



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

March 11, 2014

Mr. Andy Haub
City of Olympia
601 4th Avenue
PO Box 1967
Olympia, WA 98507

Re: Opinion on Proposed Cleanup of the following Site:

- **Site Name:** Olympia City Sewer Pump Station & General Petroleum Corporation
- **Site Address:** 220 Water Street, Olympia
- **Facility/Site No.:** 31651436
- **Cleanup Site ID No.:** 3608
- **VCP Project No.:** SW1134

Dear Mr. Haub:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your proposed independent cleanup of the Olympia City Sewer Pump Station & General Petroleum Corporation facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Issue Presented and Opinion

Upon completion of the proposed cleanup, will further remedial action likely be necessary to clean up contamination at the Site?

YES. Ecology has determined that, upon completion of your proposed cleanup, further remedial action will likely be necessary to clean up contamination at the Site.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA"). The analysis is provided below.

Description of the Site

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with the following release:



- Petroleum hydrocarbons and related constituents into the Soil and Groundwater.

Enclosure A includes a detailed description and diagram of the Site, as currently known to Ecology.

Please note a parcel of real property can be affected by multiple sites. At this time, we have no information that the parcel(s) associated with this Site are affected by other sites.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. Remedial Investigation and Feasibility Study Report, City Sewer Pump Station & General Petroleum Corporation Site, dated April 2013 by Anchor QEA, LLC.
2. Draft Upland Investigation Data Report, Percival Landing, dated January 2011 by Anchor QEA, LLC.
3. Letter to Mr. Thomas O. Meade (Olympia Public Works) from Mr. Chuck Cline (Ecology), RE: Opinion on Tank Closure, dated March 9, 2000.
4. Letter to Mr. Chuck Cline (Ecology) from Mr. Thomas O. Meade (Olympia Public Works), RE: Water Street Sewer Pump Station and Olympia Maintenance Center Fuel Tank Replacements, dated November 9, 1999.
5. UST Closure Report, Water Street Pumping Station, 220 Water Street Northwest, Olympia, Washington, dated May 14, 1999 by Kleinfelder, Inc.
6. City of Olympia Water Street Sewer Lift Station Underground Storage Tank Characterization Report, dated April 20, 1998 by Associated Environmental Group, Inc.

Those documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. You can make an appointment by calling the SWRO resource contact at (360) 407-6365.

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis of the Cleanup

Ecology has concluded that, upon completion of your proposed cleanup, **further remedial action** will likely be necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

1. Characterization of the Site.

Ecology has determined your characterization of the Site is not sufficient to establish cleanup standards and select a cleanup action. Additional characterization is warranted to justify the proposed cleanup action, as detailed below.

Based on data collected to date, the Site comprises two Thurston County Tax Parcels: 78507200100 (former GPC property) and 78507200500 (Pump Station property). Both parcels are currently owned by the City of Olympia (City). In addition, a portion of the Site along the shoreline to the west of these parcels is owned by the State of Washington and managed by the Department of Natural Resources. Ecology understands that the former GPC facility and the Pump Station are separate facilities; however, data collected to date suggests that releases from these facilities have likely commingled. As a result, they are being treated as one Site for the purpose of this investigation and cleanup.

GPC operated a bulk fuel plant on Site beginning in the 1920s. Reportedly, GPC became Mobil Oil Company and City Fuel Oil Service sometime around 1966 and operated until about 1979. According to historical photos, at least five large (exact volumes unknown) aboveground storage tanks were present on this property, as well as a pump house and oil/grease storage area. It is unknown to what extent cleanup activities, if any, were conducted on this property when the facility was dismantled. The property is currently occupied by a City parking lot (*see attached Figures 2 and 3*).

The Pump Station is an approximately 600-square-foot structure located about 75 feet from Budd Inlet (*see attached Figures 2 and 3*). A decommissioned, 1,500-gallon, underground storage tank (UST) is located along the north wall of the Pump Station. Tank closure occurred in 1999 and consisted of removing the contents of the tank and filling it with cement slurry. Soil and groundwater samples collected from three borings around the UST in 1998 prior to closure identified diesel-range petroleum hydrocarbons (TPH-D) up to 3,200 milligrams per kilogram (mg/kg) in soil and up to 80,000 micrograms per liter (µg/L) in groundwater (*see attached Figures 5 and 6*).

The area to the west of these properties is currently occupied by a portion of the newly redeveloped Percival Landing Park (park) (*see attached Figures 2 and 3*).

In September 2010, during shoreline excavation as part of park redevelopment, petroleum contamination was identified that resulted in a visible sheen on the waterway. This release occurred when the contractor encountered and removed a timber cribwall that was buried in the shoreline embankment. The release was reported to Ecology and was assigned Environmental Report Tracking System (ERTS) #622261. The Ecology Spills Team responded and contained the release to the waterway.

Following the incident, the City initiated an upland investigation to determine the source of the petroleum contamination. Between September and December 2010, numerous soil samples were collected from 30 soil borings and nine test pits in the upland area. Analytical

results identified concentrations of gasoline-range petroleum hydrocarbons (TPH-G), TPH-D, oil-range petroleum hydrocarbons (TPH-O), benzene, and ethylbenzene in soil above MTCA Method A cleanup levels (*see attached Figures 4 and 5*). The contamination was primarily located on the properties adjacent to the shoreline. One of the areas identified included the former GPC and Pump Station properties. Another area of contamination was identified north of Olympia Avenue. However, based on data collected to date, this source area appears to be different and separate from the GPC/Pump Station area, and is being addressed as a separate site.

As part of park redevelopment, the City had originally proposed to install sheet piling along a portion of the shoreline following the completion of in-water activities. However, since contamination was identified, the City altered their plans and installed sheet piling along the entire shoreline following the excavation of contaminated material (*the sheet pile wall is illustrated on Figure 8*). This was done to provide a more substantial barrier to prevent upland contamination from further migrating to the waterway. A total of 19 confirmation soil samples (*CS sample series on attached Figures 4 and 5*) were collected from the in-water excavation area. Analytical results indicated that contamination was still present in three locations (CS-10, CS-17, and CS-19) adjacent to the GPC/Pump Station properties. TPH-D/TPH-O was present in CS-17 at 6,174 mg/kg and in CS-19 at 16,677 mg/kg. Benzene was present in CS-10 at 1.28 mg/kg.

In June 2011, groundwater samples were collected from four soil borings (BH-21, BH-30, BH-31, and BH-32). No permanent wells were installed. Analytical results identified TPH-G in BH-21 (1,190 µg/L) and BH-32 (7,050 µg/L) above the MTCA Method A cleanup level of 800 µg/L; TPH-D/TPH-O in BH-32 (3,201 µg/L) above the MTCA Method A cleanup level of 500 µg/L; and benzene in BH-32 (16.5 µg/L) above the MTCA Method A cleanup level of 5 µg/L, but below the surface water criteria of 23 µg/L. Toluene and ethylbenzene were also detected but below MTCA cleanup levels (*see attached Table 3b and Figure 6*).

Also in June 2011, one soil vapor sample was collected from boring BH-31 at 4 feet below ground surface (bgs) to evaluate the soil-to-vapor pathway. Analytical results indicated the presence of air-phase petroleum hydrocarbons (APH), benzene, and xylene above MTCA Method B screening levels. Also, the detection limits for ethylene dibromide (EDB) and 1,2-dichloroethane (DCA) were above their respective screening levels, so it is not clear whether these contaminants were also present (*see attached Table 4 and Figure 7*).

