new roadway connections are somewhat offset by increases in general traffic congestion."[24]

- The June ER/ITS, in its Recommendations, acknowledged that *"[r]esponse times are not significantly affected in 2020 or 2035 with the planned roadway projects."*[25]

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[22] June 2015 ER/ITS.
[23] June, 2015 ER/ITS at p. 32.
[24] June, 2015 ER/ITS at p. 24.
[25] June, 2015 ER/ITS at p. 36. (Italic added).

0027-13 Continued

- The new ER/ITS report itself acknowledges that although the increase in manufacturing on the Blair/Hylebos Peninsula may present operations that potentially add to the demand for fire services, "these developments will help restore the economic and tax-generating base within the Tideflats."[26] Those benefits would already be realized upon construction of Tacoma LNG, as the positive fiscal impacts to the City as a result of the project construction phase alone total $5.17 million.

The nexus and proportionality requirements are not met for an exercise of substantive SEPA authority to impose mitigation to pave a road in order to improve fire response for this project.[27].

0027-14

ITS Funding: PSE has contributed $75,000 to the City toward the cost of the ER/ITS study. We understand that grant funding for 50% of the remaining costs may have been identified already. Contribution to the remaining unfunded need for Phase I ITS may be an appropriate mitigation measure taking into account the amount already contributed and the $5.17 in new revenues to the City as a result of the Project's construction.

0027-15

Changes consistent with the foregoing should be made to Section 3.10 of the FEIS as follows: At 3.10.3.10 - Potential Future Transportation Improvement Projects, the following should be added as a result of the recent 2016-2017 budget passed by the Washington Legislature and signed by Gov. Inslee in July, 2015 after the release of the DEIS:

> Tacoma to Puyallup-New Freeway received funding recently when the Governor signed the new-law Connecting Washington transportation bill. Design of the SR 167 extension, six lane facility (two general purpose, one HOV lane each direction) in Puyallup from SR 161 to I-5, and four lane facility (two general purpose lanes each direction) from I-5 to SR 509 is about 15 percent complete, to include new interchanges at SR509/54th, SR 167/Valley Avenue and I-5/SR 167. There is a new 70th Ave structure crossing over I-5. Currently the project is preparing a NEPA Re-Evaluation for FHWA approval. Design Documentation and Plans for Approval will be the next milestone document for this project. Our Record of Decision was signed in October 2007. There have been a few a more parcels acquired, however the alignment has been refined (changed) from the FEIS to reduce right of way (ROW) costs, reduce environmental impacts, and reduce construction costs (see attached pdf). We are in beginning efforts of scheduling an access hearing for Spring 2016, which will result in new ROW plans for continued acquisition by September 2016. We have been allocated funds over the next four biennia (2015-2023). The key piece being completion of ROW acquisition throughout the corridor. Relocation of businesses once ROW is acquired will take approximately 3 years to complete. Construction of portions of the overall project (e.g. wetland mitigation or riparian restoration or stream relocation project) could starts at early as 2017.

[26] June, 2015 ER/ITS at p. 4.
[27] Based on constitutional law from *Nollan* to *Dolan* to *Koontz*.

On p. 3.10-16, at Safety, the following revisions should be made consistent with the DEIS and the foregoing: 0027-16

> The number of vehicle collisions and the type of collisions within the Tacoma LNG Facility site are not expected to change as a result of the Proposed Action. The nominal increase in traffic volume would not be expected to cause increased traffic incidents, and no changes in traffic patterns are anticipated.
>
> Introduction of LNG tank trucks on the roadways near the Tacoma LNG Facility site would not significantly affect safety. The Port of Tacoma currently experiences heavy truck traffic, and any new LNG tank trucks associated with the Proposed Action would be fewer than the number currently generated at the Tacoma LNG Facility site by PCC Logistics.
>
> ~~However, the operation of a major LNG processing facility would pose increased health and safety risks in the vicinity of the Project, as described in Section 3.5 (Public Health and Safety). These increased risks would result in a greater need for transportation improvements to ensure emergency services' access to the area.~~

At 3.10.6.1 - Avoidance, Minimization, and Mitigation - Construction, the second to last bullet should be revised as follows: 0027-17

- Following installation of the pipeline~~ with the exception of Taylor Way~~, roads would be restored by repaving the travel lane impacted by the pipeline construction pursuant to ~~the~~appropriate plans and specifications adopted by~~of~~ Tacoma Public Works, City of Fife Public Works, and Pierce County Public Works.

At 3.10.6.1 - Avoidance, Minimization, and Mitigation - Construction, the last bullet should be revised as follows: 0027-18

> For the 2 miles of Taylor Way from SR 509 to the Project site, restoration requirements for areas disturbed by placement of the new gas line will be based on the City Right-of-Way Restoration Policy requirements, which will be determined by the design and construction methodology of the Project's new gas line design. ~~Utility conflicts, utility separation requirements, and subsurface soils conditions will determine the alignment of the gas main within the Taylor Way roadway. Standard Plan SU-15A requires the full trench to be repaired, including a 2-foot-wide cut back zone on both sides of the trench. Transverse joints cannot fall within the wheel path; therefore, the pavement restoration may include up to two full lanes. Standard Plan PD-01 requires that the pavement design section satisfy the specifications for a Heavy Haul Industrial Corridor. The method of construction will also impact restoration requirements. If bore pits are being proposed, Section 2.3 of the Restoration Policy requires the consolidation of roadway excavations that are within 75 feet of each other. This is typically accomplished with a grind and overlay.~~

In regard to Section 3.10.6.2, the following revisions should be made consistent with the foregoing. Parenthetically, discussion of any mitigation measures for 3.5 - Public Health and Safety and 3.11 -Public Services and Utilities does not belong in 3.10 - Transportation. 0027-19

> 3.10.6.2 Operations
> Project operations are not likely to have an adverse impact on vehicle delay times, vehicle queues, or congestion during the afternoon peak hour. Impacts on traffic outside the peak hour are not expected based on the Project operation's nominal effect on traffic volumes. However, the Project is in ~~does add a new and significant risk to~~ an area of the City that currently does not meet the City's standard for emergency services' response time. The following mitigation measure~~s~~ would help improve emergency services' ability to respond to emergencies at ~~on the Blair/Hybelos peninsula and~~ the Project site. ~~Section 3.5 (Public Health and Safety) also addresses the increased public health and safety risks.~~
> ~~• The ER/ITS Study indicates that improving Taylor Way to meet current City standards will improve emergency response travel time by approximately 40 seconds. Establishment of a Local Improvement District with participation by PSE to rebuild Taylor Way to Heavy Haul Industrial Corridor standards should be considered.~~
> • Construction of Phase I of the planned ITS Infrastructure needed for basic information sharing among stakeholders, as defined in the ER/ITS study.
>
> ~~In addition, as described in Section 3.11 (Public Services and Utilities), it is recommended a new unit of the Tacoma Fire Department with fire response, emergency medical services, and hazardous materials operations capabilities be stationed in proximity to the Tacoma LNG Facility.~~

At 3.10.7, the following revision should be made consistent with the foregoing: 0027-20

> Unavoidable adverse impacts on traffic and transportation are also not expected as a result of operating the Project. ~~The need for additional access for emergency services to a site with increased public health and safety needs during operation of the Tacoma LNG Facility would be addressed by the mitigation measures defined in Section 3.10.6.2.~~

Chapter 3.11 - Public Services and Utilities

The discussion regarding Chapter 3.10 - Transportation is reincorporated by this reference regarding Public Services and Utilities.

At Section 3.11.4.1 - Fire Protection, the construction of Tacoma LNG does not present an increased risk of an emergency event requiring the mitigation measures described and discussed above. The construction methodologies are similar to other major construction projects. The presence of "potentially hazardous materials on site (including diesel, fuel oil, lubricant and others)…" occurs on other major construction projects, including construction project equipment, demolishing structures and the like. 0027-21

The following revision to p. 3.11-11 is recommended accordingly:

0027-21 Continued

Fire Protection

This subsection addresses potential impacts to fire protection services that would result from the construction of the Project. ~~There is an increased risk of an emergency event requiring fire protection services during the construction period, which would require the application of mitigation measures listed in Section 3.5.6 (Avoidance, Minimization, and Mitigation), as well as Section 3.11.6 (Avoidance, Minimization, and Mitigation).~~

Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System

Construction methods, materials, Labor and Industries safety regulations and other applicable construction safety measures are conventional to project demolition and construction in the City of Tacoma, and present no probability of a significant adverse environmental impact. ~~Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could result in an emergency event and an increase in emergency calls to fire stations in the vicinity of the Project as described in Section 3.11.3.1 (Fire Protection).~~

~~The increased level of activity on site during demolition and construction would increase the likelihood of a fire or hazardous material incident. The use of construction machinery would likely result in the increased presence and use of potentially hazardous materials on site (including diesel, fuel oil, lubricant and others), as well as an increase in potential sources of ignition. In addition, because the initial stages of construction for the Tacoma LNG Facility would involve the decommissioning and/or demolition of existing industrial facilities, there could be an additional increased risk of hazardous materials incident during this period.~~

Based on traffic modeling in the vicinity of the Project, temporary increases in traffic due to construction would not significantly impact the ability of fire protection services to access the Port of Tacoma.

0027-22

Consistent with the discussion throughout this letter, and further consistent with the verbatim but italicized introductory language below, the DEIS concludes that most operational incidents would not likely require fire protection services. The plant will be designed, constructed and operated in accordance with the most modern and exacting applicable laws and regulations. The DEIS is replete with discussion, analysis and support for this conclusion. The text on p. 3.11-17 should be revised as follows:

Most operational incidents would likely not require direct intervention of fire protection services due to the safeguards described above. However, demand for fire protection services would nevertheless likely be increased as a result of Project operations, for the following reasons:

- Facility emergency response procedures involve notification of first responders from the Tacoma Fire Department who would be obligated to respond;
- Even if no direct fire response is necessary by fire protection services, an operational incident would likely require the intervention of auxiliary services

provided by the Tacoma Fire Department, such as EMS or hazardous materials response; 0027-22 Continued

- Reopening of Fire Station 15 is a recommend mitigation measures that places EMS responders in close proximity for a timely response.
- ~~Those rare incidents that would require direct intervention of fire response services are likely to be very severe and require significant amounts of Tacoma Fire Department staff and equipment for both direct fire response and auxiliary services; and~~
- ~~As noted in Section 3.11.4.1 (Construction Impacts), the relative lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident.~~

~~The operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would therefore need to include mitigation measures to address these impacts, as listed in Section 3.11.6 (Avoidance, Minimization, and Mitigation) and Section 3.5 (Health and Safety).~~

At 3.11.6 - Avoidance, Minimization, and Mitigation, page 3.11-22, the last sentence italicized in the paragraph excerpted below is unclear as to intent or propriety under SEPA. If the intent is to indicate that revenues derived from the construction of Tacoma LNG will be distributed in a fashion determined by the City that is appropriate. However, to suggest that mitigation for impacts occasioned by Tacoma LNG falls short because those new revenues were already distributed elsewhere and are simply unavailable is not appropriate under SEPA because it potentially skews the analysis of nexus and proportionality. PSE is confident that this is not the intent of such statement. However, please correct to conform to SEPA and clarify the intent of the statement. 0027-23

> In addition to the various mitigation measures described in this section, increased demand for public services or utilities during construction and operation of the Project would be partially mitigated by an increase in City tax revenue generated by the Proposed Action through the process described in Section 3.12.4.2 (Operations Impacts). *Nonetheless, new City tax revenues generated by the Proposed Action would only offset projected impacts to public services and the cost of required mitigation to a limited extent, and would likely need to be redistributed to benefit the full range of City services.*

In regard to the first bulleted mitigation measure in 3.11.6.1, at p. 3.11-22 and its identical counterpart in 3.11.6.2, at p. 3.11-24, PSE suggests the following revisions in accordance with the most recent ER report dated June 2015: 0027-24

- A new unit of the Tacoma Fire Department ~~with fire response and EMS response capabilities and hazardous materials awareness~~ appropriately staffed in accordance with the needs analyzed in the ER report of June, 2015 would be stationed at Fire Station 15, in proximity to the site of the Tacoma LNG Facility at the time operations are commenced at Tacoma LNG. Mitigation for the costs of reopening Fire Station 15 should be accurately evaluated and proportionate

mitigation for unmet need considered. ~~for the duration of construction. This would address the increased risk of incidents requiring fire protection and EMS, reduce response times to potential incidents and avoid impacts to fire protection in other parts of the Tacoma Fire Department if an incident occurs on site.~~ 0027-24 Continued

0027-25

Insofar as there would be a new need to fund the on-going operations of Fire Station 15, we appreciate that the DEIS recognizes that this project will generate $1.374 million per year in direct new tax revenues, not to mention the other reasonably foreseeable tax-revenue generating projects proposed for the Blair-Hylebos Peninsula or the significant but uncalculated indirect economic activity that flows from Tacoma LNG. Determining proportionate shares for an on-going expense in the face of a variety of new revenues accruing in the future is particularly difficult. Nevertheless, PSE recognizes that those costs (e.g., staffing) are an on-going expense. PSE acknowledges that the determination of how the City allocates new, on-going tax revenues from the operations of Tacoma LNG is soundly within the City's discretion. Nevertheless, PSE strongly encourages the City to consider dedicating on-going tax revenues from the operations of Tacoma LNG to the staffing of Fire Station 15.

