Engineering Design Report

Former Shell Oil Tank Farm Site
Anacortes, Washington

for
Washington State Department of Ecology on Behalf of Port of Anacortes

July 29, 2014

GeoEngineers
Earth Science + Technology

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GeoEngineers

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Anacortes, Washington

Project No. 5147-012-04

July 29, 2014

Prepared for:

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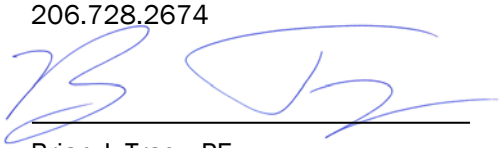

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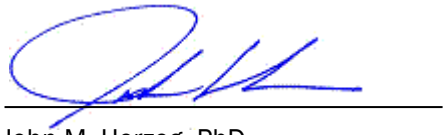

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1.0 INTRODUCTION

This Engineering Design Report (EDR) has been prepared for the planned cleanup of the Former Shell Oil Tank Farm Site (Site). The Site is formally referenced in the Washington State Department of Ecology (Ecology) databases as the Former Shell Oil Tank Farm Site (Ecology Facility Site Identification No. 4781157) and is generally located between 13th and 14th Street east of Commercial Avenue in Anacortes, Washington (Figure 1). This EDR was prepared in accordance with Washington State Model Toxics Control Act (MTCA), administered by Ecology through the MTCA rules, Chapter 173-340 of the Washington Administrative Code (WAC). The cleanup action will be conducted by the Port of Anacortes (Port) under an Ecology Consent Decree. Ecology is managing the Site as part of the Fidalgo and Padilla Bay component of their Puget Sound Initiative program.

Cleanup activities are being performed by the Port to address petroleum hydrocarbon, carcinogenic polycyclic aromatic hydrocarbon (cPAHs), volatile organic compound (benzene) and metal (cadmium) contamination in soil that has resulted from historical uses of the property at which the Site is located. Cleanup activities are being completed pursuant to the Cleanup Action Plan (CAP; Ecology, 2014b). Site cleanup construction work is anticipated to occur over a period of approximately three months beginning in the fall of 2014.

The primary objective of this EDR is to describe the plans and procedures that will be used for cleanup of the Site. Performance and confirmational monitoring to verify the effectiveness of the cleanup action will be performed in accordance with the Compliance Monitoring Plan (CMP) presented as Attachment 1. The major project elements discussed in this EDR include:

- Site description and background;
- Cleanup requirements;
- General description of cleanup action;
- Permits;
- Site preparation;
- Soil excavation and disposal;
- Site restoration;
- Financial assurance;
- Quality assurance/quality control (QA/QC);
- Health and safety; and
- Schedule and reporting.

2.0 BACKGROUND INFORMATION

2.1. Historical Operation and Site Use

The property occupied by the former Shell Oil Tank Farm facility was originally a portion of the Fidalgo Bay tide flats, which were filled to the current grade (up to the former bulkhead just east of Q Avenue shown on Figure 2) between 1925 and 1929. This property was acquired by the Port in 1929 and leased to Shell Oil Company in 1930 for use as a bulk fuel storage and distribution facility that primarily handled gasoline and diesel-range fuels. Site facilities included three 25,000-gallon aboveground storage tanks (ASTs) that contained gasoline and diesel, product lines that connected the ASTs and pump house to a historical pier located east of the Site across Q Avenue, and a 2,000-gallon underground storage tank (UST). Historically, gasoline and diesel were pumped from the pier to the bulk fuel facility for storage and distribution to various distributors. In the 1950s, two additional 12,500-gallon ASTs were installed at the Site and the 2,000-gallon UST was reportedly replaced with a 4,000-gallon UST. Gasoline, diesel and stove oil were reportedly stored in the ASTs and dry cleaning solvent was reportedly stored in the UST.

Prior to 1947, the area east of Q Avenue (east of the former Shell Oil Tank Farm facility) consisted of tide flats (GeoEngineers, 2008a) and from 1930 to approximately 1947, the historic fuel supply lines hung from below a pier. In the late 1940s to early 1950s, the area east of Q Avenue was filled with dredged material from the adjacent federal waterway behind a second bulkhead constructed near the current shore of Fidalgo Bay (see Figure 2). During the filling activities in the late 1940s and early 1950s, the fuel supply lines east of Q Avenue were reportedly reconfigured as underground lines.

Shell and various bulk product distributors operated at the fuel storage facility until 1987 at which time operations ceased and the facility was decommissioned, including removal of all tanks, associated piping, and structures. At this time, an unknown volume of soil was excavated from one or more of the areas in which surface staining was reportedly observed. Currently, the property occupied by the former Shell Oil Tank Farm facility is used by the Port as a vehicle and boat trailer parking lot supporting the trailer boat launch facility located along the western shoreline of the Cap Sante Boat Haven.

The approximate locations of the historical facilities, including USTs, ASTs, fuel supply lines, and areas of observed surface staining are shown relative to the Site on Figure 2.

2.2. Current and Future Land Use

The Site is located on property zoned by Skagit County as Commercial (C). The current and anticipated future use of the property will remain a vehicle and boat trailer parking lot supporting the trailer boat launch facility located across Q Avenue in the Cap Sante Marina. There are currently no plans to change the uses of the property for the foreseeable future.

2.3. Previous Environmental Investigations

Several environmental investigations have been conducted at the Site, beginning in 1987 with an initial soil investigation performed by Hart Crowser (Hart Crowser, 1987), and culminating in the recent 2012/2013 remedial investigation study performed by GeoEngineers (GeoEngineers, 2013). Environmental investigations conducted prior to May 2007 are detailed in the Remedial

Investigation/Feasibility Work Plan (RI/FS Work Plan; GeoEngineers, 2009). Remedial investigation (RI) activities performed pursuant to the RI/FS Work Plan are detailed in the Remedial Investigation/Feasibility Study (RI/FS; GeoEngineers, 2014). The RI/FS utilized the results of the RI as well as earlier investigations to characterize the nature and extent of contamination. The feasibility study (FS) portion of the RI/FS describes cleanup action alternatives evaluated for addressing Site contamination and the CAP presents the Ecology-selected cleanup action alternative for the Site.

2.4. Geology and Hydrology

This section summarizes the geology and hydrogeology in the vicinity of the Site. The discussion is based on the results of the RI and earlier environmental investigations completed.

2.4.1. *Soil*

The area previously occupied by the former Shell Oil Tank Farm facility is currently surfaced with gravel-size crushed rock. Soil beneath the crushed rock surface consists of dredged fill material composed mainly of loose to medium dense silty sand with scattered shell fragments. The dredged fill material in some locations is interbedded with layers of gravel, silt and clay of variable thicknesses to approximately 7 feet below the ground surface (bgs). The dredge fill is underlain by approximately 9 feet of native, loose to medium dense silty gravelly sand with scattered interbeds of soft silt (Hart Crowser, 1987; GeoEngineers, 2008). The native sand is underlain by hard silt interpreted as a glacial deposit, which extends to a depth of at least 16 feet bgs as observed in the exploration completed at location MW-1 (see Figure 3).

Subsurface soil conditions along the historic fuel supply lines east of Q Avenue are similar and consist of dredged fill material overlying native marine sediment and glacial deposits. The fill generally consists of gravelly sand with varying amounts of silt overlying silty fine to medium sand. The thickness of the fill material ranges from about 5 to 12 feet. The native soil underlying the dredged fill material consists of sandy silt to at least 30 feet bgs (Landau, 2007; Floyd|Snider, 2005).

2.4.2. *Groundwater*

Three hydrogeologic units have been identified in the vicinity of the Site, including: 1) a shallow, unconfined aquifer occurring in the dredged fill; 2) a native silt confining unit; and 3) a deeper, confined aquifer. Measured depth to groundwater at the Site ranges from approximately 3 feet to 6 feet bgs (approximately Elevation 6.5 to 9.5 feet mean lower low water [MLLW]). Observed groundwater flow direction is generally to the east toward Fidalgo Bay. Based on the results of tidal studies completed in the vicinity of the Site (Landau, 2007), tidal influence on groundwater levels and flow direction appears to be limited to a 0.8-foot fluctuation in groundwater levels in near shoreline wells during a high-low tide cycle. Measured fluctuation in groundwater levels away from the shoreline (approximately 100 to 200 feet) is on the order of approximately 0.1 foot or less.

3.0 NATURE AND EXTENT OF CONTAMINATION

As noted above, several environmental investigations have been conducted at the Site between 1987 and 2012. The results of these studies are presented in the RI/FS and are summarized on

Figure 3. The RI used information about the history and environmental conditions of the Site gathered during the RI as well as previous environmental investigations to characterize the nature and extent of contamination. The nature and extent of Site contamination is discussed in the following sections (Section 3.1 and 3.2). The cleanup levels referenced below are discussed further in Section 4.3.

3.1. Soil Conditions

Contaminants of concern (COCs) detected in soil at concentrations exceeding site-specific cleanup levels during previous environmental investigations include petroleum hydrocarbons, benzene, cPAHs and cadmium. In general, two areas with petroleum hydrocarbon and benzene contamination were identified; one generally located in the central and eastern portions of the former Shell Oil Tank Farm area which is believed to extend beneath Q Avenue, and the other located in the southwestern corner of the former Shell Oil Tank Farm area. In addition, isolated areas of cPAH- and cadmium-contaminated soil were identified in the southern and southwestern portions of the property previously occupied by the former Shell Oil Tank Farm, respectively. In the southern portion of the property, cPAH-contaminated soil is believed to extend beneath 14th Street. In the southwestern portion of the property, cadmium-contaminated soil is located beneath an existing municipal storm drain utility.

Soil sampling locations and analytical results are summarized on Figure 3. Based on the findings of the previous environmental studies, petroleum hydrocarbon and benzene contamination is present in soil between approximately 2.5 feet and 17 feet bgs. cPAH contamination is present in soil between approximately 9 feet and 14 feet bgs, and cadmium contamination is present in soil between approximately 5 feet and 8 feet bgs.

3.2. Groundwater Conditions

Water samples obtained as “grab samples” from temporary wells that were utilized during the 1987 and 2005 investigations (Hart Crowser, 1987 and Floyd|Snider, 2005) identified elevated concentrations of lead and diesel-range petroleum hydrocarbons in the central portion of the former Shell Oil Tank Farm area. Subsequent water samples collected from permanent groundwater monitoring wells that were installed as part of the formal RI (GeoEngineers, 2013) indicated that lead and diesel-range petroleum hydrocarbons as well as the other COCs were not present at concentrations exceeding site-specific groundwater cleanup levels in groundwater within and/or downgradient of the Site.

4.0 CLEANUP REQUIREMENTS

The MTCA cleanup regulations provide that a cleanup action must comply with cleanup levels for identified COCs, points of compliance, and applicable or relevant and appropriate requirements (ARARs) based on federal and state laws (WAC 173-340-710). This section identifies cleanup standards, points of compliance and applicable regulatory requirements for the Ecology-selected cleanup action.

4.1. Human Health and Environmental Concerns

Because Site groundwater is not a current or reasonably likely future source of drinking water, cleanup levels for Site soil need not be protective of groundwater as drinking water. Additionally, an empirical demonstration presented in the RI/FS verified that existing chemical concentrations in Site soils are protective of groundwater and marine surface water receptors.

When developing site-specific cleanup levels, both future land use considerations and ecological risk considerations were evaluated. Because the results of a terrestrial ecological evaluation (TEE) did not identify a substantial potential for posing a threat of significant adverse effects to terrestrial ecological receptors and the Site is not zoned for industrial use, soil cleanup levels were developed based on unrestricted land use, including the more stringent MTCA Method B cleanup levels that assume ground floor residential land use (WAC 173 340 740[3]).

4.2. Indicator Hazardous Substances

Under MTCA, "indicator hazardous substances" refer to the subset of hazardous substances present at a Site for monitoring and analysis during any phase of remedial action for the purpose of characterizing the Site or establishing cleanup requirements for the Site. As indicated in Section 3.0, Site contaminants, including hazardous and/or deleterious substances identified during previous environmental studies include:

- Gasoline-range petroleum hydrocarbons;
- Diesel-range petroleum hydrocarbons;
- Heavy oil-range petroleum hydrocarbons;
- Benzene;
- cPAHs; and
- Cadmium.

In accordance with the CAP, indicator hazardous substances selected by Ecology for the Site include all of these COCs listed above.

4.3. Cleanup Standards

In accordance with MTCA, cleanup standards consist of: 1) cleanup levels that are protective of human health and the environment, 2) the point of compliance at which the cleanup levels must be met, and 3) regulatory requirements established in applicable State and Federal laws. Cleanup levels, points of compliance and applicable regulatory requirements are described in the following sections (Sections 4.3.1 through 4.3.3).

4.3.1. *Cleanup Levels*

4.3.1.1. SOIL

Soil cleanup levels for the Site are presented in Table 1. As indicated above, the Site COCs will be used as indicator hazardous substances for remedial actions addressing Site soils. The cleanup levels presented in Table 1 will apply to all areas of the Site.

4.3.1.2. GROUNDWATER

Groundwater cleanup levels for the Site are presented in Table 1. Although groundwater is not a media of concern, groundwater conditions will be evaluated following completion of the remedial action to verify the effectiveness of the selected cleanup action. The cleanup levels for groundwater are applicable to all areas of the Site.

4.3.2. *Points of Compliance*

Under MTCA, the point of compliance is the locations at a site where the cleanup levels must be attained. This section describes the points of compliance for soil and groundwater.

4.3.2.1. SOIL

The standard point of compliance for the soil cleanup levels presented in Table 1 will be throughout the soil column from the soil surface to 15 feet bgs, in accordance with WAC 173-340-740(6)(d) and WAC 173-340-7490(4)(b).

4.3.2.2. GROUNDWATER

Because groundwater cleanup levels presented in Table 1 are based on protection of marine surface water and not protection of groundwater as drinking water, Ecology has established a conditional point of compliance for groundwater at the groundwater/surface water interface along the western shoreline of the Cap Sante Marina.

4.3.3. *Applicable Regulatory Requirements*

In addition to the cleanup standards developed through the MTCA process described in the preceding sections, other regulatory requirements must be considered in the selection and implementation of the cleanup action. MTCA requires the cleanup standards to be "at least as stringent as all applicable state and federal laws" (WAC 173-340-700[6][a]). Besides establishing minimum requirements for cleanup standards, applicable state and federal laws may also impose certain technical and procedural requirements for performing cleanup actions (WAC 173-340-710). Because the cleanup action is being performed under MTCA pursuant to the terms of a consent decree, the cleanup action is exempt from the procedural requirements of certain laws and all local permits (WAC 173-340-710[9][a]). However, the cleanup action must comply with the substantive requirements of these laws and permits. Applicable or Relevant and Appropriate Requirements (ARARs) identified for the Site are presented in Table 2.

4.3.3.1. HISTORICAL AND CULTURAL RESOURCES

In response to public comments regarding compliance with the Archaeological Resources Protection Act, 43 CFR Part 7, Columbia Geotechnical Associates (CGA) conducted an archaeological, ethnographic and historical literature review to evaluate the potential for encountering significant cultural artifacts/resources during construction at the Site (Attachment 2). The review of available information concluded that potentially significant archaeological materials are not likely to be present within the vicinity of the Site due to the development and filling of the historical shoreline and that infilling of the shoreline area with dredged material would likely to have destroyed or disturbed any cultural deposits in the vicinity of the Site. In the unlikely event of the discovery of archeological materials or human remains, work will be immediately stopped in the area and appropriate personnel will be notified as detailed in Section 5.2

4.3.3.2. STATE ENVIRONMENTAL POLICY ACT

Compliance with the State Environmental Policy Act (SEPA), Chapter 43.21C RCW, was achieved by conducting SEPA review in accordance with applicable regulatory requirements, including WAC 197-11-268, and Ecology guidance as presented in Ecology Policy 130A. The Port, acting as the SEPA lead agency, issued a Determination of Non-significance (DNS) dated December 6, 2013. SEPA Checklist and DNS are presented in Attachment 3.

5.0 CLEANUP ACTION

The cleanup action consists of removal of a significant volume of soil containing contaminant concentrations above MTCA cleanup levels within the portion of the Site that is readily accessible (i.e., gravel surface within the former Shell Oil Tank Farm). Key components of the cleanup action are described in Sections 5.1 through 5.4. Project drawings detailing the cleanup action are presented on Sheets 1.0 through 8.0.

The objective of the cleanup action is to eliminate, reduce, or otherwise control to the extent feasible and practicable, unacceptable risks to human health and the environment posed by the COCs identified in soil in accordance with MTCA (WAC 173-340) and other applicable regulatory requirements.

The cleanup action will consist of the following activities:

- Implementation of Site security, traffic control and erosion and sediment control measures.
- Decommissioning of existing groundwater monitoring wells located within the excavation area.
- Demolition of existing aboveground features (i.e., sidewalks and landscaped areas), as necessary, to complete the cleanup action.
- Protection of existing underground utilities through in-place protection and/or disconnecting, temporarily rerouting and restoring.
- Collection, storage, treatment and disposal (if required) of excavation water.
- Excavation of non-contaminated overburden material within the gravel surface area located within the former Shell Oil Tank Farm.
- Excavation of contaminated soil within the gravel surface area located within the former Shell Oil Tank Farm.
- Collection and analysis of verification soil samples obtained from the excavation limits to confirm that cleanup objectives have been achieved vertically and horizontally and/or to document the nature and extent of residual soil contamination that may be left in place below portions of Q Avenue and 14th Street.
- Transportation and disposal of non-contaminated overburden material at an off-site disposal facility.
- Transportation and disposal of contaminated soil at an off-site permitted disposal facility approved by Ecology.
- Backfilling excavation with imported, clean backfill material.

- Placement of oxygen releasing material within the saturated/smear zone in areas upgradient of where contaminated soil is left in place beneath the sidewalk/asphalt surfaces of 14th Street and Q Avenue to enhance biological degradation of organic contaminants remaining in place.
- Completing finish grading to meet design grades.
- Restoration of sidewalks, curbs, roadway and landscaped areas, as necessary, disturbed by the cleanup action.
- Completion of post-construction groundwater monitoring to confirm post-construction performance and compliance with groundwater cleanup standards.

5.1. Site Preparation

5.1.1. *Utility Locate*

Prior to any groundbreaking activities at the Site, the contractor will be responsible for contacting utility locating agencies in order to identify utilities in the vicinity of the work area. A recent pre-construction survey completed by the Port identified existing utilities at the Site. Currently known underground utilities at the Site include underground power, telephone, stormwater, water and gas utilities (see Sheet 6.0). The exact location or depth of these utilities is unknown and will be verified in the field by the contractor. The contractor will be responsible for field-locating existing utilities prior to beginning excavation work.

Underground utilities will be protected in place and/or temporarily rerouted to facilitate excavation and restored. The contractor will be responsible for coordinating and notifying respective utility providers in advance of the remedial excavation. In addition, the contractor will be responsible for obtaining necessary inspections for the restored utilities.

5.1.2. *Contractor Staging*

Portions of the Site not occupied by the remedial excavation will be available to the contractor for placement of construction trailers, contractor vehicle parking, supply storage and/or material management during construction. It is anticipated that the contractor will use a closed section of 14th Street located immediately south of the excavation area for construction staging (see Sheet 4.0).

5.1.3. *Temporary Site Controls*

Temporary site controls will include site access and security control, vehicular and pedestrian traffic control, erosion and sediment control, and dust and noise control.

5.1.3.1. SITE ACCESS, SECURITY AND TRAFFIC CONTROL

Site access will be controlled in general accordance with the construction traffic control plans included in the project contract documents and presented on Sheet 4.0. Prior to the start of work, the contractor will be responsible for providing and installing temporary fencing, barricades, signage, and other traffic control devices as necessary for cordoning off the work area in accordance with the City of Anacortes codes/requirements. Temporary fencing, barricades, and traffic control flaggers will be used as necessary, to control access to construction work area. The

fencing and other traffic control measures will remain in-place for the duration of the project. The Site and construction work area will be secured during non-work hours.

Upon final approval by the City of Anacortes, a portion of 14th Street adjacent to the Site will be closed to general public during construction and available to the contractor as the truck and trailer haul route. Construction entrance/exit will be located on 14th Street as identified in Sheet 4.0. Traffic control flaggers will be used as required to control the flow of vehicle traffic on adjacent surface streets (i.e., 13th and 14th Streets and/or Q Avenue) during periods of material export. Q Avenue and Commercial Avenue will serve as the main truck route into and out of Anacortes. Pedestrian access will be re-routed from the Site during construction, including closure of the sidewalk along Q Avenue. Pedestrian and vehicular access will be kept open to adjacent businesses during construction. Vehicular and pedestrian traffic control (including sidewalk closure) will be completed in accordance with City of Anacortes codes/requirements.

5.1.3.2. TEMPORARY EROSION AND SEDIMENT CONTROL

Best management practices (BMPs) will be used to control erosion during the cleanup action. BMPs will be implemented consistent with Ecology *Stormwater Management Manual for Western Washington*. The contractor will be required to prepare a temporary erosion and sediment control plan for the cleanup action subject to approval by the Port. Erosion control procedures are detailed in the project contract documents and on Sheet 5.0. Proposed temporary erosion and sediment control elements include:

- Prevention of sediment, debris and sediment-laden water from leaving the Site and entering adjacent surface streets/storm drains through the use of silt fencing, silt dikes, storm drain inlet protection, catch basin silt barriers, fabric filter fences, straw bales, interceptor swales, wattle and rock check dams, and/or similar BMPs.
- Implementation of BMPs at construction entrance/exit to minimize the tracking of sediment onto the adjacent surface streets.
- Street sweeping and/or street cleaning, as necessary, to remove sediment tracked onto the adjacent surface streets.
- If excavated soil is stockpiled on Site, the stockpile will be covered and secured from wind, rain, and other disturbances as appropriate to control erosion and dust.

5.1.3.3. DUST AND NOISE CONTROL

Site grading and excavation work could generate airborne dust. Engineering controls will be used during construction (e.g., wetting or covering exposed soil), as necessary, to meet Northwest Clean Air Agency substantive restrictions on the off-site transport of airborne particulates. In addition, street sweeping will be performed, as necessary, in areas where construction traffic mixes with general vehicular traffic.

Construction noise will be generated by a variety of construction equipment, including truck engines, generators and other small engines, and earthmoving equipment. Work associated with the cleanup action will be performed during hours allowed by City of Anacortes municipal code. City of Anacortes allowable work hours are 7:00 a.m. to 7:00 p.m. Exceptions to the allowable work hours may be made for utility connections in order to minimize tenant and property owner

impacts. A variance will be required for work outside of the allowable hours. Variance on the allowable work hours will be coordinated with the City of Anacortes.

5.1.4. *Demolition*

5.1.4.1. MONITORING WELL DECOMMISSIONING

Existing monitoring wells GEI-MW-1 and GEI-MW-3 located within the excavation area will be decommissioned by a Washington-licensed driller in accordance with Ecology requirements (WAC 173-160-460) prior to construction. Other monitoring wells located on the Site will be protected during construction activities for potential future use during confirmational monitoring.

5.1.4.2. DEMOLITION OF CONCRETE/LANDSCAPED SURFACES

Concrete sidewalk, curbs and landscaped areas will be demolished as necessary to facilitate construction activities for the cleanup action. Demolished debris will be transported from the Site to an appropriate construction debris facility approved by the Port.

5.2. Procedures for the Inadvertent Discovery of Cultural Resources

As discussed in Section 4.3.3, the potential for encountering archaeological materials at the Site is believed to be low. During construction, field inspectors that are generally aware of the potential types of cultural artifacts that could be encountered will be utilized to oversee the excavation activities. If potential archaeological resources are identified by the field inspector during construction, work will be stopped immediately and the Port notified. The Port will retain a professional archeologist to evaluate the potential discovery and determine its cultural significance. If it is determined that the discovery is not culturally significant, work activities will resume. In the unanticipated event of a potential archeological discovery, the following steps shall be taken:

1. **Stop Work and Protect the Discovery Site.** If any agency employee, contractor, or subcontractor believes that he or she has uncovered any cultural resources, all work within a minimum of 50 feet of the discovery ("discovery site") will be stopped to provide for its total security, protection and integrity. The discovery site shall be secured and vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site.
2. **Notify the Port.** The individual making the discovery will immediately contact GeoEngineers who will then notify the Project Coordinator for the Port (contact information presented in the table below).
3. **Notify the Project Archaeologist.** Immediately following the work stoppage and notification to the Port, the Project Archaeologist shall be contacted by the Port.
4. **Identify the Find.** The Project Archaeologist, in coordination with the Port is responsible for ensuring that appropriate steps have been taken to protect the discovery site. The Project Archaeologist shall be qualified as a professional archaeologist under the Secretary of Interior's Professional Qualification Standards (as outlined in 36 CFR Part 61). As such, the Project Archaeologist shall be qualified to examine the find to determine if it is archaeological. If it is determined not to be archaeological, work may proceed at the discovery site with no further delay.

5. **Notify Additional Parties.** If the discovery is determined by the Project Archaeologist to be a cultural resource, the Port or their designee will provide notification to Ecology, Department of Archaeology and Historic Preservation (DAHP), the Samish Indian Nation and the Lummi Nation. Confidentiality of the find will be maintained by Project leads and their contractors.
6. **Obtain Consent to Proceed with Construction.** Construction work will not recommence at the discovery site until treatment has been completed and the Tribes, DAHP, and/or jurisdictional agencies, as appropriate, have provided written or verbal consent to proceed.

Contact information for key personnel for the inadvertent discovery of cultural resources is summarized in the following table.

CONTACT LIST FOR THE INADVERTENT DISCOVERY OF CULTURAL RESOURCES

Contact Name	Organization	Title	Contact Number
John Herzog (Primary Contact)	GeoEngineers, Inc.	Project Manager	(o) 206.728.2674 (c) 206.406.6431
Robert Trahan (Alternate Contact)	GeoEngineers, Inc.	Field Coordinator	(o) 206.728.2674 (c) 206.240.2300
Jenkins Dossen	Port of Anacortes	Project Coordinator	(o) 360.299.1814
Brett Lenz	Columbia Geotechnical Associates	Project Archaeologist	(o) 206.855.9020
Nicholas Acklam	Ecology	Site Manger	(o) 360.407.6913
Rob Whitlam	DAHP	State Archaeologist	(o) 360.586.3080
Jackie Ferry	Samish Nation	Cultural Resources	(o) 360-293-6404
Lena Tso	Lummi Nation	Lummi Tribal Historic Preservation Office	(o) 360.384.2259

5.3. Remedial Excavation

Consistent with the CAP, the objective of the cleanup action is to excavate and dispose of contaminated soil located within the readily accessible areas of the Site. In general, the excavation area at the Site includes the gravel covered areas and therefore, the maximum allowable horizontal limits of remedial excavation are defined by the sidewalk and/or curb to the north, south and east and the property boundary to the west as shown on Sheet 6.0. Based on existing chemical analytical data contaminated soil may remain outside the maximum allowable horizontal limits of remedial excavation including below the paved areas of Q Avenue and 14th Street. Consistent with the CAP this contaminated soil will be left in place and subject to monitoring over time.

The following section describes the methods and approach to complete remedial excavation activities.

5.3.1. *Remedial Excavation Methods and Approach*

The cleanup action will include remedial excavation of an estimated 1,000 in-place cubic yards of non-contaminated overburden material and approximately 3,000 in-place cubic yards of soil identified by the existing analytical data to exceed cleanup levels (as presented in Figure 3). Sheet 6.0 presents the estimated limits of the remedial excavation base that will remove the material known to exceed cleanup levels and the corresponding overburden. The final excavation limits will be determined in the field based on field screening and verification sampling as described below and therefore, may be greater than or less than the estimated limits shown on Sheet 6.0. The field methods to complete the excavation will generally include the following:

- The contractor will design and implement shoring that allows excavation of contaminated material consistent with the objectives of the cleanup action. It is anticipated that shoring will be required along Q Avenue and 14th Street to allow for the anticipated depth of excavation. In June 2014 geotechnical soil borings were completed to obtain geotechnical data to be provided to contractors during bidding for use in shoring design. Attachment 4 provides a summary of the geotechnical soil borings.
- Multiple utilities are located within the excavation area and will require specific action to complete the contaminated soil removal. To safely complete the excavation in the vicinity of an existing underground gas line located below the sidewalk along Q Avenue, the contractor will establish up to a 10-foot offset from the utility (see Sheets 6.0 and 6.1). The contractor will establish the offset in coordination with the utility provider. If the offset is greater than 10 feet from the gas line, the Port will coordinate with Ecology to determine if the gas line offset can be reasonably extended or if the utility needs to be disconnected, temporarily rerouted and restored in order to achieve the objectives of the cleanup action. Other utilities such as the municipal storm drain, phone and electrical are expected to be protected in place and/or disconnected, temporarily rerouted and restored following completion of excavation activities.
- The contractor will dewater, collect, store, treat and dispose of excavation water, as necessary to maintain a reasonably dry excavation. Disposal and/or discharge of excavation water will be completed in accordance with applicable regulations and discharge criteria. The contractor will also complete sampling and analysis of excavation water for disposal/discharge as required by applicable regulatory requirements.
- If elected by the contractor, stockpile containment areas may be constructed within the project area to manage material generated by the cleanup action. To prevent environmental releases resulting from soil and water losses from the stockpiled material, stockpiled soil will be covered, bermed and secured from wind, rain, and other disturbances as appropriate to control erosion and dust. Contaminated soil will be placed on plastic or metal sheeting to prevent direct contact to overburden soil or graveled surfaces beyond the limits of remedial excavation. BMPs in accordance with the *Stormwater Management Manual for Western Washington* will be implemented for proper management and storage of soil. Soil stockpiling will not be allowed outside the limits of the project work area.

The general approach to completing the remedial excavation will consist of the following:

- Demolition of paved surfaces and landscaped areas, and removal of overburden soil will be completed as necessary to gain access to underlying contaminated soil.