Utilizing the data collected to date, the Feasibility Study (FS) recommends a preferred alternative of monitored natural attenuation (MNA) with institutional controls.

Based on a review of the above-listed documents, Ecology has the following comments:

1. The extent of contamination in groundwater has not been sufficiently defined at the Site. As part of the latest investigation, only one round of groundwater data was collected, and it was collected from temporary well points. No permanent wells exist at the Site. A sufficient number of permanent wells shall be installed at the Site for

the collection of representative groundwater data to adequately characterize the extent of groundwater impacts, as well as to adequately evaluate whether natural attenuation is occurring. At least four quarters of data shall be collected to adequately evaluate the Site hydrogeology and how it may be affected by the sheet piling and the tides, contaminant concentration trends, and susceptibility to MNA.

2. The extent of soil vapor impacts have not been sufficiently defined at the Site. Only one location was sampled to date. Because this sample was collected at 4 feet bgs, screening levels for sub-slab measurements should have been used (see Section 3.1.3 of Ecology's Guidance for Evaluating Soil Vapor Intrusion). Using these screening levels, this sample exceeds the screening levels for APH, benzene, and xylene. Further, the detection limits exceeded the screening levels for EDB and DCA so it is uncertain whether these contaminants are present. Lastly, unless collecting sub-slab soil vapor samples, soil vapor should seldom be collected from depths shallower than 5 feet bgs due to the possibility of diluting the sample with atmospheric air (see Appendix C, Section C.2 of Ecology's Guidance for Evaluating Soil Vapor Intrusion).

The FS indicates that while there are buildings within 100 feet of this vapor sample location, soil and groundwater samples closest to the Les Schwab building were below MTCA Method A cleanup levels, indicating the extent of soil and groundwater contamination are within the Site boundary and not on the Les Schwab property. Further, it is stated that groundwater flows east to west (which is a presumption not confirmed by monitoring) so potential migration of soil vapor through groundwater transport is unlikely. Please note that soil vapor can move through the subsurface irrespective of groundwater flow. Also, the closest groundwater sample to the Les Schwab building was collected from boring BH-31, which is also where the only soil vapor sample was collected. As such, soil vapor impacts do not seem to correlate with groundwater impacts, and the extent of vapor impacts at the Site and their potential to impact nearby buildings need to be further defined.

Prior to conducting any additional soil vapor sampling, Ecology recommends a work plan be provided for review to ensure the proposed locations, depths, and collection techniques are sufficient.

3. As a reminder, in accordance with WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840 (Data Submittal Requirements), data generated for Independent Remedial Actions shall be submitted simultaneously in both a written and electronic format. For additional information regarding electronic format requirements, see the website <http://www.ecy.wa.gov/eim>. Be advised that according to the policy, any reports containing sampling data that are submitted for Ecology review are considered incomplete until the electronic data has been entered. Please ensure that data generated during on-site activities is submitted pursuant to this policy. **Data must be submitted to Ecology in this format for Ecology to issue a No Further Action determination.** Please be sure to submit all soil and groundwater data collected to date, as well as any future data, in this format. Data collected prior to August 2005

(effective date of this policy) is not required to be submitted; however, you are encouraged to do so if it is available. Be advised that Ecology requires up to two weeks to process the data once it is received.

2. Establishment of cleanup standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site do not meet the substantive requirements of MTCA.

Ecology's comments regarding the proposed cleanup levels for the Site are as follows:

1. Soil: Method B soil cleanup levels for protection of direct contact were established for the Site. Use of this pathway is considered appropriate; however, the cleanup level calculated for petroleum is not acceptable. Table 5 notes a Site-specific TPH cleanup level of 2,724 mg/kg. This value is specific to the adjacent site to the north (Former Unocal/Hulco) as it was calculated based on the highest volatile and extractable petroleum hydrocarbon (VPH/EPH) results of the three samples analyzed (BH-36) on that site. Petroleum hydrocarbons were detected at much higher concentrations on this Site, particularly in the area of the former UST. Site-specific data from *this* Site shall be used to calculate an appropriate Site-specific TPH cleanup level for direct contact.
2. Groundwater: Due to the Site's proximity to marine surface water, Ecology concurs that groundwater beneath the Site is not considered potable, and that cleanup levels for protection of surface water are appropriate. Table 6 notes the proposed cleanup levels for the contaminants of concern at the Site, and indicates that no surface water criteria exist for TPH or xylenes. Per WAC 173-340-730(3)(b)(iii), cleanup levels shall be calculated using Equation 730-1. However, as an alternative, cleanup levels in Table 720-1 (Method A) may be used. As such, please compare all current and future groundwater data for TPH-G, TPH-D/TPH-O, and xylenes to either Method A cleanup levels or a calculated Site-specific value. Further, please note that the cleanup of 500 µg/L is for the combined concentration of TPH-D and TPH-O in a sample, not 500 µg/L for each. In utilizing these cleanup levels, as you note in your Conceptual Site Model, borings BH-21 and BH-32 exceed for TPH-G, and BH-32 (and potentially BH-21 due to an elevated detection limit) exceed for TPH-D/TPH-O.
3. Soil Vapor: As noted in the previous section, the screening levels for soil vapor noted in Table 4 are for deep (15 feet bgs or greater) soil gas measurements. Since the one soil vapor sample was collected at 4 feet bgs, and any future samples will likely be collected at similar depths (preferably from greater than 5 feet bgs), the data should be compared to screening levels for sub-slab measurements (see Section 3.1.3 of Ecology's Guidance for Evaluating Soil Vapor Intrusion for more information). Also, please be sure the detection limits are below screening level values.

Standard points of compliance are being used for the Site. The point of compliance for protection of groundwater shall be established in the soils throughout the Site. For soil

cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance shall be established in the soils throughout the Site from the ground surface to 15 feet bgs. In addition, the point of compliance for the groundwater shall be established throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest most depth that could potentially be affected by the Site. Further, the point of compliance for air shall be established in ambient air throughout the Site.

3. **Selection of cleanup action.**

Ecology has determined the cleanup action you proposed for the Site does not meet the substantive requirements of MTCA.

Cleanup actions conducted to date have included closure in place of the pump station UST, and excavation of petroleum-contaminated soil along the shoreline, and installation of sheet piling (*see attached Figures 3 and 8*).

As previously noted, the preferred cleanup alternative proposed for this Site in the FS is MNA with institutional controls. Based on a review of the FS, Ecology has the following comments:

1. Very little evidence has been provided to date to demonstrate that natural attenuation is occurring at the Site. The FS indicates that "MNA is considered a viable cleanup action under MTCA regulations as long as...there is evidence that biodegradation is occurring at a reasonable rate, and appropriate monitoring is implemented to ensure that natural attenuation is occurring." The only evidence provided to demonstrate natural attenuation is occurring is a comparison of soil and temporary well point data from 1998 to 2010/2011. While in the same general area, this soil data was collected from two different locations, and no representative groundwater data collection or monitoring from permanent wells has occurred.

Ecology cannot approve an MNA remedy for a Site that has no monitoring wells and the Site's susceptibility to MNA has not been evaluated. Including that evaluation as part of the remedy as you have in the FS is not acceptable. Factors such as cost, effectiveness, and restoration timeframe cannot be adequately evaluated without this information. MNA should have been evaluated as part of the Remedial Investigation, and will need to be evaluated before Ecology can approve it as a remedy.

