

**Analysis of Brownfields Cleanup Alternatives
Port of Tacoma– Parcel 92
459 and 465 East 15th Street, Tacoma Washington**

This Analysis of Brownfields Cleanup Alternatives (ABCA) was prepared with funding provided under the Community-Wide Brownfields Assessment Cooperative agreement (BF-02J21201) executed between the Port of Tacoma (Port) and the U.S. Environmental Protection Agency (EPA). It summarizes the existing conditions and potential cleanup alternatives for the Parcel 92 property (Parcel 92), located within the Port of Tacoma’s Maritime Center master planning area (Figure 1).

I. Introduction & Background

a. Site Location and Anticipated Development Activities (459 and 465 East 15th Street, Tacoma)

Parcel 92 is located at 459 and 465 East 15th Street in Tacoma, on the south side of the Wheeler Osgood Waterway. It is located within the Port’s Maritime Center master planning area. The Port is currently undertaking Brownfield redevelopment activities within this area. Activities currently in progress include the following:

- **New 253 Maritime Skills Center:** The Port is developing a new Maritime Skills Center at the Parcel 94 property in partnership with the Tacoma School District. It will provide targeted training in maritime career skills for junior and senior high school students from 32 regional high schools in the Tacoma and Pierce County area.
- **New Port Headquarters Building:** The Port is building a new headquarters building to provide workspace for approximately 150 employees of the Port of Tacoma and The Northwest Seaport Alliance. It will include chambers for Port of Tacoma Commission meetings, as well as some Managing Members meetings of The Northwest Seaport Alliance.
- **Shoreline Restoration, Public Esplanade and Open Space Improvements:** The Port is undertaking multiple actions to restore shoreline conditions and improve public access along the Foss and Wheeler Osgood Waterways within Parcel 94. These actions include the structure and debris removal, bank cutback and restoration of over 800 feet of marine shoreline, restoration of the marine buffer area along the Foss and Wheeler Osgood shorelines, and construction of a shoreline esplanade for public use.
- **Cleanup and Reuse Planning for Parcel 132:** The Port has developed an ABCA for the cleanup of Parcel 132 and has applied for a Brownfields grant to help fund the cleanup. Options for future redevelopment of Parcel 132 are also being considered as part of the master planning process.

Ongoing master planning evaluations are evaluating reuse options for Parcel 92. No specific development plans have been identified at this time. Examples of potential development range from maritime-related light industrial or commercial properties to mixed use. Cleanup of Parcel 92 is required to support any of these alternatives.

b. Previous Site Uses

Prior to dredging and filling of Tacoma’s tidflats, Parcel 92 was located at the mouth of the southwestern branch of the Puyallup River. The Wheeler Osgood Waterway is what remains of this

former river channel. Parcel 92 and the surrounding lands were originally part of an extensive area of tideflats located along the south side of the river. Based on survey records from the late 1800s, there was a small island located in the center of Parcel 92 that was covered by between 1 and 5 feet of water at high tide.

Though no specific cultural or archaeological resources are known to exist on Parcel 92, the lands in the vicinity of Parcel 92 were historically and culturally important to the Puyallup Tribe. Documented village sites were located to the southeast along the western shoreline of the Foss Waterway. A nearby island located north of the Wheeler Osgood Waterway was known to have been used as a burial island.

Portions of the tideflats, including Parcel 92, were acquired and prepared for development by the Northern Pacific Railroad. The railroad established its terminus in Tacoma in 1873 with the Puyallup branch line crossing over the Foss Waterway just south of Parcel 92, where a rail spur remains to this day. Between the 1890s and 1910, Parcel 92 and the surrounding properties were bulkheaded and filled with dredge materials from the development of the Foss Waterway (formerly the City Waterway). The Burlington Northern Santa Fe Railway Company (BNSF) is the successor in interest to the Northern Pacific Railroad. The railroad continued to own the property and lease it for industrial development through the 1990s. BNSF continues to own multiple properties surrounding Parcel 92 including the southern portion of the Wheeler Osgood Waterway, the property to the west located along the Foss Waterway, and the rail spur located immediately south of Parcel 92.

The following is a summary of the history of industrial development and use of Parcel 92. Selected historical photographs are included in Figure 2.