- Excavation of contaminated soil to the lateral limit and base elevation presented on Sheet 6.0 to remove contaminated soil that is known to exceed site-specific cleanup levels and excavation to remove soil with evidence of contamination as determined by field screening.
- Field screening including headspace organic vapor screening, water sheen screening, and visual observation (as described in the CMP presented in Attachment 1) will be performed by a GeoEngineers field representative during the soil excavation activities to assist the contractor in segregating overburden soil from contaminated soil and to preliminarily identify the excavation limits.
- Verification samples will be collected from the preliminarily identified limits of excavation for chemical analysis as described in the CMP. Remedial excavation activities will be continued until results of verification soil samples confirm that the contamination has been removed and/or the maximum allowable horizontal limits of remedial excavation or gas line offset have been reached.
- Surveys will be completed during the excavation to document the final excavation limits and locations of each confirmation sample.

5.4. Transport and Disposal of Excavated Soil

Soil will be transferred from the Site for disposal by waste haulers in accordance with applicable state and federal solid waste handling and transportation regulations. Transportation contractor(s) will be capable of providing documentation that demonstrates that they are properly licensed and are in compliance with applicable DOT regulations, as well as a copy of their contingency and spill control plans describing measures to be implemented in the event of spills or discharges during material handling and transporting.

Contaminated soil will be disposed at an Ecology-approved permitted off-site disposal facility and non-contaminated overburden soil will be disposed at a separate construction waste off-site disposal facility. In June 2014, soil samples were collected during completion of geotechnical soil borings and analyzed for toxicity characteristic leaching procedure (TCLP) for metals as requested by disposal facilities. Documentation of these analyses is provided in Attachment 4.

Preliminary waste disposal authorizations obtained for the cleanup action will be provided to the contractor at the time of bidding. The contractor will be responsible for obtaining final waste disposal authorization prior to the transport and disposal of any material generated from the Site.

5.5. Backfill and Compaction

Upon completion of the remedial excavation, the excavation will be backfilled in accordance with contract document and Sheets 7.0 and 7.1 consistent with the following approach:

- Geotextile fabric will be placed at the excavation limits prior to backfilling for use as a visual marker in areas where contamination is left in place.
- The contractor will provide the Port with verification that imported backfill materials have been tested and certified to be free of contaminants in accordance with backfill testing requirements summarized in Table 3.

- The excavation will be backfilled with imported, clean backfill material (gravel borrow or similar) in lifts and each lift will be compacted in accordance with the requirements of the Washington Department of Transportation (WSDOT) Standard Specifications. Field density testing will be conducted to confirm adequate compaction is achieved.
- Oxygen-releasing material will be imported and placed in between backfill lifts adjacent to the saturated/smear zone portion of the contaminated soil that is left in place. Adjacent to Q Avenue the oxygen-releasing material will be placed from the base of the excavation (approximately -3.5 feet NAVD88) up to the seasonal high groundwater level (approximately +8 feet NAVD88). Adjacent to 14th Street the oxygen-releasing material will be placed from the base of the excavation (approximately +1 feet NAVD88) up to the seasonal high groundwater level (approximately +8 feet NAVD88). See Sheet 7.2 for typical details of the oxygen-releasing material placement.

5.6. Site Restoration

This section outlines the planned restoration following soil excavation and backfilling activities. Site restoration plans are detailed in the project contract documents, and are depicted on Sheets 7.0, 7.1 and 8.0.

5.6.1. *Utilities*

Disconnected, relocated and/or damaged utilities will be reinstalled and restored following the completion of remedial excavation activities to their original condition or as otherwise agreed to by the respective utility companies.

5.6.2. *Surface Restoration*

Ground surfaces within the Site disturbed by the cleanup activities will be restored in accordance with the Grading and Restoration Plans (Sheets 7.0 through 8.0) to include the following:

- Surface grades within the gravel portion of the Site will be restored or modified to allow for surface drainage in accordance with the Grading Plans (Sheets 7.0 and 7.1). Surfaces will be finished using imported clean material (permeable ballast or similar) to achieve design grades.
- Concrete paved areas (i.e., sidewalks, curbs and driveways) will be reconstructed. Reconstruction of the sidewalk and driveway areas as detailed on Sheets 7.0 and 7.1. The reconstruction of the sidewalk will include installation of sidewalk sections along 13th and 14th Streets to meet compliance with City of Anacortes Street Standards STR-09 through STR-11 (City, 2011).
- Landscaped areas will be restored in accordance with the plan and details shown on Landscape Plan (Sheet 8.0).

5.7. Institutional/Engineering Controls

If contaminated material is left in place following the completion of remedial excavation due to inaccessibility, institutional and engineering controls will be implemented in consultation with Ecology.

6.0 COMPLIANCE MONITORING

Compliance monitoring and contingency responses (as needed) will be implemented in accordance with WAC 173-340-410. The three types of compliance monitoring to be performed include:

- Protection monitoring to confirm that human health and the environment are adequately protected during the construction phase of the cleanup action.
- Performance monitoring to confirm that the cleanup action has attained cleanup standards.
- Confirmational monitoring to confirm the long-term effectiveness of the cleanup action.

The protection monitoring plan for the cleanup action will be addressed in a Health and Safety Plan (HASP; included as an appendix to the CMP; Attachment 1). Performance and confirmational monitoring are detailed in the CMP (Attachment 1). The objective of the performance and confirmational monitoring is to confirm that cleanup standards are achieved and to confirm the long-term effectiveness of the cleanup action. The CMP is included as an attachment to this EDR (Attachment 1) and describes the duration and frequency of the compliance monitoring program.

7.0 FINANCIAL ASSURANCE

Pursuant to WAC 173-340-440(11) and the terms of the Consent Decree, the Port will provide to Ecology financial assurances sufficient to cover costs associated with the operation and maintenance of the cleanup action at the Site, including institutional controls, compliance monitoring, and corrective measures.

8.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This section describes general QA/QC procedures to be implemented during the cleanup action, including contractor quality control, construction monitoring and field documentation, and analytical QA/QC.

8.1. Contractor Quality Control

The contractor will prepare a plan describing each of the primary elements of work, quality control procedures that will be utilized and project management structure. The contractor's plan will be subject to review and approval by the Port to ensure that the construction is completed in accordance with the contract requirements and EDR.

The contractor's plan for quality control and project management will address the following:

- General construction requirements and approach;
- Quality control measures;
- Project management organization;
- Documentation of methods and procedures;
- Requirements for corrective action when QC and/or acceptance criteria are not met; and

- Additional elements that the contractor deems necessary to adequately control construction processes required by the contract.

The contractor will maintain QC records for the duration of the construction. These records will include evidence that the required inspections or tests have been performed, including the type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, proposed corrective action, and corrective actions taken.

In addition to the contractor's QC activities, the Port and/or Port representatives will perform independent oversight of the contractor's activities.

8.2. Construction Monitoring and Field Documentation

Construction monitoring will be performed by the Port and its representatives. A comprehensive record of field activities will be maintained. Field documentation for this project will include field notes, field forms, field reports, and chain-of-custody forms for samples submitted for analytical testing. The field documentation will record construction, sampling, and monitoring activities, as well as decisions, corrective actions, and/or modifications to the project plans and procedures discussed in this report. Construction monitoring and field documentation procedures are described in the QAPP appendix to the CMP (Attachment 1).

8.3. Analytical QA/QC

Analytical QA/QC is described in the QAPP appendix to the CMP (Attachment 1). The QAPP describes verification soil and post-construction groundwater sampling, analysis, and QC procedures that will be implemented to produce chemical and field data that are representative, valid, and accurate for use in evaluating the effectiveness of the cleanup action.

8.4. Health and Safety

Cleanup-related construction activities will be performed in accordance with the requirements of the Washington Industrial Safety and Health Act (RCW 49.17) and the Federal Occupational Safety and Health Act (29 CFR 1910, 1926). These regulations include requirements that workers are to be protected from exposure to contaminants.

A site Health and Safety Plan (HASP) describing actions that will be taken to protect the health and safety of GeoEngineers personnel (the Port's environmental construction oversight consultant) is provided as an appendix to the CMP (Attachment 1). The contractor will be required to prepare and submit a separate HASP for use by contractor personnel. Personnel engaged in work that involves hazardous material excavation and handling will comply with MTCA safety and health provisions in WAC 173-340-810 and will be HAZWOPER, OSHA, and WISHA certified as required.

9.0 SCHEDULE

Pending Ecology approvals, cleanup-related construction work is scheduled to begin in the fall of 2014. The construction duration is estimated to occur over a period of three months.

10.0 REPORTING

The following reports will be prepared to document the cleanup action:

- **Construction Completion Report –** Upon completion of cleanup-related construction activities, a construction completion report summarizing the cleanup activities and results of performance monitoring will be prepared in accordance with WAC 173-340-400. Waste manifests, contaminated soil disposal receipts, and as-built drawings will be included in the construction completion report. A draft version of the construction completion report will be submitted to Ecology for review and comment prior to finalization.
- **Confirmational Groundwater Monitoring Report** – A report summarizing the results of confirmational groundwater monitoring will be prepared upon completion of the initial four quarterly post-construction groundwater monitoring events.
- **Progress Reports –** A monthly progress report will be made by the Port to Ecology as required by the Consent Decree. The frequency of progress reporting may be reduced to quarterly to coincide with conformational groundwater monitoring if acceptable to Ecology.

Compliance monitoring data generated during the cleanup action will be provided to Ecology in the electronic format required by Ecology's Environmental Information Management (EIM) Policy 840.

11.0 LIMITATIONS

We have prepared this EDR for use by Washington State Department of Ecology and the Port of Anacortes during the cleanup action at the Former Shell Oil Tank Farm Site. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

12.0 REFERENCES

City of Anacortes (City, 2011), "City of Anacortes Engineering Department Chapter 3 - Streets," July, 2011.

Floyd|Snider, 2005, "Limited Environmental Due Diligence Investigation Report, Former Shell Oil Tank Farm, Cap Sante Marine Lease Area," prepared for the Port of Anacortes, November 8, 2005.

GeoEngineers, Inc. (GeoEngineers, 2014), "Remedial Investigation/Feasibility Study, Former Shell Oil Tank Farm, Anacortes, Washington, Ecology Agreed Order No. DE-08TCPHQ-5474," GEI File No. 5147 012-02, prepared for the Washington State Department of Ecology on behalf of Port of Anacortes, February 3, 2014.

GeoEngineers, Inc. (GeoEngineers), "Remedial Investigation Data Report, Former Shell Tank Farm, Anacortes, Washington," GEI File No. 5147-012-02, prepared for the Washington State Department of Ecology on behalf of Port of Anacortes, April 19, 2013.

GeoEngineers, Inc. (GeoEngineers), "Work Plan, Remedial Investigation/Feasibility Study, Former Shell Oil Tank Farm," GEI File No. 5147-012-01 prepared for the Washington State Department of Ecology on behalf of Port of Anacortes, September 1, 2009.

GeoEngineers, Inc. (GeoEngineers), "Independent Remedial Action Completion Report, Former Shell Tank Farm, Storm Drain Re-Route, 13th Street and Q Avenue, Anacortes, Washington," GEI File No. 5147-012-00 prepared for the Port of Anacortes, April 18, 2008.

Hart Crowser & Associates, Inc. (Hart Crowser), "Preliminary Environmental Site Assessment, Petroleum Bulk Storage Facility, Anacortes, Washington," prepared for Port of Anacortes, May 27, 1987.

Landau Associates (Landau), "Landau Associates, Investigation Data Report, Cap Sante Marine Lease Area, Anacortes, Washington," prepared for the Port of Anacortes, August 21, 2007.

Washington State Department of Ecology (Ecology, 2014b). "Cleanup Action Plan (CAP), Former Shell Oil Tank Farm Site, Anacortes, Washington," dated February 3, 2014.

Table 1

Cleanup Levels for Indicator Hazardous Substances

Former Shell Oil Tank Farm Site

Anacortes, Washington

Indicator Hazardous Substances	Soil Cleanup Level (mg/kg)	Groundwater Cleanup Level (µg/L)
Petroleum Hydrocarbons		
Gasoline-Range	30/100[1]	800/1,000[2]
Diesel-Range	2,000	500
Heavy Oil-Range	2,000	500
Volatile Organic Compound (VOC)		
Benzene	0.13	23
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)		
Benzo(a)anthracene	0.13	0.018
Chrysene	0.14	0.018
Benzo(b)fluoranthene	0.43	0.018
Benzo(k)fluoranthene	0.43	0.018
Benzo(a)pyrene	0.137	0.018
Indeno(1,2,3-cd)pyrene	1.3	0.018
Dibenz(a,h)anthracene	0.65	0.018
Total cPAHs (TEQ)	0.137	0.10
Metals		
Cadmium	1.2	8.8

Notes:

[1]Cleanup level is 30 mg/kg when benzene is present.

[2]Cleanup level is 800 µg/L when benzene is present.

mg/kg = milligrams per kilogram

µg/L = microgram per liter

TEQ = toxicity equivalency

Table 2

Applicable or Relevant and Appropriate Requirements

Former Shell Oil Tank Farm Site

Anacortes, Washington

Standard, Requirement, Criterion, or Limitation	Citation	Description	ARAR
Federal			
Clean Air Act (CAA), National Ambient Air Quality Standards	42 USC 7401 et seq. 40 CFR 50	Provides air quality standards for six criteria pollutants, including particulate matter, to protect public health and welfare.	Applicable
Archaeological Resources Protection Act	16 USC § 470aa et seq.; 43 CFR Part 7	Prohibits the unauthorized disturbance of archaeological resources on public or Indian lands. Archaeological resources are "any material remains of past human life and activities which are of archaeological interest," including pottery, baskets, tools, and human skeletal remains. The unauthorized removal of archaeological resources from public or Indian lands is prohibited without a permit, and any archaeological investigations at a site must be conducted by a professional archeologist.	Applicable for the conduct of any selected cleanup actions that may result in ground disturbance.
American Indian Religious Freedom Act	42 USC § 1996 et seq	The American Indian Religious Freedom Act and implementing regulations are intended to protect Native American religious, ceremonial, and burial sites, and the free practice of religions by Native American groups. The requirements of this Act must be followed if sacred sites graves are discovered in the course of ground-disturbing activities.	Potentially applicable to a site where response actions involve disturbance/alteration of the ground and/or site terrain.
Native American Graves Protection and Repatriation Act	25 USC § 3001 et seq 43 CFR Part 10 25 USC 3001 et seq. 43 CFR 10	Intended to protect Native American graves from desecration through the removal and trafficking of human remains and "cultural items" including funerary and sacred objects. The requirements of this Act must be followed when graves are discovered or ground-disturbing activities encounter Native American burial sites.	Potentially applicable to a site where response actions involve disturbance/ alteration of the ground and/or site terrain.
Occupational Safety and Health Act	29 CFR 1904, 1910, 1926	Specifies minimum requirements to maintain worker health and safety during hazardous waste operations, including training and construction safety requirements.	Appropriate
State of Washington			
State Environmental Policy Act (SEPA)	RCW 43.21C WAC 197-11 WAC 173-802	Prior to taking any action on a proposal, agencies must follow specific procedures to ensure that appropriate consideration has been given to the environment. The severity of potential environmental impacts associated with a project determines whether an Environmental Impact Statement is required.	Applicable (a SEPA checklist is required prior remedial construction activities).
Model Toxics Control Act (MTCA), Cleanup Standards	WAC 173-340-700 through 173-340-760	Provides standards for cleanup of contamination in soils, surface water and groundwater.	Applicable
MTCA, Site Cleanup and Monitoring	WAC 173-340-400 through 173-340-440	Provides requirements for implementation of the cleanup action, compliance monitoring, periodic review, interim action and institutional controls.	Applicable
Washington Clean Air Act	RCW 70.94, 43.21A WAC 173-400	Requires all sources of air contaminants to meet emission standards for visible, particulate, fugitive, odors, and hazardous air emissions. Requires use of reasonably available control technology.	Substantive requirements are applicable for any response actions in the project area that may create fugitive dust or other regulated air emissions.
Puget Sound Clean Air Agency (PSCAA)	Regulation 1, Section 9.15.	Provides regulation for the visible emissions of fugitive dust and reasonable precautions that should be employed to minimize these emissions.	Substantive requirements are applicable for any response actions in the project area that may create fugitive dust or other regulated air emissions.
Solid Waste Handling Standards	WAC 173-350 WAC 173-351	Regulates the handling and disposal of solid waste.	Applicable
Regulation and Licensing of Well Contractors and Operators	RCW 18.104 WAC 173-162-020 and -030	Provides regulation and licensing of well contractors and operators and for the regulation of well design and construction.	Applicable
City of Anacortes			
City of Anacortes land disturbance/grading permit	Chapter 17.54.090 Chapter 18.12	Provides the criteria or standards for the land clearing and grading.	Permit Exempt (the substantive requirements are applicable).
City of Anacortes Rights-of-Way permit	Chapter 12.08	Requires that no person, firm or corporation shall dig, excavate or penetrate any public right-of-way, roadway, easement or alleyway, paved or unpaved, without first obtaining a "roadway excavation permit".	Applicable
City of Anacortes noise ordinance	Chapter 17.54.010 Ordinance 2316 (part), 1994	Establishes noise levels and standards.	Applicable
City of Anacortes Publicly Owned Treatment Water (POTW) discharge authorization	Chapter 13.40.060	Establishes the requirements and limitations for discharges to the POTW.	Permit Exempt (the substantive requirements are applicable).
City of Anacortes stormwater management program	Chapter 13.36 Chapter 17.54.050	Provides the necessary measures to control the quantity and quality of stormwater produced by new development and redevelopment such that they comply with water quality standards and contribute to the protection of beneficial uses of the receiving waters.	Applicable

Notes:

ARAR = Applicable or Relevant and Appropriate Requirement

CFR = Code of Federal Regulations

RCW = Revised Code of Washington

WAC = Washington Administrative Code

USC = United States Code

Table 3

Backfill Testing Requirements

Former Shell Oil Tank Farm Site

Anacortes, Washington

Indicator Hazardous Substances	Analytical Method	Site-Specific Soil Cleanup Level[1]
Total Petroleum Hydrocarbons (mg/kg)		
Gasoline-Range	NW-TPH-Gx	30/100
Diesel-Range	NW-TPH-Dx	2,000
Oil-Range	NW-TPH-Dx	2,000
Metals (mg/kg)		
Arsenic	6010B ICP	20
Cadmium	6010B ICP	1.2
Chromium	6010B ICP	120,000
Lead	6010B ICP	250
Mercury	7471A GFAA & CVAA	0.07
Volatile Organic Compounds (mg/kg)		
Benzene	EPA 8021 / 8260B	0.13
Ethylbenzene	EPA 8021 / 8260B	18
Toluene	EPA 8021 / 8260B	109
Xylenes	EPA 8021 / 8260B	9
Methyl tert-butyl ether (MTBE)	EPA 8260B	560
Ethylene Dibromide (EDB)	EPA 8260B	0.012
1,2-Dichloroethane (EDC)	EPA 8260B	0.179
Tetrachloroethylene (PCE)	EPA 8260B	0.01
Trichloroethylene (TCE)	EPA 8260B	0.044
1,1,1-Trichloroethane	EPA 8260B	13,957
Vinyl Chloride	EPA 8260B	0.015
Trichlorofluoromethane (freon)	EPA 8260B	24,000
Carbon tetrachloride	EPA 8260B	0.015
Polycyclic Aromatic Hydrocarbons (mg/kg)		
1-Methylnaphthalene	EPA 8270D SIM	NE
2-Methylnaphthalene	EPA 8270D SIM	3,200
Naphthalene	EPA 8270D SIM	140
Acenaphthene	EPA 8270D SIM	65
Acenaphthylene	EPA 8270D SIM	0.00
Anthracene	EPA 8270D SIM	12,000
Benzo(g,h,i)perylene	EPA 8270D SIM	0.00
Fluoranthene	EPA 8270D SIM	89
Fluorene	EPA 8270D SIM	550
Phenanthrene	EPA 8270D SIM	0.00
Pyrene	EPA 8270D SIM	2,400
Benzo(a)anthracene	EPA 8270D SIM	0.13
Benzo(a)pyrene	EPA 8270D SIM	0.137
Benzo(b)fluoranthene	EPA 8270D SIM	0.43
Benzo(k)fluoranthene	EPA 8270D SIM	0.43
Chrysene	EPA 8270D SIM	0.14
Dibenz(a,h)anthracene	EPA 8270D SIM	0.65
Indeno(1,2,3-cd)pyrene	EPA 8270D SIM	1.3
Total cPAHs (TEQ)	EPA 8270D SIM	0.137
Polychlorinated Biphenyls (mg/kg)		
Total PCBs	8082 Low Level	0.1

Notes:

[1]Values referenced from Remedial Investigation/Feasibility Study Work Plan (GeoEngineers, 2009).

mg/kg = milligrams per kilogram

TEQ = toxicity equivalency

mg/kg = milligram per kilogram

NE = not established

N
W E
S

2,000 0 2,000

Feet

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. can not 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.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

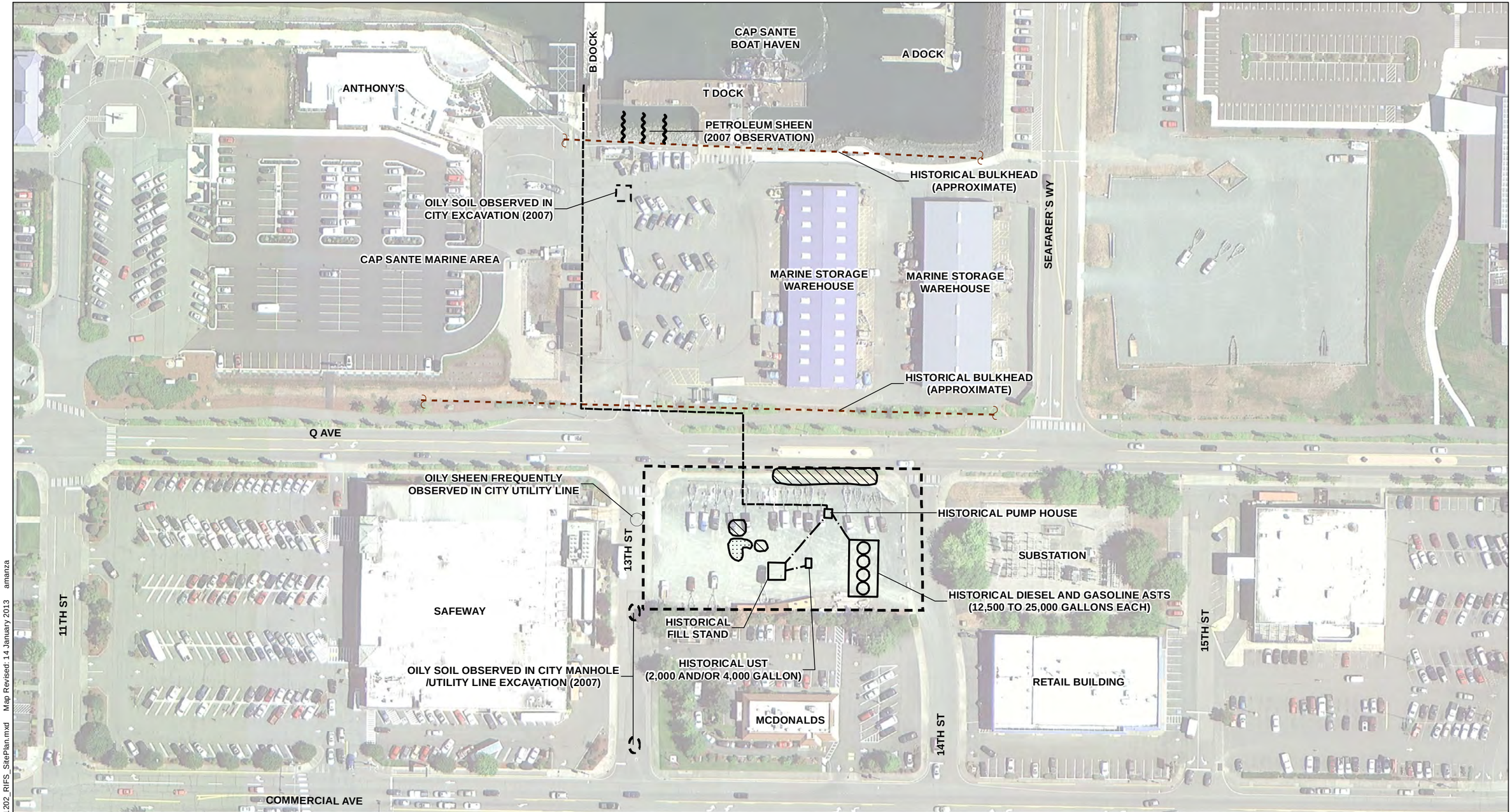
Vicinity Map

Former Shell Oil Tank Farm
Anacortes, Washington

GeoEngineers

Figure 1

Path: \\sea\projects\5\5147012\GIS\5147012_VicinityMap.mxd Map Revised: 09 January 2013 amanza



Notes:
1. AST = Above Ground Storage Tank. UST = Underground Storage Tank
2. The locations of all features shown are approximate.
3. 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: Roads from Skagit County. Point, line and polygon features digitized from figures 5.1 and 6.1 of November 2006 and Figure 2 of September 2005 by Floyd Snider. Imagery date: 2011.

Legend

- Former Shell Oil Tank Farm
- Historical Features
- Surface Oil (1987 Observation)
- White Powder (1987 Observation)
- Historical Fuel Supply Line
- Historical Product Line

N E S W

100 0 100
Feet

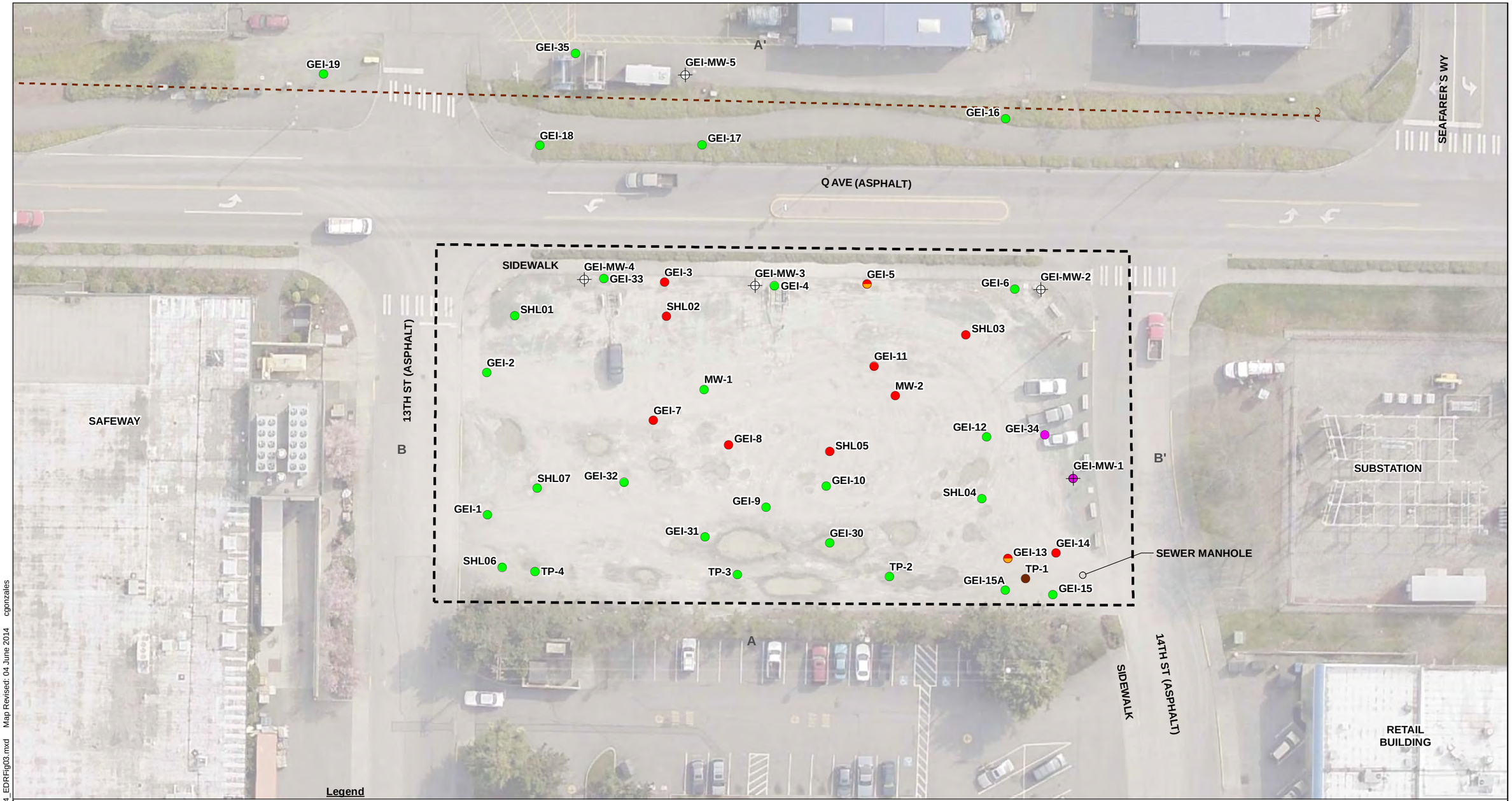
Site Plan

Former Shell Oil Tank Farm
Anacortes, Washington

GeoEngineers

Figure 2

Path: \\seal\projects\5\5147012\GIS\5147012_RIFS_SitePlan.mxd Map Revised: 14 January 2013 amanza



Path: \\seal\projects\5\5147012\GIS\5147012O4_EDRFig03.mxd Map Revised: 04 June 2014 cgonzales

Legend

- Soil Exploration Location
- Monitoring Well Location
- TPH Exceeds Soil Cleanup Level
- Benzene Exceeds Soil Cleanup Level
- cPAH Exceeds Soil Cleanup Level
- Cadmium Exceeds Soil Cleanup Level
- COCs (TPH, Benzene, cPAHs, and/or Cadmium) Less Than Soil Cleanup Level
- Former Shell Oil Tank Farm

40 0 40
Feet

N E S W

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: Roads from Skagit County. Point, line and polygon features digitized from figures 5.1 and 6.1 of November 2006 and Figure 2 of September 2005 by Floyd Snider. Imagery date: 2011.

cPAH Carcinogenic Polycyclic Aromatic Hydrocarbons
TPH Petroleum Hydrocarbons (Gasoline, Diesel and/or Heavy Oil)
COC Contaminant of Concern