2. For Alternative 2, In-Situ Treatment, one of the disadvantages noted in the FS is the lack of reduction-oxidation parameters as they were not collected during the Remedial Investigation, so further Site characterization would be necessary. Again, Ecology cannot properly evaluate and make informed decisions on the remedies presented in the FS if proper characterization has not been done to support these alternatives. What are the parameters at the Site? Is this an aerobic or anaerobic environment? Which chemicals would be used and would they pose a human health risk? How does

knowing this information affect the cost? More information is needed to properly evaluate this alternative.

3. As part of remedy selection, there is not much discussion about the three soil exceedances (CS-10, CS-17, and CS-19) on the seaward side of the sheet piling. Are these areas intended to be addressed the same as the upland areas with respect to the considered alternatives? Is groundwater impacted here? Figure 8 illustrates three compliance monitoring points in this area. Were these locations intended to be where monitoring wells were to be installed? Are these areas part of what's considered Department of Natural Resources (DNR) ownership, and if so, what is their opinion on the remedy selection? More information needs to be provided that adequately details how this area is characterized, its relation to the upland impacts and the sheet piling, as well as how it fits into the remedy.

Limitations of the Opinion

1. Opinion does not settle liability with the state.

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. Opinion does not constitute a determination of substantial equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you proposed will be substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

3. Opinion is limited to proposed cleanup.

This letter does not provide an opinion on whether further remedial action will actually be necessary at the Site upon completion of your proposed cleanup. To obtain such an opinion, you must submit a report to Ecology upon completion of your cleanup and request an opinion under the VCP.

4. State is immune from liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.030(1)(i).

Contact Information

Thank you for choosing to clean up your Property under the Voluntary Cleanup Program (VCP). After you have addressed our concerns, you may resubmit your proposal for our review. Please do not hesitate to request additional services as your cleanup progresses. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion, please contact me by phone at (360) 407-6347 or by e-mail at scott.rose@ecy.wa.gov.

Sincerely,



Scott Rose, L.G.
Unit Supervisor
SWRO Toxics Cleanup Program

SIR/ksc:Oly City Sewer Pump Station Porposed Site Cleanup Likely FA

Enclosures: A – Description and Diagrams of the Site

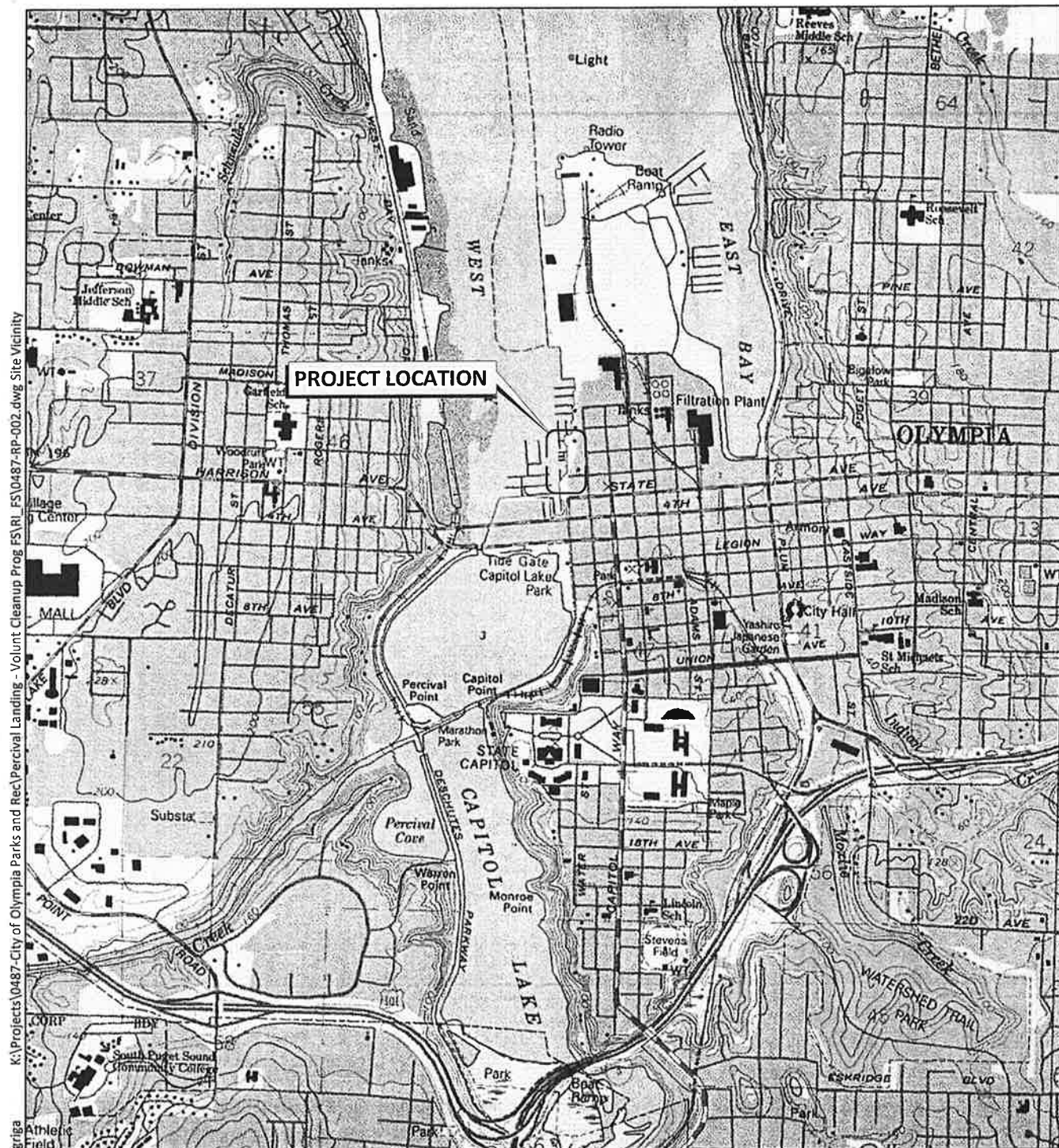
cc: Tom Morrill – City of Olympia
 Kip Summers – City of Olympia
 Mike Riley – Anchor QEA
 Rolin Christopherson – WADNR, Shoreline District
 Shayne Cothorn, WADNR, Aquatics Resources Division
 Gerald Tousley – Thurston County Health Department
 Carol Johnston – Ecology
 Dolores Mitchell – Ecology

Enclosure A

Description and Diagrams of the Site

Site Description

The Olympia City Sewer Pump Station & former General Petroleum Corporation Site is located at 220 Water Street NW in Olympia, Washington. The Site is bounded to the west by Budd Inlet, to the north by Olympia Avenue NW, to the east by N Columbia Street, and to the south by a Les Schwab automotive service center. Based on data collected to date, the Site comprises two Thurston County Tax Parcels: 78507200100 (former GPC property) and 78507200500 (Pump Station property). Both parcels are currently owned by the City of Olympia (City). In addition, a portion of the Site along the shoreline to the west of these parcels is owned by the State of Washington and managed by the Department of Natural Resources. The Site is currently occupied by a City parking lot, the pump station building, landscaped areas, and a portion of the newly redeveloped Percival Landing Park.