- By 1926, two rail spurs had been developed on the property, but no buildings were present. Standard Oil operated an oil dock immediately west of Parcel 92. According to Chevron (the successor in interest to Standard Oil), the Standard Oil Company terminal located southeast of Parcel 92 was connected initially to the dock via a pipeline running along the Northern Pacific Railroad/BNSF tracks to the south of Parcel 92. This pipeline was later replaced by a pipeline running along the northern boundary of Parcel 92. The Standard Oil/Chevron oil dock is also understood to have been connected by pipelines to two large fuel oil aboveground storage tanks (ASTs) located on BNSF property to the southwest, in what is now the former Martinac Shipyard Property. An oil fueling column located on the southeastern portion of Parcel 92 was used to transfer oil between rail tank cars and the large oil ASTs.
- Between 1929 and 1945, a complex of small buildings was located in the eastern portion of Parcel 92. The buildings were housed the Western Concrete Pipe Company of Washington, then the American Concrete Pipe Company of Washington, later the American Concrete & Steel Pipe Company, and finally the American Pipe & Construction General Contractors.
- By 1946, the early buildings had been removed from the eastern portion of Parcel 92 and two buildings had been constructed.
 - The western building consisted of a foundry building (J. D. English Steel building, Figure 2) at 465 East 15th Street, which was occupied between 1950 and the mid-1990s by the J.D. English Steel Company, and later by Lyden Castparts. The J.D. English Steel building was updated and expanded multiple times. The J.D. English Steel Company continued to occupy the western building until 1993. Lyden Castparts occupied that building briefly in the late 1990s. Urban Specialties has occupied the building since at least 2005. Urban Specialties remains a tenant of the Port, producing cast iron products from recycled iron and steel.
 - The eastern building (the Johnson Building, Figure 2) was the A.J. Johnson & Company building. That building was initially occupied by the A.J. Johnson & Company and later by other users, including Johnson & Postman Specialty Wood Products. The Johnson Building was expanded multiple times. A.J. Johnson occupied the eastern property parcel through at least 1973. After which, Johnson Cedar Products, REP Electrical Contractors, Johnson & Postman Wood Specialties, WRC

Lumber Products, B&D International Import/Export, Commercial Carpets, Inc., the Johnson Group Inc. Exporters occupied the building. Additional tenants listed at the 459 East 15th Street address after 2002 included Bear Wood Windows, Northwest Stair Specialties, Johnson & Postman Wood Specialties, and Temtco Steel. Buildings on the eastern parcel have since been demolished.

c. Environmental Site Assessment Findings

Early environmental site assessment activities were conducted prior to acquisition of Parcel 92 by the Port. The Port more recently conducted a baseline environmental site assessment with funding support provided by the Department of Ecology under an Integrated Planning Grant.

Environmental Site Assessment Activities

The Watkins Commercial Property LLC (Watkins) acquired the two portions of Parcel 92 in 1997. Environmental testing activities were conducted on behalf of Watkins between 1998 and 2003. These studies documented the presence of petroleum contamination in soil and groundwater in two areas of the property:

- Petroleum (diesel) in soil and groundwater were encountered beneath the northern and eastern portions of the J.D. English Steel Building. That contamination exceeded applicable Model Toxics Control Act (MTCA) cleanup levels.
- Petroleum (diesel) in groundwater south of the former A.J. Johnson Building near the former railroad fueling column at concentrations exceeding MTCA cleanup levels.

Soil investigations of former oil pipeline areas on/adjacent to Parcel 92 were conducted by Chevron during 1989 and 2012 as part of the investigations of the former Standard Oil Terminal site, located 1,000 feet southeast of Parcel 92. Investigation included the partial removal of the northern pipeline located north of the J.D. English Steel building in 1989. No observations of petroleum contamination were reported during that trenching/excavation. The portion of the pipeline located to the north of the Johnson Building was reportedly rinsed and capped in place. Subsequent soil sampling was conducted along the pipeline, and no soil contamination was identified.

The Port acquired both portions of Parcel 92 from Watkins in November of 2006. Bear Wood Windows continued to occupy the Johnson Building through at least 2018. Urban Specialties continues to occupy the J.D. English Steel Building as of 2025.

In 2017, the Port performed a limited environmental investigation to evaluate potentially hazardous building materials for the Johnson Building. Lead-based paint was identified on the building exterior. In follow-up testing, lead contamination was also identified in shallow surface soils (i.e., 0-6 inches in depth) located adjacent to the building. That lead contamination exceeded MTCA cleanup levels for unrestricted land use.

Approximate locations of historical soil sampling locations completed by Watkins, Chevron, and the Port are depicted in panel 1 of Figure 3.

2023 Baseline Assessment Findings

Current environmental conditions at Parcel 92 were documented in the baseline environmental site assessment performed in 2023. This work included both soil and groundwater testing as well as parallel cultural resource assessment activities.