Summary of Remedial Investigation Findings

Former Shell Oil Tank Farm
Anacortes, Washington

GeoEngineers

Figure 3

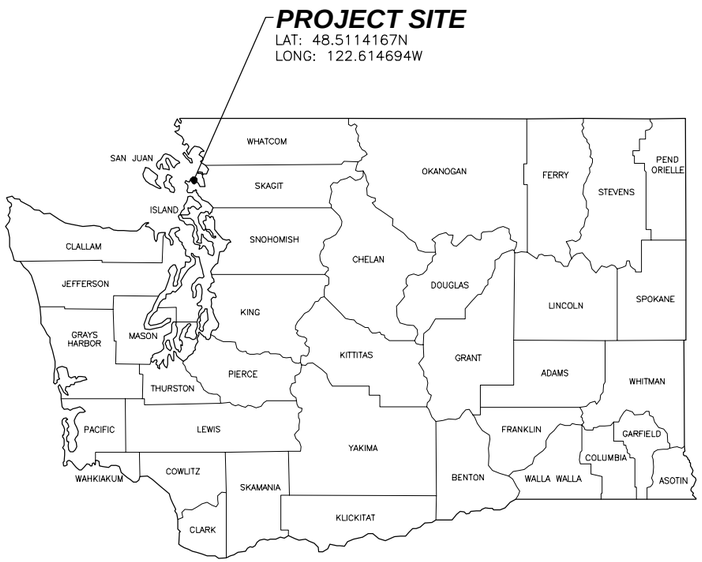
PORT OF ANACORTES

FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION

PROJECT# ENV-02

SECTION 18, TOWNSHIP 35N, RANGE 02E

VICINITY MAP
SCALE: 1"=1500'



STATE MAP
NOT TO SCALE

GRAPHIC SCALE

1500 0 1500
FEET

SHEET INDEX:

1.0 COVER SHEET
2.0 PROJECT OVERVIEW
3.0 PROJECT OVERVIEW PHOTOS
4.0 SITE ACCESS AND TRAFFIC CONTROL PLAN
5.0 TEMPORARY EROSION AND SEDIMENT CONTROL PLAN
6.0 REMEDIAL EXCAVATION PLAN
6.1 REMEDIAL EXCAVATION SECTIONS
7.0 SITE RESTORATION AND GRADING PLAN
7.1 SITE RESTORATION DETAILS
7.2 BACKFILLING AND GRADING DETAILS
8.0 LANDSCAPE PLAN

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GeoEngineers WHPacific

NO.	DATE	BY	REVISION

PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT# ENV-02

COVER SHEET

DRAWN: TJM	PROJECT NO.514701204
DESIGN: AJ	SCALE: AS NOTED
CHECKED: JMH	DATE: 7/9/2014
SHEET NO. 1.0	

CONTRACT DRAWINGS

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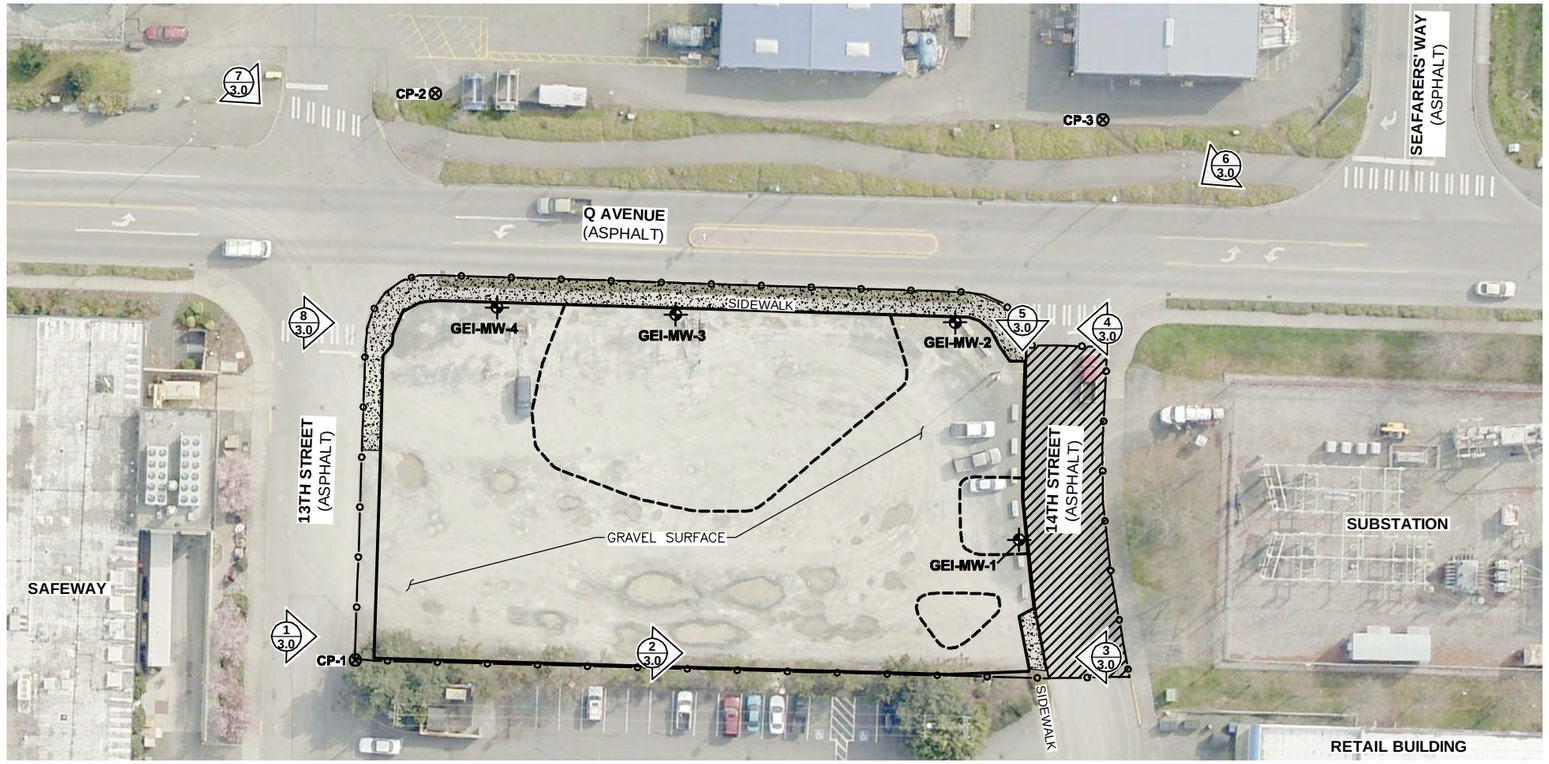

PROJECT OVERVIEW

SCALE: 1"=30'

N

GRAPHIC SCALE

30 0 30
FEET

PROJECT SUMMARY

1. IMPLEMENT TEMPORARY SITE CONTROLS INCLUDING SITE SECURITY, TEMPORARY TRAFFIC CONTROLS AND TEMPORARY EROSION AND SEDIMENT CONTROLS. EAST PORTION OF 14TH STREET ADJACENT TO THE PROPERTY WILL BE CLOSED TO PUBLIC DURING CONSTRUCTION.
2. PERFORM UTILITY LOCATE PRIOR TO EARTH DISTURBING ACTIVITIES.
3. DECOMMISSION/PROTECT EXISTING MONITORING WELLS AS SPECIFIED.
4. DEMOLISH EXISTING SIDEWALK/LANDSCAPING, AS NECESSARY.
5. INSTALL EXCAVATION SHORING NECESSARY TO ALLOW COMPLETION OF EXCAVATION.
6. PROTECT IN-PLACE EXISTING UNDERGROUND UTILITIES AND/OR DISCONNECT, TEMPORARILY REROUTE AND RESTORE UNLESS OTHERWISE SPECIFIED OR DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.
7. PERFORM DEWATERING, COLLECTION, STORAGE, TREATMENT (IF REQUIRED) AND DISPOSAL OF EXCAVATION WATER TO MAINTAIN DRY EXCAVATION WITHIN REASON.
8. PERFORM REMEDIAL EXCAVATION AS DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE.
9. TRANSPORT AND DISPOSE EXCAVATED NON-CONTAMINATED OVERBURDEN MATERIAL TO AN OWNER APPROVED FACILITY.
10. COMPLETE SURVEYING TO DOCUMENT THE LIMITS OF NON-CONTAMINATED OVERBURDEN EXCAVATION.
11. TRANSPORT AND DISPOSE EXCAVATED CONTAMINATED MATERIAL TO AN OWNER AND ECOLOGY APPROVED PERMITTED LANDFILL.
12. COMPLETE SURVEYING TO DOCUMENT THE FINAL LIMITS OF REMEDIAL EXCAVATION.
13. IMPORT, PLACE AND COMPACT BACKFILL MATERIAL. PERFORM FINISH GRADING TO MEET DESIGN FINISH GRADES.
14. RESTORE SITE FEATURES INCLUDING SIDEWALK, CURB, GUTTER AND LANDSCAPING.
15. COMPLETE SURVEYING TO CONFIRM GRADING MEETS DESIGN FINISH GRADES
16. COMPLETE POST-CONSTRUCTION SURVEYING USING A PROFESSIONAL LAND SURVEYOR REGISTERED IN THE STATE OF WASHINGTON TO RECORD FINAL AS-BUILT SURFACES AND FEATURES OF THE SITE.

PROJECT WORK HOURS

ALLOWABLE WORK HOURS ARE 7:00AM – 7:00PM, MONDAY THROUGH FRIDAY. WEEKEND, NIGHT AND HOLIDAY WORK SHALL NOT BE PERMITTED UNLESS APPROVED BY THE OWNER.

LEGEND

- APPROXIMATE LOCATION OF PERIMETER SITE SECURITY
- GEI-MW-1 EXISTING MONITORING WELL LOCATION
- ESTIMATED MINIMUM LIMITS OF CONTAMINATED SOIL TO BE EXCAVATED
- MAXIMUM ALLOWABLE HORIZONTAL LIMITS OF REMEDIAL EXCAVATION
- STREET CLOSED TO PUBLIC DURING CONSTRUCTION
- EXISTING SIDEWALK / LANDSCAPING TO BE DEMOLISHED AND RECONSTRUCTED

SHEET SYMBOLS

1 / 3.0 — DETAIL DESIGNATION; SHEET LOCATED ON — DETAIL

SECTION DESIGNATION B / SHEET LOCATED ON 2.0 — DIRECTION OF CROSS-SECTION — SECTION

PHOTOGRAPH IDENTIFICATION 5 / SHEET LOCATED ON 2.0 — DIRECTION OF PHOTGRAPGH — PHOTOGRAPH

SURVEY CONTROL

1. PRE-CONSTRUCTION TOPOGRAPHIC SURVEY COMPLETED BY SOUND DEVELOPMENT GROUP IN APRIL 2014 WAS USED AS BASIS FOR THE DESIGN DRAWINGS.
2. HORIZONTAL DATUM: WASHINGTON STATE PLANE, NORTH ZONE, NORTH AMERICAN DATUM 1983 (NAD83).
3. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88).
4. UNIT: U.S. FEET.

CP-1⊗ SURVEY CONTROL POINT

CP-1	CP-2	CP-3
N=556432.08'	N=556400.42'	N=556136.22'
E=1209371.08'	E=1209595.12'	E=1209584.68'
ELEV.=13.96'	ELEV.=12.55'	ELEV.=13.04'

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NO.	DATE	BY	REVISION

PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT# ENV-02

PROJECT OVERVIEW

DRAWN: TJM	PROJECT NO. 514701204
DESIGN: AJ	SCALE: AS NOTED
CHECKED: JMH	DATE: 7/9/2014
SHEET NO.	2.0

CONTRACT DRAWINGS

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PROFESSIONAL ENGINEER

NO.	DATE	BY	REVISION

PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT# ENV-02

PROJECT OVERVIEW PHOTOS

DRAWN:	TJM	PROJECT NO.	514701204
DESIGN:	AJ	SCALE:	AS NOTED
CHECKED:	JMH	DATE:	7/9/2014
SHEET NO.			
	3.0		

CONTRACT DRAWINGS

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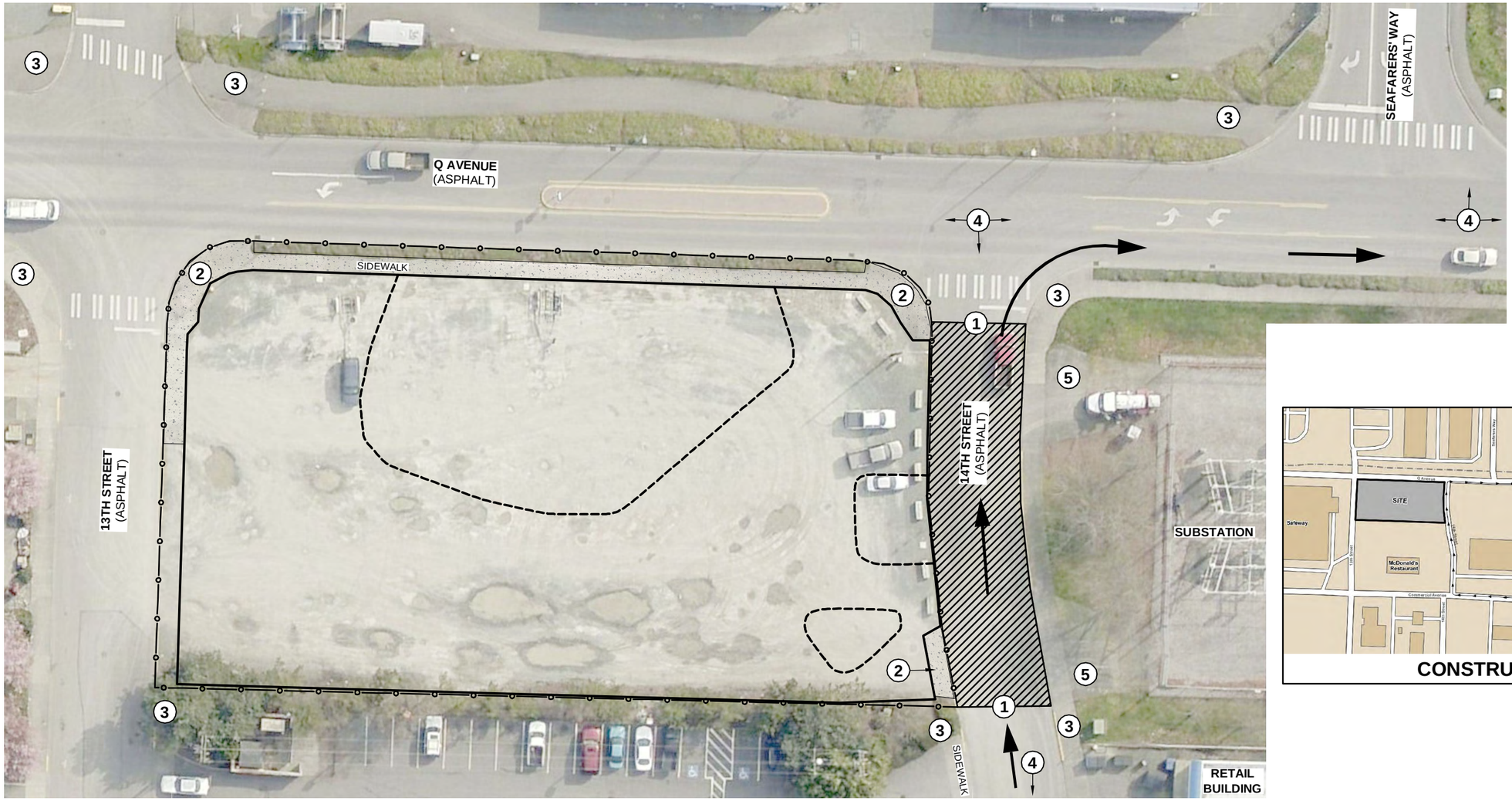

CONSTRUCTION HAUL ROUTE

LEGEND

- INSTALL TEMPORARY PORTABLE CHAIN LINK METAL FENCE
- CONSTRUCTION HAUL ROUTE
- ESTIMATED MINIMUM LIMITS OF CONTAMINATED SOIL TO BE EXCAVATED
- MAXIMUM ALLOWABLE HORIZONTAL LIMITS OF REMEDIAL EXCAVATION
- STREET CLOSED TO PUBLIC DURING CONSTRUCTION

SITE ACCESS AND TRAFFIC CONTROL PLAN

SCALE: 1"=20'

N

GRAPHIC SCALE

20 0 20
FEET

NOTES:

1. 14TH STREET ADJACENT TO THE PROPERTY WILL BE CLOSED TO GENERAL PUBLIC DURING THE CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER AND THE CITY OF ANACORTES, AND SHALL OBTAIN APPLICABLE PERMITS PRIOR TO STREET CLOSURE. TRAFFIC CONTROL DEVICES/SIGNAGE, DETOUR ROUTES AND FLAGGERS SHALL BE IMPLEMENTED IN ACCORDANCE WITH THE CITY OF ANACORTES CODE/REQUIREMENTS. THE CONSTRUCTION ENTRANCE SHALL BE LOCATED ON 14TH STREET AT THE WEST PROPERTY LINE AND THE CONSTRUCTION EXIT SHALL BE LOCATED 14TH STREET AT Q AVENUE. APPROPRIATE SECURITY MEASURES SHALL BE IMPLEMENTED ALONG 14TH STREET DURING CONSTRUCTION. IMPLEMENT TEMPORARY EROSION AND SEDIMENT CONTROL (TESC) MEASURES AT THE CONSTRUCTION ENTRANCE/EXIT IN ACCORDANCE WITH THE TESC PLAN.
2. DURING CONSTRUCTION SIDEWALK SHALL BE CLOSED TO GENERAL PUBLIC IN ACCORDANCE WITH THE CITY OF ANACORTES CODE/REQUIREMENTS. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER AND THE CITY OF ANACORTES, AND SHALL OBTAIN APPLICABLE PERMITS PRIOR TO SIDEWALK CLOSURE.
3. PEDESTRIAN TRAFFIC SHALL BE REROUTED FOR THE DURATION OF THE CONTRACT WORK. THE PEDESTRIAN ROUTE OF TRAVEL SHALL BE IDENTIFIED AND PEDESTRIAN TRAFFIC CONTROL DEVICES/SIGNAGE SHALL BE IMPLEMENTED IN ACCORDANCE WITH THE CITY OR ANACORTES CODE/REQUIREMENTS. SIDEWALK ACCESS TO ADJACENT BUSINESSES SHALL BE KEPT OPEN AT ALL TIMES.
4. PROVIDE AND MAINTAIN TRAFFIC CONTROL DEVICES/SIGNAGE FOR THE DURATION OF THE CONTRACT WORK TO ALERT VEHICULAR TRAFFIC OF CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH CITY OF ANACORTES CODE/REQUIREMENTS. THE CONTRACTOR SHALL FURNISH PERSONNEL FOR FLAGGING AS NEEDED TO ENSURE SMOOTH AND SAFE TRAFFIC FLOW AND COMPLIANCE WITH CITY OF ANACORTES CODE/REQUIREMENTS. VEHICULAR TRAFFIC ADJACENT TO THE SITE SHALL BE KEPT OPERATIONAL WITH MINIMAL DISTURBANCE. QUEUE FORMATION OF TRUCKS/TRAILERS SHALL NOT BE ALLOWED ON STREETS AT ANY TIME.
5. ACCESS TO THE SUBSTATION ADJACENT TO THE SITE SHALL BE AVAILABLE TO UTILITY WORKERS THROUGHOUT CONSTRUCTION AS REQUIRED BY THE UTILITY PROVIDER.

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07/14/14

NO.	DATE	BY	REVISION

PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT# ENV-02

SITE ACCESS AND TRAFFIC CONTROL PLAN

DRAWN:	TJM	PROJECT NO.:	514701204
DESIGN:	AJ	SCALE:	AS NOTED
CHECKED:	JMH	DATE:	7/9/2014
SHEET NO.			4.0

CONTRACT DRAWINGS

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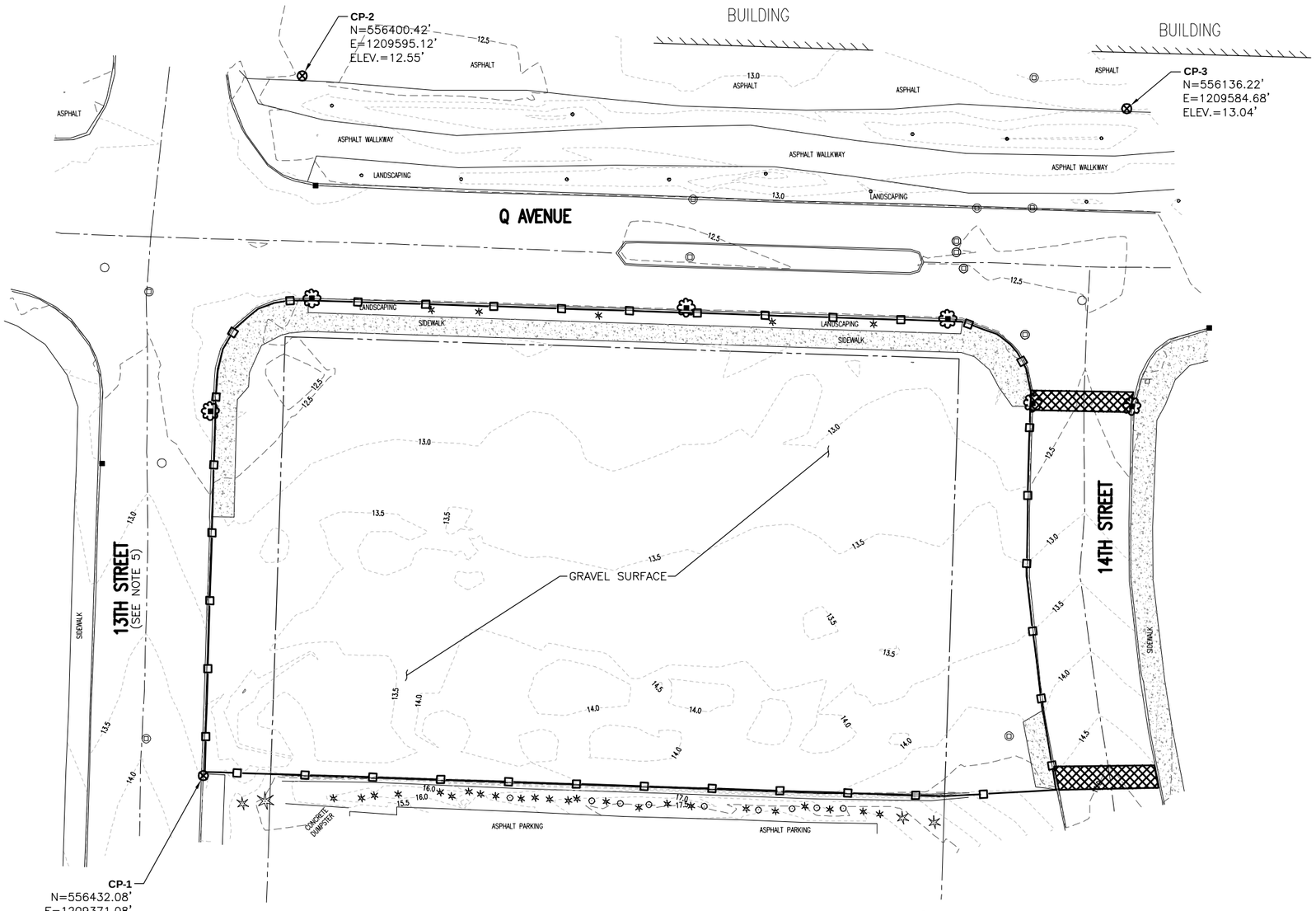

TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

SCALE: 1"=20'

N

GRAPHIC SCALE

20 0 20
FEET

LEGEND

- PROPERTY BOUNDARY
- 13.0 EXISTING TOPOGRAPHIC CONTOUR (FEET NAVD88)
- INSTALL SILT FENCE/STRAW WATTLE OR SIMILAR
- CONSTRUCTION ENTRANCE/EXIT (SEE NOTE 5)
- INLET PROTECTION (SEE NOTE 9)
- CP-1 SURVEY CONTROL POINT
- SEWER MANHOLE
- STORM DRAIN MANHOLE
- STORM CATCH BASIN
- EXISTING TREE/SHRUB

NOTES:

1. SINCE SIZE OF THE SITE IS LESS THAN 1 ACRE, CONSTRUCTION STORMWATER GENERAL PERMIT (CSWGP) IS NOT ANTICIPATED TO BE REQUIRED. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE REGULATORY REQUIREMENTS PERTAINING TO STORMWATER, EROSION AND SEDIMENT CONTROLS.
2. TEMPORARY EROSION AND SEDIMENT CONTROL (TESC) MEASURES AND BEST MANAGEMENT PRACTICES (BMP) SHALL BE IMPLEMENTED AND MAINTAINED IN ACCORDANCE WITH 2012 STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON (SWMMWW) AT ALL TIMES.
3. CONTRACTOR SHALL PREPARE TESC PLAN DETAILING TESC APPROACH THAT INCORPORATES MINIMUM REQUIREMENTS ESTABLISHED HEREIN FOR THE OWNER'S APPROVAL. ADHERE TO THE OWNER APPROVED PLAN FROM START TO FINISH OF ACTIVITIES REQUIRING TESC.
4. THE IMPLEMENTATION, MAINTENANCE, REPLACEMENT AND UPGRADING OF TESC MEASURES AND BMP SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR UNTIL FINAL SITE STABILIZATION IS ACHIEVED.
5. CONSTRUCTION ENTRANCE/EXIT SHALL BE LOCATED ON 14TH STREET. TESC MEASURES AND BMP SHALL BE IMPLEMENTED AT CONSTRUCTION ENTRANCES/EXITS DURING THE DURATION OF THE CONSTRUCTION.
6. CONTRACTOR SHALL IMPLEMENT NECESSARY CONTROLS AND TAKE ALL PRECAUTIONS TO PREVENT SEDIMENT AND SILT LADEN WATER FROM EXITING THE SITE.
7. ALL PUBLIC AND PRIVATE ROADS SHALL BE KEPT CLEAN AT ALL TIMES. TRACKING OF SEDIMENT AND DEBRIS FROM CONSTRUCTION AREAS WILL NOT BE ALLOWED. IF SEDIMENT AND DEBRIS ARE OBSERVED TO BE TRACKED OUTSIDE THE PERIMETER TESC, THE CONTRACTOR SHALL TAKE ACTION TO PERFORM STREET AND SIDEWALK CLEANING TO COLLECT THE TRACKED SEDIMENTS AND REEVALUATE/MODIFY TESC MEASURES.
8. ALL CONSTRUCTION EQUIPMENT (EARTHWORK EQUIPMENT, TRUCK AND TRAILERS, CONSTRUCTION VEHICLES, HAND TOOLS ETC.) THAT HAVE BEEN IN CONTACT WITH CONTAMINATED OR POTENTIALLY CONTAMINATED SOIL OR WATER SHALL BE DECONTAMINATED PRIOR TO LEAVING/DEMOBILIZING FROM THE SITE AND PRIOR TO USING SUCH EQUIPMENT IN OTHER CLEAN AREAS OF THE SITE INCLUDING AREAS WHERE CONTAMINATED SOIL REMOVAL ACTIVITIES ARE ACCOMPLISHED.
9. INLET PROTECTION SHALL BE WSDOT STANDARD PLAN 1-40.20-00. THE CONTRACTOR SHALL INSTALL ADDITIONAL INLET PROTECTION AS REQUIRED BY CONSTRUCTION ACTIVITY AS NEEDED TO COMPLY WITH ALL STATE, FEDERAL AND LOCAL REQUIREMENTS.