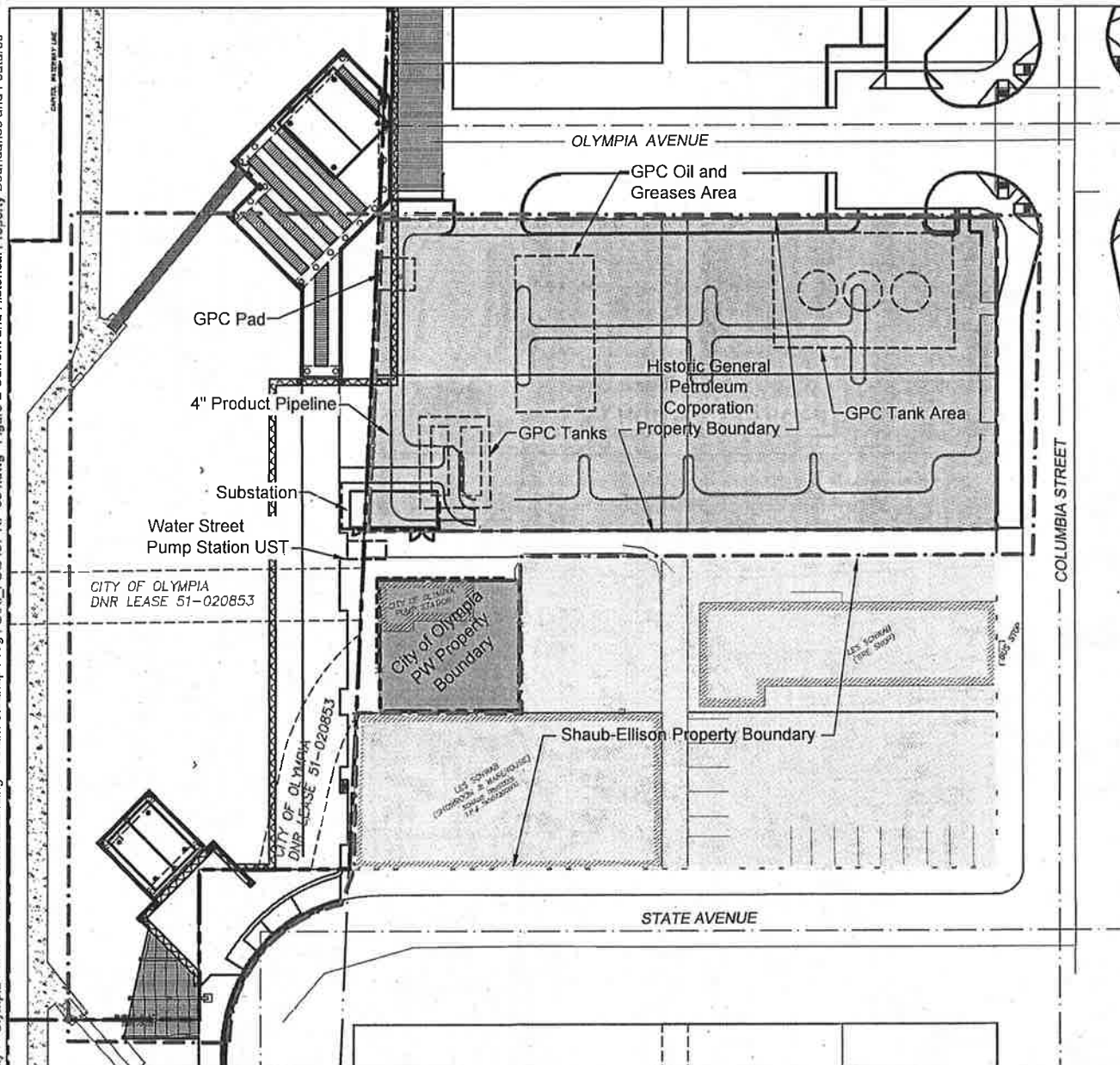
SOURCE: Base map prepared from Terrain Navigator Pro USGS 7.5 minute quadrangle map(s) of Tumwater, WA.



Figure 1
Site Vicinity

Remedial Investigation / Feasibility Study
City Sewer Pump Station and General Petroleum Corporation Site

K:\Projects\0487-City of Olympia Parks and Rec\Perical Landing - Volant Cleanup Prog FS\RI_FS\0487-RP-004.dwg Figure 2 Current and Historical Property Boundaries and Features
 Apr 25, 2013 4:10pm tgriga



NOTE: General Petroleum Company location data from 1947 historical map.

SOURCE: Percival Landing Major Rehabilitation QA25, Section A, Phase 1, Construction Drawings, dated 8/02/10.

HORIZONTAL DATUM: Washington State Plane, South, NAD 83/96 CORRS.

VERTICAL DATUM: Mean Lower Low Water (MLLW), 1983-2001 Epoch.

LEGEND:

- City Sewer Pump Station and Former General Petroleum Corporation Property RI-FS Study Area
- - - Approximate Location of Historical Features
- Historic General Petroleum Corporation Property Boundary
- City of Olympia Power Works Property Boundary
- Shaub-Ellison Property Boundary
- DNR Lease Boundary

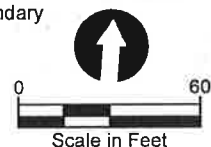
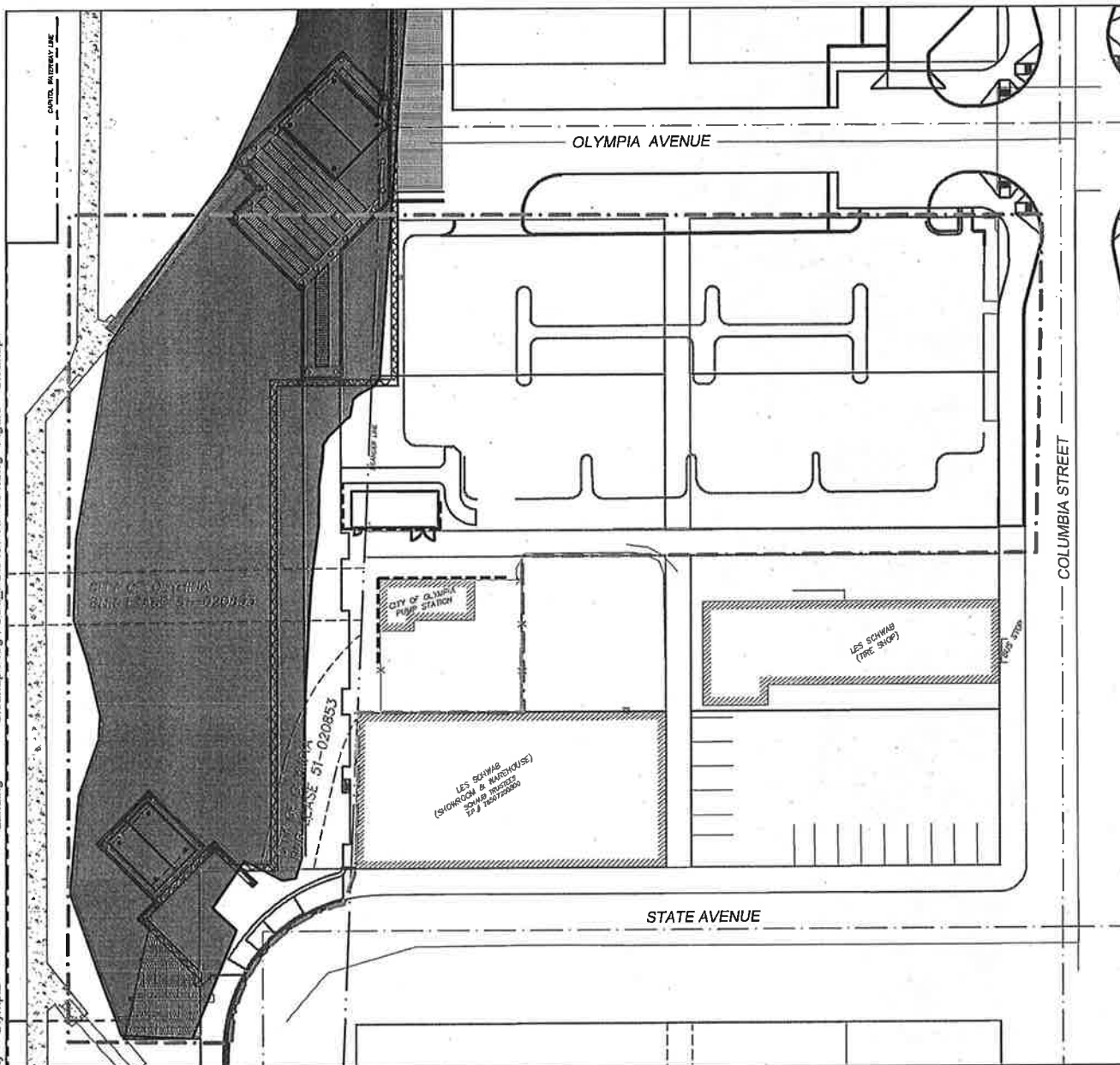