The environmental assessment included the completion of 15 soil borings throughout Parcel 92 (Panel 1 of Figure 3). Each boring was screened for the presence of environmental contamination and potential

cultural resources. Soil and groundwater samples were then collected for environmental testing from each of the borings. That testing identified four areas of contamination:

- **Area 1: Petroleum and Related Contamination Beneath the J.D. English Steel Company Building:** The contamination beneath and adjacent to the J.D. English Steel Company building included gasoline range hydrocarbons, diesel- and oil-range extractable total petroleum hydrocarbons (TPH), benzene, naphthalenes and carcinogenic polycyclic aromatic hydrocarbons (cPAHs). Phenol was also present, but at concentrations less than applicable MTCA cleanup levels. The contamination is consistent with that identified in the earlier environmental site assessment activities and is the result of historical releases within and adjacent to the J.D. English Steel building during ownership by the railroad.
- **Area 2: Surficial cPAH Contamination in the Yard Areas of the J.D. English Steel Building:** Some additional cPAH contamination was identified within the yard areas adjacent to the J.D. English Steel Company building. This contamination was limited to shallow soils, and no subsurface soil or groundwater contamination was identified in this area.
- **Area 3: Petroleum and cPAH Contamination South of the Johnson Building:** Contamination south of the Johnson building was limited to extractable TPH and low-level cPAHs in soil. The contamination is consistent with that identified in early site assessment findings from the late 1990s, and the contamination is associated with historical use of the railroad fueling column.
- **Area 4: Surficial Lead Contamination Along-side the Johnson Building:** The 2023 site assessment incorporated the 2017 soil data collected by the Port adjacent to the Johnson Building. This contamination did not extend into any of the 2023 soil borings.

In 2023, the Port reported the presence of the identified soil and groundwater contamination to the Washington State Department of Ecology (Ecology). Ecology subsequently listed the site under the site name “Wheeler Osgood Maritime Center.” That listing includes Parcel 92 as well as the Parcel 94 and Parcel 132 properties, both of which are owned by the Port. These properties are not subject to any existing Federal or State orders or formal agreements for cleanup at this time. Investigation and cleanup activities at these properties have been conducted to date by the Port as independent remedial actions under Washington’s MTCA (Washington Administrative Code [WAC] 173-340), with close coordination with Ecology.

d. EPA Brownfields Cooperative Agreement

As part of the Port’s cooperative agreement with EPA, the Port is leading Brownfield assessment activities in coordination with the local Brownfields Advisory Committee (BAC). Current members of the BAC include the following:

- The City of Tacoma
- The Puyallup Tribe
- The Tacoma Pierce County Health Department
- The New Tacoma Neighborhood Council and North End Neighborhood Council
- Communities for a healthy Bay
- University of Washington School of Urban Studies
- Washington State Department of Ecology
- Clover Park Technical College

Under the Brownfields Grant, a site inventory of potential priority projects was completed for the Tideflats Industrial Area. Through that process and with input from the BAC, Parcel 92 was identified as a high priority for assessment and remediation. This ABCA was developed by Anchor QEA with funding provided by EPA under the Cooperative Agreement.

e. Project Goal

The goal for the cleanup of Parcel 92 is to remediate the existing environmental contamination in a manner that will support reuse and revitalization of the property in a manner consistent with the Port's ongoing Maritime Center master planning activities.

Future uses of Parcel 92 may include maritime-related light industrial, commercial, or mixed-use development in a manner supportive of community land use objectives. Any redevelopment of Parcel 92 will support City of Tacoma planning requirements, including the enhancement of the marine buffer areas along the Wheeler Osgood Waterway and development of a shoreline esplanade to enhance public access to the waterfront. Land use planning activities will also include further cultural resource assessment and management activities in association with the Puyallup Tribe of Indians.

The Port proposes to clean up Parcel 92 to prepare for development of marine-related industries. Examples of potential marine-related industries include marine electric engine design, marine design, marine electronics, marine logistics or associated employee training services.

f. Regional and Site Vulnerabilities

Parcel 92 is not located within an existing flood zone. However, it is located within a waterfront area of the Tacoma Tideflats surrounded by two tidally influenced waterways (the Foss Waterway to the west and the Wheeler Osgood Waterway to the north).

Planning for the Port Maritime Center has included evaluation of climate-related risks including sea level rise. Based on an analysis performed by Anchor QEA, a minimum floor elevation of 19 feet above current Mean Lower Low Water (MLLW) elevations has been recommended for new development to provide resilience against future sea level rise. Ground surface elevations at Parcel 92 are currently just below this value, averaging approximately 18 feet. Future redevelopment will likely include import of fill materials to raise the site grade in redevelopment areas by approximately 1 foot.

Commencement Bay is also subject to periodic risks from earthquake and landslide triggered tsunamis. These were evaluated in the Anchor QEA sea level rise memorandum prepared as part of the Maritime Skills Center project. Maintenance of a minimum floor elevation of 19 feet above MLLW was recommended to reduce risks of potential tsunami-related hazards.