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NO.	DATE	BY	REVISION

PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT# ENV-02

TEMPORARY EROSION AND SEDIMENT CONTROL PLAN

DRAWN:	TJM	PROJECT NO.:	514701204
DESIGN:	AJ	SCALE:	AS NOTED
CHECKED:	JMH	DATE:	7/9/2014
SHEET NO.			5.0

CONTRACT DRAWINGS

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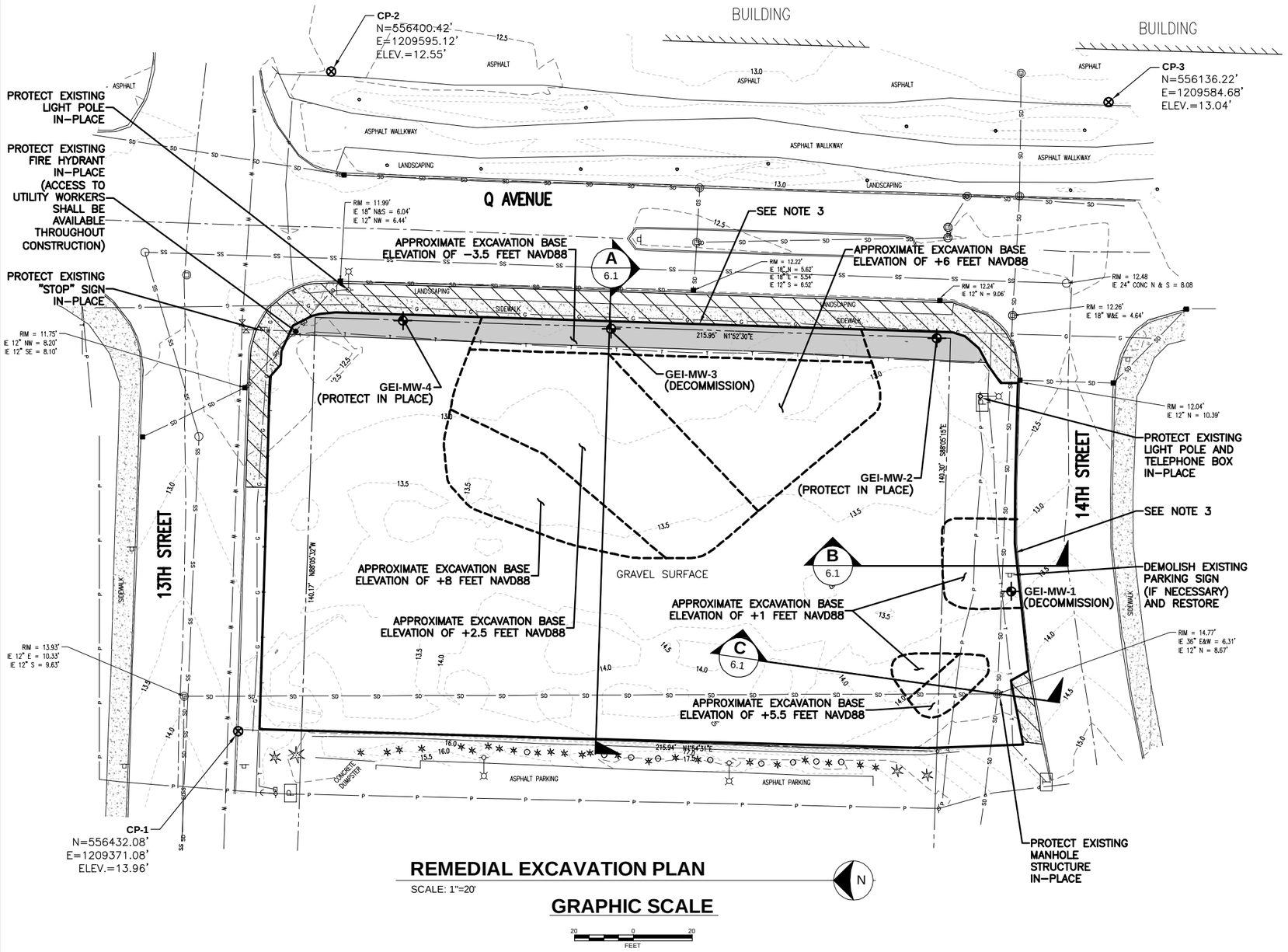

REMEDIAL EXCAVATION PLAN

SCALE: 1"=20'

GRAPHIC SCALE

20 0 20
FEET

LEGEND

- PROPERTY BOUNDARY
- EXISTING TOPOGRAPHIC CONTOURS (FEET NAVD88)
- CP-1 SURVEY CONTROL POINT
- GEI-MW-1 EXISTING MONITORING WELL LOCATION
- DEMOLISH EXISTING SIDEWALK / LANDSCAPING
- ESTIMATED MINIMUM LIMITS OF CONTAMINATED SOIL TO BE EXCAVATED
- MAXIMUM ALLOWABLE HORIZONTAL LIMITS OF REMEDIAL EXCAVATION
- APPROXIMATE UTILITY OFFSET
- SANITARY SEWER
- STORM DRAIN
- UNDERGROUND GAS (2-INCH STEEL)
- UNDERGROUND POWER
- UNDERGROUND TELEPHONE
- UNDERGROUND WATER
- SEWER MANHOLE
- STORM DRAIN MANHOLE
- STORM CATCH BASIN
- LIGHT POLE
- EXISTING TREE/SHRUB

NOTES:

1. COMPLETE UTILITY LOCATES (ONE-CALL AND PRIVATE UTILITY LOCATE) PRIOR TO EARTH DISTURBING ACTIVITIES. PROTECT IN-PLACE AND/OR DISCONNECT, TEMPORARILY REROUTE AND RESTORE EXISTING UNDERGROUND UTILITIES UNLESS OTHERWISE SPECIFIED OR DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE. GAS LINE LOCATED ALONG Q AVENUE SHALL BE PROTECTED IN-PLACE. UNDERGROUND POWER FEEDING THE LIGHT POLE IN THE SOUTHEAST CORNER OF THE SITE CAN BE DISCONNECTED, REMOVED AND RESTORED FOLLOWING REMEDIAL EXCAVATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TIMELY COORDINATION WITH APPLICABLE UTILITY PROVIDERS.
2. DECOMMISSION EXISTING MONITORING WELLS GEI-MW-1 AND GEI-MW-3 PRIOR TO EXCAVATION ACTIVITIES IN ACCORDANCE WITH WAC CHAPTER 176-160 – MINIMUM STANDARDS FOR CONSTRUCTION AND MAINTENANCE OF WELLS. PROTECT EXISTING MONITORING WELLS GEI-MW-2 AND GEI-MW-4 IN PLACE DURING CONSTRUCTION.
3. THE CONTRACTOR SHALL DESIGN AND IMPLEMENT SHORING THAT ALLOWS COMPLETION OF EXCAVATION. EXISTING SUBSURFACE SOIL DATA IS PROVIDED IN THE REFERENCE SECTION OF THE BID PACKAGE. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE OWNER WITH PROPOSED LOCATION, MEANS AND METHODS FOR EXCAVATION SHORING.
4. THE CONTRACTOR WILL BE REQUIRED TO ESTABLISH AN OFFSET FROM THE UNDERGROUND GAS LINE LOCATED ALONG Q AVENUE. UTILITY OFFSET SHOWN ON THE DRAWINGS IS APPROXIMATE. CONTRACTOR SHALL COORDINATE WITH THE UTILITY PROVIDER TO DETERMINE THE APPLICABLE OFFSET. OFFSETS GREATER THAN 10 FEET SHALL REQUIRE OWNER'S AND ECOLOGY'S APPROVAL TO ENSURE CLEANUP REQUIREMENTS ARE MET.
5. REMEDIAL EXCAVATION ACTIVITIES SHALL BE COMPLETED AS DIRECTED BY THE OWNER/OWNER'S REPRESENTATIVE. FINAL LIMITS OF REMEDIAL EXCAVATION SHALL BE DETERMINED BASED ON CHEMICAL ANALYTICAL RESULTS OF CONFIRMATION SOIL SAMPLES OBTAINED FROM THE BASE AND SIDEWALL OF REMEDIAL EXCAVATION. FINAL LIMITS OF REMEDIAL EXCAVATION SHALL NOT EXTEND BEYOND THE MAXIMUM ALLOWABLE HORIZONTAL LIMITS OF REMEDIAL EXCAVATION.
6. NON-CONTAMINATED OVERBURDEN MATERIAL SHALL BE REMOVED, SEGREGATED, HANDLED, TRANSPORTED AND DISPOSED SEPARATELY FROM CONTAMINATED MATERIAL. OWNER'S REPRESENTATIVE WILL DETERMINE LIMITS OF OVERBURDEN DURING CONSTRUCTION USING FIELD SCREENING METHODS.
7. IF NECESSARY, PERFORM STOCKPILING OF EXCAVATED MATERIAL ON SITE. STOCKPILING SHALL BE COMPLETED IN ACCORDANCE WITH THE REQUIREMENTS OF THE SPECIFICATIONS.
8. ALL EXCAVATED MATERIAL SHALL BE TRANSPORTED OFFSITE FOR DISPOSAL.
9. COMPLETE DEWATERING, COLLECTION, STORAGE, TREATMENT AND DISPOSAL OF EXCAVATION WATER AS NECESSARY TO MAINTAIN DRY EXCAVATION. DISPOSE/DISCHARGE COLLECTED EXCAVATION WATER IN ACCORDANCE WITH APPLICABLE REGULATIONS/DISCHARGE CRITERIA. CONTRACTOR SHALL COMPLETE SAMPLING AND ANALYSIS OF EXCAVATION WATER AS REQUIRED BY APPLICABLE REGULATORY REQUIREMENTS TO DOCUMENT THAT DISCHARGE CRITERIA ARE MET PRIOR TO DISPOSAL OF WATER.
10. COMPLETE SURVEY(S) TO DOCUMENT LIMITS OF NON-CONTAMINATED OVERBURDEN EXCAVATION AND FINAL LIMITS OF REMEDIAL EXCAVATION.
11. MAINTAIN STRUCTURAL INTEGRITY OF STREETS ADJACENT TO THE SITE. THE CONTRACTOR AND OWNER WILL DOCUMENT THE CONDITIONS OF ADJACENT STREETS PRIOR TO AND AT THE COMPLETION OF CONSTRUCTION.

811 Know what's **below.** **Call** before you dig.

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NO.	DATE	BY	REVISION

PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT# ENV-02

REMEDIAL EXCAVATION PLAN

DRAWN:	TJM	PROJECT NO.	514701204
DESIGN:	AJ	SCALE:	AS NOTED
CHECKED:	JMH	DATE:	7/9/2014
SHEET NO.			6.0

CONTRACT DRAWINGS

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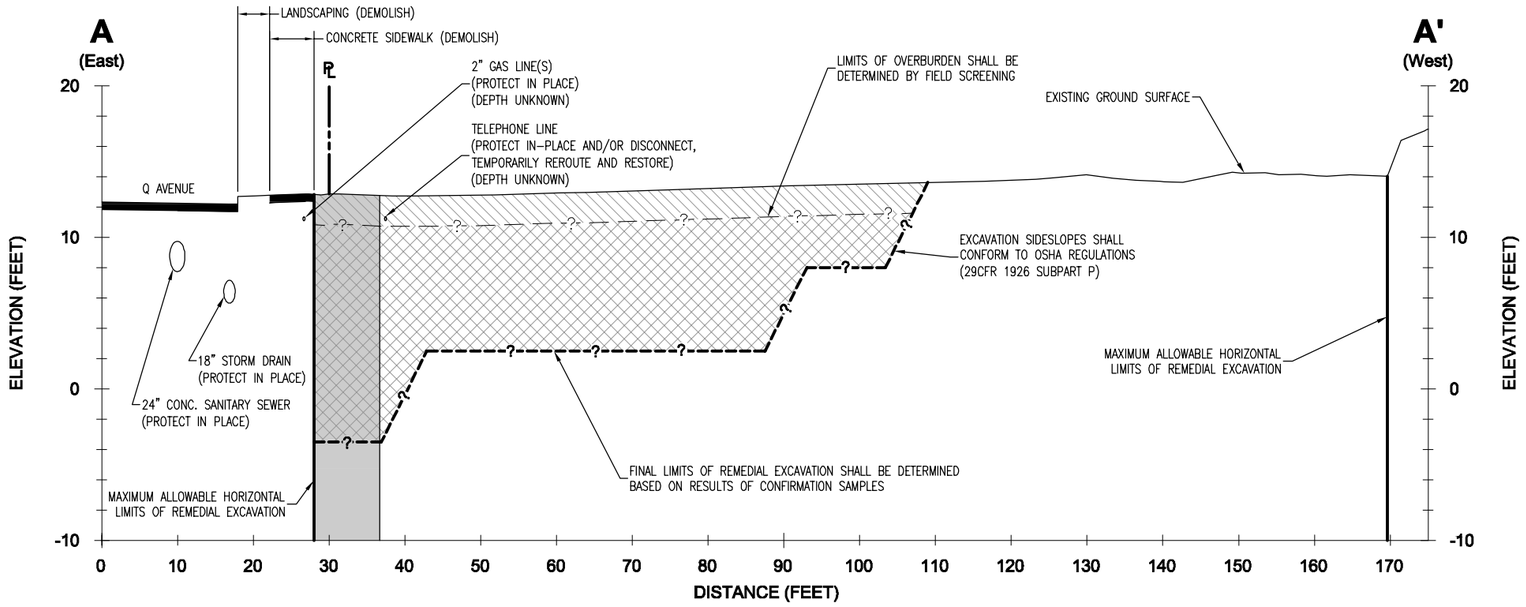
LEGEND

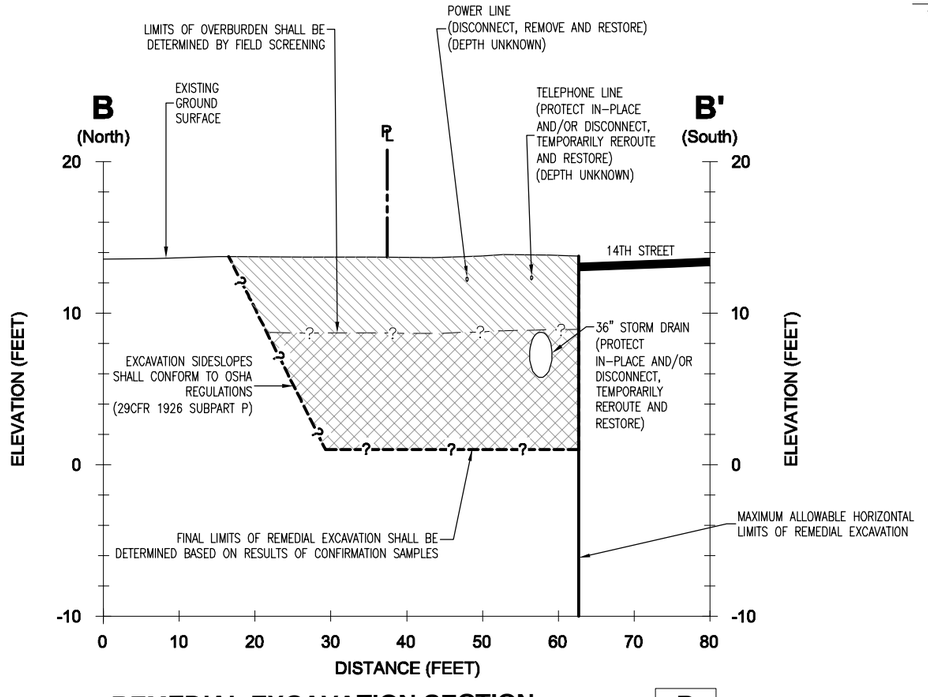
- ESTIMATED LIMITS OF CONTAMINATED SOIL TO BE EXCAVATED
- OVERBURDEN SOIL
- CONTAMINATED SOIL
- APPROXIMATE UTILITY OFFSET



REMEDIAL EXCAVATION SECTION

VERTICAL EXAGGERATION = 2X

A
6.1



REMEDIAL EXCAVATION SECTION

VERTICAL EXAGGERATION = 2X

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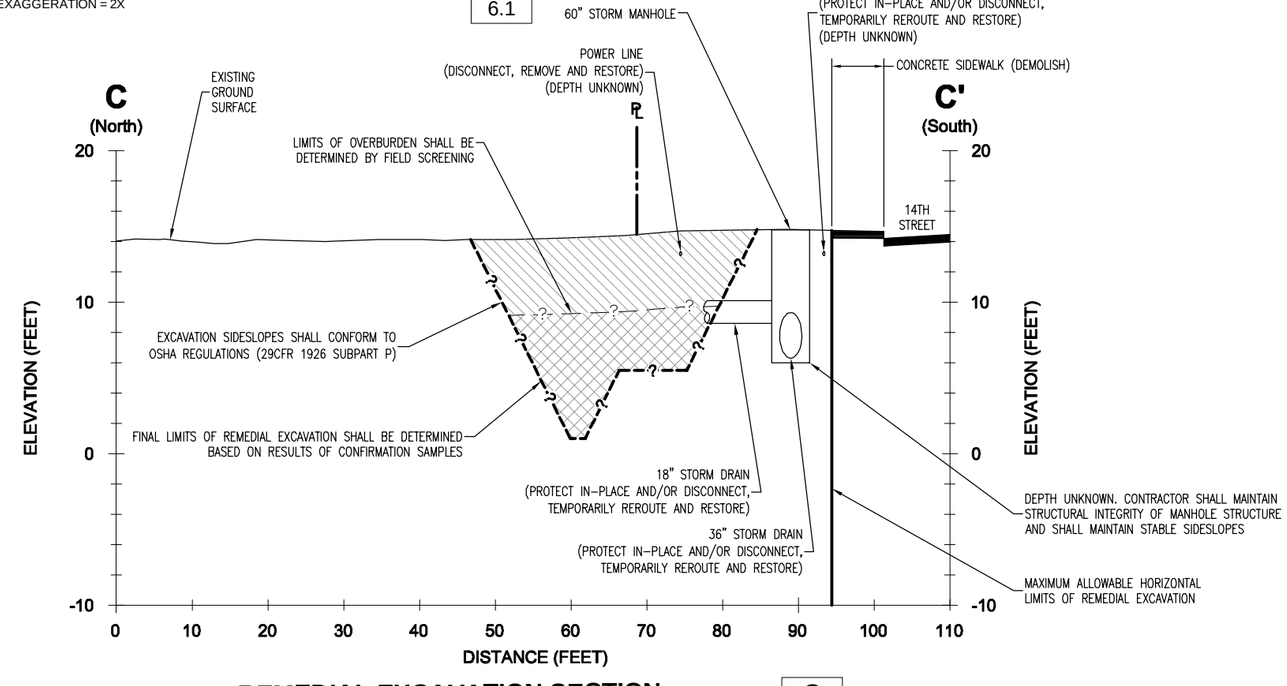

REMEDIAL EXCAVATION SECTION

VERTICAL EXAGGERATION = 2X

C
6.1

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REMEDIAL EXCAVATION SECTIONS

DRAWN: TJM	PROJECT NO.:514701204
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SHEET NO.	6.1

CONTRACT DRAWINGS

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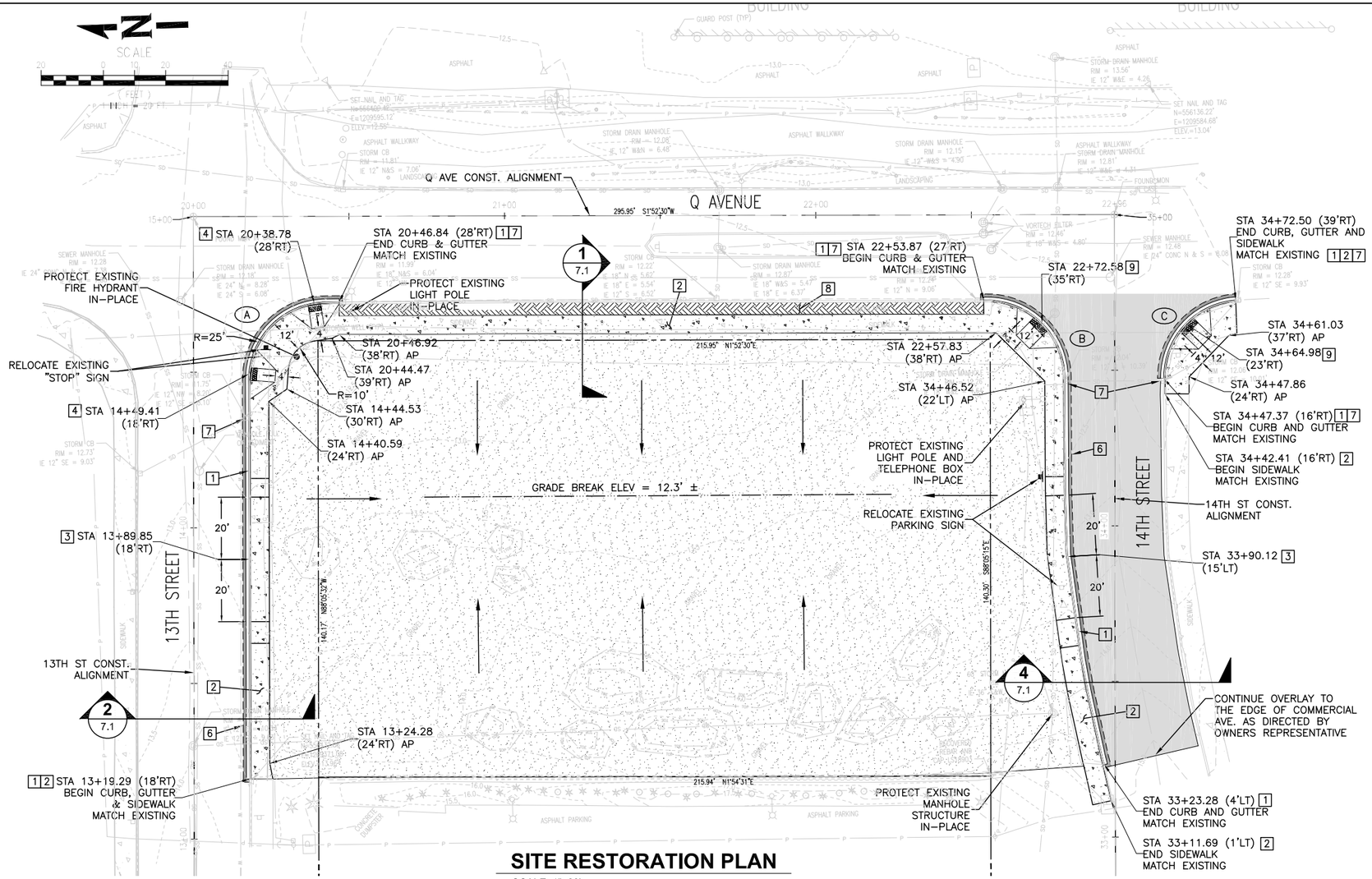

SITE RESTORATION PLAN

SCALE: 1"=20'

LEGEND

AP	ANGLE POINT
	PROPERTY BOUNDARY
13.0	EXISTING TOPOGRAPHIC CONTOURS (FEET NAVD88)
13 / 12	DESIGN GRADE CONTOURS (FEET NAVD88)
SS	SANITARY SEWER
SD	STORM DRAIN
G	UNDERGROUND GAS
P	UNDERGROUND POWER
T	UNDERGROUND TELEPHONE
W	UNDERGROUND WATER
	SIDEWALK
	SAWCUT LOCATION
	CURB & GUTTER
	GRADE BREAK
	2" HMA MILL AND OVERLAY
	FULL DEPTH HMA PAVEMENT
	PERMEABLE BALLAST
	LANDSCAPING

CONSTRUCTION NOTES:

1. CONSTRUCT CEMENT CONCRETE TRAFFIC CURB PER WSDOT STD. PLAN F-10.12-02
2. CONSTRUCT CEMENT CONCRETE SIDEWALK PER WSDOT STD. PLAN F-30.10-01
3. CONSTRUCT TYPE 1 CEMENT CONCRETE DRIVEWAY PER WSDOT STD. PLAN F-80.10-02
4. CONSTRUCT PERPENDICULAR TYPE A CURB RAMP PER WSDOT STD. PLAN F-40.15-02
5. CONSTRUCT ASPHALT WALKWAY (SEE ASPHALT WALKWAY SECTION DETAIL 3 SHEET 7.1)
6. SAWCUT EXISTING PAVEMENT FULL DEPTH
7. CONSTRUCT CEMENT CATCH BASIN GUTTER PAN PER WSDOT STD. PLAN F-10.16-00
8. LANDSCAPING (SEE PLAN SHEET 8)
9. CONSTRUCT 6' WIDE PERPENDICULAR TYPE A CURB RAMP PER WSDOT STD. PLAN F-40.15-02

NOTES:

1. THE CONTRACTOR SHALL OBTAIN THE APPROVAL OF THE OWNER/OWNER'S REPRESENTATIVE PRIOR TO PERFORMING BACKFILLING ACTIVITIES TO ENSURE THAT THE REMEDIAL EXCAVATION IS COMPLETE WITHIN THE PORTION WHERE CONTRACTOR PROPOSES TO BACKFILL.
2. THE ACTUAL LIMITS OF REMEDIAL EXCAVATION SHALL DEFINE THE LIMITS OF BACKFILLING. SEE SHEET 7.2 FOR TYPICAL BACKFILLING DETAIL.
3. COMPLETE FINISH GRADING USING PERMEABLE BALLAST TO MEET DESIGN GRADE CONTOURS SHOWN ON THE DRAWING. SEE SHEET 7.2 FOR TYPICAL GRADING DETAIL.
4. THE OWNER/OWNER'S REPRESENTATIVE SHALL APPROVE THE LIMITS OF THE PAVEMENT MILLING AND OVERLAY PRIOR TO MILLING.
5. THE CONTRACTOR SHALL REPAIR ANY POTHOLES, RUTTING OR OTHER PAVEMENT DAMAGE CAUSED BY CONSTRUCTION ACTIVES PRIOR TO PLACING THE OVERLAY AS DIRECTED BY THE OWNER/OWNER'S REPRESENTATIVE

CURB RETURN DATA (A)				
PC = STA. 14+47.46, 17.67' RT FL ELEV. = 11.78'				
DELTA=	89d54'10"	1/4Δ FL ELEV.=	11.82'	
RADIUS=	25.0'	1/2Δ FL ELEV.=	11.87'	
LENGTH=	39.23'	3/4Δ FL ELEV.=	11.92'	
PT = STA 20+42.58, 27.54' RT FL ELEV. = 11.96'				

CURB RETURN DATA (B)			
PC = STA. 22+54.94, 27.41' RT FL ELEV. = 12.28'			
DELTA=	89d47'41"	1/4Δ FL ELEV.=	12.27'
RADIUS=	25.0'	1/2Δ FL ELEV.=	12.17'
LENGTH=	39.17'	3/4Δ FL ELEV.=	12.14'
PT = STA 34+47.66, 15.99' LT FL ELEV. = 12.06'			

CURB RETURN DATA (C)			
PC = STA 34+47.37, 15.73' RT FL ELEV. = 12.12'			
DELTA=	55d47'41"	1/4Δ FL ELEV.=	12.17'
RADIUS=	25.0'	1/2Δ FL ELEV.=	12.24'
LENGTH=	24.35'	3/4Δ FL ELEV.=	12.25'
PT = STA. 34+72.50, 38.89' RT FL ELEV. = 12.28'			

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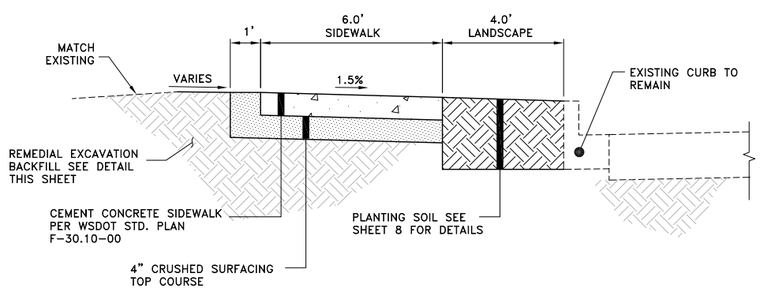
NO.	DATE	BY	REVISION

PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT #ENV-02

SITE RESTORATION AND GRADING PLAN

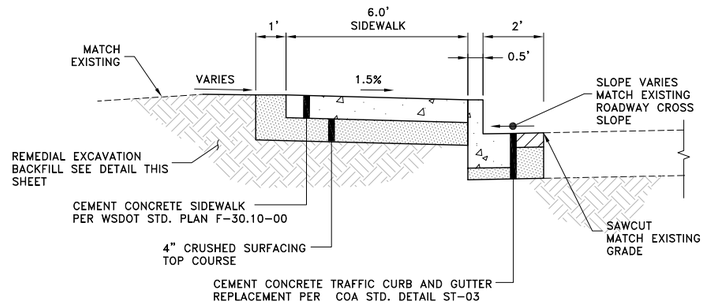
DRAWN:	TWN	PROJECT NO.:	
DESIGN:	TWN	SCALE:	1"=20'
CHECKED:	TWN	DATE:	7/14/14
SHEET NO.			7.0

CONTRACT DRAWINGS



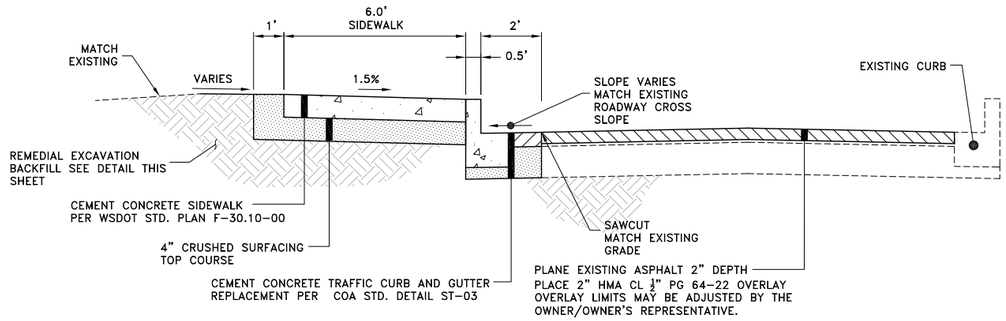
SIDEWALK & LANDSCAPE SECTION 1 / 7.1

NTS



SIDEWALK SECTION 2 / 7.1

NTS



OVERLAY & SIDEWALK SECTION 3 / 7.1

NTS

CITY OF ANACORTES CONSTRUCTION NOTES

ASPHALT CONSTRUCTION: SEE SECTION 5-05 AND SECTION 9 OF THE CURRENT WSDOT SPECIFICATION FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION.

A. ALL ASPHALT TO BE REMOVED MUST BE SAW CUT. A JACKHAMMER CAN BE USED IF A NICE EVEN CUT IS MADE. WHEEL CUTTING IS NOT AN APPROVED METHOD UNLESS APPROVED BY THE CITY OF ANACORTES ENGINEER IN ADVANCE. ANY DEVIATION FROM THIS SPECIFICATIONSHALL BE IN WRITING 48-HOURS BEFORE SAW CUTTING TAKES PLACE.
B. ADDITIONAL ASPHALT MAY BE REQUIRED FOR REMOVAL BY THE CITY OF ANACORTES ENGINEER OR INSPECTOR.
C. ALL VERTICAL DROP-OFFS WITHIN THE TRAVELED WAY WILL BE BACKFILLED EACH NIGHT.
D. ABUTTING EDGES AND CURBS MUST BE THOROUGHLY CLEANED
E. ALL ASPHALT EDGING WILL BE TACKED PRIOR TO ASPHALTING.
F. ALL ASPHALT PATCHES MUST BE A SMOOTH TRANSITION. NO BUMPS OR HIGH/LOW SPOTS (SECTION 5-04.3(13). SURFACE SMOOTHNESS MAXIMUM VARIATION IN 1 0-FEET PARALLEL TO THE CENTERLINE IS 1/8" AND TRANSVERSE Y.
G. SUB GRADE WILL BE COMPACTED AND TESTED PRIOR TO ASPHALTING.
H. A MINIMUM OF 3-INCH HMA PATCH TO BE COMPACTED TO 92% MAX RICE DENSITY (SECTION 5-04.3(10)B).
I. ALL FINAL JOINTS AND SAW CUTS TO BE SEALED (SECTION 5-05.3(8)B) USING A HOT POURED JOINT SEALANT (SECTION 9-04.2(1). A PREFERRED SEALANT IS AR-4000.
J. NOT APPLICABLE
K. NOT APPLICABLE
L. ON MAJOR STREETS WHERE TRAFFIC CONGESTION IS A PROBLEM, THE PATCH WILL BE PROTECTED WITH A ¼ INCH STEEL PLATE UNTIL SUFFICIENTLY COOLED.