0027-26

In regard to 3.11.7 Conclusion, the following revisions are suggested as consistent with the entirety of the DEIS and the foregoing comments:

3.11.7 Conclusion

~~With the exception of fire protection services, t~~ The mitigation measures contained in this Final EIS and the design, construction, and operations and safety measures, standards and regulations applicable to Tacoma LNG, as periodically inspected for continuing compliance by the appropriate jurisdictions with authority, enable this Facility to be sited, built and operated safely in the city of Tacoma. As appropriately mitigated, the Proposed Action would result in no significant or unavoidable impacts to public services and utilities potentially associated with construction, operation, and decommissioning of the Project~~, so long as the appropriate measures described in Section 3.11.6 (Avoidance, Minimization, and Mitigation) are implemented.~~

~~However, the Proposed Action would result in significant impacts to fire protection services, for the following reasons:~~

- ~~Proposed Action- related activities, during both the construction and operations phases, wouldresult in increased risk of incidents requiring fire protection, EMS and hazardous materials response.~~
- ~~The lack of alternatives to Stations 3 and 12 for rapid response at the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident. For example, Station 3 is the only station serving Northeast Tacoma. Station 12 serves the entire Port of Tacoma, which includes other high risk sites.~~

~~The mitigation measures described in Section 3.11.6.1 (Tacoma LNG Facility) and Section (Operations) would reduce these risk to a less than significant level, in particular through the addition of new firefighting, EMS and hazardous materials capacity in the~~

0027-26 Continued

~~vicinity of the Project, and through the implementation of health and safety and emergency protocols detailed in Section 3.5 (Public Health and Safety).~~

Last, as much a parenthetical comment as anything, the last paragraph on p. 3.11-26, inclusive of its 3 bullets, seem inconsistent with the fundamental purpose of SEPA, which is to reasonably and thoroughly discuss a proposal's probable significant adverse environmental impacts and explore their potential mitigation in order to ensure decision-makers are fully informed.

CONCLUSION

Tacoma LNG would bring significant private investment by TOTE and PSE were it to develop in the City of Tacoma. The facility would be state-of-the-art, and subject to an exacting and exhaustive list of federal, state and local laws and regulations. New taxes revenues of $5.17 million would be generated for Tacoma from construction-related activities, and an additional ~$1.5 million +/- per year from on-going operations. Indirect economic activity resulting from the project in the way of new jobs, additional spending and new indirect tax revenues is over $170 million in the Tacoma-Fife-Pierce County area. To the extent the project results in impacts that are unmitigated by the generation of the new revenues to the City of Tacoma, as discussed above, mitigation measures that are proportionate to these impacts should be required as stated above. Accordingly, the FEIS should incorporate these changes and be published to inform decision-makers' actions to permit and otherwise authorize Tacoma LNG.

We appreciate the City of Tacoma's engagement and dedication to this process.

Very truly yours,

Puget Sound Energy, Inc.

Larry Tornberg

Larry Tornberg
Senior Siting Project Manager

Cc: Roger Garratt
Lorna Luebbe
Jim Hogan

Number	Issue	Response
0027-1	Plants and Animals	With regard to Table ES-1, in Section 3.4, the commenter notes that the U.S. Fish and Wildlife Service has concluded that observers are not necessary for Marbled Murrelets in the context of this project. The commenter requests that the Marbled Murrelet (last bulleted item) be removed from the table. **Response: The final EIS will reflect this requested change.**
0027-2	Public Health and Safety	The commenter notes that the LNG Facility will not be accessible to the public but that PSE will be providing mitigation related to this loss pursuant to the City of Tacoma's Shoreline Master Program. **Response: Comment noted.**
0027-3	Public Health and Safety	With regard to page 3.5-3, the commenter requests that citations to 40 CFR 68 and 52 NFPA be corrected to 49 CFR 193 and 59A NFPA, respectively. **Response: The final EIS will reflect this request.**
0027-4	Public Health and Safety	With regard to draft EIS page 3.5-13, the commenter requests revision of nomenclature to reflect current requirements, and the following correction: A Fire Risk Assessment (NFPA 59A)Protection Evaluation would be completed prior to construction that evaluates the level of risk present and identified measures to reduce risk to an acceptable level per the requirements of NFPA 59A 9.1.2. **Response: The final EIS will reflect this request.**
0027-5	Public Health and Safety	The commenter notes that PSE provided the City of Tacoma with a Fire Protection Evaluation (FPE) on July 9, 2015, complying with the requirement cited in the prior response. **Response: The City of Tacoma is currently reviewing the FPE. The final EIS will note that an FPE has been submitted.**
0027-6	Public Health and Safety	With regard to draft EIS page 3.5-13, second bulleted mitigation measure, the commenter requests the following modification: To ensure evacuation routes (including Alexander WayAvenue, 11th Street and Taylor Way) in the vicinity of the project will remain open in the event of an LNG release, the facility design will incorporate mitigation measures to ensure that thermal radiation, and vapor dispersion, or the effects of a vapor clous does not extend onto any of those streets. **Response: The intent of this paragraph was to limit thermal radiation and vapor dispersion to within the property lines of the Tacoma LNG site and the TOTE property in the vicinity of the LNG fueling operation, not limited to the streets. The final EIS will keep the original reference to within the property lines.**
0027-7	Public Health and Safety	With regard to the text on page 3.5-17, Commenter requests that the text regarding each entity's rights and responsibilities be revised. Commenter proposes a number of changes. **Response: This section will be revised in the final EIS. The commenter's specific proposed changes will be taken into consideration.**
0027-7 cont'd	Public Health and Safety	See previous response.

Number	Issue	Response
0027-8	Aesthetics, Light and Glare	The commenter "takes issue with the draft EIS's conclusion that the LNG storage tank constitutes an adverse environmental impact, even if insignificant." The commenter believes that the storage tank is fully consistent with other elements of the surrounding industrial landscape. The commenter recommends that "the conclusion should be revised to conclude the Project aesthetics do not constitute an adverse environmental impact." **Response: The City of Tacoma recognizes that the storage tank may be consistent with the surrounding industrial landscape, but it still introduces a significant and dominant new feature to senstive viewers overlooking the project site. The draft EIS describes this by stating that the "...asethetic impact of the LNG storage tank would be adverse for views from this area." The final EIS will retain this characterization, but some editorial changes will be made to the mitigation section.**
0027-9	Transportation	With regard to Section 3.10, the commenter concurs with the draft EIS conclusion that the traffic volumes associated with Tacoma LNG are insignificant. **Response: Comment noted.**
0027-10	Transportation	With regard to Section 3.10, the commenter "agrees with the draft EIS that Taylor Way currently shows significant wear and tear" and "is already a poor roadway surface." The commenter disagrees with the assertion in the draft EIS that "it is 'possible' that Tacoma LNG-related traffic [...] could cause additional damage to roadway surface conditions." **Response: Comment noted. The City of Tacoma does not agree and notes that in the Transportation Section it is stated "Approximately 11 large or heavy-duty vehicles associated with construction could be used during a typical day of peak construction," which could cause additional damage to roadway surface conditions.**
0027-10 cont'd	Transportation	See previous comment.
0027-11	Transportation	The commenter notes that draft EIS section 3.5 (Public Health and Safety) establishes that the operation of the Tacoma LNG facility would not "present significant adverse environmental impacts regarding safety, regardless of the condition of Taylor Way." Therefore, the commenter disagrees with the statement on draft EIS page 3.10-16, whereby "the operation of a major LNG processing facility would pose increased health and safety risks in the vicinity of the Project, as described in Section 3.5". **Response: Comment noted. A word search for "significant, adverse, and environmental" did not reveal any reference to Taylor Way. However, section 3.5 does describe numerous LNG hazards such as cryogenic burns, flammability, and aphyxiation; moreover, there are other industrial accidents that could occur on site that would require emergency responders to be on site as quickly as possible.**
0027-11 cont'd	Transportation	See previous response.

Number	Issue	Response
0027-12	Transportation	This comment applies to the Public Services and Utilities section as well as Transportation. The commenter (PSE) supports the Fire Station 15 reopening, reflecting existing deficiencies and the increased need from foreseeable facilities in the area. The commenter asks that the final EIS acknowledge new revenue from the Proposed Action and set forth that PSE's share of cost for reopening Fire Station 15 be proportionate to mitigation obligations imposed by Tacoma LNG's impacts. **Response: Comment noted. The final EIS will reflect the agreed upon mitigation measure of reopening Fire Station 15.**
0027-13	Transportation	The commenter states that there is no public health and safety risk to support reducing the current 12.7-minute response time to the proposed Tacoma LNG Facility site, and therefore no nexus or proportionality in requiring the repaving of Taylor Way as mitigation for the Proposed Action. The commenter offers a variety of reasons, including: The proposed facility would not present an unmitigated significant risk of adverse impact to public health and safety. There would be no significant hazard to public health and safey in a catastrophic event. The 12.7-minute response time has no nexus to the development of Tacoma LNG and is the result of a variety of pre-existing factors. The 12.7 minute response time does not account for the proposed mitigation measure of reopening Fire Station no. 15. A 40-second improvement in a 12.7 minute event is a 5.2% improvement. The improvement has been estimated at 15 to 40 seconds by the updated ER study rather than 40 seconds. This improvement in travel time is expected to be lost by increases in roadway congestion by 2020. Developments such as Tacoma LNG on the Tideflats, although they may potentially add to the demand for fire services, generate significant positive fiscal impacts. **Response: The City of Tacoma disagrees with the contentions regarding the absence of significant risk in general, and in a catastrophic event in particular. The City of Tacoma further disagrees with the assertion that the current emergency bears no nexus to Tacoma LNG. Both construction and operation of the Tacoma LNG facility will increase the need for emergency services in the area, for the reasons cited in the draft EIS. The City of Tacoma further notes that the reopening of Fire Station no. 15 will not be immediate and will require refurbishing of the building, meaning that emergency response services will continue to be provided from Fire Stations no. 3 and 12 in the intervening period.** **For these reasons, the City of Tacoma in general disagrees with the comment, but nonetheless does recognize the significant cost to the Project to implement the proposed mitigation for Taylor Way. For this reason, the City of Tacoma, the Port of Tacoma, and PSE have reached and agreement for rebuilding Taylor Way to Heavy Haul Standards.**
0027-13 cont'd	Transportation	See previous response.
0027-13 cont'd	Transportation	See previous response.