Figure 2
 Current and Historical Property Boundaries and Features
 Remedial Investigation / Feasibility Study
 City Sewer Pump Station and General Petroleum Corporation Site

K:\projects\0487-City of Olympia Parks and Rec\Perical Landing - Volunt Cleanup Prog FS\RI_FS\0487-RP-004.dwg Figure 3 Cleanup Action Areas
 Apr 25, 2013 4:10pm tgriga



NOTE: General Petroleum Company location data from 1947 historical map.
SOURCE: Percival Landing Major Rehabilitation QA25, Section A, Phase 1, Construction Drawings, dated 8/02/10.
HORIZONTAL DATUM: Washington State Plane, South, NAD 83/96 CORS.
VERTICAL DATUM: Mean Lower Low Water (MLLW), 1983-2001 Epoch.

LEGEND:

- City Sewer Pump Station and Former General Petroleum Corporation Property RI-FS Study Area
- 2011 Excavation Area

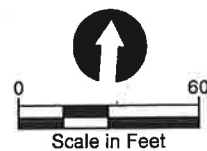
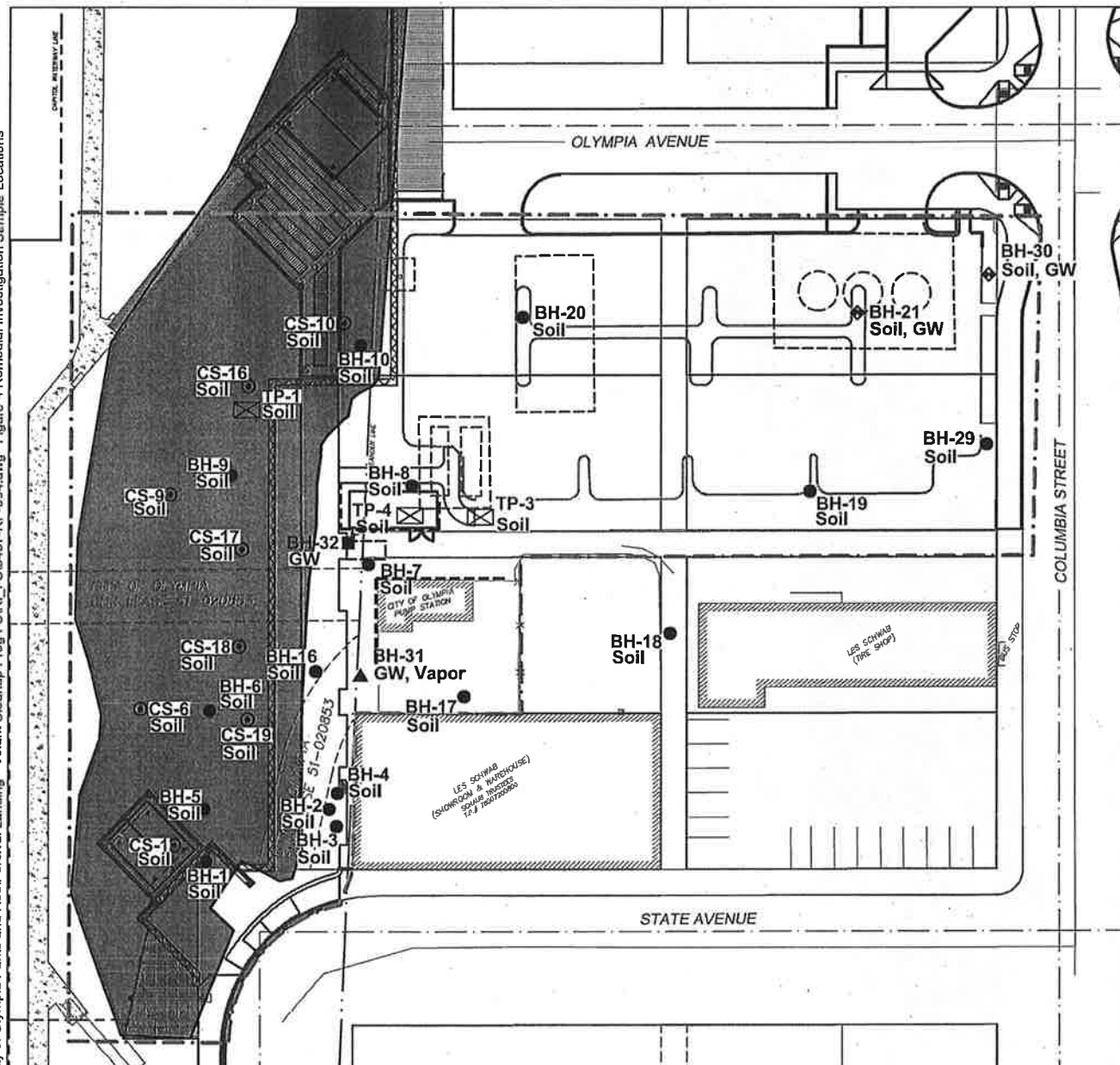


Figure 3
 Cleanup Action Areas
 Remedial Investigation / Feasibility Study
 City Sewer Pump Station and General Petroleum Corporation Site

Apr 25, 2013 4:10pm tgriga K:\Projects\0487-City of Olympia Parks and Rec\Perical Landing - Volant Cleanup Prog FSR\FSR\0487-RP-034.dwg Figure 4 Remedial Investigation Sample Locations



NOTE: General Petroleum Company location data from 1947 historical map.
SOURCE: Percival Landing Major Rehabilitation QA25, Section A, Phase 1, Construction Drawings, dated 8/02/10.
HORIZONTAL DATUM: Washington State Plane, South, NAD 83/96 CORS.
VERTICAL DATUM: Mean Lower Low Water (MLLW), 1983-2001 Epoch.