CONCRETE CONSTRUCTION: SECTION 8-04 AND 8-14 OF THE CURRENT WSDOT SPECIFICATION FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION.

A. CALL FOR A FORMS INSPECTION BEFORE PLACING OF CONCRETE. CALL 360.299.1951 TO SCHEDULE.
B. NO MONOLITHIC POURS ALLOWED PER THE CITY OF ANACORTES CITY ENGINEER. IN OTHER WORDS, THE SIDEWALK, CURB & GUTTER, DRIVEWAYS, DRIVEWAY APRONS, WHEELCHAIR RAMPS, ETC. ARE TO BE INDIVIDUAL POURS AND SEPARATED BY A FABRIC EXPANSION JOINT.
C. PROTECTING THE CONCRETE IS THE RESPONSIBILITY OF THE CONTRACTOR. NO GRAFFITI, FOOTPRINTS, FINISHING BLEMISHES OR OTHER OBJECTIONABLE MARKS ALLOWED. IF ANY OF THIS TAKES PLACE, THE SECTION THAT IS DAMAGED WILL BE REPLACED.
D. CONCRETE SHALL BE A 5.5 SACK MIX WITH A 28-DAY STRENGTH OF 3000 PSI. ANY DEVIATION FROM THIS SPECIFICATION SHALL BE IN WRITING 48-HOURS BEFORE CONCRETE ISPLACED.
E. THE PAN AND WINGS SHALL BE STAMPED. THE USE OF 1-INCH CONSTRUCTION FENCING ACCEPTABLE. ROLLING IS NOT AN OPTION.
F. DURING THE FIRST 14-DAYS OF CURING, THE CONTRACTOR MUST PROTECT FROM FREEZING.

CURB/GUTTER AND SIDEWALK WORKMANSHIP AND AESTHETICS:

1. CURB/GUTTER AND SIDEWALK CONSTRUCTION SHALL FOLLOW A TRUE AND UNIFORM HORIZONTAL AND VERTICAL ALIGNMENT.
2. THE VERTICAL AND HORIZONTAL SURFACES SHALL BE A SMOOTH BROOM FINISH WITH NO DETECTABLE FINISHING BLEMISHES, UNDULATIONS, RIPPLES, SWELLS, WAVES, RUTS, FURROWS, GRAFFITI OR OTHER OBJECTIONABLE MARKS. THE END RESULT SHALL BE A NEAT AND PROFESSIONALLY FINISHED APPEARANCE.
3. THE EDGE FINISH ADJACENT TO THE EXPANSION JOINT MATERIAL SHALL BE CLEAN AND FREE OF EXCESS SLURRY. THE EXPANSION JOINT MATERIAL SHALL BE TRIMMED TO A LEVEL EVEN WITH THE ADJACENT CONCRETE RESULTING IN A NEAT AND PROFESSIONALLY FINISHED APPEARANCE.
4. THE CITY ENGINEER, IN HIS SOLE DISCRETION RESERVES THE AUTHORITY TO ORDER THE REMOVAL OF SECTIONS OF CURB/GUTTER AND SIDEWALK THAT DO NOT MEET THE WORKMANSHIP AND AESTHETIC STANDARDS OF THE CITY OF ANACORTES.
5. SECTIONS OF NEWLY CONSTRUCTED CURB/GUTTER AND SIDEWALK, THAT EXHIBIT CRACKING FOLLOWING CURING, SHALL BE SUBJECT TO REMOVAL AND REPLACEMENT.
   - CRACKING RESULTING FROM SUB-BASE FAILURE OR CONSTRUCTION SIRE DAMAGE SHALL BE IMMEDIATELY REMOVED AND REPLACED TO THE NEAREST EXPANSION JOINT.
   - MINOR HAIR LINE STRESS CRACKS MAY, AT THE DISCRETION OF THE PROJECT MANAGER, BE MONITORED AND RE-EVALUATED FOR POSSIBLE REMOVAL AT THE END OF THE MAINTENANCE PERIOD.

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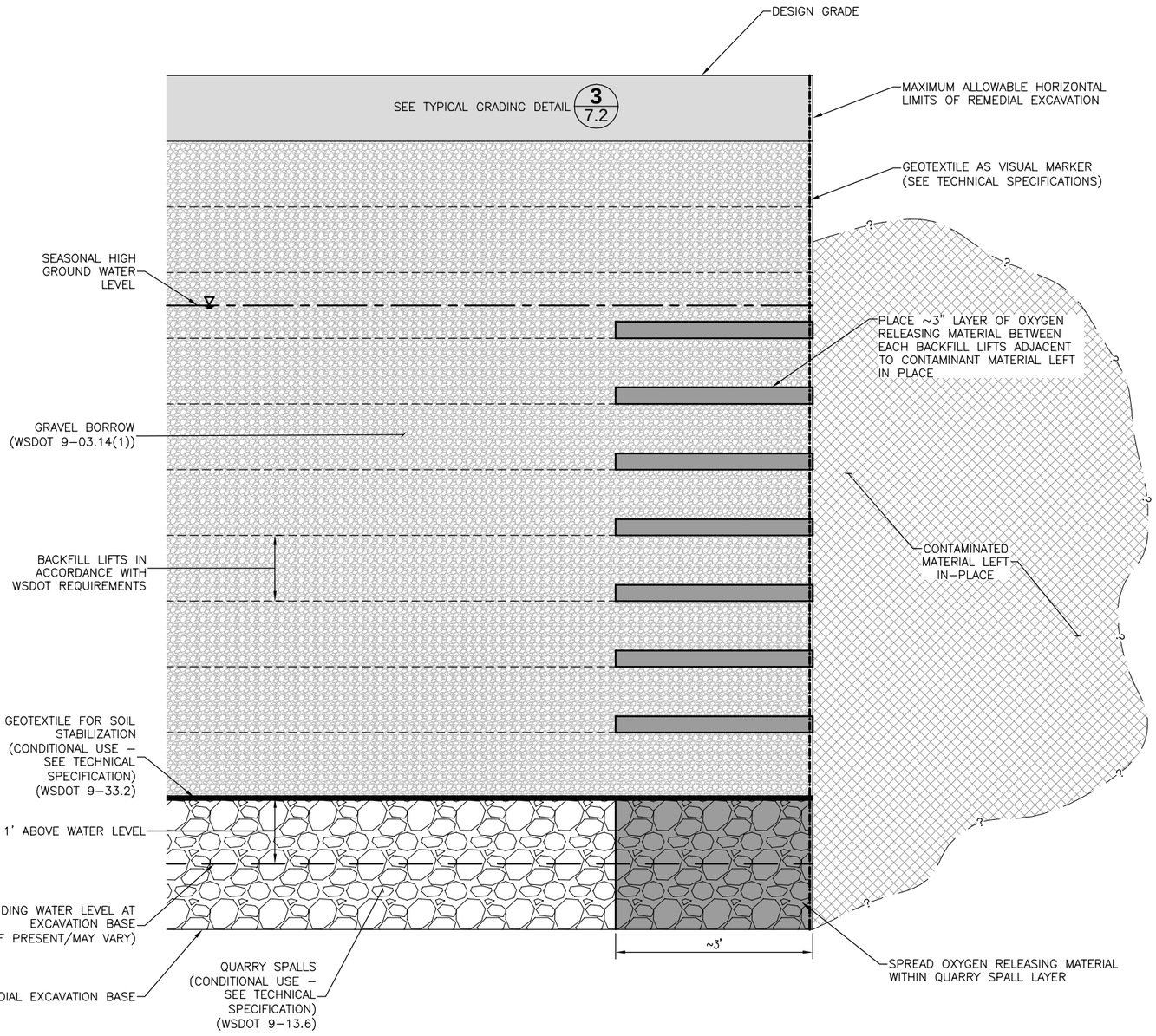
NO.	DATE	BY	REVISION

PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT #ENV-02

SITE RESTORATION DETAILS

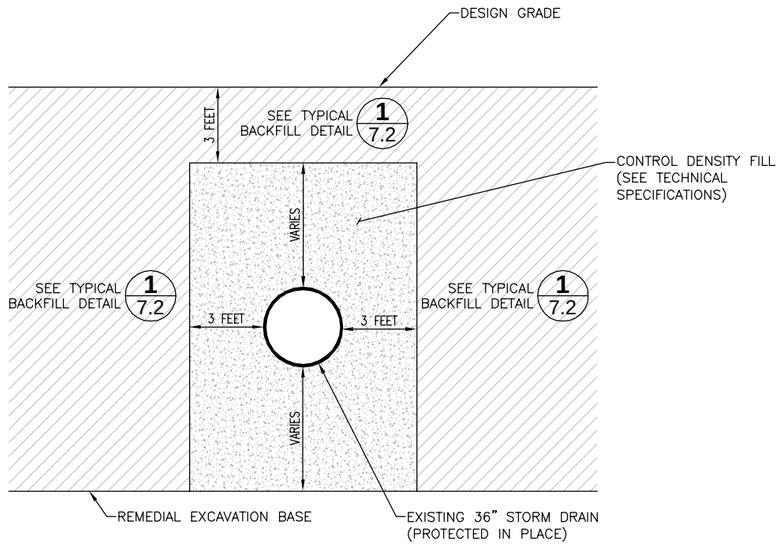
DRAWN:	TWN	PROJECT NO.:	
DESIGN:	TWN	SCALE:	N.T.S.
CHECKED:	TWN	DATE:	7/14/14
SHEET NO.			7.1



TYPICAL BACKFILL DETAIL

SCALE: NOT TO SCALE

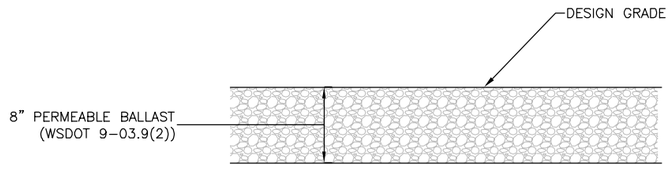
1 / 7.2



TYPICAL BACKFILL DETAIL FOR UTILITIES PROTECTED IN-PLACE

SCALE: NOT TO SCALE

2 / 7.2



TYPICAL GRADING DETAIL

SCALE: NOT TO SCALE

3 / 7.2

GeoEngineers
Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle WA 98101
P: 206-728-2674
F: 206-728-2731

ANKUT R. JOSHI STATE OF WASHINGTON 30466 REGISTERED PROFESSIONAL ENGINEER

NO.	DATE	BY	REVISION

PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT# ENV-02

BACKFILLING AND GRADING DETAILS

DRAWN:	TJM	PROJECT NO.:	514701204
DESIGN:	AJ	SCALE:	AS NOTED
CHECKED:	JMH	DATE:	7/9/2014
SHEET NO.			7.2

CONTRACT DRAWINGS

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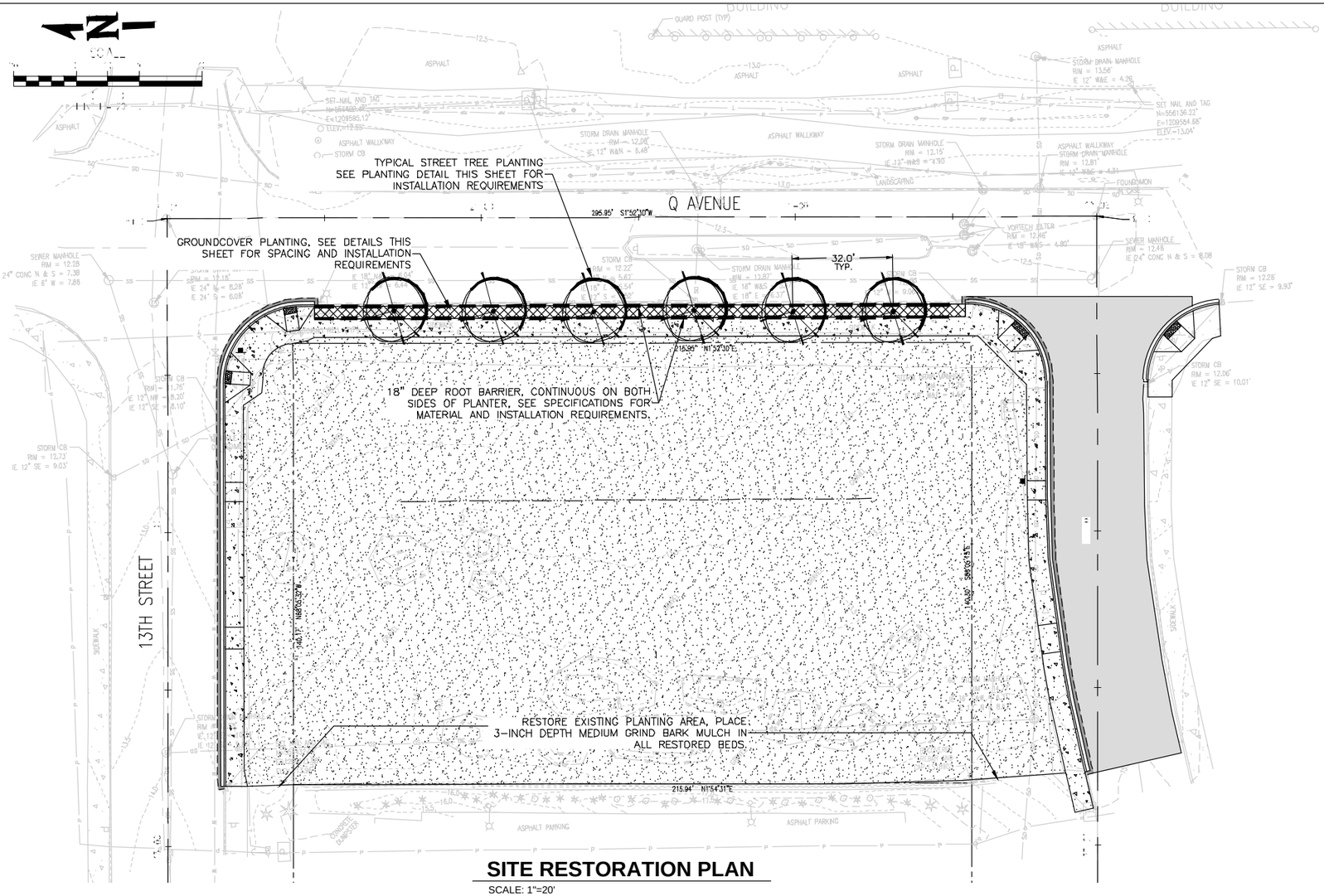
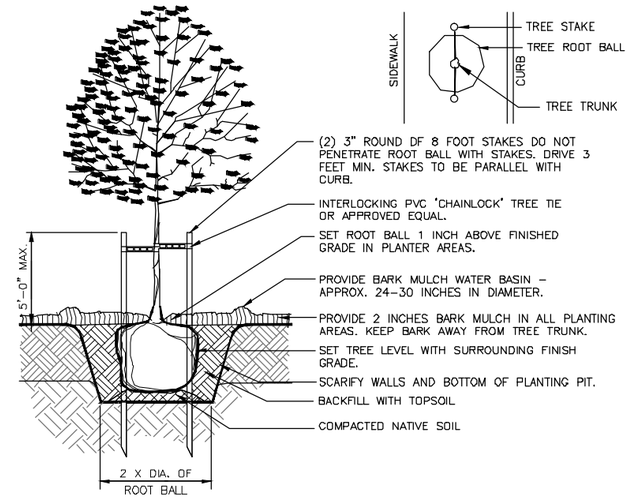


SITE RESTORATION PLAN

SCALE: 1"=20'



DECIDUOUS TREE PLANTING DETAIL

NOT TO SCALE
NOTE: REMOVE ALL BURLAP OR TWINE PRIOR TO BACKFILLING PLANT PIT.

GROUNDCOVER SPACING DETAIL

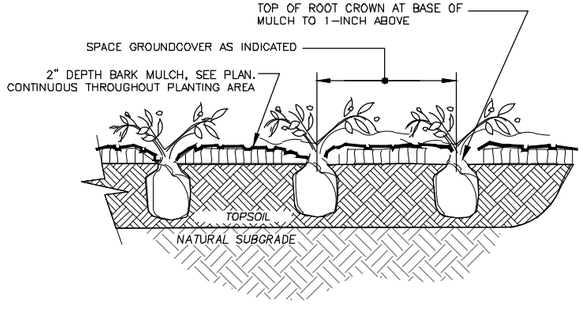
NTS

PLANT SCHEDULE

SYMBOL	QTY	BOTANICAL NAME / COMMON NAME	SIZE / CONDITIONS	SPACING
		TREES		
	6	CARPINUS CAROLINIANA / AMERICAN HORNBEAM	2-1/2" CAL. B&B	AS SHOWN
		STREET TREES MATCHED FOR SPECIES, SIZE AND FORM, BOTTOM BRANCH SHALL BE A MINIMUM OF 8' HT., MEASURED FROM THE BASE OF TRUNK		
		GROUNDCOVER		
	303	ARCTOSTAPHYLOS UVA-URSI / KINNIKINICK	4" POT.	18" O.C.

PLANTING NOTES

1. NO IRRIGATION SYSTEM IS PLANNED FOR THIS PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR HAND WATERING PLANT MATERIAL THROUGH PLANT ESTABLISHMENT, SEE SPECIFICATIONS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND HAULING ALL EXTRA DEBRIS AND EXCESS SOIL GENERATED BY THIS PROJECT. SUBGRADE FOR PLANTING AREAS SHALL BE 21" BELOW TOP OF SIDEWALK / CURB, FOR PLACEMENT OF 18" OF NEW TOPSOIL, 2 INCHES OF BARK MULCH AND 1 INCH CLEAR.
3. ANY DISCREPANCIES WITH THE PLANS, AND/OR SPECIFICATIONS, SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE PRIOR TO PROCEEDING WITH CONSTRUCTION.



GROUNDCOVER PLANTING DETAIL

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STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT BRIAN WAY LICENSE NO. #33 EXPIRES ON: 8/23/2015

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PORT OF ANACORTES
FORMER SHELL OIL TANK FARM SITE CLEANUP ACTION
PROJECT #ENV-02

LANDSCAPE PLAN

DRAWN:	BW	PROJECT NO.:	
DESIGN:	BW	SCALE:	1"=20'
CHECKED:	TWN	DATE:	7/14/14
SHEET NO.			

8.0

ATTACHMENT 1
Compliance Monitoring Plan

Compliance Monitoring Plan

Former Shell Oil Tank Farm
Anacortes, Washington

for
Washington State Department of Ecology on Behalf of Port of Anacortes

July 29, 2014

GeoEngineers

Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington 98101
206.728.2674

Compliance Monitoring Plan

Former Shell Oil Tank Farm
Anacortes, Washington

File No. 5147-012-04

July 29, 2014

Prepared for:

Washington State Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

Attention: Nicholas Acklam

On Behalf of:

Port of Anacortes
100 Commercial Avenue
Anacortes, Washington 98221

Prepared by:

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Robert S. Trahan
Environmental Geologist

John M. Herzog, PhD
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RST:JMH:tt

GeoEngineers

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1.0 INTRODUCTION

This document presents the Compliance Monitoring Plan (CMP) for the cleanup action at the Former Shell Oil Tank Farm Site (Site) generally located between 13th Street and 14th Street east of Commercial Avenue in Anacortes, Washington (Figure 1). The Site is formally referenced in Ecology's database as the Former Shell Oil Tank Farm Site (Ecology Facility Site Identification No. 4781157). Ecology is managing the Site as part of the Fidalgo and Padilla Bay component of their Puget Sound Initiative program.

Cleanup activities are being performed by the Port to address petroleum hydrocarbon (gasoline, and diesel), carcinogenic polycyclic aromatic hydrocarbon (cPAHs), volatile organic compound (VOC) (benzene) and metal (cadmium) contamination in soil that has resulted from historical uses of the property at which the Site is located. Cleanup activities are being completed pursuant to the Cleanup Action Plan (CAP; Ecology, 2014b) and Consent Decree. Site cleanup construction work is anticipated to occur over a period of approximately three months beginning in the fall of 2014.

This Compliance Monitoring Plan has been prepared in accordance with Washington Administrative Code (WAC) 173-340-410 to describe the performance and confirmation monitoring to be completed to verify the effectiveness of the cleanup action and is intended to be used in conjunction with the Engineering Design Report (EDR) prepared for the project. Supporting documents to this CMP include a Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP). These documents are presented in Appendix A and B, respectively.

2.0 BACKGROUND

2.1. Previous Site Investigations

Several environmental investigations have been conducted at and in the vicinity of the Site, beginning in 1987 (Hart Crowser, 1987) and culminating in the RI/FS completed in 2014 (GeoEngineers, 2014). The RI/FS Report presents the results of the soil and groundwater investigations conducted between 2011 and 2012, and uses the results from earlier investigations to characterize the nature and extent of contamination.

Detailed information describing the Site including its known history, current uses, existing property features, soil and groundwater conditions are presented in the RI/FS Work Plan (GeoEngineers, 2009) and RI/FS Report.

2.2. Nature and Extent of Contamination

2.2.1. Soil

Soil sampling completed between 1987 and 2011 (Hart Crowser, 1987; Floyd|Snider, 2005; Landau, 2007; GeoEngineers, 2008 and GeoEngineers, 2013) identified petroleum hydrocarbons, benzene, cPAHs, and/or cadmium in soil exceeding soil cleanup levels established by the CAP. In general, two areas with petroleum hydrocarbons and benzene contamination were identified; one generally located in the central and eastern portions of the property which are believed to extend

beneath Q Avenue, and other located in the southwestern corner of the property. Additionally, an isolated area of cPAH contamination was identified in the southern portion of the property which is believed to extend beneath 14th Street, and an isolated area of cadmium contamination was identified in the southwest corner of the property.

Areas where soil analytical results have shown soil to exceed cleanup levels for petroleum hydrocarbon, benzene, cPAH and/or cadmium are shown on Figure 2. Based on the findings of previous environmental investigations, petroleum hydrocarbon- and benzene-contaminated soil is present between approximately 2.5 feet and 17 feet below ground surface (bgs), cPAHs contaminated soil is present between approximately 9 feet and 14 feet bgs, and cadmium-contaminated soil is present between approximately 5 feet and 8 feet bgs.

2.2.2. Groundwater

Water samples obtained as "grab samples" from temporary wells that were utilized during the 1987 and 2005 investigations (Hart Crowser, 1987 and Floyd|Snider, 2005) identified elevated concentrations of lead and diesel-range petroleum hydrocarbons in the central portion of the Former Shell Oil Tank Farm area. Subsequent water samples collected from permanent groundwater monitoring wells that were installed as part of the formal RI (GeoEngineers, 2013) indicated that lead and diesel-range petroleum hydrocarbons as well as the other contaminants of concern (COCs) were not present at concentrations exceeding site-specific groundwater cleanup levels in groundwater within and/or downgradient of the Site.

3.0 CLEANUP ACTION

The Ecology-selected cleanup action for the Site consists of remedial excavation activities in the accessible (i.e., gravel surface within the Former Shell Oil Tank Farm) areas of the Site, off-site transport and disposal of the excavated material at a permitted landfill facility, backfill of the remedial excavation and restoration of the ground surface to resemble pre-existing conditions. Detailed information describing the cleanup action including excavation, disposal, backfill and restoration activities is presented in the EDR.

4.0 COMPLIANCE MONITORING

Compliance monitoring will be implemented during the Site cleanup action in accordance with the CAP and WAC 173-340-410. The three types of compliance monitoring to be conducted include protection monitoring, performance monitoring, and confirmational monitoring. The objectives of compliance monitoring are to protect human health and the environment during the cleanup action (protection monitoring), verify that cleanup standards have been achieved (performance monitoring), and confirm the long-term effectiveness of the cleanup action (confirmational monitoring). Compliance monitoring activities are described in the following sections.

4.1. Protection Monitoring

Protection monitoring will include monitoring of worker health and safety and environmental protection practices such as stormwater, erosion and sediment controls. The purpose of protection

monitoring is to confirm that human health and the environment are adequately protected during the cleanup action.

4.1.1. Worker Health and Safety

Cleanup-related construction activities will be performed in accordance with the requirements of the Washington Industrial Safety and Health Act (RCW 49.17) and the Federal Occupational Safety and Health Act (29 CFR 1910, 1926). These regulations include requirements that workers are to be protected from exposure to contaminants. A site-specific HASP applicable to GeoEngineers' work is included as Appendix B. The Port's construction contractor (contractor) will be required to prepare and submit a separate HASP for use by the contractor's personnel.

4.1.2. Environmental Protection

Environmental protection measures consisting of Best Management Practices (BMPs) for stormwater, sediment, drainage, and erosion control; spill prevention and pollution control; and all other controls needed to protect environmental quality will be implemented. Environmental protection measures including installation, inspection and maintenance necessary for stormwater management, control of surface water runoff, and temporary erosion and sediment control measures will be described by the Contractor prior to commencing construction activities. The minimum standards for environmental protection measures that will be implemented are described in the EDR. If the Port or Ecology determines that the contractor's environmental protection measures are inadequate to meet the intent of applicable regulations, the contractor will be required to implement additional stormwater runoff, erosion control, or spill prevention and control measures to address the deficiencies.

4.2. Performance Monitoring

Performance monitoring will be conducted to verify that the cleanup action achieves soil cleanup standards established for the Site and/or to document contaminant concentrations remaining at the Site that are not accessible (i.e., below portions of 14th Street and Q Avenue). The following section (Section 4.2.1) describes performance monitoring activities that will be performed.

4.2.1. Verification Soil Sampling

Performance monitoring includes collection of soil samples from the base and sidewalls of the remedial excavations to confirm that the site-specific soil cleanup levels have been achieved or to document residual contaminant concentrations where contaminated soil may be left in place in areas where excavation is not planned (i.e., below portions of 14th Street and Q Avenue). As detailed in the EDR, excavation activities will be completed to remove soil that is known to exceed cleanup levels. Additional excavation will be completed to remove soil with evidence of contamination as determined by field screening. When the limits of the excavation are reached based on field screening and/or the physical limits of the Site, verification sidewall and base samples will be submitted for chemical analysis to confirm the removal of previously identified COCs within each remedial excavation area and/or document the contaminated soil left in that are not accessible for excavation. Figure 2 identifies the COCs for the three remedial excavation areas. Verification samples will be analyzed for the COCs identified in Figure 2 for each remedial excavation area. If the limit of one or more excavation areas overlap based on field screening

and/or chemical analytical results, then verification soil samples obtained from each of the overlapping excavation areas will be submitted for analysis of COCs identified for each area.

Performance monitoring activities will include the following:

- Base verification soil samples: Collect discrete grab samples at a rate of approximately one soil sample per 625 square feet of excavation base.
- Sidewall verification soil samples: Collect discrete grab samples at the rate of one sample per every 40 lineal feet of excavation sidewall. If length of excavation sidewall is less than 40 feet, a minimum of one sample will be obtained per sidewall.
- To the extent practical, the samples will be analyzed on a short turnaround (i.e., two days) basis to allow timely decision-making regarding the need for further excavation to achieve cleanup levels.

Site-specific cleanup levels for indicator hazardous substances established by the CAP are presented in Table 1. Procedures for field screening and soil sampling activities are detailed in the QAPP presented in Appendix A.

4.3. Confirmational (Post-Construction) Monitoring

Confirmational monitoring will be performed after the Site cleanup action is completed to evaluate the post-construction effectiveness of the cleanup action. The following section (Section 4.3.1) describes confirmational monitoring activities that will be performed.

4.3.1. Groundwater Monitoring

Confirmational groundwater monitoring will be performed after the completion of the construction to evaluate the effectiveness of the cleanup action. To verify that the selected cleanup action is protective of groundwater, existing monitoring wells located downgradient of the cleanup action area will be sampled for Site indicator hazardous substances (see Table 1). The exact number and location of the confirmational monitoring wells will be determined following completion of remedial actions based on the final limits of the excavation area.

Groundwater will be sampled on a quarterly basis for a minimum of four consecutive quarters. Procedures for groundwater sampling activities are detailed in the QAPP presented in Appendix A. Groundwater samples will be submitted for chemical analysis of gasoline-, diesel- and oil-range hydrocarbons, benzene, cPAHs and cadmium to ensure that groundwater conditions downgradient of the Site meet the cleanup standards.

If one or more of the hazardous indicator substances are detected at concentrations exceeding the Site cleanup levels, Ecology may require additional compliance groundwater monitoring. Site-specific cleanup levels for indicator hazardous substances established by the CAP are presented in Table 1. If additional compliance groundwater monitoring becomes necessary based on the results of the four initial monitoring events, the sampling frequency and groundwater hazardous indicator substances will be determined based on discussions between the Port and Ecology and the CMP will be amended accordingly.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) procedures and standards that will be implemented during the Former Shell Oil Tank Farm Site cleanup action and subsequent compliance groundwater monitoring activities are detailed in the QAPP presented in Appendix A.

6.0 SCHEDULE

Pending permit approvals, cleanup-related construction work is scheduled to begin within 180 calendar days of Ecology approval of the Final EDR and this CMP. Construction is estimated to occur over a period of three months beginning in the fall of 2014.

7.0 REPORTING

Following completion of cleanup-related construction activities, a construction completion report summarizing the cleanup activities and results of performance monitoring will be prepared in accordance with WAC 173-340-400. Waste manifests, contaminated soil disposal receipts, and as-built drawings will be included in the construction completion report. A draft version of the construction completion report will be submitted to Ecology for review and comment prior to finalization.

A report summarizing the results of compliance groundwater monitoring will be prepared upon completion of the four initial quarterly compliance monitoring events.

Compliance monitoring data generated during the cleanup action will be provided to Ecology in the electronic format required by Ecology's Environmental Information Management (EIM) Policy 840.