According to the US Global Change Research Program (USGCRP), expected weather trends for the Puget Sound area include more extreme temperatures, increased precipitation with greater variability, and increased extreme precipitation events are likely to occur in the future. Parcel 92 currently has a limited stormwater conveyance system including outfalls to the Wheeler Osgood Waterway. Stormwater-related improvements will be required to prevent adverse impacts from heavy storm events that may overwhelm available on-site stormwater management measures. Because the site soils are sandy, stormwater improvements may be able to utilize certain low impact development strategies including the use of stormwater bioretention and infiltration.

Groundwater is present within temporary wells at depths of approximately 9 to 15 feet below ground surface (between 3 and 9 feet MLLW). Based on the nature of the Site and its proposed reuse, changing temperature, rising sea levels, wildfires, changing dates of ground thaw/freezing, changing ecological zone, saltwater intrusion and changing groundwater table are not likely to significantly affect conditions at Parcel 92.

II. Applicable Regulations and Cleanup Standards

a. Cleanup Oversight Responsibility

The cleanup of Parcel 92 will be led by the Port and conducted in compliance with Washington’s MTCA regulations, which are overseen by Ecology.

Ecology has designated the larger Port Maritime Center area (including Parcel 92) as a contaminated site. The site is identified as the Wheeler Osgood Maritime Center site (cleanup site ID 17005). There are no active orders with EPA or the State dictating timeframes or methods for cleanup of this site at this time. Cleanup and redevelopment of the Wheeler Osgood Maritime Center site is being led by the Port, with the work being conducted in phases under Washington’s independent remedial action program.

Like the ongoing cleanup at portions of Parcel 94 (the locations of the 253 Maritime Center and the New Port Headquarters building), the cleanup will be performed as an interim remedial action under MTCA. Interim remedial actions are used to expedite remediation of portions of larger sites and address specific contaminant exposure pathways.

b. Cleanup Standards for major contaminants

The Port seeks to clean up Parcel 92 in a manner that supports a wide range of future uses from light industrial to mixed-use. The Port proposes to remediate Parcel 92 to unrestricted use standards so that engineering controls (e.g., fencing) are not required. This will support City land use requirements, including the development of the shoreline esplanade and marine buffer restoration area. It will also provide protectiveness for a variety of future uses including by students from the 253 Maritime Skills Center (e.g., participation of high school students in on-site activities during training or mentorship programs).

Cleanup levels for contaminated soils are expected to include the MTCA Method A and B cleanup levels established for unrestricted land use to allow for a range of development options as listed in Table 1. Table 1 lists each of the contaminants identified in excess of cleanup levels in on-site soils and groundwater (Figure 3).

Table 1. Preliminary Site Cleanup Levels

Analyte	Cleanup Level	Units	Basis
Soil Cleanup Levels			
Lead	250	mg/kg	MTCA Method A for unrestricted land use
cPAH TEQ	100	mg/kg	MTCA Method B for unrestricted land use
Total Naphthalenes	5,000	ug/kg	MTCA Method A for unrestricted land use
Benzene	30	ug/kg	MTCA Method A for unrestricted land use
Petroleum (gasoline)	30	mg/kg	MTCA Method A for unrestricted land use
Petroleum (diesel + oil)	2,000	mg/kg	MTCA Method A for unrestricted land use
Groundwater Cleanup Levels			
Petroleum (diesel + oil)	500	ug/L	MTCA Method A for unrestricted land use

Notes:

cPAH: Carcinogenic Polynuclear Aromatic Hydrocarbons

MTCA: Model Toxics Control Act (WAC 173-340)

TEQ: Benzo(a)pyrene Toxicity Equivalent

c. Laws & Regulations Applicable to the Cleanup

Federal laws and regulations that are applicable to this cleanup include the Federal Small Business Liability Relief and Brownfields Revitalization Act, and the Federal Davis-Bacon Act. The cleanup will be conducted in compliance with the various provisions of the MTCA (WAC 173-340).

Federal, state, and local laws regarding procurement of contractors to conduct the cleanup will be followed.

Environmental review and permitting requirements applicable to the cleanup include the following:

- State Environmental Planning Act (SEPA; WAC 197-11) review will be completed prior to procuring project permits
- A Tacoma site development permit (SDEV) will be obtained for site grading and stormwater management activities
- A construction stormwater general permit (CSGP) will be obtained to regulate construction stormwater management during the cleanup in compliance with the National Pollutant Discharge Elimination System (NPDES) regulations and corresponding state of Washington requirements
- Stormwater that requires treatment and off-site discharge during the cleanup will be treated and discharged to the sanitary sewer under the terms of a Tacoma Special Authorized Discharge (SAD) permit
- Soils transported for off-site disposal will be profiled and managed consistent with a Tacoma Pierce County Health Department Waste Discharge Authorization
- Utility clearances (i.e., call before you dig) will be obtained prior to initiation of soil excavations or other ground penetrating construction activities.