LEGEND:

- BH-1 ● Geoprobe (Soil)
- BH-30 ◆ Geoprobe (Soil and Groundwater)
- BH-31 ▲ Geoprobe (Groundwater and Soil Vapor)
- BH-32 ■ Geoprobe (Groundwater)
- TP-3 ☒ Test Pit
- CS-10 ⊙ Confirmation Sample Location





- City Sewer Pump Station and Former General Petroleum Corporation Property RI-FS Study Area
- Approximate Location of Historical Features
- 2011 Excavation Area



Figure 4
Remedial Investigation Sample Locations
Remedial Investigation / Feasibility Study
City Sewer Pump Station and General Petroleum Corporation Site

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LEGEND:

-  Soil Vapor Samples
-  2011 Excavation Area
-  Historical Features
-  Approximate Site Boundary

BH-31

Benzene: 45 µg/m³
Ethylbenzene: 200 µg/m³
Toluene: 780 µg/m³
Total Xylene (U = 1/2): 1160 µg/m³

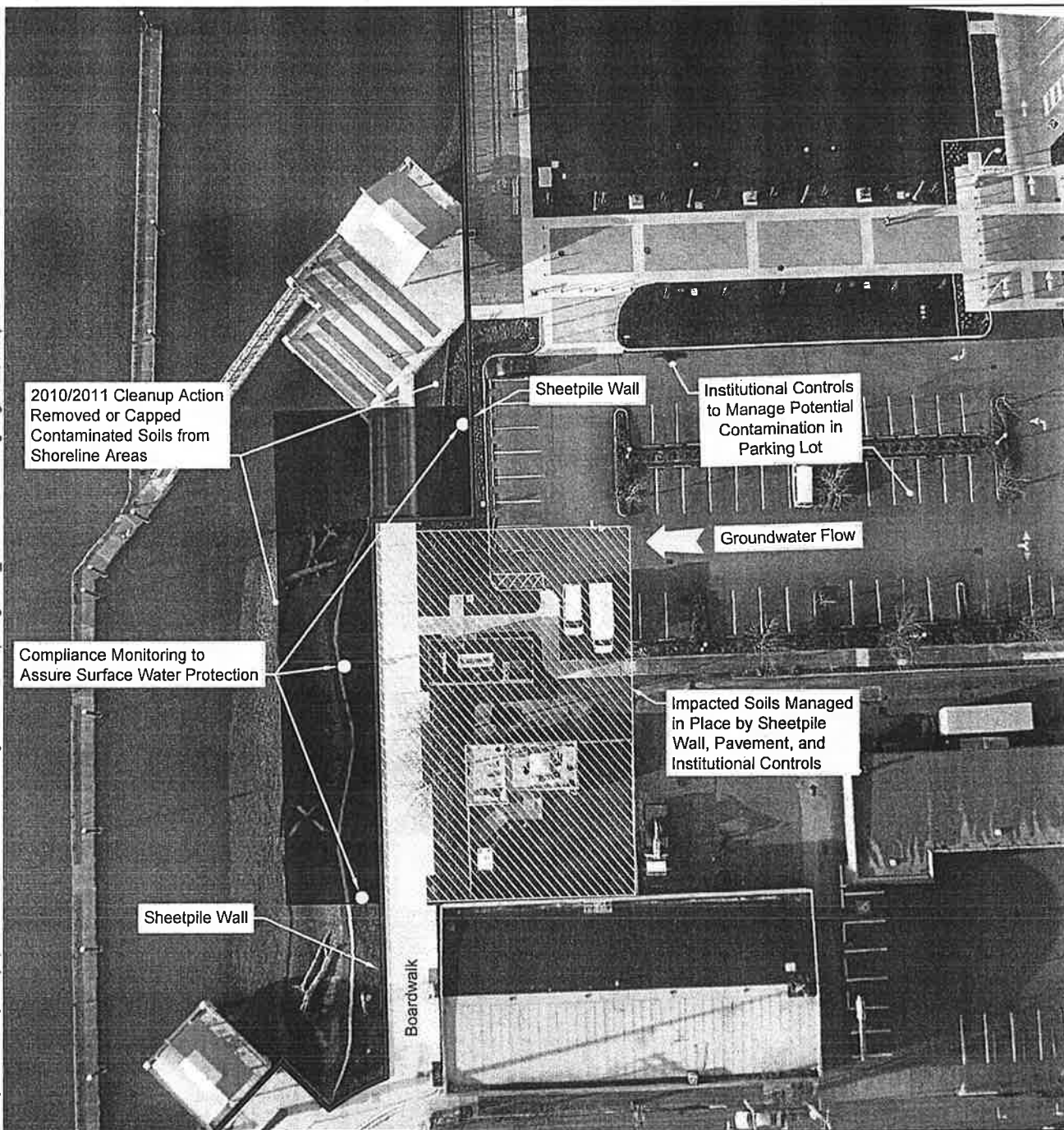
NOTES:

Locations shown were sampled in June 2011.
All detects shown.
Aerial from Google Earth Pro (9/3/11).



Figure 7
Soil Vapor VOC Concentrations
Remedial Investigation / Feasibility Study
City Sewer Pump Station and General Petroleum Corporation Site

K:\Projects\0487-City of Olympia Parks and Rec\Perical Landing - Volunt Cleanup Prog FS\RL_FS\0487-RP-004.dwg Figure 8 Conceptual Site Model