Number	Issue	Response
0027-14	Transportation	The commenter notes that PSE has contributed $75,000 toward the cost of the Emergency Response/Intelligent Transportation Systems (ER/ITS) study and proposes that contribution to the remaining unfunded need for Phase I ITS may be an appropriate mitigation measure taking into account the $5.17 million in new revenues to the City as a result of the Proposed Action. **Response: Comment noted, but new revenue resulting from the Proposed Action will be needed to re-establish and maintain operations of the re-opened fire station.**
0027-15	Transportation	The commenter notes upcoming updates regarding SR 167 and proposes changes to the text in draft EIS section 3.10.3.10. **Response: Comment noted. The final EIS will reflect changes to the text proposed by the Washington State Department of Transportation (see response 0022-1).**
0027-16	Transportation	With regard to text on page 3.10-16, the commenter requests that the following paragraph concerning Safety be removed: However, the operation of a major LNG processing facility would pose increased health and safety risks in the vicinity of the Project, as described in Section 3.5 (Public Health and Safety). These increased risks would result in a greater need for transportation improvements to ensure emergency services' access to the area. **Response: Comment noted, no changes will be made in the final EIS.**
0027-17	Transportation	With regard to section 3.10.6.1, the commenter requests minor modifications to a mitigation measure, specifically: Following installation of the pipeline with the exception of Taylor Way, roads would be restored by repaving the travel lane impacted by the pipeline construction pursuant to theappropriate plans and specifications adopted byof Tacoma Public Works, City of Fife Public Works, and Pierce County Public Works. **Response: The proposed changes will be made in the final EIS.**
0027-18	Transportation	With regard to draft EIS section 3.10.6.1, the commenter requests that the technical specificity in the text regarding road reconstruction plans be removed. **Response: The final EIS will reflect the requested changes. However, the specifics to be deleted from the final EIS will be reflected in permit conditions.**

Number	Issue	Response
0027-19	Transportation	With regard to draft EIS section 3.10.6.2, the commenter requests edits to the text as follows: Project operations are not likely to have an adverse impact on vehicle delay times, vehicle queues, or congestion during the afternoon peak hour. Impacts on traffi outside the peak hour are not expected based on the Project operation's nominal effect on trffic volumes. However, the Project is in does add a new and significant risk to an area of the City that currently does not meet the City's standard for emergency services' response time. The following mitigation measures would help improve emergency services' ability to respond to emergencies at on the Blair/Hylebos peninsula and the Project site. Section 3.5 (Public Health and Safety) also addresses the increased public health and safety risks. The ER/ITS study indicates that improving Taylor Way to meet current City standards will improve emergency response travel time by approximately 40 seconds. Establishment of a Local Improvement District with participation by PSE to rebuild Taylor Way to Heavy Haul Industrial Corridor standards should be considered. Construction of the Phase I of the planned ITS infrastructure needed for basic information sharing among stakeholders, as defined in the ER/ITS study. In addition, as described in Section 3.11 (Public Services and Utilities), it is recommended a new unit of the Tacoma Fire Department with fire response, emergency medical services, and hazardous materials operations capabilities be stations in proximity to the Tacoma LNG Facility. **Response: Comment noted, some of the recommended changes will be incorporated into the final EIS.**
0027-20	Transportation	With regard to draft EIS section 3.10.7, the commenter asks that the reference to access for emergency services be removed and the text revised as follows: Unavoidable adverse impacts on traffic and transportation are also not expected as a result of operating the Project. The need for additional access for emergency services to a site with increased public health and safety needs during operation of the Tacoma LNG Facility would be addressed by the mitigation measures defined in Section 3.10.6.2. **Response: The City of Tacoma disagrees with this deletion. No changes will be made to this section in the final EIS in response to this comment.**

Number	Issue	Response
0027-21	Public Services and Utilities	With regard to Section 3.11.4.1, the commenter asserts that "the construction of Tacoma LNG does not present an increased risk of an emergency event." Accordingly, the commenter requests edits to the text at page 3.11-11 reflecting this position, justified by the fact that construction of Tacoma LNG will follow safety and other standards typical of major construction projects: Fire Protection This subsection addresses potential impacts to fire protection services that would result from the construction of the Project. There is an increased risk of an emergency event requiring fire protection services during the construction period, which would require the application of mitigation measures listed in Section 3.5.6 (Avoidance, Minimization and Mitigation), as well as Section 3.11.6 (Avoidance, Minimization and Mitigation). *Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System* Construction methods, materials, Labor and Industries safety regulations and other applicable construction safety measures are conventional to project demolition and construction in the City of Tacoma, and present no probability of a significant adverse environmental impact. Construction of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System could result in an emergency event and an invrease in emergency calls to fire stations in the vicinity of the Project as described in Section 3.11.3.1 (Fire Protection). The increaswed level of activity on site during demolition and construction would increase the likelihood of a fire or hazardous material incident. The use of construction machinery would likely result in the increased presence and use of potentially hazardous materials on site (including diesel, fuel oil, lubricant and others), as well as an increase in potential sources of ignition. In addition, because the initial stages of construction for the Tacoma LNG Facility would involve the decommissioning and/or demolition of existing industrial facilities, there could be an additional increased risk of hazardous materials incident during this period. **Response: The City of Tacoma disagrees with the proposed deletions. Construction of the project, even following applicable safety protocols, does increase risk of an emergency event compared to the current situation (no construction), due to the hazardous nature of construction in general. No changes will be made to this section in the final EIS in response to this comment.**
0027-21 cont'd	Public Services and Utilities	See previous response.

Number	Issue	Response
0027-22	Public Services and Utilities	With regard to draft EIS page 3.11-17, the commenter requests edits regarding the need for fire protection services reflecting the fact that "most operational incidents would likely not require direct intervention of fire protection services." Edits include adding the following bullet: Reopening of Fire Station 15 is a recommended mitigation measure that places EMS responders in close proximity for a timely response. Those rare incidents that would require direct intervention of fire response services are likely to be very sever and require significant amounts of Tacoma Fire Department staff and equipment for both direct fire response and auxiliary services. As noted in Section 3.11.4.1 (Construction Impacts), the relative lack of alternatives to Stations 3 and 12 for rapid response ad the Tacoma LNG Facility and TOTE Maine Vessel LNG Fueling System could leave other parts of the Tacoma Fire Department's service area temporarily unprotected in case of such an incident. The operation of the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System would therefore need to include mitigation measures to address these impacts, as listed in Section 3.11.6 (Avoidance, Minimization and Mitigation) and Section 3.5 (Health and Safety). **Response: The City of Tacoma disagrees with the extent of the deletions. Some edits will be made to the text in the final EIS, but not the proposed deletions.**
0027-22 cont'd	Public Services and Utilities	See previous response.
0027-23		The commenter requests that the intent of the following statement be clarified to conform to SEPA: *In addition to the various mitigation measures described in this section, increased demand for public services or utilities during construction and operation of the Project would be partially mititated by an increase in City tax revenue generated by the Proposed Action through the process described in Section 3.12.4.2 (Operations Impacts). Nonetheless, new City tax revenues generated by the Proposed Action would only offset projected impacts to public services and the cost of required mitigation to a limited extent, and would likely need to be redistributed to benefit the full range of City services.* **Response: Comment noted. The underlined sentece will be edited to the following in the final EIS:** ***"Nonetheless, new City tax revenues generated by the Proposed Action would only offset projected impacts to public services and the cost of required mitigation to a limited extent."***

Number	Issue	Response
0027-24	Transportation	The commenter suggests edits to the first bulleted mitigation mesure in draft EIS section 3.11.6.1, and its identical counterpart in section 3.11.6.2, as follows: A new unit of the Tacoma Fire Department with fire response and EMS response capabilities and hazardous materials awareness appropriately staffed in accordance with the needs analyzed in the ER report of June, 2015 would be stationed at Fire Station 15, in proximity to the site of the Tacoma LNG Facility at the time operations are commenced at Tacoma LNG. Mitigation for the costs of reopening Fire Station 15 should be accurately evaluated and proportionate mitigation for unmet need considered. for the duration of construction. This would address the increased risk of invidents requiring fire protection and EMS, reduce response times to potential incidents and avoid impacts to fire protection in other parts of the Tacoma Fire Department if an incidient occurs on site. **Response: Comment noted. Some of the recommended edits will be incorporated into the final EIS.**
0027-24 cont'd		See previous response.
0027-25	Public Services and Utilities	The commenter encourages the City of Tacoma to consider dedicating ongoing tax revenues from the operation of Tacoma LNG to the staffing of Fire Station 15. **Response: Comment noted.**
0027-26	Public Services and Utilities	The commenter (PSE) proposes significant edits to Section 3.11.7, the conclusion of the Transportation section, reflecting commenter's positon that the Proposed Action would result in no significant or unavoidable impacts to public services and utilities, including fire response services. **Response: The City of Tacoma disagrees with this position and the proposed edits. No changes will be made in response to this comment.**
0027-26 cont'd	Public Services and Utilities	See previous response.

July 23, 2015

Shirley Schultz
Project Manager
City of Tacoma Planning Department

Re: LNG project at the Port of Tacoma

Dear Ms. Schultz:

0028-1

As a former Mayor and current resident of the City of Tacoma, I have both a strong interest and a unique perspective on what is best for our community and our citizenry. It is from this perspective that I wish to provide my support for the LNG project Puget Sound Energy has proposed to be located at the Port of Tacoma.

The environmental benefits of this project are clear. It is being driven by the need to provide a cleaner fuel alternative for maritime vessels owned by Totem Ocean Trailer Express (TOTE), and berthed at the Port of Tacoma. The bottom line is that the LNG facility fueling TOTE ships will help reduce greenhouse gas emissions and virtually eliminate visible particulate emissions. This is a very favorable outcome for the citizens of Tacoma and the entire South Sound region, namely better air quality and an accompanying reduction in health risks. As Tacoma just received news of its removal from non-attainment status, this type of environmentally responsible project can continue our momentum in improving our local air quality.

In addition to these environmental benefits, the project also is consistent with the on-going efforts by the City of Tacoma to encourage a healthy local business climate to help retain and grow companies who call Tacoma home. It will reaffirm that the Port of Tacoma is a leader of economic growth in Pierce County, supporting two well-known and respected local companies using the best available environmental technology to remain competitive in a world economy.

As such, the PSE LNG proposal is a win-win for the citizens of Tacoma to improve our environment and help local companies succeed and remain robust employers in our community.

Another important benefit is that the LNG project will generate additional tax revenues for our city government, including property taxes, sales taxes and utility taxes. As a current Tacoma school board member, I appreciate and value seeing projects that will lead to increased tax revenues to help our local schools.

As Mayor, I believed that it was the City's job to offer incentives as an encouragement to grow local businesses. This is a project that would give the City visibility as a leader in the nation in supporting clean businesses and growing our Port potential. The City should be encouraging the success of this project.

Finally and importantly, our local citizens and businesses will also benefit from the enhanced natural gas infrastructure provided by the LNG project. It is the most cost-effective way to ensure continued dependable service to all PSE natural gas customers on the coldest days of the year, when natural gas is in highest demand.

0028-1
Continued

I fully support the thorough review this project is receiving from federal, state and local government agencies. I am confident that this review and approval process will reach the conclusion that this project is good for our community. I am hopeful that the City will do all it can to assure the success of PSE's proposed LNG facility understanding that it will provide great benefits to the citizens of Tacoma, Pierce County and the Puget Sound region for years to come.

Sincerely,

Karen Vialle

Karen Vialle

Number	Issue	Response
0028-1	General	Commenter supports project. Comment noted.
0028-1 cont'd	General	See previous response.

Port of Tacoma
People. Partnership. Performance
P.O. Box 1837
Tacoma, WA 98401-1837
www.portoftacoma.com

August 6, 2015

Shirley Schultz, Principal Planner
Planning and Development Services Department
City of Tacoma
747 Market Street, Room 345
Tacoma, WA 98402

RE: Tacoma LNG Draft Environmental Impact Statement

Dear Ms. Schultz:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for Puget Sound Energy's (PSE) proposed Tacoma Liquefied Natural Gas (LNG) facility.