8.0 LIMITATIONS

We have prepared this Compliance Monitoring Plan for use by Ecology and the Port of Anacortes during the cleanup action at the Former Shell Oil Tank Farm Site. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

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Table 1

Cleanup Levels for Indicator Hazardous Substances

Former Shell Oil Tank Farm Site

Anacortes, Washington

Indicator Hazardous Substances	Soil Cleanup Level (mg/kg)	Groundwater Cleanup Level (µg/L)
Petroleum Hydrocarbons		
Gasoline-Range	30/100[1]	800/1,000[2]
Diesel-Range	2,000	500
Heavy Oil-Range	2,000	500
Volatile Organic Compound (VOC)		
Benzene	0.13	23.00
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)		
Benzo(a)anthracene	0.13	0.02
Chrysene	0.14	0.02
Benzo(b)fluoranthene	0.43	0.02
Benzo(k)fluoranthene	0.43	0.018
Benzo(a)pyrene	0.137	0.018
Indeno(1,2,3-cd)pyrene	1.3	0.0
Dibenz(a,h)anthracene	0.65	0.018
Total cPAHs (TEC)	0.137	0.100
Metals		
Cadmium	1.2	8.0

Notes:

[1]Cleanup level is 30 mg/kg when benzene is present.

[2]Cleanup level is 800 µg/L when benzene is present.

NE = not established

mg/kg = milligrams per kilogram

µg/L = micrograms per liter

TEC = toxicity equivalency concentration

N
W E
S

2,000 0 2,000

Feet

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. can not 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.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Former Shell Oil Tank Farm
Anacortes, Washington

GeoEngineers

Figure 1

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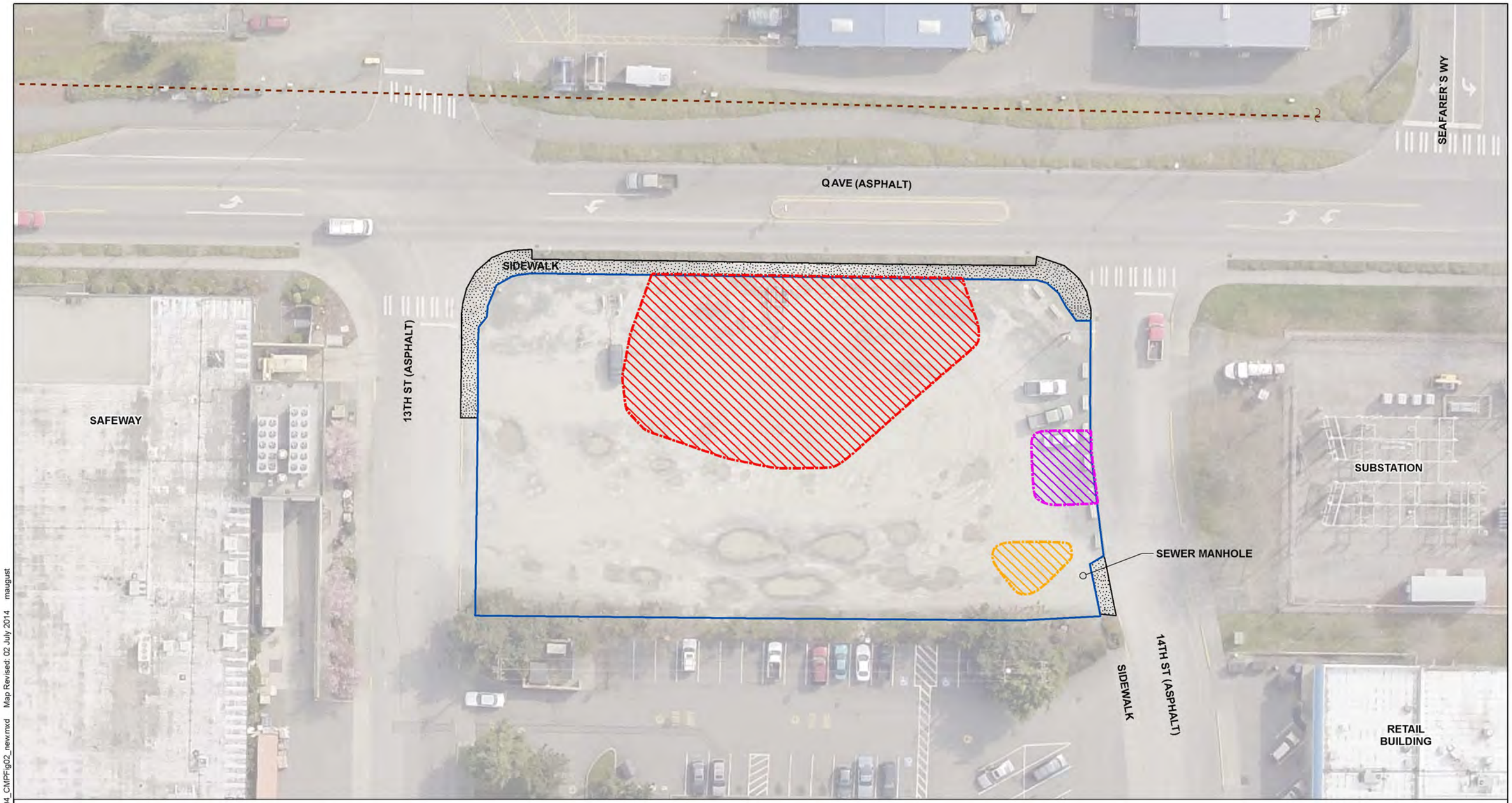

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Feet

N E S W

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: Roads from Skagit County. Point, line and polygon features digitized from figures 5.1 and 6.1 of November 2006 and Figure 2 of September 2005 by Floyd Snider. Imagery date: 2011.

Legend

- TPH and Benzene Exceedance
- cPAH Exceedance Area
- TPH, Benzene and Cadmium Exceedance
- Maximum Allowable Horizontal Limit of Remedial Execution

cPAH Carcinogenic Polycyclic Aromatic Hydrocarbons
TPH Petroleum Hydrocarbons

Site Plan

Former Shell Oil Tank Farm
Anacortes, Washington

GeoEngineers

Figure 2

Path: \\sea\projects\5\5147012\GIS\5147012O4_CMPFig02_new.mxd Map Revised: 02 July 2014 maugust

APPENDIX A
Quality Assurance Project Plan

Quality Assurance Project Plan

Former Shell Oil Tank Farm Site
Anacortes, Washington

for
Washington State Department of Ecology on Behalf of Port of Anacortes

July 29, 2014

GeoEngineers

Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington 98101
206.728.2674

Quality Assurance Project Plan

Former Shell Oil Tank Farm Site
Anacortes, Washington

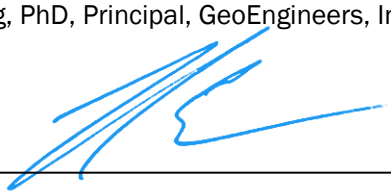
Project No. 5147-012-04

July 29, 2014

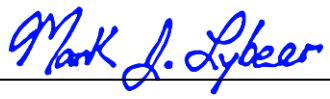
Approved By:

Signature:  Date: 7/29/14

John M. Herzog, PhD, Principal, GeoEngineers, Inc.

Signature:  Date: 7/29/14

Robert S. Trahan, Field Coordinator, GeoEngineers, Inc.

Signature:  Date: 7/29/14

Mark J. Lybeer, Quality Assurance Leader, GeoEngineers, Inc.

RST:JMH:tt

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared for sampling and compliance monitoring activities at the Port of Anacortes (Port) Former Shell Oil Tank Farm Site (Site) generally located between 13th Street and 14th Street west of Q Avenue in Anacortes, Washington. This QAPP serves as the primary guide for the integration of quality assurance (QA) and quality control (QC) functions for field verification soil and groundwater sampling activities that will be completed to support the Washington State Department of Ecology (Ecology) selected cleanup action for the Site. The QAPP presents the objectives, field sampling procedures, organization, and specific quality assurance and quality control activities designed to achieve data quality goals established for the project. Environmental measurements will be conducted to produce data that are scientifically valid, of known and acceptable quality and that meet established objectives. QA/QC procedures will be implemented so that the precision, accuracy, representativeness, completeness and comparability (PARCC) of the data generated meet the specified data quality objectives.

The cleanup action at the Site is being conducted by the Port to satisfy requirements of an Ecology Consent Decree for the Site to address contamination resulting from historical use of the property at which the Site is located. The objectives of the cleanup action are presented in the Engineering Design Report (EDR). The Compliance Monitoring Plan (CMP) describes the performance and confirmation monitoring to be completed to verify the effectiveness of the cleanup action for the project. A site-specific Health and Safety Plan (HASP) will be used for field sampling activities and is presented in Appendix B of the CMP.

2.0 BACKGROUND

Detailed information regarding Site and operational history, previous investigations and regulatory history and cleanup actions are presented in the Remedial Investigation/Feasibility Study Report (RI/FS; GeoEngineers, 2014) and Cleanup Action Plan (CAP; Ecology, 2014) and are summarized in the EDR)

3.0 PROJECT AND TASK DESCRIPTION

3.1. Project Description

The Site includes soil that has been contaminated by historical bulk fuel storage and distribution operations. Historical facilities included several aboveground storage tanks (ASTs) containing gasoline and diesel fuel, an underground storage tank (UST), pump house and product lines that connected the ASTs and pump house to a historical pier located east of the Site across Q Avenue. Operations at the Site included the transfer of gasoline and diesel from the pier to the bulk fuel facility for storage and distribution to various distributors. Environmental investigations conducted following the closure of the distribution facility identified elevated concentrations of petroleum hydrocarbons, benzene, carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and cadmium in soil in the eastern and southern portions of the property in which the facility operated.

Cleanup activities that are being performed at the Site to address contamination will consist of the excavation and off-site disposal of contaminated and non-contaminated soil. The objective of the cleanup action is to eliminate, reduce, or otherwise control to the extent feasible and practicable, unacceptable risks to human health and the environment posed by gasoline-, diesel- and heavy oil-range petroleum hydrocarbons, benzene, cPAHs and cadmium in soil in accordance with Washington Administrative Code (WAC) Chapter 173-340 and other applicable regulatory requirements.

To evaluate the removal of contaminated soil at the Site during construction, verification soil samples obtained from the base and sidewalls of the remedial excavation at a frequency of one base sample per 625 square feet and one sample per 40 linear feet of sidewall as detailed in the CMP. Additionally, it is believed that residual contamination will remain at the Site following the completion of the cleanup action beneath portions of 14th Street and Q Avenue. Soil samples will be obtained at these locations to document residual contamination remaining in place at the Site. Following the completion of the remedial excavation, new and/or existing groundwater monitoring wells will be sampled to evaluate the post-construction effectiveness of the cleanup action.

Verification soil samples and post-construction groundwater samples will be submitted to OnSite Environmental, Inc. (OnSite) of Redmond, Washington for chemical analysis of indicator hazardous substances, including:

- Gasoline-range petroleum hydrocarbons by Ecology Method NWTPH-G;
- Diesel- and heavy oil-rang petroleum hydrocarbons by Ecology Method NWTPH-Dx;
- cPAHs by Environmental Protection Agency (EPA) Method 8270SIM;
- Benzene by EPA Method 8021 or 8260; and/or
- Cadmium by EPA Method 6010.

3.2. Project Schedule

Pending permit approvals, cleanup-related construction work is scheduled to begin within 180 days of Ecology approval of the Final EDR and estimated to occur over a period of three months beginning in the fall of 2014.

4.0 PROJECT MANAGMENT

The project management and organization elements of the QAPP as detailed below address the basic area of project management including the roles and responsibilities of the participants, the project description, quality objectives and criteria, special training/certification and documents and records.

4.1. Project Organization and Responsibilities

Key individuals and positions providing QA and QC are summarized in the following table. A description of the responsibilities, lines of authority and communication for the key individuals and positions providing QA and QC is presented in Sections 4.1.1 through 4.1.9. This element of the plan ensures that the each key project participant has a defined role.

Project Role	Name Organization	Telephone Email Address
Regulatory Project Manager	Nicholas Acklam Ecology	360.407.6913 nack461@ecy.wa.govWashington State Department of Ecology PO Box 47600 Olympia, Washington 98504-7600
Port of Anacortes Project Manager	Jenkins Dossen Port of Anacortes	360.299.1814 Jenkins@portofanacortes.com 100 Commercial Avenue Anacortes, Washington 98221
Technical Project Manager	John Herzog GeoEngineers	206.406.6431 jherzog@geoengineers.com 600 Stewart Street, Suite 1700 Seattle, Washington 98101
Task Manager/Field Coordinator	Robert Trahan GeoEngineers	206.239.3253 rtrahan@geoengineers.com 600 Stewart Street, Suite 1700 Seattle, Washington 98101
Health and Safety Manger	Wayne Adams GeoEngineers	253.383-4940 wadams@geoengineers.com 1101 South Fawcett Avenue, Suite 200 Tacoma, Washington 98402
Quality Assurance Leader	Mark Lybeer GeoEngineers	206.278.2674 mlybeer@geoengineers.com 600 Stewart Street, Suite 1700 Seattle, Washington 98101
Laboratory Project Manager	David Baumeister OnSite Environmental, Inc.	245.883.3881 DBaumeister@onsite-env.com 14648 NE 95th Street Redmond, Washington 98052

4.1.1. Regulatory Project Manager

The Regulatory Project Manager is responsible for overseeing the implementation of the work to be performed under the Consent Decree. The Regulatory Project Manager will review and approve the QAPP and subsequent revisions and amendments.

4.1.2. Port of Anacortes Project Manager

The Port of Anacortes Project Manager's duties consist of implementing the project approach and tasks, overseeing the project team members during performance of project tasks.

4.1.3. Technical Project Manager

The Technical Project Manager is responsible for fulfilling contractual and administrative control of the project. The Technical Project Manager's duties include defining the project approach and tasks, selecting project team members and establishing budgets and schedules.

The Technical Project Manager's duties also include implementing the project approach and tasks, overseeing project team members during performance of project tasks, adhering to and communicating the status of budgets and schedules to the Port of Anacortes Project Manager, providing technical oversight, and providing overall production and review of project deliverables. The Technical Project Manager shall maintain the official, approved QAPP and shall be responsible for distributing updated documents to the recipients listed in the table above.

4.1.4. Task Manager

The individual Task Managers are responsible for the daily management of project tasks including providing technical direction to the field staff, produces task specific documents including the QAPP and Health and Safety Plan (HASP), develops schedules and allocates resources for field tasks, coordinates data collection activities to be consistent with information requirements, supervises the compilation of field data and laboratory analytical results, assures that data are correctly and completely reported, implements and oversees field sampling in accordance with project plan and supervises field personnel. Additionally, the Task Manger coordinates work with on-site subcontractors, verifies that appropriate sampling, testing, and measurement procedures are followed, coordinates the transfer of field data, sample tracking forms, and log books to the Project Manager for data reduction and validation, and participates in QA corrective actions as required.

4.1.5. Field Coordinator

The Field Coordinator will lead the field sampling effort for the project, serving as the direct point of contact between the Task Manager, analytical laboratory, and subcontractors and ensures that the appropriate sampling containers, chain-of-custody (COC) forms and field sampling gear including personal protective equipment (PPE) are available. The Field Coordinator is to ensure that data collection activities are consistent with information requirements and to assure that field information is correctly and completely reported for the entire duration of the project. The Field Coordinator will also coordinate appropriate sampling, testing, and measurement procedures and schedule sample delivery/shipment with the analytical laboratory. The Field Coordinator will transfer field data and sample tracking forms to the project file and data reduction and validation and participate in QA corrective actions as required.

4.1.6. Technical/Field Staff

Technical/Field Staff have the primary responsibility for duties involve field data collection and documentation. Technical/Field Staff are responsible for:

- Understanding and following the QAPP.
- Checking all equipment and supplies in advance of field operations.
- Ensuring that samples are properly collected, preserved, labeled, packaged and shipped.
- Ensuring that all field data are carefully recorded and preserved according to the QAPP.
- Following COC procedures and standard operating procedures when they are required.

4.1.7. Quality Assurance Leader

The Quality Assurance Leader will provide oversight required for the completion of sample analyses for the project and verify, in conjunction with the Laboratory Manager, that the analytical work is proceeding in accordance with internal laboratory standard practices and the QA/QC guidelines for the project. This person will also oversee completion of data validation activities completed for this project. The Quality Assurance Leader maintains independence from the individual(s) generating the data.

4.1.8. Health and Safety Manager

The Health and Safety Manager will oversee implementation of health and safety programs and verify that work on the project proceeds in accordance with the site-specific HASP.

4.1.9. Laboratory Project Manager

The Laboratory Project Manager will fulfill the analytical requirements of this project including being responsible for sample analyses using appropriate analytical laboratory methods. The specific procedures to be used for COC transfer, internal calibrations, laboratory analyses, reporting, preventive instrument maintenance, and corrective action will follow standard protocols.

5.0 DATA QUALITY OBJECTIVES

The quality assurance objective for technical data is to collect environmental monitoring data of known, acceptable, and documentable quality. The specific objectives established for the project are:

- Implement the procedures outlined herein for field sampling, sample custody, equipment operation and calibration, laboratory analysis, and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the level of QA/QC required to produce scientifically valid analytical data of known and documented quality. This will be accomplished by establishing criteria for precision, accuracy, representativeness, completeness, and comparability, and by evaluating project data against these criteria.

The sampling design, field procedures, useable laboratory procedures, and QC procedures established for this project were developed to provide defensible data. Specific data quality factors that may affect data usability include quantitative factors such as bias, sensitivity, precision, accuracy and completeness, and qualitative factors such as representativeness and comparability. The specific data quality objectives (DQOs) associated with these data quality factors are discussed below. The measurement quality objectives (MQO) associated with the data quality factors are summarized in Table A-1 and are discussed below.

5.1. Detection Limits

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Although results reported near the MDL provide insight to Site conditions, quality assurance dictates that analytical methods achieve a

consistently reliable level of detection known as the practical quantitation limit (PQL), which is typically demonstrated with the lowest point of a linear calibration. The contract laboratory will provide numerical results for all analytes and report them as detected above the PQL or undetected at the PQL.

The reporting limits for Site Chemicals of Potential Concern (COPCs) are presented in Table A-2 for soil and Table A-3 for groundwater. These reporting limits were obtained from an Ecology-certified laboratory (OnSite). The reporting limits presented in Tables A-2 and A-3 are the laboratory PQLs that are considered target reporting limits (TRLs) because several factors may influence final reporting limits. First, moisture and other physical conditions of soil affect detection limits. Second, analytical procedures may require sample dilutions or other practices to accurately quantify a particular analyte at concentrations above the range of the instrument. The effect is that other analytes could be reported as undetected but at a value higher than a specified TRL. Data users must be aware that high non-detect values, although correctly reported, can bias statistical summaries and careful interpretation is required to correctly characterize Site conditions.

5.2. Precision

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses, and duplicate spiked environmental samples (matrix spike duplicates). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons for collected samples.

This value is calculated by:

Where $$RPD(\%) = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} X\ 100,$$

D_1 = Concentration of analyte in sample.

D_2 = Concentration of analyte in duplicate sample.

The calculation applies to split samples, replicate analyses, duplicate spiked environmental samples (matrix spike duplicates), and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Persons performing the evaluation must review one or more pertinent documents (USEPA, 1999; USEPA, 2004) that address criteria exceedances and courses of action. Project RPD goals for all analyses are 35 percent for water samples and 50 percent for soil samples, unless the primary and duplicate sample results are less than five times the MRL, in which case RPD goals will not apply for data quality assessment purposes.

5.3. Accuracy

Accuracy is a measure of bias in the analytic process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported values versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest. Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

For this project, accuracy will be expressed as the percent recovery of a known surrogate spike, matrix spike, or laboratory control sample (blank spike), concentration:

$$Recovery\,(\%) = \frac{Spiked\ Result - Unspiked\ Result}{Known\ Spike\ Concentration}\ X\ 100$$

Persons performing the evaluation must review one or more pertinent documents (USEPA, 1999; USEPA, 2004) that address criteria exceedances and courses of action. Accuracy criteria for surrogate spikes, matrix spikes, and laboratory control spikes are found in Table A-1 of this QAPP.

5.4. Representativeness

Representativeness expresses the degree to which data accurately and precisely represent the actual Site conditions. The determination of the representativeness of the data will be performed by completing the following:

- Comparing actual sampling procedures to those delineated within this QAPP.
- Comparing analytical results of field duplicates to determine the variations in the analytical results.
- Invalidating non-representative data or identifying data to be classified as questionable or qualitative.

Only representative data will be used in subsequent data reduction, validation, and reporting activities.

5.5. Completeness

Completeness establishes whether a sufficient amount of valid measurements were obtained to meet project objectives. The number of samples and results expected establishes the comparative basis for completeness. Completeness goals are 90 percent useable data for samples/analyses planned. If the completeness goal is not achieved an evaluation will be made to determine if the data are adequate to meet study objectives.

$$Completeness = \frac{number\ of\ valid\ measurements}{total\ number\ of\ data\ points\ planned} \times 100$$

5.6. Comparability

Comparability expresses the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, a statement on comparability will be prepared to determine overall usefulness of data sets, following the determination of both precision and accuracy.

5.7. Holding Times

Holding times are defined as the time between sample collection and extraction, sample collection and analysis, or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample exceeds a holding time, then the results may be biased low. For example, if the extraction holding time for volatile analysis of soil sample is exceeded, then the possibility exists that some of the organic constituents may have volatilized from the sample or degraded. Results for that analysis would be qualified as estimated to indicate that the reported results may be lower than actual Site conditions. Holding times are presented in Table A-4.

5.8. Blanks

According to the *National Functional Guidelines for Organic Data Review* (USEPA, 1999), "The purpose of laboratory (or field) blank analysis is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks)." Trip blanks are placed with samples during shipment and travel with samples from the laboratory to the field and back to the laboratory. Method blanks are created during sample preparation and follow samples throughout the analysis process.

Analytical results for blanks will be interpreted in general accordance with *National Functional Guidelines for Organic Data Review* (USEPA, 1999) and professional judgment.

5.9. Special Training Requirements/Certification

The Superfund Amendments and Reauthorization Act of 1986 required the Secretary of Labor to issue regulations providing health and safety standards and guidelines for workers engaged in hazardous waste operations. Occupational Safety and Health Administration (OSHA) regulations (29 CFR 1910.120) require training to provide employees with the knowledge and skills necessary to enable them to perform their jobs safely and with minimum risk to their personal health. All sampling personnel will have completed the 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course and 8-hour refresher courses, as necessary, to meet OSHA regulations.

6.0 DOCUMENTATION AND RECORDS

6.1. Field Observations

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will maintain daily field logs. The field logs will be prepared on field report forms or in a bound logbook. Entries in the field logs and associated sample documentation forms will be made in waterproof ink, and corrections will consist of line-out deletions that are initialed and dated. Individual logbooks will become part of the project files at the conclusion of the field work.

At a minimum, the following information will be recorded during the collection of each sample.

- Sample location and description
- Site or sampling area sketch showing sample location and measured distances
- Sampler's name(s)
- Date and time of sample collection
- Designation of sample as composite or discrete
- Sample matrix (e.g., soil or water)
- Type of sampling equipment used
- Field instrument (e.g., PID) readings
- Field observations and details that are pertinent to the integrity/condition of the samples (e.g., weather conditions, performance of the sampling equipment, sample depth control, sample disturbance, etc.)
- Preliminary sample descriptions (e.g., lithology, field screening results)
- Sample preservation
- Sample transport/shipping arrangements
- Name of recipient laboratory
- Photograph of soil sample location

In addition to the sampling information, the following specific information also will be recorded in the field log for each day of sampling.

- Sampling team members
- Time of arrival/entry on Site and time of Site departure
- Other personnel present at the Site
- Summary of pertinent meetings or discussions with regulatory agency or contractor personnel
- Deviations from sampling plans, QAPP procedures and HASP
- Changes in field personnel and responsibilities with reasons for the changes
- Calibration readings for any field instruments used

The handling, use, and maintenance of field log books are the Field Coordinator's responsibility.

6.2. Analytical Chemistry Records

Laboratories will be responsible for internal checks on data reporting and will correct errors identified during the QA review. All laboratories must be accredited by Ecology for the required analytical methods. Close contact will be maintained with the laboratories to resolve any quality control problems in a timely manner. The laboratories will be required to provide the following:

- **Project narrative –** This summary, in the form of a cover letter, will present any problems encountered during any aspect of analysis. The summary will include, but not be limited to, a discussion of QC, sample shipment, sample storage, and analytical difficulties. Any problems encountered by the laboratory, and their resolutions, will be documented in the project narrative.
- **Records –** Legible copies of the COC forms will be provided as part of the data package. This documentation will include the time of receipt and the condition of each sample received by the laboratory. Additional internal tracking of sample custody by the laboratory will also be documented.
- **Sample results –** The data package will summarize the results for each sample analyzed. The summary will include the following information, as applicable:
    - Field sample identification code and the corresponding laboratory identification code
    - Sample matrix
    - Date of sample extraction/digestion
    - Date and time of analysis
    - Weight and/or volume used for analysis
    - Final dilution volumes or concentration factor for the sample
    - Total solids in the samples
    - Identification of the instruments used for analysis
    - MDLs and RLs
    - All data qualifiers and their definitions
- **QA/QC summaries –** These summaries will contain the results of all QA/QC procedures. Each QA/QC sample analysis will be documented with the same information as that required for the sample results (see above). The laboratory will make no recovery or blank corrections. The required summaries are listed below.
    - The calibration data summary will contain the concentrations of the initial calibration and daily calibration standards and the date and time of analysis. The response factor, percent standard deviation (%RSD), RPDs, and retention time for each analyte will be listed, as appropriate. Results for standards analyzed at the RL to determine instrument sensitivity will be reported.
    - The internal standard area summary will report the internal standard areas, as appropriate.

- The method blank analysis summary will report the method blank analysis associated with each sample and the concentrations of all compounds of interest identified in these blanks.
- The surrogate spike recovery summary will report all surrogate spike recovery data for organic analyses. The names and concentrations of all compounds added, percent recoveries, and QC limits will be listed.
- The matrix spike (MS) recovery summary will report the MS or MS duplicate (MSD) recovery data for analyses, as appropriate. The names and concentrations of all compounds added, percent recoveries, and QC limits will be included in the data package. The RPD for all MS/MSD analyses will be reported.
- The laboratory replicate summary will report the RPD for all laboratory replicate analyses. The QC limits for each compound or analyte will be listed.
- The laboratory control sample (LCS) analysis summary will report the results of the analyses of the LCS. The QC limits for each compound or analyte will be included in the data package.
- The relative retention time summary will report the relative retention times for the primary and confirmational columns of each analyte detected in the samples, as appropriate.

EQuIS four-file format electronic data deliverables will be obtained from the laboratory and data will be submitted into Ecology's Environmental Information Management (EIM) system after data quality assessments are completed.

6.3. Data Reduction

Data reduction is the process by which original data are converted or reduced to a specified format or unit to facilitate the analysis of the data. For example, a final analytical concentration may need to be calculated from a diluted sample result. Data reduction requires that all aspects of sample preparation that could affect the test result, such as sample volume analyzed or dilutions required, be taken into account in the final result. The laboratory personnel will reduce the analytical data for review by the Quality Assurance Leader and Project Manager.

During chemical analysis, samples are occasionally diluted after the initial analysis if the estimated concentration curve for one or more of the target analytes is above the calibration curve. In these instances, concentrations from the initial analysis will be identified as the "best result" for all target analytes other than the chemical(s) that was originally above the calibration range. The "best result" for this qualified analyte(s) will be taken from the diluted sample.

7.0 DATA GENERATION AND ACQUISITION

7.1. Sample Process Design

As required Ecology's Cleanup Action Plan (CAP; Ecology, 2014), samples of soil and groundwater will be collected during the cleanup action activities. Sampling activities at the Site are described in the CMP and will consist primarily of the following:

- Obtain verification soil samples from the remedial excavation for chemical analysis to confirm that the site-specific soil cleanup levels have been achieved and/or to document residual contaminant concentrations beyond the readily accessible portion of the Site (i.e., gravel surface area).
- Obtain water samples from existing Site monitoring wells for chemical analysis to evaluate the effectiveness of the cleanup action.

Verification soil samples and post-construction groundwater samples will be submitted to OnSite Environmental, Inc. (OnSite) of Redmond, Washington for chemical analysis of indicator hazardous substances, including:

- Gasoline-range petroleum hydrocarbons by Ecology Method NWTPH-G;
- Diesel- and heavy oil-rang petroleum hydrocarbons by Ecology Method NWTPH-Dx;
- cPAHs by EPA Method 8270SIM;
- Benzene by EPA Method 8021 or 8260; and/or
- Cadmium by EPA Method 6010.

7.1.1. Soil Verification Sampling

Soil verification samples will be collected by GeoEngineers field personnel from the base and/or sidewalls of the remedial excavation to confirm that the cleanup action achieves soil cleanup standards for the Site and/or to document residual contamination remaining in portions of the property that are inaccessible (i.e., beneath portions of 13th Street, 14th Street, Q Avenue and the McDonalds parking lot). The CMP describes contaminants for analysis and collection frequencies for verification samples. Verification soil samples will be submitted to an Ecology-certified laboratory for chemical analysis on a short turnaround time, to the extent practicable to facilitate the construction schedule.

Each sample will be designated with a unique, sequential sample identification number as described in Section 7.2.3. The field representative will visually classify the soils in accordance with ASTM International (ASTM) Method D 2488 and record soil descriptions and other relevant field screening details (e.g., staining, debris, odors, etc.) in the field log. Field screening procedures are described in Section 7.2.2. Collected samples will be transferred into clean sample containers provided by the analytical laboratory. Reusable sampling equipment (if used) will be decontaminated prior to sample collection at each location. Decontamination procedures are described Section 7.2.1. Each sample container will be securely capped, labeled, and placed in a cooler with ice immediately upon collection. Sampling handling procedures are further discussed in Section 7.3.

7.1.2. Groundwater Monitoring

Following the completion of cleanup action, groundwater samples will be obtained from existing monitoring wells located downgradient of the Site to evaluate the effectiveness of the cleanup action. The exact number and location of the confirmational monitoring wells will be determined by Ecology following completion of remedial actions based on the final limits of the excavation.

7.1.2.1. WATER LEVEL MEASUREMENTS

Water level measurements will be obtained at each monitoring well prior to purging and sample collection. All water levels will be measured using an electronic water level indicator and will be recorded to the nearest 0.01 foot. Measurements will be taken from the top of the well casing.