AERIAL: Aerial flown by Aerial Images Northwest (March 2012).
NOTE: Not to Scale

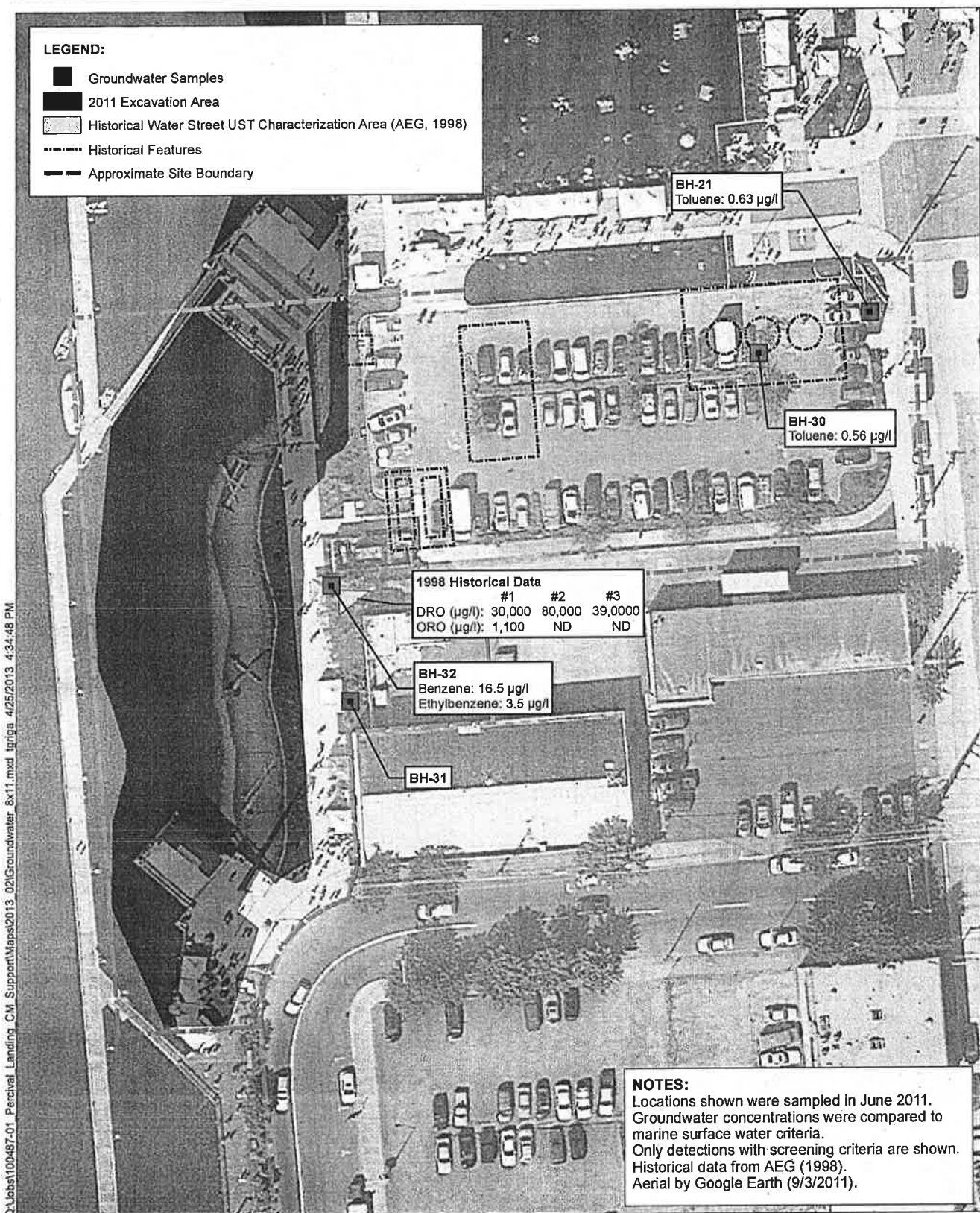
LEGEND:

- Sheetpile Wall: 60 ft Embedment
- Sheetpile Wall: 12 to 20 ft Embedment
- Impacted Soils at Depth Waterside of Sheetpile Wall
- ▨ Impacted Soils at Depth Upland of Sheetpile Wall

Apr 25, 2013 4:10pm tgniga



Figure 8
 Conceptual Site Model
 Remedial Investigation / Feasibility Study
 City Sewer Pump Station and General Petroleum Corporation Site



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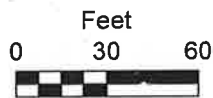


Figure 6
Groundwater VOC Concentrations
Remedial Investigation / Feasibility Study
City Sewer Pump Station and General Petroleum Corporation Site

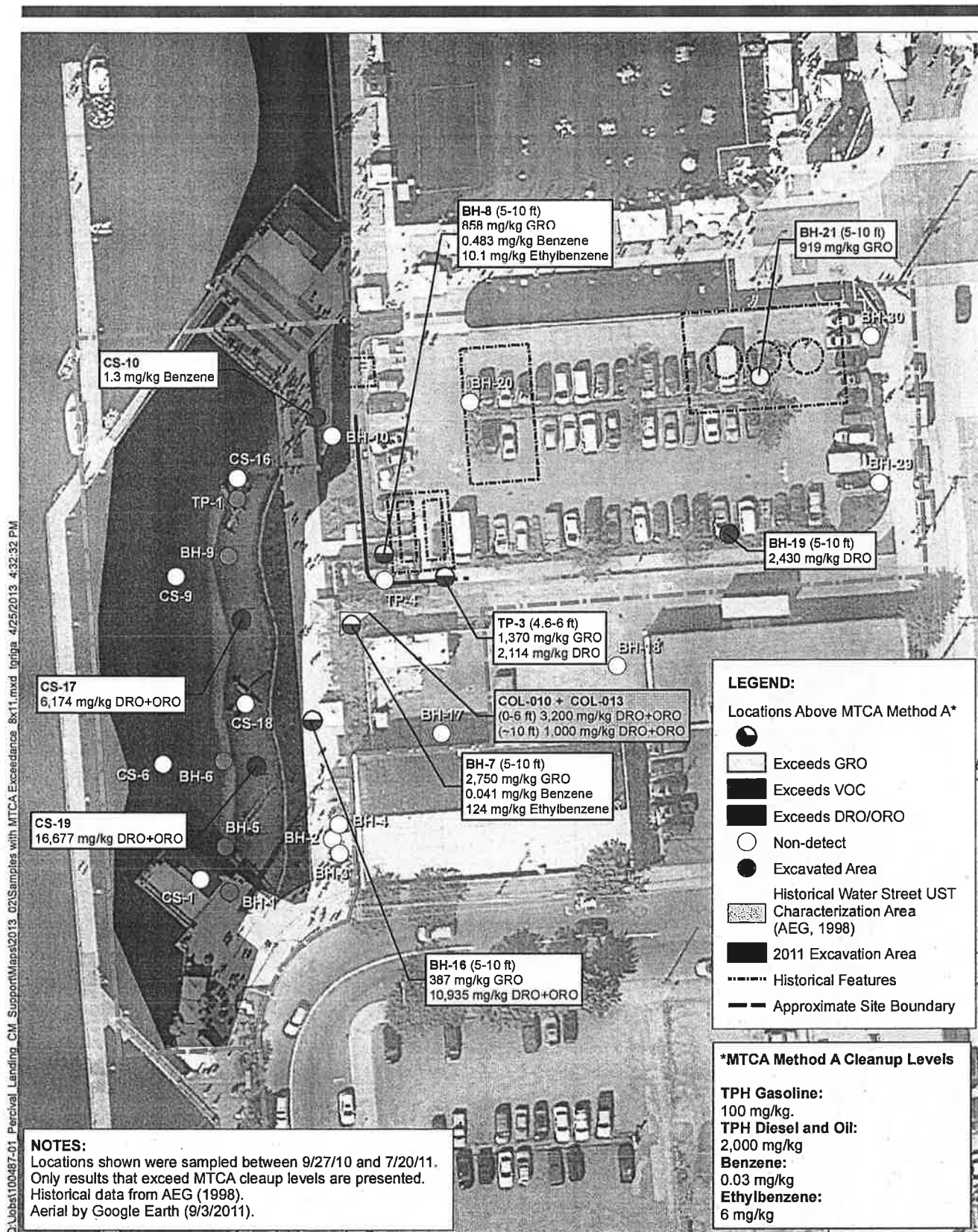


Figure 5
Soil Sample Locations with MTCA Method A Exceedances
Remedial Investigation / Feasibility Study
City Sewer Pump Station and General Petroleum Corporation Site