The Port of Tacoma (Port) strongly supports this project. The plant will provide Totem Ocean Trailer Express (TOTE) clean alternative fuel for its domestic service (primarily between Tacoma and Alaska). Changes in federal air quality requirements have necessitated significant emissions reductions from most commercial vessels within 200 miles of North American shores. While marine cargo related sources only account for 3% of fine particulate emissions in Pierce County, we believe these emission reduction initiatives demonstrate the leadership of the maritime industry in maintaining and improving our region's quality of life. The Port further supports PSE's goal of providing a peek shaving source allowing them to maintain expected levels of natural gas service throughout Pierce County during times of high gas demand on exceptionally cold winter days.

PSE's proposed plant will place Tacoma at the forefront of providing clean fuel to the maritime, as well as other sectors of the transportation industry. It is very exciting to watch the transition to cleaner fuels at our very doorstep.

In general the Port finds the DEIS to be thorough and well-reasoned. The Port also appreciates the speed at which the City of Tacoma (City) produced the document and engaged the SEPA process. Below is a compilation of comments from Port staff. Please note these comments are Port positions as the lessor of the Tacoma plant site and as a major land owner and developer of the Tideflats area.

Comment 1 ES-1; Section 3.1: The Port has two minor, but important, technical corrections regarding subsurface conditions at the proposed plant site.

Section 3.1.3.4 (pg. 3.1-10).

0029-1

Please consider replacing the last sentence with the bold text to the following paragraph.

Port Parcel 2 (adjacent to the northwest of the Tacoma LNG Facility site): The northwest portion of this property is located adjacent to the former PRI site. The property historically was used for bulk petroleum storage. It is impacted by migration of groundwater-containing solvents and elevated pH from the Occidental Chemical site, and potentially by migration of petroleum

contamination from the adjacent former PRI site (Port of Tacoma 2009). Petroleum contamination has been documented in soil and groundwater on the Port Parcel 2 property. **Parcel 2 and the former PRI site are being investigated under an Agreed Order between Ecology, Mariana Properties (Occidental Chemical Corporation) and the Port.** 0029-1 Continued

Section 3.1.3.4 (pg. 3.1-11) 0029-2

In the second paragraph to further clarify, please consider deleting "a narrow plume of"… and replacing it with "identified a **delineated** plume of **dissolved** benzene in groundwater that extends onto the TOTE Marine Vessel LNG Fueling System site, approximately 300 feet northwest of the proposed cryogenic pipeline."

Comment 2 ES-1; Section 3.4: States that a bubble curtain and one other noise attenuation device would be used for impact driving of all steel pile. The Port disagrees with the need to use bubble curtains in this area. The species for which this type of attenuation device is intended to protect are not present during the in-water construction season. There are not forage fish beds in this area. The National Marine Fisheries Service (US NMFS) did not request bubble curtains at all for this project as part of their Endangered Species Act (ESA) Section 7 Consultation. The US Fish and Wildlife Service has requested bubble curtains as part of Section 7 Consultation for pile 30" in diameter and larger. And while the Port remains confused as to the science behind that request, PSE has agreed to use bubble curtains for 30" pile. Given the outcome of the Consultation process, the City should not impose more stringent requirements than the USFWS. There is no need for bubble curtains for pile under 30". 0029-3

Further, the Port disagrees with the need to have observers for marbled murrelets. They are not present in this (or likely any) part of Commencement Bay. Murrelets do not frequent industrial areas. The USFWS, which regulates impacts to marbled murrelets, specifically stated murrelet monitoring during pile driving is not required for this project. 0029-4

Comment 3 ES.5; Section 3.8: The Port disagrees with the conclusion that replacing an old warehouse on a currently hard-scape site in a heavily industrialized area with a large gray tank constitutes a significant negative aesthetic impact. This is not a view sensitive area like the Columbia Gorge. It is an industrial area that pre-dates all "sensitive receptors". While the Port understands and appreciates the desire for right-of-way trees and some on-site landscaping, painting a structure like the tank is unreasonable. 0029-5

Comment 4; ES-1, Section 3.10: The Port is confused by the Taylor Way discussion. As written, this implies the applicant (PSE) is liable for the rebuilding of Taylor Way from SR 509 to East 11th to heavy haul standards. Certainly, that cannot be the case. While the City has its restoration policy (which in this case would address trenching or direction bore installation of the Taylor Way pipeline) to saddle the last applicant for these costs is not legal under SEPA[1], nor appropriate for the long-term viability of Tacoma. Areas of 0029-6

[1] Under SEPA all mitigation must be proportionate to the impact caused by the proposal. The Tacoma plant does not create impacts to Taylor Way worthy of a $10 million-$11 million dollar rebuild.

the City that have fallow properties, be they industrial, commercial or residential that suffer deficits in infrastructure investment will continue to lie fallow as developers cannot make up for historic lack of public investment. Attempting to impose those costs on the "last applicant through the door" will create a significant chilling effect on investment in Tacoma. The rebuilding of Port of Tacoma Road should serve as a model for this case. The Port requests this section be clarified to note multiple funding partners, including agencies providing transportation grants, will be included in cost sharing.

0029-6 Continued

Further, the Port disagrees that the reconstruction of Taylor Way, which might improve fire response times by 15-40 seconds (according to City data), constitutes a significant positive impact. While 40 seconds could be critical in a medical emergency, given the design and fire suppression methods at LNG facilities 40 seconds will not improve fire safety. A fire at an LNG facility is either extinguished with on-site dry chemicals, or allowed to burn itself out. The reopening of the 11th Street fire station, directly across the road from the proposed plant site, would provide excellent medical response for any emergencies at the proposed Tacoma Plant, and elsewhere on the Blair Peninsula. The DEIS does an excellent job of discussing the safety and health hazards and risks of LNG facilities in Section 3.5. However, there is a disconnect between the analysis presented in Section 3.5 and the conclusions drawn in Section 3.10.

The Port recommends that the EIS distinguish between the need for improved investment in fire and medical services in this area from the desire to rebuild Taylor Way to heavy haul standards.

The Port notes that the City stands to collect over $5 million in fees and taxes just from the construction of the plant. This sum does not include any fees paid as mitigation. It also stands to collect approximately $1.3 million each year in taxes from the facility. And while the Port certainly will not tell the City how to allocate its funds, the Port does believe a portion of that money should be reinvested in the Blair peninsula. Not only will that help make this project work, it will help set that peninsula up for much needed future investment.

Again, thank you for your timely and good hard work on this project. Your efforts are greatly appreciated. If you have any questions regarding our comments please direct them to Tony Warfield at 253-428-8632.

Sincerely,

John Wolfe
CEO, Port of Tacoma and Northwest Seaport Alliance

Number	Issue	Response
0029-1	Earth	With regard to Section 3.1.3.4, Commenter recommends replacing portions of the text with the bold text indicated as follows: ***Port Parcel 2*** *(adjacent to the northwest of the Tacoma LNG Facility site): The northwest portion of this property is located adjacent to the former PRI site. The property historically was used for bulk petroleum storage. It is impacted by migration of groundwater-containing solvents and elevated pH from the Occidental Chemical site, and potentially by migration of petroleum contamination from the adjacent former PRI site (Port of Tacoma 2009). Petroleum contamination has been documented in soil and groundwater on the Port Parcel 2 property.* ***Parcel 2 and the former PRI site are being investigated under an Agreed Order between Ecology, Marianna Properties (Occidental Chemical Corporation) and the Port.*** **Response: The final EIS will reflect this recommended change.**
0029-1 cont'd	Earth	See previous response.
0029-2	Earth	With regard to draft EIS section 3.1.3.4, page 3.10-11, the commenter recommends deleting the text "a narrow plume of" and replacing it with "identified a delineated plume of dissolved benzene [...]" **Response: The final EIS will reflect the recommended change.**
0029-3	Plants and Animals	With regard to section 3.4, the commenter disagrees with the need to use a bubble curtain for driving pile under 30 inches, following the recommendations of the U.S. Fish and Wildlife Service. **Response: The final EIS will be edited to reflect that a bubble curtain may not be required per recommendations of the U.S. Fish and Wildlife Service.**
0029-4	Plants and Animals	The commenter disagrees with the need for observers for marbled murrelets, noting that the U.S. Fish and Wildlife Service, has "specifically stated murrelet monitoring during pile driving is not required for this project." **Response: The final EIS will not include a requirement to have observers for marbled murrelets.**
0029-5	Aesthetics, Light and Glare	The commenter disagrees with the conclusion that replacing current structures with a large grey tank "constitutes a significant negative aesthetic impact" and states that requiring "painting a structure like the tank is unreasonable." **Response: The City of Tacoma recognizes that the proposed LNG storage tank is located in an industrial area, but it is also a new dominant structure in the viewscape. The final EIS will not include a requirement to paint the LNG storage tank. However, it is recommended that the concrete be tinted a dark gray color to lessen the contrast with surrounding asphalt and buildings.**
0029-6	Transportation	The commenter disagrees that the full reconstruction of Taylor Way to heavy haul industrial standards would constitute appropriate and proportional mitigation to the impacts of the Project and recommends a model that was used in rebuilding of Port of Tacoma Road be considered. **Response: The final EIS will include mitigation that has been changed to be more proportional to the impacts of the Proposed Action.**
0029-6 cont'd	Transportation	See previous response.

Puyallup Tribe of Indians

August 17, 2015

VIA ELECTRONIC MAIL AND U.S. MAIL

Ms. Shirley Schultz, Principal Planner
City of Tacoma, Planning and Development Services Department
747 Market Street, Room 345
Tacoma, WA 98402

RE: Comments on the Draft EIS for the Tacoma LNG Facility proposed by Puget Sound Energy

Dear Ms. Schultz:

We want to thank City of Tacoma staff for sitting down with us on August 12th in Council chambers on a government-to-government basis to begin our discussions on the proposed Tacoma LNG facility. We appreciate the candor and openness of the conversation. It is essential we continue a transparent dialogue given the concerns both of our governments have regarding ensuring the safety of the Tribal membership and surrounding community, as well as preventing irrevocable damage to Tribal and community assets and properties.

The intent of this letter is to provide you preliminary comments on the draft EIS for the Tacoma LNG. The preponderance of our comments focus on safety and security issues associated with the proposed facility. The key issues with the draft EIS are two-fold. The EIS lacks quantitative analysis, most importantly with regard to defining the extent of the maximum thermal and radiation vapor zones (exclusion zone) that would be needed in the event of a catastrophic release. Secondly, the project continues to be modified, after the publication of the 0030-1 0030-2

3009 East Portland Ave. • Tacoma, Washington 98404 • 253/597-6200

0030-2 Continued

draft EIS. For these reasons, we reserve the right to provide additional comments on this project in its "final configuration" as warranted.

Background

The Proposed Action as summarized in the Draft EIS is outlined below. The proposed action includes:

• receiving natural gas from PSE's distribution system, chilling natural gas to produce approximately 250,000 to 500,000 gallons of LNG daily, and storing up to 8 million gallons of LNG on site;

• re-gasifying the LNG for re-injection and diversion of approximately 85,000 decatherms (Dth) per day (995,000 gallons of LNG) of peak day gas supply into PSE's distribution pipeline system; and

• dispensing LNG for the following uses: maritime transportation fuel to be used by Totem Ocean Trailer Express (TOTE) at their Port of Tacoma facility (approximately 39 million gallons per year) and other future regional LNG marine vessel fuel customers, and loading to trucks or barges for other regional markets seeking a cleaner fuel. LNG would be stored in the Tacoma LNG facility storage tank before being transferred to TOTE's ships via cryogenic pipeline as part of the TOTE Marine Vessel LNG fueling system or bunkering barge originating at the Hylebos Pier. We have learned that the cryogenic pipeline option is the preferred approach.