III. Evaluation of Cleanup Alternatives

This section describes four cleanup alternatives evaluated for Parcel 92. How the cleanup is performed will affect certain project cost elements or regulatory requirements. The cleanup alternatives considered for Parcel 92 have been developed and evaluated with the following consistent assumptions:

- The demolition of remaining buildings on the property is assumed to be performed separately by the Port in advance of the cleanup. This is assumed to include both the removal of above-ground structures as well as the removal of building foundations and capping of on-site utilities.
- The Port will separately address City planning and shoreline management act requirements. These requirements will attach to the first development project permitted on Parcel 92 (this can include cleanup if the cleanup is performed as an independent action and in advance of other site development). These requirements are anticipated to include development of a vegetated marine buffer area along the shoreline of the Wheeler Osgood Waterway, and construction of a shoreline esplanade consistent with the City's design standards for the East Foss Waterway area.
- The Port will separately address shoreline stabilization requirements. Some shoreline erosion has affected portions of Parcel 92 and the adjacent BNSF-owned properties. Future work to address this erosion affecting Parcel 92 is assumed to be performed by the Port separately from the cleanup.
- The cleanup of Parcel 92 will be performed as a MTCA independent remedial action. Implementation of the cleanup under a MTCA Agreed Order would result in additional site investigation and regulatory review costs beyond those included in the remedial alternatives.
- Stormwater management activities required to implement the cleanup are included with the cleanup alternatives (i.e., management of construction stormwater). However, the

development of stormwater improvements to support future redevelopment is assumed to be performed separately in the future.

Changes in any of the above assumptions would result in an increase to the cost of implementing the cleanup alternatives described below.

a. Cleanup Alternatives Considered

Three different alternatives were developed and evaluated along-side a No Action alternative. The alternatives use different approaches to address the identified areas of contamination shown in Figure 3. The evaluated alternatives include the following:

- Alternative #1: No Action
- Alternative #2: Capping
- Alternative #3: Limited Soil Excavation and In Situ Groundwater Treatment
- Alternative #4: Expanded Soil Excavation and In Situ Groundwater Treatment

Each of the alternatives is illustrated in Figure 3. Under Alternative 1, environmental site conditions would remain as they are today. Alternatives 2, 3 and 4 would use different combinations of remedial technologies to remediate the contamination and comply with MTCA regulatory requirements:

Under Alternative 2, contaminated soils would be capped. Some soils would be removed as necessary to allow cap placement without impairing the reuse potential for the property. Groundwater contamination would be addressed solely through monitored natural attenuation.

Alternatives 3 and 4 both involve the removal of contaminated surface soils. Deeper contaminated soils are removed to different degrees, with the most extensive contaminated soil removal completed under Alternative 4. These alternatives include the placement of in situ remediation additives (i.e., Petrofix) to enhance the restoration time for site contaminated groundwater.

b. Evaluation of Cleanup Alternatives

Prior to selecting a recommended cleanup approach, each of the cleanup alternatives were evaluated to assess and compare the effectiveness, implementability, and costs.

Effectiveness – Including Vulnerability/Resiliency Considerations

- Alternative #1 (No Action): Alternative #1 does not support project requirements. It does not provide a permanent, protective cleanup for Parcel 92. It relies on the continued use of engineering controls (i.e., fencing) to protect property users and neighbors from the soil and groundwater contamination. It does not support the planned future reuse of the property in line with the goals of the Port Maritime Center.
- Alternative #2 (Capping): Capping can be an effective approach to contain contaminated soils and decreases infiltration of surface water when it is implemented in parallel with a specific long-term land use. Alternative #2 would include capping in all areas of contamination. Future construction could require capped areas to be re-worked one or more times to support site redevelopment. In addition, capping will require periodic monitoring and the filing of restrictive covenants to ensure long-term protectiveness of the remedy. Under alternative 2, there is a risk that groundwater quality may worsen in Area 1 due to future leaching (i.e., by exposing Area 1 soils to precipitation following removal of the J.D. English Steel Building) of subsurface soil contamination into the groundwater.