7.1.2.2. GROUNDWATER SAMPLING

Groundwater samples will be obtained by GeoEngineers field personnel using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in the samples. The wells will be purged and groundwater samples will be obtained from the wells using a peristaltic or submersible pump and disposable polyethylene tubing. Groundwater will be purged from the wells at a rate of approximately 0.5 liters per minute. A Horiba U-22 (or similar) water quality measuring system with a flow-through cell will be used to monitor the following water quality parameters during purging:

- Electrical conductivity (EC);
- Dissolved oxygen (DO);
- Acidity (pH);
- Salinity;
- Total dissolved solids (TDS);
- Turbidity;
- Oxidation-reduction potential (ORP); and
- Temperature.

Samples will be collected from the wells after these parameters vary by less than 10 percent on three consecutive measurements. The stabilized field measurements will be documented in the field log. Following well purging, the flow-through cell will be disconnected and groundwater samples will be collected in laboratory-prepared containers. Groundwater will be collected from the new and existing monitoring wells and submitted to an Ecology-certified laboratory for analyses of indicator hazardous substances listed above. Both field-filtered and unfiltered samples for metals (cadmium) analysis will be collected.

The samples will be placed into a cooler with ice and logged on the chain-of-custody form using procedures described below. Purge water removed from the monitoring wells and decontamination water generated during all sampling activities will be stored on Site in labeled and sealed 55-gallon drums. The drums will be stored temporarily at a secure location on Port property pending receipt of analytical results and off-site disposal at a permitted facility.

7.1.3. Disposal of Investigation-Derived Materials

7.1.3.1. SOIL

Soil cuttings from borings completed during the post-construction groundwater monitoring well installation will be placed in labeled and sealed 55-gallon drums. The drums will be temporarily stored on Site at a secure location pending receipt of analytical results and off-site disposal at a permitted facility. Each drum will be labeled with the following information:

- Material/media (i.e., soil, water, etc.) contained in the drum;

- Source of the material in the drum (i.e., investigation locations and depths where appropriate);
- Date material was generated; and
- Name and telephone number of GeoEngineers contact person.

7.1.3.2. GROUNDWATER AND DECONTAMINATION WATER

Development and purge water removed from the monitoring wells and decontamination water generated during all sampling activities will be placed in labeled and sealed 55-gallon drums. The drums will be temporarily stored on Site at a secure location pending receipt of analytical results and off-site disposal at a permitted facility. Each drum will be labeled with the following information:

- Material/media (i.e., soil, water, etc.) contained in the drum;
- Source of the material in the drum (i.e., investigation locations and depths where appropriate);
- Date material was generated; and
- Name and telephone number of GeoEngineers contact person.

7.1.3.3. DISPOSITION OF INCIDENTAL WASTE

Incidental waste generated during sampling activities includes items such as gloves, plastic sheeting, sample tubing, paper towels and similar expended and discarded field supplies. These materials are considered *de minimis* (Ecology, 2006) and will be disposed of in a local trash receptacle or county disposal facility.

7.2. Sample Methods

7.2.1. Sampling Equipment and Decontamination Procedures

Soil samples will be collected using excavation equipment (i.e., backhoe or excavator), and hand tools including stainless steel spoons and stainless steel mixing bowls. Groundwater samples will be collected from monitoring wells using submersible or peristaltic pumps and low-flow sampling procedures.

Reusable sampling equipment that comes in contact with soil or groundwater will be decontaminated before each use. Decontamination procedures for this equipment will consist of the following:

1. Washing with a brush and non-phosphate detergent solution (e.g., Liqui-Nox and distilled water),
2. Rinsing with distilled water, and
3. Wrapping or covering the decontaminated equipment with aluminum foil. Field personnel will limit cross-contamination by changing gloves between sampling locations.

Wash water used to decontaminate the reusable sampling equipment will be collected and stored on site in 55-gallon drums.

7.2.2. Field Screening Procedures

The potential presence of contamination in soil samples will be evaluated using field screening techniques. Field screening results will be recorded on the field logs and the results will be used as a general guideline to delineate areas of possible contamination. In addition, screening results will be used as a basis for selecting soil samples for chemical analysis. The following screening methods will be used: 1) visual screening; 2) water sheen screening; and 3) headspace vapor screening.

7.2.2.1. VISUAL SCREENING

The soil will be observed for unusual color and stains and/or odor indicative of possible contamination.

7.2.2.2. WATER SHEEN SCREENING

This is a qualitative field screening method that can help identify the presence or absence of petroleum hydrocarbons. A portion of the soil sample will be placed in a pan containing distilled water. The water surface will be observed for signs of sheen. The following sheen classifications will be used:

Classification	Identifier	Description
No Sheen	(NS)	No visible sheen on the water surface
Slight Sheen	(SS)	Light, colorless, dull sheen; spread is irregular, no rapid; sheen dissipates rapidly
Moderate Sheen	(MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface
Heavy Sheen	(HS)	Heavy sheen with color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface

7.2.2.3. HEADSPACE VAPOR SCREENING

This is a semi-quantitative field screening method that can help identify the presence or absence of volatile organic compounds (VOCs) in soil samples. A portion of the soil sample will be placed in a resealable plastic bag. The bag will then be sealed capturing air in the bag. The bag is then shaken gently to expose the soil to the air trapped in the bag. The bag will remain closed for approximately 5 minutes at ambient temperature before the headspace vapors are measured. Vapors present within the sample bag's headspace will be measured by inserting the probe of a photoionization detector (PID) through a small opening in the bag, taking care not to clog the probe with soil. The maximum PID reading (in parts per million [ppm]) and the ambient air temperature will be recorded on the field log for each sample. The PID will be calibrated to 100 ppm isobutylene each day prior to soil sampling. No soil sample used for headspace screening will be submitted to the laboratory for chemical analysis.

7.2.3. Sample Containers and Labeling

The Field Coordinator will establish field protocol to manage field sample collection, handling and documentation. Soil and groundwater samples will be placed in appropriate laboratory-prepared containers. Sample containers and preservatives are listed in Table A-4.

Sample containers will be labeled with the following information at the time of sample collection:

- Project name and number
- Type of sample preservative used (where applicable)
- Sample name, which will include a reference to date and sampling depth (if applicable)
- Date and time of collection

The sample collection activities will be noted in the field log books. The Field Coordinator will monitor consistency between sample containers/labels, field log books and COC forms.

7.3. Sample Handling and Custody

7.3.1. Sample Storage

Samples will be placed in a cooler with ice after they are collected. The objective of the cold storage will be to attain a sample temperature of 2 to 6 degrees Celsius. Holding times (Table A-4) will be observed during sample storage.

7.3.2. Sample Shipment

Samples will be transported and delivered to the analytical laboratory in the sample coolers. The samples will either be transported by field personnel, laboratory personnel or by courier service. The Field Coordinator will ensure that the cooler has been properly secured using clear plastic tape and custody seals.

7.3.3. Chain-of-Custody Records

Field personnel are responsible for the security of samples from the time the samples are collected until the samples have been received by the courier service or laboratory personnel. A COC form will be completed for each group of samples being shipped to the laboratory. Information to be included on the COC form includes:

- Project name and number;
- Sample identification numbers;
- Date and time of sampling;
- Sample matrix (soil and groundwater), preservative, and number of containers for each sample;
- Analyses to be performed;
- Names of sampling personnel;
- Project manager name and contact information including phone number; and
- Shipping information including shipping container number, if applicable.

The original COC form will be signed by a member of the field team. Field personnel will retain copies and place the original and remaining copies in a plastic bag. The plastic bag containing the COC form will be placed in the cooler before sealing the cooler for transport to the laboratory.

7.3.4. Laboratory Custody Procedures

The laboratory will follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. Documentation will include, at a minimum, the analyst's name or initials, time and date.

7.4. Analytical Methods

The methods of chemical analysis are identified in Tables A-2 and A-3. All methods selected represent standard methods used for the analysis of these analytes in soil and groundwater. The laboratory project manager will determine the remedy to be used if the project RLs cannot be attained, in consultation with GeoEngineers Quality Assurance Leader.

7.5. Quality Control

Table A-5 summarizes the types and frequency of QC samples to be analyzed, including both field QC and laboratory QC samples.

7.5.1. Field Quality Control

Field QC samples serve as a control and check mechanism to monitor the consistency of field sampling methods and the potential influence of off-site factors on project samples. Examples of off-site factors include airborne VOCs and contaminants that may be present in potable water used during drilling activities. Table A-5 summarizes the types and frequency of field QC samples to be analyzed and the following sections discuss field QC samples.

7.5.1.1. FIELD DUPLICATES

Field duplicates serve as a measure for precision. Under ideal field conditions, field duplicates (sometimes referred to as splits), are created by thoroughly mixing a volume of the sample matrix, placing aliquots of the mixed sample in separate containers, and identifying one of the aliquots as the primary sample and the other as the duplicate sample. Field duplicates measure the precision and consistency of laboratory analytical procedures and methods, as well as the consistency of the sampling techniques used by field personnel.

One field duplicate will be collected for every 10 soil samples. For groundwater, one field duplicate will be collected for every sampling event given that less than 10 samples will be collected as part of each sampling event.

7.5.1.2. TRIP BLANKS

Trip blanks accompany samples for VOC analysis during field sampling and delivery to the laboratory. Trip blanks typically are analyzed at a rate of one trip blank per cooler containing samples for VOC analysis. Trip blanks will be analyzed on a one per cooler basis.

7.5.1.3. EQUIPMENT RINSATE BLANKS

Equipment rinsate blanks will be used to evaluate the effectiveness of decontamination procedures for preventing possible cross-contamination of project samples as necessary. Rinsate samples will be collected by slowly pouring distilled water over decontaminated sampling equipment and collecting the rinse water in appropriate sample containers for analysis.

A minimum of one equipment rinsate blank will be collected for every day of soil or groundwater sampling if reusable equipment are used for sampling. At least one equipment rinsate blank will be collected for every 20 soil samples collected.

7.5.2. Laboratory Quality Control

Laboratory QC procedures will be evaluated through a formal data quality assessment process. The analytical laboratory will follow standard analytical method procedures that include specified QC monitoring requirements. These requirements will vary by method, but generally include:

- Method blanks
- Internal standards
- Instrument calibrations
- Matrix spike/matrix spike duplicates (MS/MSD)
- Laboratory control samples/laboratory control sample duplicates (LCS/LCSD)
- Laboratory replicates or duplicates
- Surrogate/Labeled compounds

7.5.2.1. LABORATORY BLANKS

Laboratory procedures utilize several types of blanks, but the most commonly used blanks for QC monitoring are method blanks. Method blanks are laboratory QC samples that consist of either a soil-like material having undergone a contaminant destruction process, or reagent (contaminant-free) water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis. If a substance is detected in a method blank, then one (or more) of the following occurred:

- Sample containers, measurement equipment, and/or analytical instruments were not properly cleaned and contained contaminants.
- Reagents used in the process were contaminated with a substance(s) of interest.

It is difficult to determine which of the above scenarios took place if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. If target analytes are detected in method blanks, data validation guidelines assist in determining which substances in project samples are considered "real," and which ones are attributable to the analytical process. Furthermore, the guidelines state, ". . . there may be instances where little or no contamination was present in the associated blank, but qualification of the sample is deemed necessary. Contamination introduced through dilution water is one example."

7.5.2.2. CALIBRATIONS

Several types of instrument calibrations are used, depending on the analytical method, to assess the linearity of the calibration curve and assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations, and continuing calibration verification.

7.5.2.3. MATRIX SPIKE/MATRIX SPIKE DUPLICATES (MS/MSD)

MS/MSD samples are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH can affect the results for semivolatile organic compounds. Or, the presence of a particular compound may interfere with accurate quantitation of another analyte. MS/MSD data is reviewed in combination with other QC monitoring data to determine matrix effects. In some cases, matrix effects cannot be determined due to dilution and/or high levels of related substances in the sample. A matrix spike is evaluated by spiking a project sample with a known amount of one or more of the target analytes, ideally at a concentration that is 5 to 10 times higher than the sample result. A percent recovery is then calculated by subtracting the un-spiked sample result from the spiked sample result, dividing by the known concentration of the spike, and multiplying by 100.

MS/MSD samples will be analyzed at a frequency of one MS/MSD per analytical batch. The samples for the MS/MSD analyses should be collected from a sampling location that is believed to have only low-level contamination. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to determine the presence of matrix interferences, which can best be achieved with low levels of contaminants. Additional sample volume will be collected for the MS/MSD analyses as required by the laboratory.

7.5.2.4. LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATES (LCS/LCSD)

Also known as blanks spikes, laboratory control samples (LCS) are similar to MS samples in that a known amount of one or more of the target analytes are spiked into a prepared sample medium, and a percent recovery of the spiked substances is calculated. The primary difference between LCS and MS samples is that the LCS uses a contaminant-free sample medium. For example, reagent water is typically used for LCS water analyses. The purpose of an LCS is to help assess the overall accuracy and precision of the analytical process including sample preparation, instrument performance, and analyst performance.

7.5.2.5. LABORATORY REPLICATES/DUPLICATES

Laboratories utilize MS/MSDs, LCS/LCSDs, and/or replicates to assess precision. Replicates are a second analysis of a field-collected environmental sample. Replicates can be split at varying stages of the sample preparation and analysis process and most commonly consist of a second analysis on the extracted media.

7.5.2.6. SURROGATES/LABELED COMPOUNDS

Surrogate spikes are used to verify proper extraction procedures and the accuracy of the analytical instrument. Surrogates are substances with characteristics similar to the target analytes. A known concentration of surrogate is added to the project sample and passed through the instrument and the percent recovery is calculated. Each surrogate used has acceptance limits (i.e., an acceptable range) for percent recovery. If a surrogate recovery is low, sample results may be biased low and depending on the recovery value, a possibility of false negatives may exist. Conversely, when recoveries are above the specified acceptance limits, a possibility of false positives exist, although non-detect results are considered accurate.

7.6. Instrument Testing, Inspection and Maintenance

The Field Coordinator will be responsible for overseeing the testing, inspection and maintenance of all field equipment. The Laboratory Project Manager will be responsible for laboratory equipment

testing, inspection, and maintenance requirements. The calibration methods used in calibrating the analytical instrumentation are described in the following section.

7.7. Instrument Calibration and Frequency

7.7.1. Field Instrumentation

Field instrument calibration and calibration checks facilitate accurate and reliable field measurements. The calibration of field instruments used on the project will be checked and adjusted as necessary in general accordance with the manufacturer's recommendations. Methods and intervals of calibration checks and instrument maintenance will be based on the type of instrument, stability characteristics, required accuracy, intended use and environmental conditions. The basic calibration check frequencies are described below.

7.7.2. Laboratory Instrumentation

For chemical analytical testing, calibration procedures will be performed in general accordance with the analytical methods used and the laboratory's SOPs. Calibration documentation will be retained at the laboratory.

All instrument calibrations and their appropriate chemical standards are to comply with the specific methods within EPA SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, 3rd Edition, December 1996 and the Laboratory SOPs. Calibration documentation, initial (ICALs) and continuing (CCALs), will be retained at the Laboratory.

7.8. Inspection of Supplies and Consumables

Supplies and consumables for the field sampling effort will be inspected upon delivery and accepted if the condition of the supplies is satisfactory. For example, jars will be inspected to ensure that they are the correct size and quantity and were not damaged in shipment.

7.9. Data Management

Laboratories will report data in formatted hardcopy and digital formats. Analytical laboratory measurements will be recorded in standard formats that display, at a minimum, the field sample identification, the laboratory identification, reporting units, data qualifiers, analytical method, analyte tested, analytical result, extraction and analysis dates, and quantitation limits. Each sample delivery group will be accompanied by sample receipt forms and a case narrative identifying data quality issues. Laboratory electronic data deliverable (EDD) requirements will be established by GeoEngineers with the contract laboratory. The laboratory will send final analytical testing results to the Project Manager.

Following completion of the cleanup action and post-construction monitoring, the relevant data generated as part of the project will be reported to Ecology as required by the Consent Decree.

8.0 ASSESSMENT AND OVERSIGHT

8.1. Assessment and Response Actions

8.1.1. Review of Field Documentation and Laboratory Receipt Information

Documentation of field sampling data will be reviewed periodically for conformance with project QC requirements described in this QAPP. At a minimum, field documentation will be checked for proper documentation of the following:

- Sample collection information (date, time, location, matrices, etc.);
- Field instruments used and calibration data;
- Sample collection protocol;
- Sample containers, preservation, and volume;
- Field QC samples collected at the frequency specified;
- COC protocols; and
- Sample shipment information.

Sample receipt forms provided by the laboratory will be reviewed for QC exceptions. The final laboratory data package will describe (in the case narrative) the effects that any identified QC exceptions have on data quality. The laboratory will review transcribed sample collection and receipt information for correctness prior to delivering the final data package.

8.1.2. Response Actions for Field Sampling

The Field Coordinator, or a designee, will be responsible for correcting equipment malfunctions throughout the field sampling effort and resolving situations in the field that may result in nonconformance or noncompliance with the QAPP. All corrective measures will be documented in the field logbook.

8.1.3. Corrective Action for Laboratory Analyses

Laboratories are required to comply with their current written standard operating procedures. The laboratory project manager will be responsible for ensuring that appropriate corrective actions are initiated as required for conformance with this QAPP. All laboratory personnel will be responsible for reporting problems that may compromise the quality of the data to the Laboratory Project Manager. A narrative describing the anomaly, the steps taken to identify and correct it, and the treatment of the relevant sample batch (i.e., recalculation, reanalysis and re-extraction) will be submitted with the data package.

9.0 DATA VALIDATION AND USABILITY

9.1. Data Review, Verification and Validation

The data validation and usability elements of the QAPP as detailed below address the QA/QC activities that occur after data collection and/or data generation is complete. Implementation of

these elements ensures that the data conform to the specified criteria and will achieve the project objectives.

The data are not considered final until validated. All data, including laboratory and field QC sample results, will be summarized in a data validation report. The data validation report will focus on data that did not meet the MQOs specified in Table A-1. The data validation reports will be included as an appendix to the final RI report. The data report will also describe any deviations from this QAPP and actions taken to address those deviations.

Level III laboratory data packages will be obtained for all soil and groundwater samples. These data will be reviewed for the following QC parameters:

- Holding times and sample preservation
- Method blanks
- MS/MSD analyses
- LCS/LCSD analyses
- Surrogate spikes
- Duplicates/replicates
- Field/Lab duplicates

In addition to these QC parameters, other documentation such as sample receipt forms and case narratives will be reviewed to evaluate laboratory QA/QC.

9.2. Verification and Validation Methods

Hard-copy laboratory reports will be MDL-generated providing the analysis-specific information including final sample analytical results, reportable field and laboratory QA/QC analytical results, MDLs and MRLs. The laboratory data will also be reported via electronic media using the tabular outputting capabilities of standard software formats.

The term "reporting limit" will be used interchangeably with "quantitation limit" to mean the lowest concentration at which an analyte can be quantified subject to the quality control criteria of the analytical method. These terms are different from "MDL," which refers to the lowest concentration that the analytical method can ideally detect.

Data validation qualifiers including "U," "J," and "R" will be used following the reported laboratory results to explain data quality issues affecting the laboratory data to the data user. These qualifiers are explained as follows:

- "U" indicates that a compound was analyzed for but not detected. The associated numerical value is the estimated sample quantitation limit, which is corrected for dilution and percent moisture.
- "J" indicates that a compound was detected below the reporting limit and the value is estimated or the value was estimated by the validator because the of instrument bias reasons.

- "R" indicates severe uncertainty with the reported result associated with the quality control of a compound.

If any target analytes are found in a laboratory method blank, it will be regarded as blank contamination. In these cases, the result of a given analyte in the method blank will be compared to any positive result of the same analyte in the associated field samples. If a field sample result is less than five times (10 times for common laboratory contaminants like acetone, phthalates, etc.) the result that is reported in the method blank, the result will be considered blank contamination. Accordingly, the result will be qualified as not-detected "U" at the elevated reporting limit.

If there are two analyses reported by the laboratory for one sample (as in the case of dilutions), the validator will make a decision as to which analysis to use in the final assessment. As there should be only one reported result per analyte for a given sample, any extraneous results will be qualified as not-reportable "R" and will not be used.

9.3. Reconciliation with User Requirements

A data quality assessment will be conducted by the project Quality Assessment Leader to identify cases where the projects MQOs were not met.

10.0 REFERENCES

GeoEngineers, Inc. (GeoEngineers, 2014), "Remedial Investigation/Feasibility Study, Former Shell Oil Tank Farm, Anacortes, Washington, Ecology Agreed Order No. DE-08TCPHQ-5474," GEI File No. 5147 012-02, prepared for the Washington State Department of Ecology on behalf of Port of Anacortes, February 2, 2014.

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Washington State Department of Ecology (Ecology, 2014b). "Cleanup Action Plan (CAP), Former Shell Oil Tank Farm Site, Anacortes, Washington," dated February 3, 2014.

Washington State Department of Ecology (Ecology), "Minimum Standards for Construction and Maintenance of Wells", Chapter 173-160 WAC, update November 2006.

Washington State Department of Ecology (Ecology), "Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies." July 2004.

Table A-1

Measurement Quality Objectives

Former Shell Oil Tank Farm Site
Anacortes, Washington

Laboratory Analysis	Reference Method	Laboratory Control Sample (LCS) %R Limits[1,2]		Matrix Spike (MS) %R Limits[2]		Surrogate Standard (SS) %R Limits[1,2,3]	MS Duplicate Samples or Lab Duplicate RPD Limits[4]		Field Duplicate Samples RPD Limits[4]	
		Soil	Water	Soil	Water	Soil/Water	Soil	Water	Soil	Water
Gasoline-Range Hydrocarbons	Ecology NWTPH-Gx	50%-150%	50%-150%	NA	NA	50%-150%	≤30%	≤30%	≤50%	≤35%
Diesel- and Motor oil-range Hydrocarbons	Ecology NWTPH-Dx with acid/silica gel cleanup	50%-150%	50%-150%	NA	NA	50%-150%	≤40%	≤40%	≤50%	≤35%
Benene	EPA 8021/8260	70%-130%	70%-130%	70%-130%	70%-130%	50%-150%	≤30%	≤30%	≤50%	≤35%
cPAHs	EPA 8270SIM	70%-130%	70%-130%	70%-130%	70%-130%	70%-130%	≤30%	≤30%	≤50%	≤35%
Metals[5]	EPA 6000/7000 Series	80%-120%	80%-120%	75%-125%	75%-125%	NA	≤20%	≤20%	≤50%	≤35%

Notes:

[1]Recovery ranges are estimates. Actual ranges will be provided by the laboratory when contracted.

[2]Percent recovery limits are expressed as ranges based on laboratory control limits. Limits will vary for individual analytes.

[3]Individual surrogate recoveries are compound-specific.

[4]RPD control limits are only applicable if the primary and duplicate sample concentrations are greater than 5 times the method reporting limit (MRL). For results less than 5 times the MRL, the 2X the MRL for soils/sediments and 1X the

[5]Metals to be analyzed include cadmium

EPA = U.S. Environmental Protection Agency

NA = Not applicable

RPD = Relative percent difference

RSD = Relative standard deviation

SVOCs = Semi-Volatile Organic Compounds

VOCs = Volatile Organic Compounds

Table A-2

Target Practical Quantitation Limits for Soil

Former Shell Oil Tank Farm Site

Anacortes, Washington

Analyte	CAS Number	Target Practical Quantitation Limit (PQL)
Petroleum Hydrocarbons (mg/kg)		
Gasoline-Range Petroleum Hydrocarbons	NA	5
Diesel-Range Petroleum Hydrocarbons	NA	25
Heavy Oil-Range Petroleum Hydrocarbons	NA	50
Volatile Organic Compounds (VOCs; µg/kg)		
Benzene	71-43-2	20
Metals (mg/kg)		
Cadmium	7440-43-9	0.5
Carcinogenic Polycyclic Aromatic Hydrocarbons and Naphthalenes (cPAH; µg/kg)		
Benzo(a)anthracene	56-55-3	6.7
Benzo(a)pyrene	50-32-8	6.7
Benzo(b)fluoranthene	205-99-2	6.7
Benzo(k)fluoranthene	207-08-9	6.7
Chrysene	218-01-9	6.7
Dibenzo(a,h)anthracene	53-70-3	6.7
Indeno(1,2,3-cd)pyrene	193-39-5	6.7
Total cPAHs TEC	NA	NA

Notes:

CAS = Chemical Abstract Services

mg/kg = milligrams per kilogram

NA = Not applicable

TEC = Toxic equivalent concentration; PQL calculated as prescribed in WAC 173-340 using one-half the PQL for individual constituents.

µg/kg = micrograms per kilogram

Table A-3

Target Practical Quantitation Limits for Water

Former Shell Oil Tank Farm Site

Anacortes, Washington

Analyte	CAS Number	Target Practical Quantitation Limit (PQL)
Petroleum Hydrocarbons (µg/L)		
Gasoline-Range Petroleum Hydrocarbons	NA	100
Diesel-Range Petroleum Hydrocarbons	NA	250
Heavy Oil-Range Petroleum Hydrocarbons	NA	500
Volatile Organic Compounds (VOCs; µg/L)		
Benzene	71-43-2	1
Metals (µg/L)		
Cadmium	7440-43-9	4
Carcinogenic Polycyclic Aromatic Hydrocarbons and Naphthalenes (cPAH; µg/L)		
Benzo(a)anthracene	56-55-3	0.01
Benzo(a)pyrene	50-32-8	0.01
Benzo(b)fluoranthene	205-99-2	0.01
Benzo(k)fluoranthene	207-08-9	0.01
Chrysene	218-01-9	0.01
Dibenzo(a,h)anthracene	53-70-3	0.01
Indeno(1,2,3-cd)pyrene	193-39-5	0.01
Total cPAHs TEC	NA	NA

Notes:

CAS = Chemical Abstract Services

NA = Not applicable

TEC = Toxic equivalent concentration; PQL calculated as prescribed in WAC 173-340 using one-half the PQL for individual constituents.

µg/L = micrograms per Liter

Table A-4

Soil and Water Test Methods, Sample Containers, Preservatives and Holding Times

Former Shell Oil Tank Farm Site

Anacortes, Washington

Analysis	Method	Soil				Groundwater			
		Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times	Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times[1]
Gasoline Range Hydrocarbons	Ecology NWTPH-Gx	100 g[2]	4 or 8 oz glass widemouth with Teflon-lined lid and 5035 kit with methanol preserved vial	Cool 4°C	14 days	120 mL	3 - 40 mL VOA Vials	HCl - pH<2	14 days preserved 7 days unpreserved
Diesel- and Oil-Range Hydrocarbons	Ecology NWTPH-Dx with silica gel/acid wash cleanup	100 g	8 or 16 oz amber glass wide-mouth with Teflon-lined lid	Cool 4°C	14 days to extraction, 40 days from extraction to analysis	500 mL	2 - 500 mL amber glass with Teflon-lined lid	Cool 4 C, HCl to pH < 2	14 days to extraction 40 days from extraction to analysis
Benzene	EPA 8021/8260	100 g*	4 or 8 oz glass widemouth with Teflon-lined lid and 5035 kit with methanol preserved vial	Cool 4°C	14 days	120 mL	3 - 40 mL VOA Vials	HCl - pH<2	14 days preserved 7 days unpreserved
cPAHs	EPA 8270SIM	100 g	4 or 8 oz glass widemouth with Teflon-lined lid	Cool 4°C	14 days to extraction, 40 days from extraction to analysis	1 L	1 liter amber glass with Teflon-lined lid	Cool 4°C	7 days to extraction 40 days from extraction to analysis
Metals[3]	EPA 6010/200.8/7470/7471	100 g	4 or 8 oz glass widemouth with Teflon-lined lid	Cool 4°C	180 days/ 28 days for Mercury	500 mL	1 liter poly bottle	HNO_3 - pH<2 (Dissolved metals preserved after filtration)	180 days (28 days for Mercury)

Notes:

[1]Holding times are based on elapsed time from date of collection.

[2]For both soil and water the Gx and BETX can be combined and do not require separate containers.

[3]Metals to be analyzed are cadmium. Groundwater samples to be analyzed for both total and dissolved metals.

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

EPA = U.S. Environmental Protection Agency

g = gram

HCl = hydrochloric acid

HNO_3 = nitric acid

L = liter

mL = milliliter

oz = ounce

VOA = volatile organic analysis

Table A-4

Soil and Water Test Methods, Sample Containers, Preservatives and Holding Times

Former Shell Oil Tank Farm Site

Anacortes, Washington

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cPAHs = carcinogenic polycyclic aromatic hydrocarbons

EPA = U.S. Environmental Protection Agency

g = gram

HCl = hydrochloric acid

HNO_3 = nitric acid

L = liter

mL = milliliter

oz = ounce

VOA = volatile organic analysis

APPENDIX B
Health and Safety Plan

Health and Safety Plan

Former Shell Tank Farm
Anacortes, Washington

for
Washington State Department of Ecology on Behalf of Port of Anacortes

July 29, 2014

GeoEngineers

Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington 98101
206.728.2674

Health and Safety Plan

Former Shell Tank Farm
Anacortes, Washington

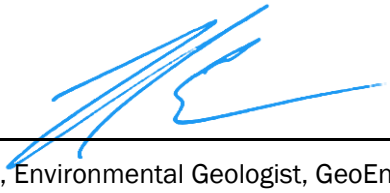
File No. 5147-012-04

July 29, 2014

Approvals:

Signature:  Date: 7/29/14

John M. Herzog, PhD, Principal, GeoEngineers

Signature:  Date: 7/29/14

Robert S. Trahan, Environmental Geologist, GeoEngineers

Signature:  Date: 7/29/14

Wayne Adams, Health & Safety Program Manager, GeoEngineers

RST:JMH:tt

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) is to be used in conjunction with the GeoEngineers Safety Program Manual for the Shell Oil Tank Farm Site (Site) cleanup action. Together, the written safety programs and this HASP constitute the site safety plan for this Site. This plan is to be used by GeoEngineers personnel on this site and must be available on-Site. If the work entails potential exposures to other substances or unusual situations, additional safety and health information will be included, and the plan will need to be approved by the GeoEngineers Health and Safety Manager. All plans are to be used in conjunction with current standards and policies outlined in the GeoEngineers Health and Safety Program Manual.