Puyallup Tribe Comments

Our gravest concern about the proposed facility is the imminent endangerment to human life and property of an uncontrolled release from the facility. Given that the energy content of the 8 million storage tank has an equivalency of 11 hiroshima nuclear bombs, it is to us an untenable position to consider putting the safety and security of theTribal membership and community at risk by locating the proposed facility in a densely populated area. For this reason alone, we oppose the siting of the LNG facility on the Puyallup Reservation. 0030-3

The construction and operation of the proposed LNG facility disproportionately shifts the consequence of an uncontrolled release to the Tribe, potentially killing, injuring many Tribal members who live and work on the Reservation as well as damage to our properties. As we 0030-4

0030-4 Continued

discussed in our consultation on August 12th, over ¾ of the 5,000 members live on or near the Reservation. The Tribe is not peripetetic like most other populations, so members typically don't leave the Reservation. Such an action by PSE would place most of the entire Tribe in jeopardy of harm. This is a risk we are not willing to accept. We recognize the importance of cleaner fuels as well as our dependence on imports to meet U.S. energy demands, just don't take this action here.

We have several nearby properties that would be severely impacted if a catastrophic event were to occur at the facility. Our Chinook Landing Marina, Ole & Charlie's Marina, our Blair Waterway and Back-up properties as well as our Inner Hylebos Mitigation Site and Outer Hylebos Mitigation site and a host of other mitigation sites could be irrevocably damaged. We are very concerned the location of this facility would put the safety and welfare of employees associated with our marina and planned port development at risk. Attached maps show Tribal properties and surrounding land uses.

0030-5

In the event of a catastrophic event, the safety and security of the surrounding community would also be in jeopardy. There are over 30,000 workers in the tideflats during peak operations; 20,000 NE Tacoma residents; and over 200,000 people in Tacoma that would be placed at risk from a chain reaction of explosions or an ensuing vapor cloud that would disperse quickly off the site.

0030-6

James Fay, now deceased and a former professor emeritus at MIT, worked on LNG for over 35 years. Fay's exlusion zones extend well beyond the boundary of the facility site, regardless of the facility size. This makes sense given the thermal dynamics of cryogenic liquefied gas (at -260 degrees F) when it hits a relatively warmer medium, whether it be water or land. The liquid vaporizes rapidly. If the vapor cloud subsequently encounters an ignition source, those portions of the cloud with a combustible gas-air concentration will burn. The vapor cloud would gradually burn its way back to the location of the LNG spill and would continue to burn as a pool fire until all of the LNG that was spilled was consumed. An LNG pool fire is the evaporating gas in a combustible gas-air concentration that will burn above an LNG spill if ignited. The resulting pool fire would spread as the LNG pool expanded away from its source and continued evaporating. These pool fires are intensely hot, and they cannot be extinguished – all of the LNG must be consumed before it goes out. These fires burn much hotter and more rapidly than oil or gasoline fires, which renders emergency response in a very diminished capacity. Evacuation becomes necessary.

0030-6
Continued

The 2004 Sandia Report by the Sandia National Laboratory, a division of the Department of Energy, suggested that an expanding pool fire from a leak in a storage vessel could cause a fire that would be hot enough to melt steel at distances of 1,200 feet and could result in second degree burns on exposed skin a mile away. Of course, this is one scenario from a leak from a tanker barge. What makes LNG dangerous? Natural gas is 90% methane, which is highly combustible. Though in the liquid state, natural gas is not explosive, spilled LNG will quickly evaporate, forming a highly combustible vapor cloud, which if ignited, can be exceedingly dangerous. Fay says that "there's no way to put out that kind (pool) of fire". The fire would burn until all of its fuel is gone, which would take five to eight minutes, and it could ignite a rash of secondary fires on such a large scale that the secondary fires could cause more damage than the initial blaze. The risk of a chain reaction due to the open flames and flammable materials in the vicinity of the facility would be high.

Fay modeled several facility exclusion zones, and of course, their size is contingent on the extent of the spill, location, wind, and several other variables, but not one, was limited to the site boundaries. In some cases, like in the case of the Pleasant Point terminal on Sipayaik tribal land, the thermal and flammable radiation zones encompassed a swath of land about 20-square miles! Just last year, emergency personnel evacuated a 2-mile zone around the LNG storage facility near Plymouth WA on the Columbia when there was an explosion and ensuing fire.

For illustration purposes, we prepared a map that showed a one mile and two-mile "exclusion zone" around the proposed facility. The exclusion zones cover most of the industrial tideflats and a big portion of the residential neighborhood of NE Tacoma (see attached map). No quantification of the thermal and vapor zone is forthcoming in the draft EIS, but for a statement that the exclusion zone will not extend beyond site borders. There is no basis to support this statement. Concrete sumps are not going to contain a vapor cloud. At what distance does thermal radiation fall below the safe threshold of 1.6 kilowatts per square meter? A safe radiation distance for fires would be that for which the thermal radiation level does not exceed 1.6 kilowatts per square meter. Federal regulations govern thermal radiation protection (49 C.F.R. § 193.2057) and flammable vapor-gas dispersion protection (49 C.F.R. § 193.2059). Generally, each LNG container and LNG transfer system must have a dispersion exclusion zone in accordance with sections 2.2.3.3 and 2.2.3.4 of NFPA 59A-2001.

The draft EIS's failure to examine the extent of the risks identified above as added to the already existing facilities, including other fuel facilities that maintain open flames or also pose a significant fire and explosion risk renders the EIS deficient. An EIS should provide information to allow for a reasoned decision by identifying primary, secondary, and cumulative impacts. The cumulative impact analysis in the EIS fails to analyze the impacts the project will have as a result of its own risks ADDED to those risks already present from existing facilities. 0030-7

Furthermore, PSE has very little experience owning and operating an LNG storage facility. The LNG facility in Gig Harbor is a very, very small operation. Their experience re-gasifying LNG in order to meet peaking demand isn't extensive either. They simply have nowhere near the expertise of owning and operating a facility with complexities like the one currently proposed. Furthermore, we are dismayed by the fact that this facility wouldn't be under the regulatory oversight of FERC. We have borne the consequences of the lack of FERC oversight in other arenas with Puget Sound Energy as the Operator to the Tribe's detriment. In many ways, this is an age old story – of efforts to locate facilities that pose significant safety or environmental consequences on tribal lands or other's lands deemed to be of less value. There are other LNG facilities in the United States that were proposed on Indian lands, such as the Pleasant Point terminal on Sipayik tribal land near Eastport, ME. But unlike most Indian lands, the Puyallup Reservation is densely populated. We don't oppose cleaner energy – what we oppose is siting this facility here on the Puyallup Reservation in a densely populated urban environment. 0030-8 0030-9 0030-10

The EIS must evaluate reasonable alternatives that could feasibly attain the proposal's objective. While it is true that not every conceivable alternative need be considered, the entire purpose of the EIS is to lead to a reasoned choice among alternatives. The draft EIS does not provide an analysis of alternatives other than the no-action and proposed alternative, in spite of several alternative sites or even capacity for the facility to carry out its primary objective exist. It is presumed that any of the location alternatives that were considered were dismissed on cost. The key criteria for consideration prior to cost should have been public safety. In fact, federal law prescribes minimum safety standards for making decisions on the location of a new liquefied natural gas pipeline. 49 U.S.C. §60103, Standards for Liquified Natural Gas Pipeline Facilities. In prescribing safety standards for deciding on the location of a new liquefied natural gas pipeline facility, the Secretary of Transportation is required to, among other things, consider: 0030-11 0030-12 0030-13

0030-13
Continued

existing and projected population and demographic characteristics of the location; existing and proposed land use near the location; and the need to encourage remote siting. 49 U.S.C. §60103(2)(3)(6). There was not one rural location considered or evaluated in the draft EIS, for the new cryogenic pipeline and larger facility. Every facility in the country we have researched, whether it be a storage facility in Plymouth, WA or an LNG terminal in Cameron Parish, Louisiana (shown below), look similar to the one below – it is located in a rural area with an exclusion zone that extends far and wide, way beyond the limits of the property boundary.

Sabine Pass LNG - Cameron Parish, Louisiana

0030-14

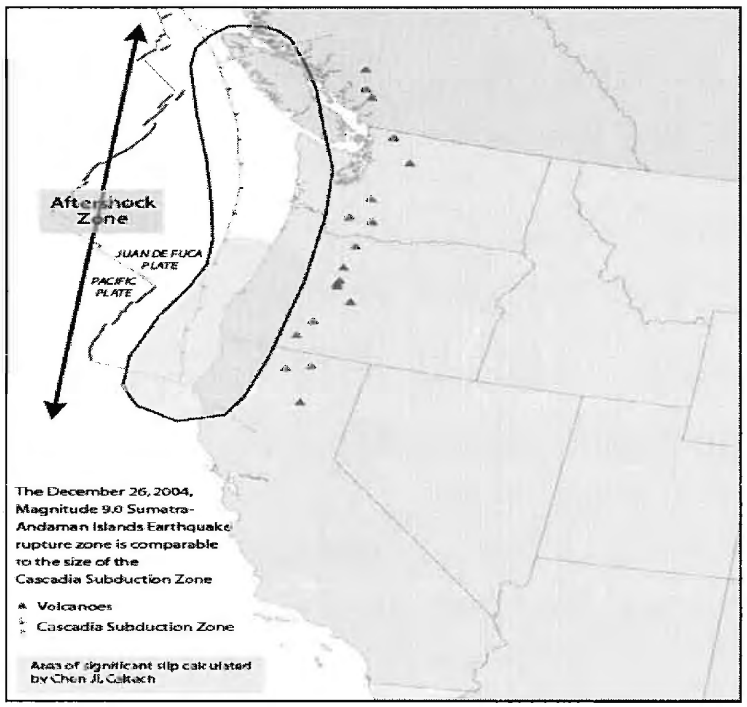
As we understand it, the primary objective of this facility is to provide a cleaner fuel to the TOTE ships. The opportunity to meet peaking-demand would be a secondary consideration. Based on the primary objective, alternative routes for the pipeline, alternative locations for the fueling facility, and alternative locations for the storage tank should be considered in combination and alone. At the very least, varying sizes for the facility to meet the primary goal should have also been considered to reduce the imminent danger in the urban environment. There is no indication that in order to meet the secondary objective of the peaking-demand the facility MUST be sited on the Port of Tacoma Tideflats amidst a densely populated urban environment and within the Reservation. It is the Tribe's understanding that to fuel TOTE, which is identified as the primary reason to locate the facility at the Tacoma Tideflats and is cited as the reason alternative sites listed in the EIS would not be cost efficient, the facility would not require an 8 million gallon storage capacity but rather roughly 25% of the storage capacity

proposed. Each of these alternatives should be fully evaluated and discussed in the draft EIS to meet the requirements under SEPA. The criteria for consideration should include first and foremost public safety and welfare.The overall seismicity of the Pacific Northwest region is high because of the presence 0030-14 Continued

of the Cascadia Subduction Zone off the coast. The Cascadia subduction zone (also referred to as the Cascadia fault) is a convergent plate boundary that stretches from northern Vancouver Island to northern California. It is a very long sloping subduction zone fault that separates the Juan de Fuca and North America tectonic plates. 0030-15

Due to the high seismic activity along the coast and high potentiality of liquifaction in the event of a large earthquake, again siting the facility on the Puyallup Reservation poses unacceptable risks to to the Tribe and the community as a whole.

The cascadia subduction zone, where two oceanic and continental plates meet, are shown below. The proximity to the proposed facility is evident in the picture below.



Source: http://earthquake.usgs.gov/eqinthenews/2004/usslav/rupture_area-nw.gif

Given the proximity of the subduction zone to the proposed facility location and the fact that our last large earthquake was in 2001, the siting for this facility in the tideflats does not make sense. The facility site would have a high risk of soil liquefaction during a large

0030-16

earthquake. Obviously, in the case of liquefaction, the consequences, once again, could very well be catastrophic in an uncontrolled release. In fact, a figure prepared by Department of Natural Resources, and attached to this letter shows high liquefaction susceptibility for the entire Hylebos-Blair Waterway peninsula exactly where the proposed facility would be located. The area in red indicates a high susceptibility to liquefaction – precisely where the proposed facility would be located. The facility would also be located within the 100-year floodplain as well as the inundation boundary for a tsunami associated with a large CSZ earthquake. There is no sufficient mitigation that would be sufficient to allay our concerns.