- Alternative #3 (Limited Excavation with In Situ Groundwater Treatment): Alternative 3 includes the removal of contaminated surface soils from all four areas of contamination, with deeper excavations in Area 1 to remove petroleum source area soils that represent a significant potential source of contamination to groundwater. Deeper contaminated soils and groundwater would be contained on site beneath a thick layer of clean soils. In situ groundwater treatment reagents would be added to Area 1 to enhance the attenuation of groundwater contaminants. Alternative #3 will require periodic monitoring and the filing of restrictive covenants to ensure long-term protectiveness of the remedy. Limited removal of contaminated soils will not remove all encumbrances that could inhibit future site redevelopment.
- Alternative #4 (Expanded Excavation with In Situ Groundwater Treatment): Alternative 4 includes the removal of contaminated surface soils from all four areas of contamination, with deeper excavations in Areas 1 and 3 to remove petroleum source area soils contributing to existing groundwater contamination. Contaminated soils present in soils immediately above the native tideflat layer will remain in place to avoid disturbing potential cultural or archaeological resources. Deeper contaminated soils and groundwater would be contained on site beneath a thick layer of clean soils. In situ groundwater treatment reagents would be added to Area 1 and Area 3 to enhance the attenuation of groundwater contaminants. Alternative #4 will require periodic monitoring and the filing of restrictive covenants to ensure long-term protectiveness of the remedy. Alternative #4 is expected to have a shorter restoration time frame than Alternatives #1, #2, or #3.

Implementability

- Alternative #1 (No Action): While highly implementable in the short-term, the ongoing presence of contaminated soil and groundwater under Alternative #1 will ultimately require further action to address MTCA cleanup requirements and prevent exposure of property users and stormwater to soil contaminants.
- Alternative #2 (Capping): Capping is a readily implementable cleanup approach provided that the cap design anticipates the needs of stormwater management and addresses grade transitions required to align with area roadways and infrastructure. Measures to address these requirements are included in the preliminary design and estimated costs for Alternative #2. Future redevelopment will require additional costs to retrofit/expand the cap as necessary to accommodate building and utility construction, and that redevelopment will require active stormwater controls to manage contaminated materials that may be exposed during construction. Further actions may be required to remediate groundwater should conditions worsen in Area 1 following removal of the J.D. English Steel Building, which currently limits the potential for precipitation to leach soil contaminants into the groundwater.
- Alternative #3 (Limited Excavation with In Situ Groundwater Treatment): Alternative 3 is considered readily implementable, as it uses similar approaches (excavation/backfill, off-site disposal, in situ treatment) as those used for implementation of the recently completed Parcel 94 interim action. The alternative is assumed to include proactive stormwater management and dust control during the cleanup and adherence to project permitting and environmental review constraints, use of appropriate industrial truck haul routes and using adaptive management during construction to address any unforeseen conditions. In-situ treatment of groundwater is also subject to project permitting and environmental review constraints; however, it includes minimal ground disturbance and is typically a short duration. Removal of shallow soil contamination, treatment of groundwater, removal of the remaining segments of Standard Oil/Chevron pipeline remove these potential encumbrances to future site redevelopment in comparison to Alternatives #1 and #2. Areas will still require a cap and institutional controls (restrictive covenant) to manage residual soil and groundwater contamination remaining under this alternative.
- Alternative #4 (Expanded Excavation with In Situ Groundwater Treatment): Alternative 4 uses similar implementation methods to Alternative 3 and is considered equally

implementable. It is anticipated that Alternative 4 will have the shortest restoration time-frame of any of the evaluated alternatives, minimizing long-term groundwater monitoring requirements.

Cost

- Alternative #1 (No Action): No Action. No costs are estimated for the no action alternative. However, future costs will necessarily be incurred to manage contaminated soils and groundwater at Parcel 92 to comply with MTCA and support future redevelopment.
- Alternative #2 (Capping): The costs to implement Alternative #2 are estimated at \$3.1 million. Additional costs would be incurred at the time of future redevelopment to seat new buildings and utilities into the cap and manage displaced contaminated soils and contaminated stormwater. Additional groundwater remediation costs may be required if groundwater quality in Area 1 worsens following removal of the J.D. English Steel building (which is currently limiting infiltration into Area 1 soils).
- Alternative #3 (Limited Excavation with In Situ Groundwater Treatment): The cost to implement Alternative #3 is estimated at \$5.1 million.
- Alternative #4 (Expanded Excavation with In Situ Groundwater Treatment): The cost to implement Alternative #4 is estimated at \$7.4 million.

c. Recommended Cleanup Alternative

It is recommended that the cleanup of Parcel 92 be performed using either Alternative #3 or Alternative #4. These two alternatives provide the greatest degree of effectiveness while remaining implementable. Costs of Alternative #4 are higher, but these costs are expected to provide the best environmental effectiveness and shortest restoration time-frame.