Table 3b
RI Groundwater Sampling Results

Analyte	Station ID		BH-21 BH-21-GW 6/17/2011 6 - 10 feet	BH-30 BH-30-GW 6/17/2011 6 - 10 feet	BH-31 BH-31-GW 6/17/2011 5 - 10 feet	BH-32 BH-32-GW 6/17/2011 6 - 10 feet	Field QC EB-06172011 6/17/2011	Field QC TRIP BLANK 6/17/2011
	Sample Name	Sample Date						
	Screen Depth							
	Screening Level ^a /Cleanup Level ^b							
Total Petroleum Hydrocarbons (µg/L)								
Gasoline Range Hydrocarbons	800 ^a		1190	205	194 U	7050	198 U	100 U
Diesel Range Hydrocarbons	500 ^a		251	100 U	100 U	2810	100 U	--
Residual Range Hydrocarbons	500 ^a		748 U	381 U	388 U	391 J	396 U	--
Volatile Organics (µg/L)								
Benzene	23 ^b		0.25 U	0.25 U	0.25 U	16.5	0.25 U	0.25 U
Ethylbenzene	2100 ^b		0.5 U	0.5 U	0.5 U	3.5 J	0.5 U	0.5 U
Toluene	15000 ^b		0.63 J	0.56 J	1 U	10 U	1 U	1 U
m,p-Xylene	--		0.51 J	0.52 J	1 U	10 U	1 U	1 U
o-Xylene	--		0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U
Total Xylene (U = 1/2)	1000 ^a		0.76	0.77	1 U	10 U	1 U	1 U
1,2-Dibromoethane (EDB)	0.01 ^a		0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U
1,2-Dichloroethane	5 ^a		0.5 U	0.5 U	0.5 U	5 U	0.5 U	0.5 U
Methyl tert-butyl ether (MTBE)	20 ^a		1 U	1 U	1 U	10 U	1 U	1 U
Dissolved Metals (µg/L)								
Lead	8.1 ^b		1 U	1 U	1 U	1 U	--	--
Total Metals (µg/L)								
Lead	--		3.09	1 U	1 U	2.77	1 U	--

Notes:

a. MTCA Method A criteria (protective of potable water) are provided for compounds that were not detected in groundwater samples or do not have associated surface water criteria, for reference only.

b. A summary of the development of groundwater cleanup levels is presented in Table 6 and is based on the protection of marine surface water.

Bold = Detected result

J = Estimated value

U = Compound analyzed, but not detected above detection limit

Table 4
RI Soil Vapor Sampling Results

Analyte	Location ID Sample Name Sample Date Sample Depth		BH-31 BH-31-SV 6/17/2011 4 - 4 feet
	MTCA Method B SL ¹	MTCA Method C SL ¹	
Total Petroleum Hydrocarbons (µg/m³)			
APH (C5-C8 Aliphatic)	270,000	600,000	680
APH (C8-C12 Aliphatic)	14,000 ²	30,000	340
APH (C8-C10 Aromatic)	18,000 ³	40,000	1900
APH (C10-C12 Aromatic)	---	---	130 U
Volatile Organics (µg/m³)			
1,2-Dibromoethane (Ethylene dibromide)	1.1	11	8.8 U
1,2-Dichloroethane	9.6	96	4.6 U
Benzene	32	320	45
Ethylbenzene	46,000	100,000	200
m,p-Xylene	4,600	10,000	880
Methyl tert-butyl ether (MTBE)	960	9,600	4.1 U
o-Xylene	4,600	10,000	280
Toluene	220,000	490,000	780
Total Xylene (U = 1/2)	---	---	1160

Notes:

Totals are calculated as the sum of all detected results and 1/2 the undetected reporting limit. If all are undetected results, the highest reporting limit value is reported as the sum.

1. Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State, Table B-1; unrestricted and industrial SLs provided.

2. Criteria is for C9-C12 fraction but analytical data included C8 range, therefore the concentration is a conservative value.

3. Criteria is for C9-C10 fraction but analytical data included C8 range, therefore the concentration is a conservative value.

µg/m³ = micrograms per cubic meter

Bold = Detected result

N = Normal Field Sample

U = Compound analyzed, but not detected above detection limit

Detected concentration is greater than lowest available screening level

Non-detected concentration is above lowest available screening level

SL = screening level

Table 5
Soil Cleanup Levels

Analyte	Soil Cleanup Level¹	MTCA Method B Direct Contact²	Protection of Surface Water² Soil-Unsaturated³	Site-specific TPH Cleanup Level⁴
Total Petroleum Hydrocarbons (mg/kg)				
Gasoline Range Hydrocarbons	NA	--	--	--
Diesel Range Hydrocarbons	NA	--	--	--
Residual Range Hydrocarbons	NA	--	--	--
TPH (site-specific)	2,724	--	--	2,724
Volatile Organics (mg/kg)				
Benzene	0.13	18.2	0.13	--
Ethylbenzene	18.1	8000	18.1	--
Toluene	109	6400	109	--
Xylenes, total	NA	16000	--	--
Polycyclic Aromatic Hydrocarbons (mg/kg)				
Naphthalene	138	1600	138	--
1-Methylnaphthalene	34.5	34.5	--	--
2-Methylnaphthalene	320	320	--	--
Metals (mg/kg)				
Lead	1,620	--	1,620	--

Notes:

1. Proposed cleanup levels are based on the most stringent applicable criteria
 2. All cleanup level criteria were researched from Ecology's CLARC Database on 2/4/2013
 3. Soil cleanup levels protective of surface water calculated using MTCA equation 747-1 for unsaturated (vadose zone) soils
 4. Reference cleanup value from Former Unocal/Hulco site (Anchor QEA 2012). Calculated using the CLARC TPH Workbook (MTCATPH11.1.xls)
- = research has not been conducted and no value exists in the database for this parameter
- mg/kg = milligram per kilogram
- MTCA = Model Toxics Control Act
- NA = no criteria is applicable for this parameter

Table 6
Groundwater Cleanup Levels

Analyte	Proposed Groundwater Cleanup Level ¹ (µg/L)	Surface Water Criteria (Aquatic) ²			Surface Water Criteria (Human Health) ²		
		WAC 173-201A (µg/L)	Clean Water Act Section 304 (µg/L)	National Toxics Rule, 40 CFR 131 (µg/L)	MTCA Method B Surface Water Criteria (µg/L)	Clean Water Act Section 304 (µg/L)	National Toxics Rule, 40 CFR 131 (µg/L)
Total Petroleum Hydrocarbons (µg/L)							
Gasoline Range Hydrocarbons	NA	---	---	---	---	---	---
Diesel Range Hydrocarbons	NA	---	---	---	---	---	---
Residual Range Hydrocarbons	NA	---	---	---	---	---	---
Volatile Organics (µg/L)							
Benzene	23	---	---	---	23	51	71
Ethylbenzene	2,100	---	---	---	6,900	2,100	29,000
Toluene	15,000	---	---	---	19,000	15,000	200,000
Xylenes, total	NA	---	---	---	---	---	---
Polycyclic Aromatic Hydrocarbons (µg/L)							
Naphthalene	4,900	---	---	---	4,900	---	---
1-Methylnaphthalene	NA	---	---	---	---	---	---
2-Methylnaphthalene	NA	---	---	---	---	---	---
Dissolved Metals (µg/L)							
Lead	8.1	8.1	8.1	8.1	---	---	---

Notes:

- Groundwater cleanup level based on protection of marine surface water and selected value is most stringent of applicable marine surface water criteria
 - All values were researched from Ecology's CLARC Database on 2/4/2013
- = surface water criteria not available
µg/L = micrograms per Liter
CFR = Code of Federal Regulations
MTCA = Model Toxics Control Act
NA = no criteria is applicable for this parameter
WAC = Washington Administrative Code