0030-17

Richard A. Clarke, a former senior adviser to both the Bush and Clinton administrations, indicated that defenders probably can't prevent a determined terrorist strike on a liquefied natural gas terminal (or any LNG facility). Clarke's consultant group concluded that terrorists could "relatively easily" secure weapons needed for an effective attack on a LNG tanker (or tank facility), and said an attack runs "a high risk of generating catastrophic damage." The Institute for the Analysis of Global Security (IAGS) has said that LNG would fit well with al-Qaeda's tactics and techniques. Recent events have borne this out. Al-Qaeda militants fired two rockets at the Balhaf liquefied natural gas (LNG) terminal in Shabwah province in December of 2014. An 8 million gallon tank is a highly visible, potential target on the Puyallup Reservation.

0030-18

We don't question the need for additional energy supplies, our opposition against this LNG facility is about siting it in an alternative location that is sufficiently remote to prevent harm to innocent people.

Thank you for consideration of our comments. If you have any questions or would like to discuss this letter further with me or my staff, you can reach me at (253) 573-7838, or our Natural Resources Director, Bill Sullivan at (253) 573-7850 or Char Naylor at (253) 680-5520.

Sincerely,

Bill Sterud

Bill Sterud, Chairman
Puyallup Tribe of Indians

Puyallup Tribe

Proposed Location for Liquified Natural Gas (LNG) Facility

- Proposed LNG Facility Site
- 1873 Survey Area
- Pierce County Parcels (Pierce Co)

Puyallup Tribal Lands

Trust Status

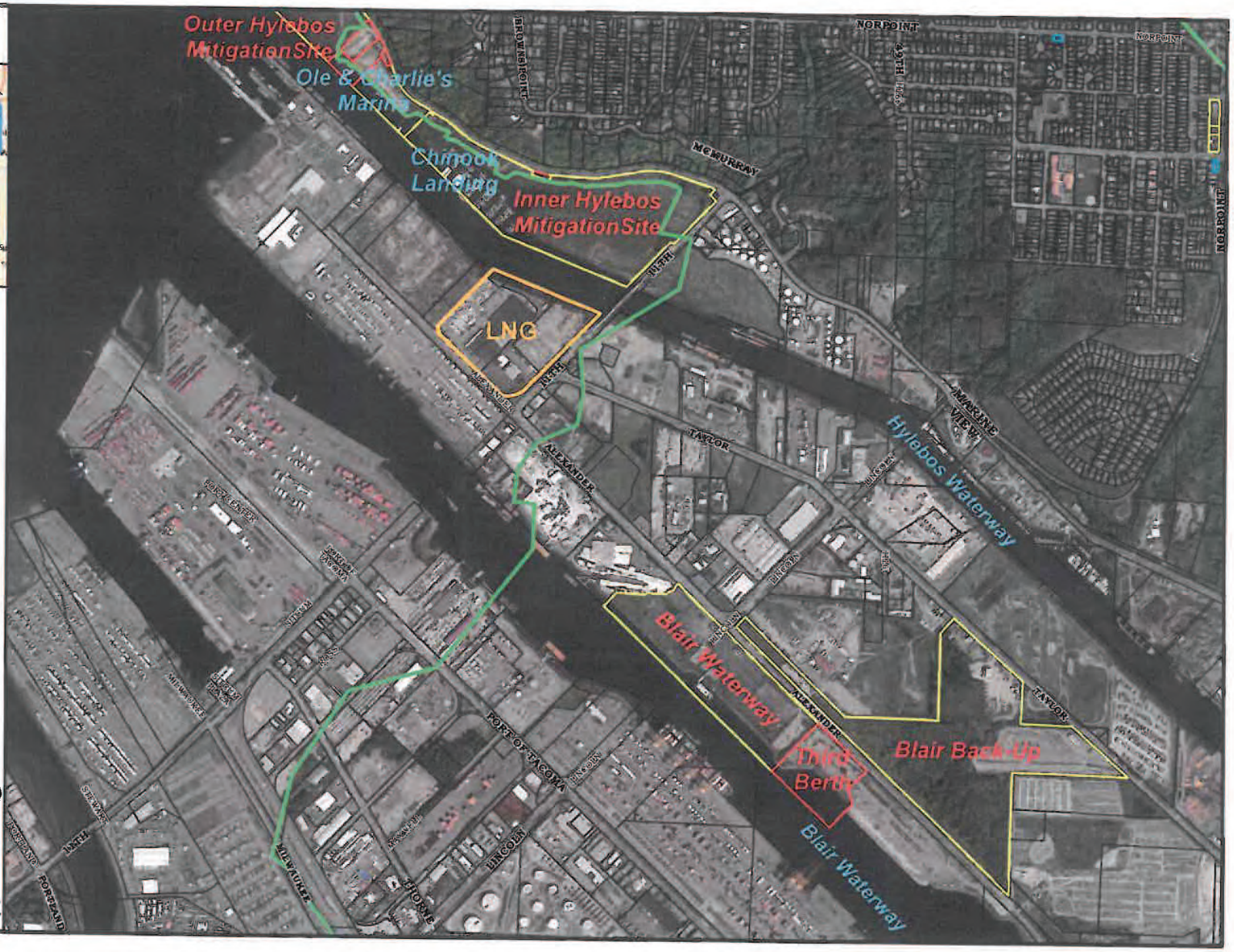
- In Fee
- Tribal Trust
- Member Trust

Note: The boundary of the Puyallup Indian Reservation is similar, but not identical, to the 1873 Survey.

Map Author: Puyallup Tribe GIS Dept
10 August 2015

Puyallup Tribe GIS

Feet
0 500 1,000 1,500 2,000



Puyallup Tribe

Proposed Location for Liquified Natural Gas (LNG) Facility

- Proposed LNG Facility Site
- 1873 Survey Area
- Pierce County Parcels (Pierce Co)

Puyallup Tribal Lands

Trust Status

- In Fee
- Tribal Trust
- Member Trust

Business names are taken from the Pierce County parcel data. Not all parcels immediately near the proposed LNG facility (which itself consists of several parcels) are labeled.

Note: The boundary of the Puyallup Indian Reservation is similar, but not identical, to the 1873 Survey.

Map Author: Puyallup Tribe GIS Dept
11 August 2015

Puyallup Tribe GIS

Feet
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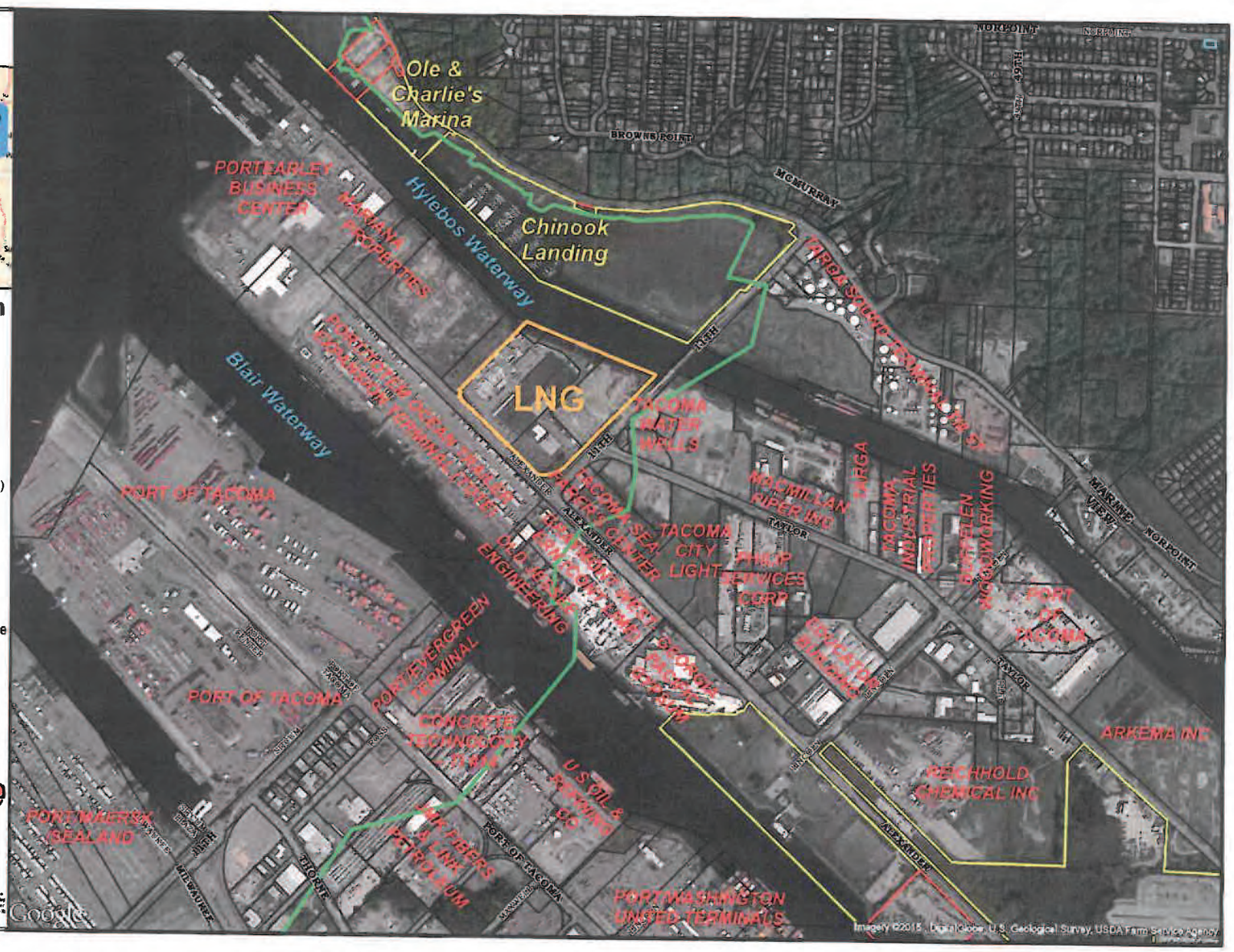

Puyallup Tribe

Proposed Location for Liquified Natural Gas (LNG) Facility

- Proposed LNG Facility Site
- Buffers Around Proposed LNG Site
- 1873 Survey Area

Puyallup Tribal Lands

Trust Status

- In Fee
- Tribal Trust
- Member Trust

Note: The boundary of the Puyallup Indian Reservation is similar, but not identical, to the 1873 Survey.