- Alternative #1 (No Action): Alternative #1 cannot be recommended since it does not meet MTCA cleanup requirements or support the cleanup and revitalization goals of the Port Maritime Center.
- Alternative #2 (Capping): The direct costs of capping are less expensive than more permanent remedies. However, Alternative #2 will require ongoing monitoring and maintenance of the cap, and additional costs will be incurred in the future to support site redevelopment or in the event the groundwater quality worsens within Area 1 following removal of the J.D. English Steel Building.
- Alternative #3 (Limited Excavation with In Situ Groundwater Treatment): Alternative #3 will comply with MTCA cleanup levels and will remove the soils posing the highest risk of groundwater contamination from Area 1. This alternative will have fewer impacts on future property reuse than under Alternative #2.
- Alternative #4 (Expanded Excavation with In Situ Groundwater Treatment): Alternative #4 has the highest direct costs, but it provides the highest degree of effectiveness and permanence, has the shortest restoration time-frame and best supports future redevelopment goals for the project.

Green and Sustainable Remediation Measures for Selected Alternative

To optimize the sustainability of the cleanup action, several green remediation approaches will be applied, including the following:

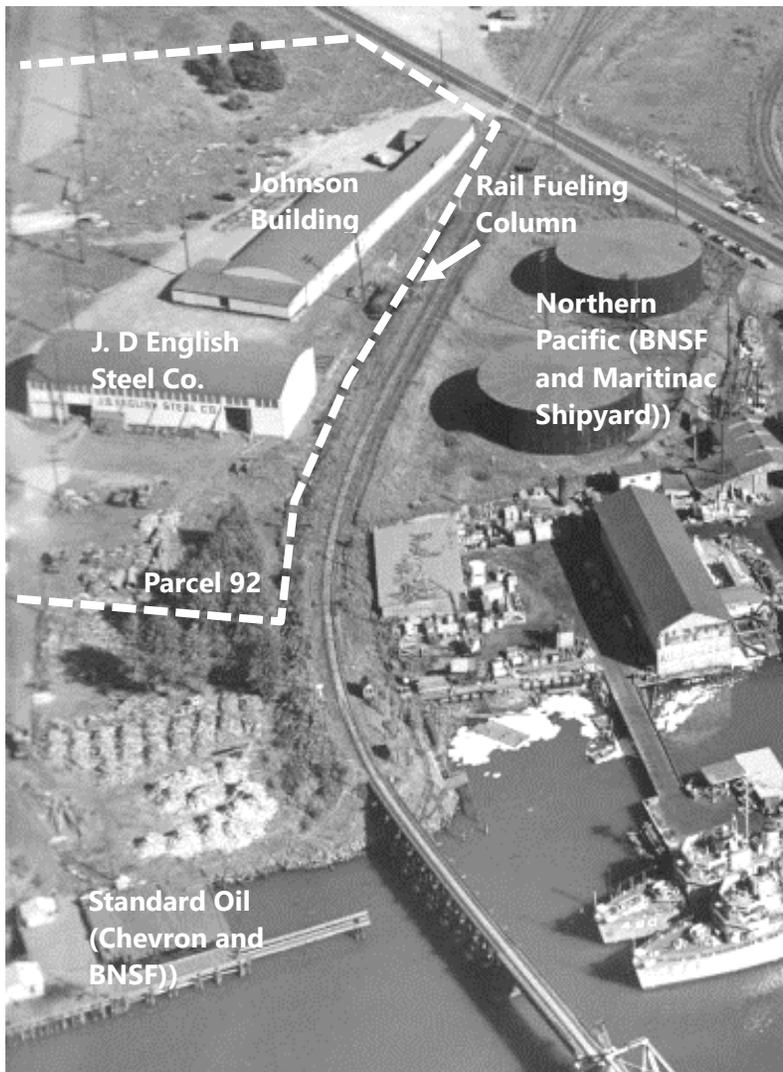
- The most recent Best Management Practices issued under ASTM International Standard E-2893: Standard Guide for Greener Cleanups will be used as a reference in this effort.
- The work will be planned for the dry season to minimize stormwater management requirements. Stormwater generated during the cleanup will be prevented from discharge to Commencement Bay waters. Stormwater will be managed through on-site infiltration to the extent practicable. Waters that cannot be infiltrated will be treated and discharged to the sanitary sewer in accordance with the requirements of a City of Tacoma SAD permit.

- The Port will maximize soil reuse opportunities both 1) for low-level contaminated soils generated during the cleanup (i.e., those reusable at Port-owned industrial properties or to support other cleanup projects) and 2) for imported clean soils required to backfill cleanup excavations. For example, clean dredge materials generated from port navigation improvement projects could be used for some of the excavation backfill materials. All soil reuse will be conducted in accordance with applicable State and local regulations and requirements.
- Air emissions associated with construction vehicles and equipment will be minimized using measures such as an idle-reduction policy, the use of heavy equipment with advanced emissions controls operated on ultra-low sulfur diesel, the use of electric vehicles where appropriate to the work being performed.

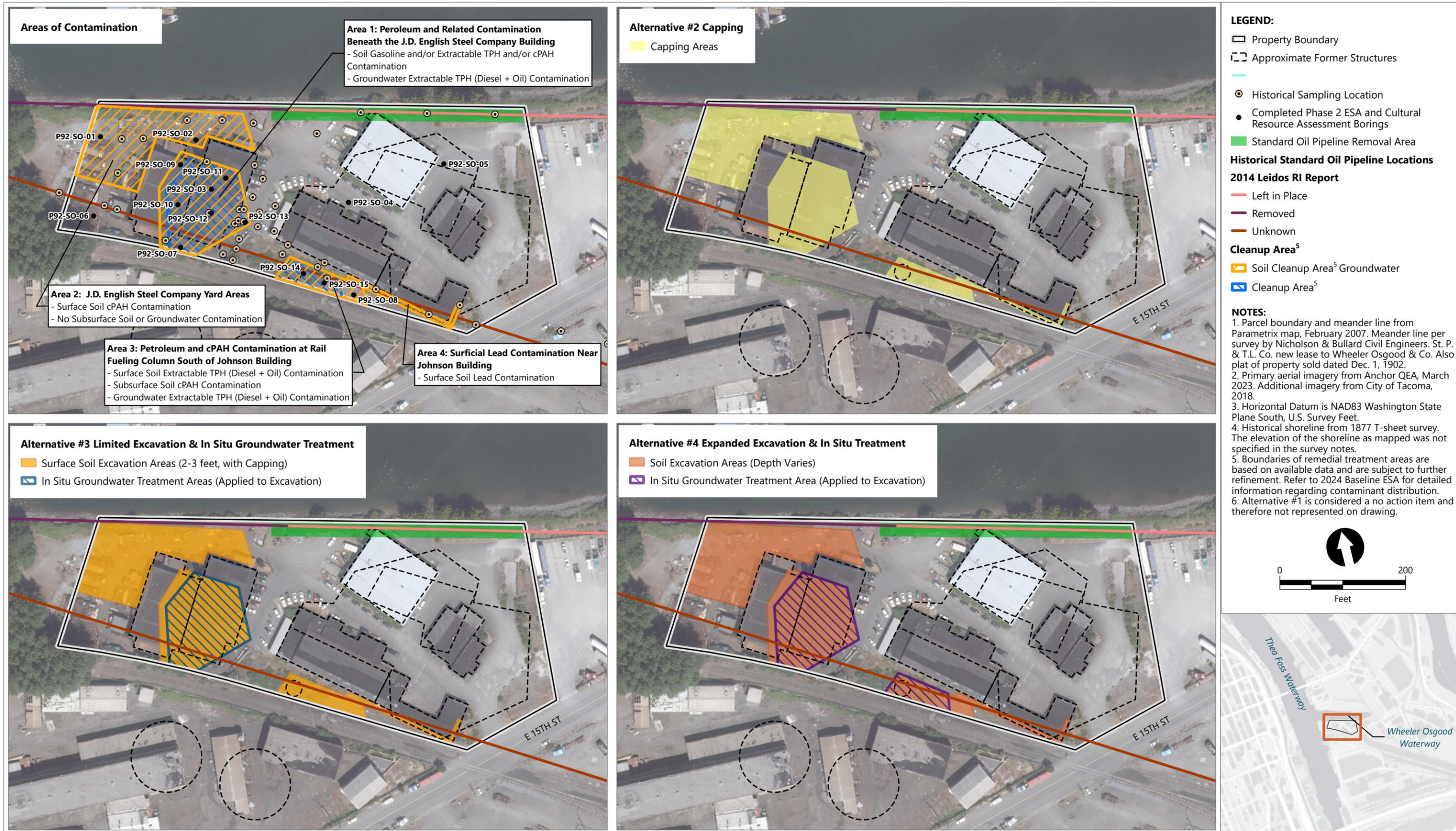
Figure 1. Location of Parcel 132 within the Port Maritime Center Master Planning Area



Figure 2. Historical Photographs of Parcel 92 and Vicinity



Above Left: Photograph of Parcel 92 during 1955. In the rear of the photograph (P92 eastern portion), the Johnson building is visible, along with a railroad oil tanker car operating at the railroad fueling column, which was connected to the Northern Pacific Railroad fuel tanks visible in the right side of the photograph. The J.D. English Steel building (after its first expansion to the south) is visible in the foreground (P92 western portion). **Above Right:** Photograph from 1946 showing the Johnson Building. The J.D. English Steel building is located in the background. **Lower Right:** Photograph from 1958 showing the original J.D. English Steel building and the Johnson Building. The former Standard Oil/Chevron fuel dock is visible in the background.



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Figure 3
Existing Cleanup Areas and Evaluated Cleanup Alternatives

Analysis of Brownfield Cleanup Alternatives
 Port Maritime Center Project – Parcel 92