Map Author: Puyallup Tribe GIS Dept
11 August 2015

Puyallup Tribe GIS

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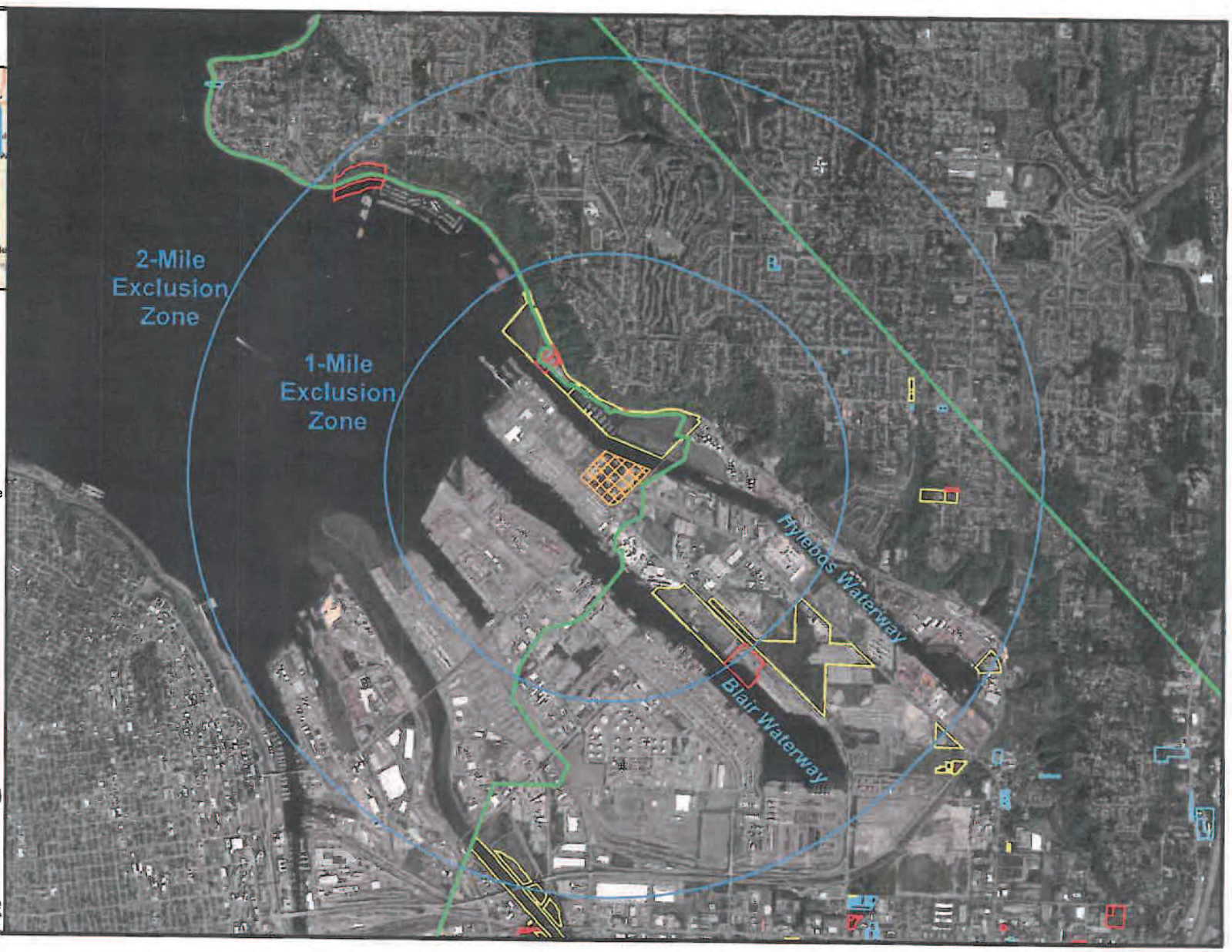
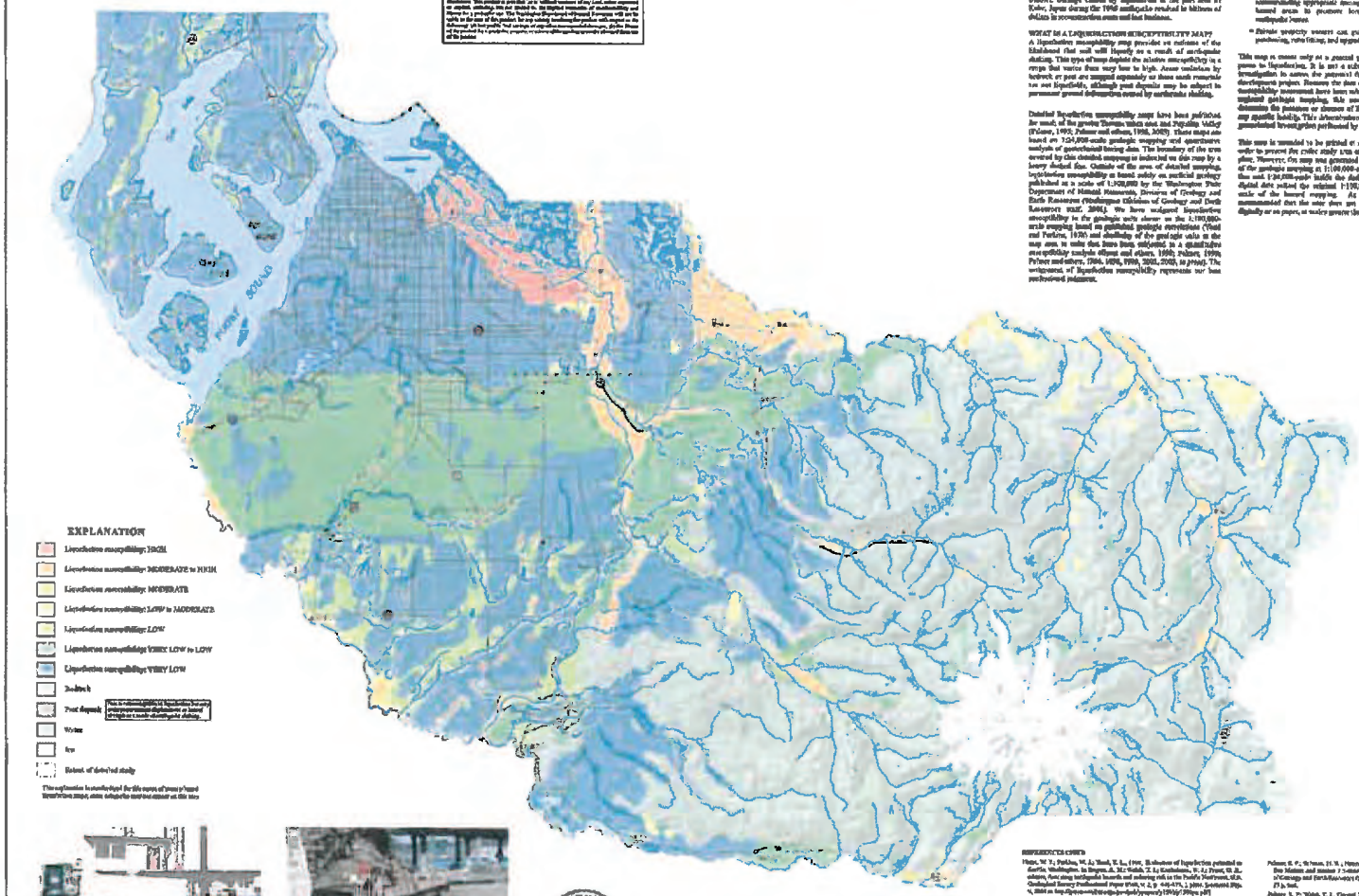


Liquefaction Susceptibility Map of Pierce County, Washington

by Stephen P. Palmer, Sammantha L. Magsino, Eric L. Bilderback, James L. Poelstra, Derek S. Folger, and Rebecca A. Niggemann

September 2004



Stephen P. Palmer
9/1/04

WHAT IS LIQUEFACTION?

Liquefaction is a phenomenon in which strong earthquake shaking causes soil to rapidly lose its strength and behave like quicksand. Liquefaction typically occurs in saturated fills and in areas of loose sandy soils that are saturated with water, such as low-lying coastal areas, lakebeds, and river valleys. When soil strength is lost during liquefaction, the overlying soil can be susceptible. Movement of liquefied soils can rupture pipelines, move bridge abutments and land and railway alignments, and pull apart the foundations and walls of buildings. Ground movement resulting from liquefaction caused most of the damage to highways and railroads throughout southern Alaska during the 1964 Good Friday earthquake. During the 1989 Loma Prieta earthquake, liquefaction was a contributing factor to severe building damage in the Marina District of San Francisco. Liquefaction-induced ground movements also broke water lines, severely hampering control of the resulting fires in the Marina District. Damage caused by liquefaction in the port area of Kobe, Japan during the 1995 earthquake resulted in billions of dollars in reconstruction costs and lost business.

WHAT IS A LIQUEFACTION SUSCEPTIBILITY MAP?

A liquefaction susceptibility map provides an estimate of the likelihood that soil will liquefy as a result of earthquake shaking. This type of map depicts the relative susceptibility in a range that varies from very low to high. Areas underlain by bedrock or peat are mapped separately as these much resistant to not liquefiable, although peat deposits may be subject to permanent ground deformation caused by earthquake shaking.

Detailed liquefaction susceptibility maps have been published for much of the greater Tacoma, which cites and Puyallup Valley (Palmer, 1995; Palmer and others, 1998, 2003). These maps are based on 1:24,000-scale geologic mapping and quantitative analysis of geotechnical boring data. The boundary of the area covered by this detailed mapping is indicated on this map by a heavy dashed line. Outside of the area of detailed mapping, liquefaction susceptibility is based solely on surficial geology published at a scale of 1:100,000 by the Washington State Department of Natural Resources, Division of Geology and Earth Resources (Washington Division of Geology and Earth Resources staff, 2004). We have assigned liquefaction susceptibility to the geologic units shown on the 1:100,000-scale mapping based on published geologic correlations (Yeats and Perkins, 1978) and chemistry of the geologic units in the map area to note that have been subjected to a quantitative susceptibility analysis (Keefer and others, 1989; Palmer, 1995; Palmer and others, 1994, 1998, 1999, 2001, 2002, in press). The assignment of liquefaction susceptibility represents our best professional judgment.

HOW CAN THIS MAP BE USED?

Liquefaction susceptibility maps such as this can be used for many different purposes by a variety of users. For example:

- Emergency managers and domestic which provided decision and kitchens are located in hazardous areas.
- Building officials and engineers can select areas where detailed geotechnical studies should be performed before new construction or rehabilitation of older structures.
- Facilities managers can assess the vulnerability of corporate and public facilities, including schools, and recommend actions required to minimize public safety and minimize earthquake damage and loss.
- Insurance companies can determine relative risk, such as adjusting rates of insurance coverage and premiums.
- Land-use planners can reduce vulnerability by recommending appropriate zoning and land use in high hazard areas to promote hazard mitigation of earthquake losses.
- Private property owners can guide their decisions on purchasing, retrofitting, and upgrading their properties.

This map is meant only as a general guide to delineate areas prone to liquefaction. It is not a substitute for site-specific investigations to assess the potential for liquefaction for any development project. Because the data used for the liquefaction susceptibility assessment have been established on the basis of regional geologic mapping, this map cannot be used to determine the presence or absence of liquefiable soils beneath any specific building. This determination requires a site-specific geotechnical investigation performed by a qualified professional.

This map is intended to be printed at a scale of 1:24,000 or smaller to present the entire study area on a single standard sheet. However, the map was generated using digital coverages of the geologic mapping at 1:100,000-scale outside the dashed line and the 1:24,000-scale inside the dashed line; therefore, the digital data extend the original 1:100,000-scale or 1:24,000-scale of the hard copy map. As with all maps, it is recommended that the user does not apply this map, either digitally or on paper, at smaller generic than the source data.

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Number	Issue	Response
0030-1	General	The commenter asserts that the EIS lacks quantitative analysis, particularly with regard to the thermal and radiation vapor exclusion zone in a catastrophic event. **Response: With respect to exclusion zones, the federal regulations establish hard and non-discretionary criteria for demonstrating that a proposed facility will satisfy all applicable exclusion zones under National Fire Protection Association (NFPA) 59A-2001 Paragraph 2.1.1(d), which is incorporated by reference in 49 CFR Part 193. All hazards that can affect the safety of the public or plant personnel are to be considered by the siting and regulatory agencies during project design review.** **The hazards evaluated in an LNG hazard and safety review include vapor dispersion from liquid pools, vapor dispersion from jetting and flashing phenomena, thermal radiation from pool fires, thermal radiation from fires involving jetting and flashing phenomena (jet fires), overpressure from vapor cloud ignitions, toxic gas dispersion, and boiling liquid expanding vapor explosions (“BLEVEs”) when pressurized storage vessels are present. These assessments ensure that, among many other safety measures and criteria, the thermal radiation exclusion zone and vapor dispersion exclusion zones are accurately calculated so that facilities may be sited entirely within those zones where the public is not present.** **Insofar as defining the extent of thermal vapor dispersion and thermal radiation exclusion zones to ensure the public’s safety, including the safety of Tribal members, the City of Tacoma agrees with the Tribe’s comments that such effort requires quantitative modeling and this modeling has been completed. The exclusion zone modeling cited in the Tribe’s letter as done by Dr. Richard Fay is not applicable to the Tacoma LNG facility and is not a substitute for the actual modeling per federal regulations that has been done for Tacoma LNG. Notably, the work done by Dr. Fay (comment letter at p. 3-4) in regard to LNG facilities does not account for the absence of oxygen in an LNG tank or the LNG itself. Without that oxygen, LNG energy cannot be released by explosion and combustion.** **The effects of a release of LNG into the air, are discussed in the draft EIS at pp. 3.5-9 through 3.9-12. The draft EIS, at p. 3.5-11, makes clear that LNG is not explosive in its normal manner of transport or storage.**
0030-2	General	The commenter states that the project continues to be modified after publication of the draft EIS. **Response: The Project remains essentially the same as described in the draft EIS. However, initiation of environmental review before the completion of final engineering design is very common. Most infrastructure and major facility proposals (e.g., highways, convention centers, manufacturing facilities, and wastewater treatment plants) obtain initial use authorization, including completion of Wasthington State Environmental Policy Act (SEPA) review, before final project design is complete. Nevertheless, significant changes to the project engineering and design could warrant further review under SEPA through a Supplemental EIS.**
0030-2 cont'd		See previous response.

Number	Issue	Response
0030-3	General	The commenter states that they are opposed to the Proposed Action, due to imminent endangerment to life and property. For this reason alone, the commenter opposes the siting of the LNG facility on the Puyallup Reservation. **Response: The City of Tacoma does believe that the proposed Tacoma LNG project presents a new health and safety risk, but that risk is confined to a relative small area, primarily the project site. The draft EIS and the final EIS include mitigation that requires PSE to design the facility to contain vapor dispersion and thermal radiation within the fenceline of the project site. The City has also included mitigation measures that re-establish Fire Station 15; reached an agreement with PSE and the Port for rebuilding Taylor Way, which will reduce emergency responder transit time to the Hybelos/ Blair Peninsula; and agreed to implement Phase I of the Emergency Response/Intelligent Transportation System (ER/ITS) plan.**
0030-4	General	The commenter states that the proposed LNG Facility poses a disproportionate risk to the members, community, and properties of the Puyallup Tribe of Indians. **Response: The City of Tacoma understands the concerns that the Puyallup Tribe has for its people, reservation, and other properties in the vicinity of the proposed project. The City also has concerns for industries, businesses, and neighborhoods that are in the vicinity of the Project. That is why the City has hired environmental and LNG experts to evaluate in detail the potential environmental and health and safety risks of the Project. In addition, the U.S. Coast Guard, the Pipeline and Hazardous Materials Safety Administration (PHMSA), the Washington Utilities and Transportation Commission, and the Tacoma Fire Department are also evaluating the health and safety risks of the Project. Oversight of the Project by these agencies will extend throughout construction and operation of the Project to ensure it is constructed and operated in safe manner.**
0030-4 cont'd	General	See previous response.
0030-5	General	The commenter states that the Proposed Action also puts in jeopardy the safety of the surrounding community, including over 30,000 workers and over 200,000 residents. **See responses to 0030-1, -3, and -4.**
0030-6	Public Health and Safety	The exclusion zone surrounding the LNG facility should extend significantly beyond the facility site boundary, in accordance with scientific research findings and applicable federal regulations. **Response: 2-D and 3-D PHAST quantitative modeling has been completed for the Project in accordance with federal regulation. The modeling results have been reviewed by the LNG engineering consultant for the City, who determined that the modeling was done according the federal requirements and the guidelines of 59A of the National Fire Protection Association. The modeling shows that exclusions zones that extend significantly beyond the facility site are not warranted.**
0030-6 cont'd	Public Health and Safety	See previous response.

Number	Issue	Response
0030-7	Cumulative Impacts	The commenter states that the draft EIS fails to examine the extent of primary and secondary project risks and that the cumulative impacts analysis fails to anayalse the impacts the project will have when added to risks already present from existing facilities. **Response: It is correct that there are other facilities in the industrial area that also present a risk for vapor expansion, fire, or explosion, and the addition of the Project does present a new risk. However, the existing facilities and the proposed Project are standalone risks, and an incident at one facility does not have any bearing on other such facilities in the area. To mitigate for adding an additional risk in the Tideflats industrial area, Fire Station 15 will be refurbished and staffed. Other mitigation measures include improvements to Taylor Way and implementing Phase I of the Emergency Response/Intelligent Transportation Systems (ER/ITS). As for future facilities that would pose an additional risk of vapor expansion, fire, or explosion, it would be anticipated that additional mitigation measures would be required.**
0030-8	General	The commenter states that the Proponent has very limited experience owning and operating LNG facilities. **Response: PSE will be responsible for staffing and operating the facility. PSE has extensive experience and capabilities in operating large energy infrastructure. In addition to its natural gas and electric distribution systems, PSE also operates an LNG facility in Gig Harbor, WA; a large underground storage facility in Chehalis, WA; nine natural gas fired power plants; three wind farms; and two hydroelectric facilities. In total, PSE is responsible for over $10.5 billion of assets that are either directly or indirectly related to operating energy infrastructure.** **PSE took delivery of its mobile LNG tanker and vaporizer in 2000 and has been operating the Gig Harbor LNG facility since 2004.** **Further, the Tacoma LNG Project will be operated by trained and qualified staff 24 hours per day, seven days per week. Operation of the facilities will comply with prescriptive federal and state regulations for LNG facilities. Worker and public safety are paramount in the operation of the Tacoma LNG facilities. Training of staff and requalification will continue during the lifetime operation of these facilities.**
0030-9	General	The commenter objects to the lack of FERC oversight over the Proposed Action. **Response: The Federal Energy Regulatory Commission (FERC) is responsible for authorizing the siting and construction of onshore and near-shore LNG facilities engaged in import/export activities. As required by the National Environmental Policy Act (NEPA), FERC prepares environmental analyses for proposed LNG facilities under its jurisdiction. The Tacoma LNG Facility would not engage in import/export facilities, and therefore does not fall under the jurisdiction of FERC. Futher, PHMSA has authority to establish and enforce safety standards for onshore LNG facilities, and has issued its regulations in 49 CFR 193. The Tacoma LNG Facility is obligated to follow regulations pursuant ro 49 CFR 193.**

Number	Issue	Response
0030-10	General	The commenter states that the Proposed Action continues a history of locating hazardous facilities on tribal lands and other devalued lands, with the added risk that the Puyallup Indian Reservation is densely populated. **Response: The Project site is zoned Port Maritime Industrial (PMI). A variety of uses are permitted in the PMI District, including Industry, heavy; Port, terminal and industrial (water-dependent or water-related uses); and Utilities. The PMI District is intended to allow all industrial uses and uses that are not permitted in other districts. In addition, the City of Tacoma Comprehensive Plan designations for the Tacoma LNG Facility and TOTE Marine Vessel LNG Fueling System component sites include Manufacturing/Industrial Center, High-Intensity Industrial Development, and Shoreline High-Intensity Environment.**
0030-11	Purpose, Need, and Alternatives Considered	The commenter argues that the analysis of alternatives to the Proposed Action did not include sufficient analysis of alternative sites or project capacity. **Response: As indicated in Chapter 1 of the EIS, PSE did evaluate alternative sites to assess whether they could meet each Proposed Action objective. Key attributes in this evaluative process included sufficient setbacks to comply with federal code 49 CFR 193, proper industrial zoning, access to markets, access to PSE’s distribution system, and waterfront siting to accommodate deliveries to TOTE and potential marine markets. All of these factors contribute to the determining the site of the Proposed Action.**
0030-12	General	The commenter argues that safety should be a primary consideration in project siting and design, superseding cost. **Response: A primary requirement for sites considered is meeting the vapor dispersion and thermal radiation requirements of the federal regulations (49 CFR 193) and requirements of the National Fire Protection Association (59A). If the siting requirements cannot be met the project cannot be constructed.**
0030-13	Purpose, Need, and Alternatives Considered	The commenter states that federal regulations require LNG facility siting to take into account considerations that essentially require LNG facilities to be located in remote and/or rural areas, and that such siting is the usual practice. **Response: Federal regulations for siting of LNG facilities do not have criteria that would essentially require LNG facilities to be constructed in remote or rural areas. There are numerous examples of LNG facilities located in urban areas that have operated without incidents for decades. Two examples include the Yankee LNG facility built in a residential area in Waterbury, Connecticut and the Everett LNG marine terminal in Boston Harbor. See https://primis.phmsa.dot.gov/comm/LNG_Map.htm?nocache=7428 for a map showing LNG facilities in the United States.**
0030-13 cont'd	General	See previous response.

Number	Issue	Response
0030-14	Purpose, Need, and Alternatives Considered	The commenter argues that alternative routes, locations, and sizes of Proposed Action components that meet the objectives of the Proposed Action should have been considered and evaluated in the draft EIS, per SEPA requirements. **Response: Per Washington Administrative Code 197-11-440(5)(d) regarding private projects proposed at specific site, the lead agency must evaluate the proposed action, the no action alternative, and only other reasonable alternatives for achieving the proposals objective on the same site.**
0030-14 cont'd	Purpose, Need, and Alternatives Considered	See previous response.
0030-15	Public Health and Safety	The commenter states that risks emanating from natural hazards, such as earthquake-induced soil liquefaction, tsunamis, and flooding pose a significant risk in the presence of an LNG facility, including the possibility of accidental catastrophic releases. Commenter states that no possible mitigation of these risks would be sufficient to allay Tribal concerns. **Response: the seismicity of the Pacific Northwest, including the Cascadia Subduction Zone, is fully acknowledged and analyzed in the DEIS. At Section 3.1.3.1 - Geologic Hazards, the DEIS contains a thorough description and discussion of all geologic hazards associated with the Blair-Hylebos Peninsula and surrounding communities, including seismic and landslide hazards, liquefaction and lateral spreading, and tsunamis. As discussed therein, there are applicable federal regulations that apply to the modeling of an LNG facility in such an area. The draft EIS, at pp. 3.1-3, carefully describes the magnitude of events for which the Tacoma LNG must be modeled.** **Tacoma LNG’s ground improvements must meet the seismic design criteria in 49 CFR Part 193 to withstand liquefaction, lateral spreading and tsunami inundation events. To achieve this, ground improvements would provide foundational support and reduce the effects of soil liquefaction and lateral spreading. The LNG tank, which is the largest project component, would be underlain by a seismic base isolation system to absorb potential seismic events. Other portions of Tacoma LNG will similarly be subject to stringent ground improvement standards. With these in place, the draft EIS concludes that the ground improvements would serve to decrease potential seismic hazards at the site.**
0030-16	Public Health and Safety	See previous response.

Number	Issue	Response
0030-17	Public Health and Safety	The commenter argues that LNG facilities are vulnerable to terrorist attack and difficult to effectively defend. **Response: The Sandia Report of 2004, referenced in the comment letter, specifically includes discussion of intentional LNG breach, spill and hazard analyses. The Sandia Report studied significantly larger LNG facilities; however, it concludes that “the risk analysis performed as part of this study indicates that the potential for a large vapor dispersion from an intentional breach is highly unlikely." The Sandia Report, at Key Conclusion 5 (p. 14) includes a general analysis of a range of intentional attacks. While noting that the consequences from an intentional breach of an LNG containment structure can be more severe than those from accidental breaches, multiple techniques exist to enhance LNG spill safety and security management and to reduce the potential of a large LNG spill due to intentional threats. Effectively implemented, these techniques significantly reduce the potential for an intentional spill.** **The design of the facility includes a state-of-the-art integrated control and safety system that includes automated shutdowns upon detection of abnormal and hazardous occurrences. Security measures are included in the design of the facility including access control, intrusion detection and CCTV camera monitoring.**
0030-18	General	The commenter states that the Puyallup Tribe of Indians is opposed to the proposed LNG facility and would prefer that such a facility be located in an alternative and remote location to prevent harm to innocent people. **Response: Comment noted**

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