1.1. Liability Clause

If requested by subcontractors, this HASP may be provided for informational purposes only. In this case, Form 3 shall be signed by the subcontractor. Please be advised that this HASP is intended for use by GeoEngineers employees only. Nothing herein shall be construed as granting rights to GeoEngineers' subcontractors or any other contractors working on this site to use or legally rely on this HASP. GeoEngineers specifically disclaims any responsibility for the health and safety of any person not employed by them.

1.2. General Project Information

Project Name:	Shell Oil Tank Farm Site
Project Number:	5147-012-04
Type of Project:	Construction Observation and Compliance Sampling
Start/Completion:	Fall 2014
Contractors:	TBD
Subcontractors:	TBD

2.0 BACKGROUND INFORMATION

Cleanup activities are being performed by the Port to address petroleum hydrocarbon (gasoline, and diesel), carcinogenic polycyclic aromatic hydrocarbon (cPAHs), volatile organic compound (benzene) and metal (cadmium) contamination in soil that has resulted from historical uses of the property at which the Site is located. Cleanup activities are being completed pursuant to the Cleanup Action Plan (CAP; Ecology, 2014) and Consent Decree. Detailed information describing the Site including its known history, current uses, existing property features, soil and groundwater conditions are presented in the Engineering Design Report (EDR).

3.0 WORK PLAN

In accordance with the Washington State Department of Ecology (Ecology) Cleanup Action Plan (CAP, Ecology 2014), the selected cleanup action for the Site will include remedial excavation activities within in the accessible (i.e., gravel surface within the former Shell Oil Tank Farm) areas of the Site, off-site transport and disposal of the excavated material at permitted landfill facilities, backfill of the remedial excavation and restoration of the ground surface to resemble pre-existing conditions. Detailed information describing the cleanup action including excavation, disposal, backfill and restoration activities is presented in the EDR. As part of the Cleanup Action, our scope includes:

- Assisting the cleanup contractor in identifying the contact between overburden and underlying contaminated soil;
- Identifying the initial limits of excavation based on field screening results;
- Obtaining soil samples from the limits of excavation and submitting soil samples to an Ecology accredited laboratory for chemical analysis of indicator hazardous substances including gasoline-, diesel- and heavy oil-range hydrocarbons, benzene, cPAHS and metals (cadmium);
- Oversight of backfill and the placement of oxygen releasing chemicals for enhancing biodegradation of residual contaminants that are believed to remain in place below portions of Q Avenue and 14th Street;
- Site restoration oversight following completion of remedial excavation activities; and
- Obtaining groundwater samples from existing monitoring wells to evaluate post-construction groundwater conditions downgradient of the Site. Groundwater samples will be submitted for chemical analysis of indicator hazardous substances including gasoline-, diesel- and heavy oil-range hydrocarbons, benzene, cPAHS and cadmium.

3.1. Field Activities

The following activities are anticipated for GeoEngineers field personnel during the implantation of the cleanup action and post-construction monitoring activities:

- Construction Observation
- Field Screening of Soil Samples
- Headspace Vapor Measurements
- Verification Soil Sample Collection
- Groundwater Treatment System Sampling
- Groundwater Sample Collection

3.2. Field Personnel, Training Records and Chain of Command

Anticipated field personnel include the following:

- Nate Solomon

- Abhijit Joshi
- Robert Trahan
- Brian Tracy

Field personnel will have appropriate training and up-to-date certifications.

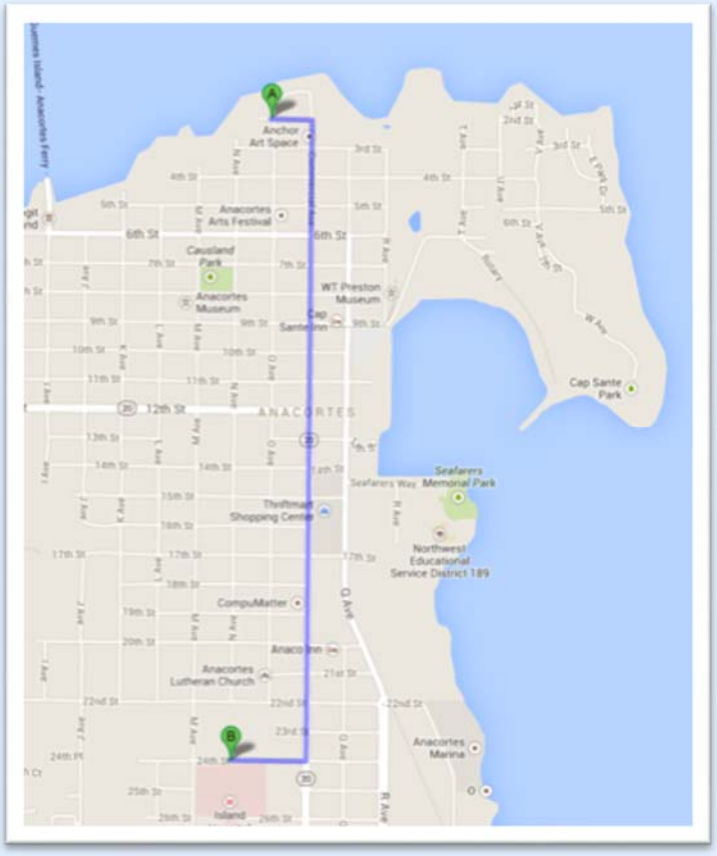
Chain of Command	Title	Name	Telephone Numbers
1	Project Manager	John Herzog	(o) 206.239.3252 (c) 206.406.6431
2	HAZWOPER Supervisor	Brian Tracy	(o) 206.239.3250 (c) 206.679.1643
3	Field Engineer/Geologist*	TBD	
6	Health and Safety Program Manager	Wayne Adams	(o) 253.383.4940 (c) 253.350.4387
N/A	Subcontractor(s)	TBD	
N/A	Current Owner	Port of Anacortes Representative Jenkins Dossen	(o) 360.299.1814 (c) 360.661.2163

*Site Safety and Health Supervisor – The individual present at a hazardous waste Site responsible to the employer and who has the authority and knowledge necessary to establish the Site-specific health and safety plan and verify compliance with applicable safety and health requirements.

4.0 EMERGENCY INFORMATION

Hospital Name and Address:	Island Hospital 1211 24th Street Anacortes, WA 98221
Phone Numbers (Hospital ER):	(360) 468-3185 /(360) 299-1300
Distance:	1.5 Miles
Route to Hospital:	1) Head east on 2nd St toward O Ave – 410 feet 2) Turn right onto Commercial Ave – 1.2 mile 3) Turn right onto 24th Street – 0.1 mile 4) Arrive at 1211 24th Street, Anacortes

Map to Hospital:



5.0 STANDARD EMERGENCY PROCEDURES

- **Get help**
  - send another worker to phone 9-1-1 (if necessary)
  - as soon as feasible, notify GeoEngineers' Project Manager (PM)
- **Reduce risk to injured person**
  - turn off equipment
  - move person from injury location (if in life-threatening situation only)
  - keep person warm
  - perform CPR (if necessary)
- **Transport injured person to medical treatment facility (if necessary)**
  - by ambulance (if necessary) or GeoEngineers vehicle
  - stay with person at medical facility
  - keep GeoEngineers manager apprised of situation and notify Human Resources Manager of situation

6.0 HAZARD ANALYSIS

This section presents hazards that may be potentially present at the Site. A hazard assessment will be completed at the Site prior to beginning field activities. Updates will be included in the daily log.

6.1. Physical Hazards

- Backhoe
- Trackhoe
- Front End Loader
- Excavations/trenching (1:1 slopes for Type B soil)
- Shored/braced excavation if greater than 4 feet of depth
- Overhead hazards/power lines
- Tripping/puncture hazards (debris on-site, steep slopes or pits)
- Unusual traffic hazard – street traffic
- Heat/Cold, humidity
- Utilities/utility locate

6.1.1. Safe Work Practices

- Utility checklist will be completed as required for the location to preventing drilling or digging into utilities.
- Work areas will be marked with reflective cones, barricades and/or caution tape. High-visibility vests will be worn by on-site personnel to ensure they can be seen by vehicle and equipment operators.
- Field personnel will be aware at all times of the location and motion of heavy equipment in the area of work to ensure a safe distance between personnel and the equipment. Personnel will be visible to the operator at all times and will remain out of the swing and/or direction of the equipment apparatus. Personnel will approach operating heavy equipment only when they are certain the operator has indicated that it is safe to do so through hand signal or other acceptable means.
- Heavy equipment and/or vehicles used on this site will not work within 20 feet of overhead utility lines without first ensuring that the lines are not energized. This distance may be reduced to 10 feet depending on the client and the use of a safety watch.
- Personnel entry into unshored or unsloped excavations deeper than 4 feet is not allowed. Any trenching and shoring requirements will follow guidelines established in OSHA 1926.651 Excavation Requirements.
    - In the event that a worker is required to enter an excavation deeper than 4 feet, a trench box or other acceptable shoring will be employed or the side walls of the excavation will be sloped according to the soil type and guidelines as outlined in DOSH/OSHA regulations.

- If the shoring/sloping deviates from that outlined in OSHA, it will be designed and stamped by a PE.
- Prior to entry, personnel will conduct air monitoring as described later in this plan.
- All hazardous encumbrances and excavated material will be stockpiled at least 2 feet from the edge of a trench or open pit.
- If concentrations of volatile gases accumulate within an open trench or excavation, the means of entering shall adhere to confined space entry and air monitoring procedures outlined under the air monitoring recommendations in this Plan and/or the GeoEngineers Health and Safety Program.

- Personnel will avoid tripping hazards, steep slopes, pits and other hazardous encumbrances.
  - If it becomes necessary to work within 6 feet of the edge of a pit, slope or other potentially hazardous area, appropriate fall protection measures will be implemented by the Site Safety and Health Supervisor in accordance with OSHA/DOSH regulations and the GeoEngineers Health and Safety Program.
- Cold stress control measures will be implemented according to the GeoEngineers Health and Safety Program to prevent frost nip (superficial freezing of the skin), frost bite (deep tissue freezing), or hypothermia (lowering of the core body temperature). Heated break areas and warm beverages shall be available during periods of cold weather.
- Heat stress control measures required for this site will be implemented according to GeoEngineers Health and Safety Program with water provided on site.

6.2. Biological Hazard Mitigation Measures and Procedures

Biological hazards can come in the form of wildlife such as rodents, wild animals, insects and spiders. Each of the hazards can present concerns. Exposure can be minimized by following the measures below:

6.2.1. Rodents and Wildlife

Live animals can inflict wounds and can spread diseases such as Rat Bite Fever and Rabies.

- Avoid contact with wild or stray animals. If bitten or scratched, get medical attention immediately.
- Avoid contact with rats or rat-infested buildings. If you can't avoid contact, wear protective gloves and wash your hands regularly.
- Avoid contact with animal and bird droppings. Particles can become airborne and, if inhaled, cause sickness.
- Report dead animals to the proper authorities so they can be disposed of properly.

6.2.2. Insects, Bees and Spiders

Hazardous inspects and spiders include:

- Mosquitoes: Rain and flooding may lead to increased numbers of mosquitoes, which can carry diseases such as West Nile virus or dengue fever.

- Bee stings: If you receive multiple stings seek help immediately. Watch for signs of allergic reaction to stings, which typically happen within the first few hours.
- Spiders: The black widow and brown recluse are poisonous spiders that hide behind objects and in rubble piles. Their bites can be severe, causing pain, nausea, fever, and breathing difficulty.

Protective Measures include:

- Wear long pants, long sleeves, and socks. Tuck pants into boots or socks to provide an insect barrier.
- Be alert when working around abandoned buildings or debris.
- Wear work gloves, and stay on the lookout for spiders.
- Seek medical attention if bitten by a poisonous spider or deer tick or if you experience severe symptoms.
- Avoid scented soaps and perfumes.
- Don't leave food, drinks, and garbage out uncovered.

6.3. Ergonomic Hazard Mitigation Measures and Procedures

The following sections provide potential ergonomic hazards and how to mitigate these concerns.

6.3.1. Avoiding Lifting Injuries

Back injuries often result from lifting objects that are too heavy or from using the wrong lifting technique. Keep your back healthy and pain-free by following common sense safety precautions.

- Minimize reaching by keeping frequently used items within arm's reach, moving your whole body as close as possible to the object.
- Avoid overextending by standing up when retrieving objects on shelves.
- Keep your back in shape with regular stretching exercises.
- Get help from a coworker or use a hand truck if the load is too heavy or bulky to lift alone.

6.3.2. Proper Lifting Techniques

- Face the load; don't twist your body. Stand in a wide stance with your feet close to the object.
- Bend at the knees, keeping your back straight. Wrap your arms around the object.
- Let your legs do the lifting.
- Hold the object close to your body as you stand up straight. To set the load down, bend at the knees, not from the waist.

6.4. Engineering Controls

- Trench shoring (1:1 slope for Type B Soils).
- Location work spaces upwind/wind direction monitoring.

- Stockpiled soil will be covered as conditions warrant.
- Site controls will be implemented to restrict access to the Site from the general public.

6.5. Chemical Hazards

CHEMICAL HAZARDS AND EXPOSURES (POTENTIALLY PRESENT AT SITE)

Compound/ Description	Exposure Limits/IDLH	Exposure Routes	Symptoms/Health Effects
Gasoline (Unleaded) — clear liquid with a characteristic odor	PEL 300 ppm TLV 300 ppm STEL 500 ppm	Ingestion, inhalation, skin absorption, skin and eye contact	Irritated eyes, skin, and mucous membrane; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; headache; dermatitis
Diesel Fuel — liquid with a characteristic odor	None established by OSHA, but ACGIH has adopted 100 mg/m3 for a TWA (as total hydrocarbons)	Ingestion, inhalation, skin absorption, skin and eye contact	Irritated eyes, skin, and mucous membrane; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; headache; dermatitis
Waste oil – may contain metals, gas, antifreeze and PAHs	Depends on the ancillary contaminants	Ingestion, inhalation, skin absorption, skin and eye contact	Depends on the ancillary contaminants.
Polycyclic aromatic hydrocarbons (PAH) as coal tar pitch volatiles	PEL 0.2 mg/m^3 TLV 0.2 mg/m^3 REL 0.1 mg/m^3 IDLH 80 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Dermatitis, bronchitis, potential carcinogen
Benzene	OSHA PEL 1 ppm Short term: 5 ppm ACGIH PEL 0.5 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritated eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]
Cadmium	PEL 0.005 mg/m3 IDLH 9 mg/m3	respiratory system, kidneys, prostate, blood	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]

Notes:

IDLH = immediately dangerous to life or health
OSHA = Occupational Safety and Health Administration
ACGIH = American Conference of Governmental Industrial Hygienists
TLV = threshold limit value (over 10 hrs.)
ppm = parts per million
mg/m^3 = milligrams per cubic meter
TWA = time-weighted average (over 8 hrs.)
PEL = permissible exposure limit
STEL = short-term exposure limit (15 min)

6.5.1. *Polycyclic Aromatic Hydrocarbons (PAHs) and Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)*

Exposure to cPAHs can occur via inhalation of vapors, ingestion, and skin and eye contact. Skin contact can result in reddening or corrosion. Ingestion can cause nausea, vomiting, blood pressure fall, abdominal pain, convulsions and coma. Damage to the central nervous system can also occur. The U.S. Department of Health and Human Services (1989) has classified 15 PAHs compounds as having sufficient evidence for carcinogenicity, while the U.S. Environmental Protection Agency (EPA) (1990) has classified at least five of the identified PAHs as human carcinogens. There is no currently assigned PEL-TWA for cPAHs, but the closely related material coal tar is listed as coal tar pitch volatiles with a PEL-TWA of 0.2 mg/m^3. PAHs and cPAHs as soil contaminants can be irritating to eyes and mucous membranes. PAHs are also formed during combustion and are linked to lung cancers with exposure to combustion byproducts. Lymphatic cancers are reported in the literature with PAHs in the presence of carbon black.

6.6. Hazards Reporting/Documentation

Update in Daily Report. Include evaluation of:

- *Physical Hazards* (excavations and shoring, equipment, traffic, tripping, heat stress, cold stress and others)
- *Chemical Hazards* (odors, spills, free product, airborne particulates and others present)
- *Biological Hazards* (snakes, spiders, other animals, discarded needles, poison ivy, pollen, bees/wasps and others present)

7.0 AIR MONITORING PLAN

AIR MONITORING, FREQUENCY, LOCATION AND ACTION LEVELS

Contaminant	Activity	Monitoring Device	Frequency of Monitoring Breathing Zone	Action Level	Action
Organic Vapors	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes and in event of odors	Background to 5 ppm in breathing zone	Use Level D or Modified Level D PPE
Organic Vapors	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes and in event of odors	5 to 25 ppm in breathing zone	Upgrade to Level C PPE
Organic Vapors	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes	> 25 ppm in breathing zone	Stop work and evacuate the area. Contact Health and Safety Manager for guidance.

Contaminant	Activity	Monitoring Device	Frequency of Monitoring Breathing Zone	Action Level	Action
Combustible Atmosphere	Environmental Remedial Actions	PID or 4-gas meter	Start of shift; prior to excavation entry; every 30 to 60 minutes	>10% LEL or >1,000 ppm	Stop work and evacuate the site. Contact Health and Safety Manager for guidance.
Oxygen Deficient/ Enriched Atmosphere	Environmental Remedial Actions or Confined Spaces	Oxygen meter or 4-gas meter	Start of shift; prior to excavation entry; every 30 to 60 minutes	<19.5>23.5%	Continue work if inside range. If outside range, evacuate area and contact Health and Safety Manager.

- The workspace will be monitored using a photoionization detector (PID). These instruments must be properly maintained, calibrated and charged (refer to the instrument manuals for details). Zero this meter in the same relative humidity as the area in which it will be used and allow at least a 10-minute warm-up prior to zeroing. Do not zero in a contaminated area. The PID can be tuned to read chemicals specifically if there are not multiple contaminants on-site. It can be tuned to detect one chemical with the response factor entered into the equipment, but the PID picks up all volatile organic compounds (VOCs) present. The ionization potential (IP) of the chemical has to be less than the PID lamp (11.7/10.6eV), and the PID does not detect methane. The ppm readout on the instrument is relative to the IP of isobutylene (calibration gas), so conversion must be made in order to estimate ppm of the chemical on-site.
- An initial vapor measurement survey of the site should be conducted to detect "hot spots" if contaminated soil is exposed at the surface. Vapor measurement surveys of the workspace should be conducted at least hourly or more often if persistent petroleum-related odors are detected. Additionally, if vapor concentrations exceed 5 ppm above background continuously for a 5-minute period as measured in the breathing zone, upgrade to Level C personal protective equipment (PPE) or move to a non-contaminated area.
- Standard industrial hygiene/safety procedure is to require that action be taken to reduce worker exposure to organic vapors when vapor concentrations exceed one-half the TLV. Because of the variety of chemicals, the PID will not indicate exposure to a specific PEL and is therefore not a preferred tool for determining worker exposure to chemicals. If odors are detected, then employees shall upgrade to respirators with Organic Vapor cartridges and will contact the Health and Safety Program Manager for other sampling options.

8.0 SITE CONTROL PLAN

Work zones will be considered to be within the delineated construction area or within 50 feet of any active construction equipment. Employees should work upwind of the machinery if possible. To the extent practicable, use the buddy system. Do not approach heavy equipment unless you are sure the operator sees you and has indicated it is safe to approach. All personnel from

GeoEngineers and subcontractor(s) should be made aware of safety features during each morning's safety tailgate meeting (drill rig shutoff switch, location of fire extinguishers, cell phone numbers etc.). For medical assistance, see Section 3.0 above.

A contamination reduction zone should be established for personnel before leaving the Facility or before breaking for lunches etc. The zone should consist of garbage bags into which used PPE should be disposed. Personnel should wash hands at the Facility before eating or leaving the Facility.

8.1. Traffic or Vehicle Access Control Plans

Traffic entering and exiting the Site will be through controlled access points. Flaggers will be used as necessary to control traffic at the controlled access points. Where flaggers are needed, supervisor must ensure that each flagger has the qualifications, training and equipment necessary to perform assigned task in accordance with the MUTCD. Training must be updated every 3 years. At a minimum, flaggers must have a stop/slow paddle, high visibility clothing, safety shoes, and a hard hat, before approaching any right of way to control traffic.

Site personnel will be instructed to stop and look both ways before crossing any vehicle access point/roadway.

8.2. Site Work Zones

Fencing (chain link, orange construction netting, silt fence or similar), Survey Tape, Traffic Cones, Posted signage and/or barricades will be used to delineate the work zone and excluding non-site personnel from entering the work zone.

Hot/exclusion zones will be established within approximately 10 feet around any open excavation or sampling location. Only persons with the appropriate training will enter this perimeter while work is being conducted there.

A contamination reduction zone will be established just outside the hot/exclusion zone for the decontamination of sampling equipment. Care will be taken to prevent the spread of contamination. Equipment and personnel decontamination are discussed in the following sections, and the following types of equipment will be available to perform these activities:

- Scrub brushes
- Spray rinse applicator
- Plastic garbage bags
- Container of Alconox/water solution and Alconox powder

8.3. Buddy System

Personnel on-site should use the buddy system (pairs), particularly whenever communication is restricted. If only one GeoEngineers employee is on-site, a buddy system can be arranged with subcontractor/contractor personnel.

8.4. Site Communication Plan

Positive communications (within sight and hearing distance or via radio) should be maintained between pairs on site, with the pair remaining in proximity to assist each other in case of emergencies. The team should prearrange hand signals or other emergency signals for communication when voice communication becomes impaired (including cases of lack of radios or radio breakdown). In these instances, you should consider suspending work until communication can be restored. If not, the following are some examples for communication:

- Hand gripping throat: Out of air, can't breathe.
- Gripping partner's wrist or placing both hands around waist: Leave area immediately, no debate.
- Hands on top of head: Need assistance.
- Thumbs up: Okay, I'm all right: or I understand.
- Thumbs down: No, negative.

Communications between field crews is summarized in the following table:

Type of Communication	Primary Means	Back-up Means
Communications with Fire and Emergency Services	Cell phone	Land line
Communications with office	Radio	Cell phone
Emergency/Drills Communications among field crew members	Radios, eye contact, hand signals (equipment operators)	Horns in machinery, portable air horns, flashing lights

8.5. Decontamination Procedures

Decontamination consists of removing outer protective Tyvek clothing and washing soiled boots and gloves using bucket and brush provided on site in the contamination reduction zone. Inner gloves and respirator will then be removed, hands and face will be washed in either a portable wash station or a bathroom facility in the support zone. Employees will perform decontamination procedures and wash prior to eating, drinking or leaving the Site.

Sampling equipment will be decontaminated using wet decontamination procedures:

- Wash and scrub equipment with Alconox/Liquinox and tap water solution
- Rinse with tap water
- Rinse with distilled water
- Repeat entire procedure or any parts of the procedure as necessary.

In addition to wet decontamination procedures, other measures will be taken to prevent cross contamination.

These measures include changing out disposable gloves between each sampling location, using fresh paper towels at each sample location, and maintaining a clean work area. Downhole drilling equipment will be decontaminated using a hot-water, high-pressure washer. Decontamination water will be stored on site in 55-gallon drums.

8.6. Waste Disposal or Storage

Used PPE to be placed in trash containers. Decontamination/well purge water will be placed in on-site drums pending characterization and disposal.

9.0 PERSONAL PROTECTIVE EQUIPMENT

After the initial and/or daily hazard assessment has been completed the appropriate protective personal protective equipment (PPE) will be selected to ensure worker safety. Task-specific levels of PPE shall be reviewed with field personnel during the pre-work briefing conducted prior to the start of site operations. Task-specific levels of PPE shall be reviewed with field personnel during the pre-work briefing conducted prior to the start of site operations.

Site activities may include handling and sampling solid subsurface material (material may potentially be saturated with groundwater). Depth-to-groundwater measurements may be performed as well. Site hazards include potential exposure to hazardous materials, and physical hazards such as trips/falls, heavy equipment, and exposure.

Air monitoring will be conducted to determine the level of respiratory protection.

- Half-face combination organic vapor/high efficiency particulate air (HEPA) or P100 cartridge respirators will be available on-site to be used as necessary. P100 cartridges are to be used only if PID measurements are below the site action limit. P100 cartridges are used for protection against dust, metals and asbestos, while the combination organic vapor/HEPA cartridges are protective against both dust and vapor. Ensure that the PID or TLV will detect the chemicals of concern on-site.
- Level D PPE unless a higher level of protection is required will be worn at all times on the site. Potentially exposed personnel will wash gloves, hands, face and other pertinent items to prevent hand-to-mouth contact. This will be done prior to hand-to-mouth activities including eating, smoking, etc.
- Adequate personnel and equipment decontamination will be used to decrease potential ingestion and inhalation.

Applicable personal protection gear to be used includes:

- Hardhat
- Steel-toed boots (if crushing hazards are a potential or if client requests)
- Safety glasses (if dust, particles, or other hazards are present or client requests)
- Hearing protection (if it is difficult to carry on a conversation 3 feet away)
- Rubber boots (if wet conditions)

- Nitrile gloves
- Tyvek (if dry conditions are encountered, Tyvek is sufficient)
- Cotton clothing
- Rain gear (as needed)
- Layered warm clothing (as needed)

9.1. Personal Protective Equipment Inspections

PPE clothing ensembles designated for use during site activities shall be selected to provide protection against known or anticipated hazards. However, no protective garment, glove or boot is entirely chemical-resistant, nor does any PPE provide protection against all types of hazards. To obtain optimum performance from PPE, site personnel shall be trained in the proper use and inspection of PPE. This training shall include the following:

- Inspect PPE before and during use for imperfect seams, non-uniform coatings, tears, poorly functioning closures or other defects. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Inspect PPE during use for visible signs of chemical permeation such as swelling, discoloration, stiffness, brittleness, cracks, tears or other signs of punctures. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Disposable PPE should not be reused after breaks unless it has been properly decontaminated.

9.2. Respirator Selection, Use and Maintenance

If respirators are required, Site personnel shall be trained before use on the proper use, maintenance and limitations of respirators. Additionally, they must be medically qualified to wear a respiratory protection in accordance with 29 CFR 1910.134. Site personnel who will use a tight-fitting respirator must have passed a qualitative or quantitative fit test conducted in accordance with an OSHA-accepted fit test protocol. Fit testing must be repeated annually or whenever a new type of respirator is used. Respirators will be stored in a protective container.

9.3. Respirator Cartridges

If Site personnel are required to wear air-purifying respirators, the appropriate cartridges shall be selected to protect personnel from known or anticipated site contaminants. The respirator/ cartridge combination shall be certified and approved by the National Institute for Occupational Safety and Health (NIOSH). A cartridge change-out schedule shall be developed based on known site contaminants, anticipated contaminant concentrations and data supplied by the cartridge manufacturer related to the absorption capacity of the cartridge for specific contaminants. Site personnel shall be made aware of the cartridge change-out schedule prior to the initiation of site activities. Site personnel shall also be instructed to change respirator cartridges if they detect increased resistance during inhalation or detect vapor breakthrough by smell, taste or feel, although breakthrough is not an acceptable method of determining the change-out schedule.

9.4. Respirator Inspection and Cleaning

Site personnel shall inspect respirators prior to each use in accordance with the manufacturer's instructions. In addition, site personnel wearing a tight-fitting respirator shall perform a positive and negative pressure user seal check each time the respirator is donned, to ensure proper fit and function. User seal checks shall be performed in accordance with the GeoEngineers respiratory protection program or the respirator manufacturer's instructions.

10.0 ADDITIONAL ELEMENTS

10.1. Cold Stress Prevention

Working in cold environments presents many hazards to site personnel and can result in frost nip (superficial freezing of the skin), frost bite (deep tissue freezing), or hypothermia (lowering of the core body temperature).

The combination of wind and cold temperatures increases the degree of cold stress experienced by site personnel. Site personnel shall be trained on the signs and symptoms of cold-related illnesses, how the human body adapts to cold environments, and how to prevent the onset of cold-related illnesses. Heated break areas and warm beverages shall be provided during periods of cold weather.

10.2. Heat Stress Prevention

State and federal OSHA regulations provide specific requirements for handling employee exposure to heat stress. GeoEngineers' program complies with these requirements and will be implemented in all areas where heat stress is identified as a potential health issue.

General requirements for preventing heat stress apply to outdoor work environments from May 1 through September 30, annually, only when employees are exposed to outdoor heat at or above an applicable temperature listed in the following table. To determine which temperature applies to each worksite, select the temperature associated with the general type of clothing or PPE each employee is required to wear.

Keeping workers hydrated in a hot outdoor environment requires that more water be provided than at other times of the year. GeoEngineers is prepared to supply at least one quart of drinking water per employee per hour. When employee exposure is at or above an applicable temperature listed in the following table, the Project Manager shall ensure that:

- A sufficient quantity of drinking water is readily accessible to employees at all times.
- All employees have the opportunity to drink at least one quart of drinking water per hour.

Type of Clothing	Outdoor Temperature Action Levels (Degrees Fahrenheit)
Non-breathing clothes including vapor barrier clothing or PPE such as chemical resistant suits	52°
Double-layer woven clothes including coveralls, jackets and sweatshirts	77°
All other clothing	89°

10.3. Emergency Response

- Personnel on-site should use the "buddy system" (pairs).
- Visual contact should be maintained between "pairs" on site, with the team remaining in proximity to assist each other in case of emergencies.
- If any member of the field crew experiences any adverse exposure symptoms while on-site, the entire field crew should immediately halt work and act according to the instructions provided by the Site Safety and Health Supervisor.
- Wind indicators visible to all on-site personnel should be provided by the Site Safety and Health Supervisor to indicate possible routes for upwind escape. Alternatively, the Site Safety and Health Supervisor may ask on-site personnel to observe the wind direction periodically during site activities.
- The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should result in the evacuation of the field team, contact of the PM, and reevaluation of the hazard and the level of protection required.
- If an accident occurs, the Site Safety and Health Supervisor and the injured person are to complete, within 24 hours, an Accident Report for submittal to the PM, the Health and Safety Program Manager and Human Resources. The PM should ensure that follow-up action is taken to correct the situation that caused the accident or exposure.

11.0 MISCELLANEOUS

11.1. Personnel Medical Surveillance

GeoEngineers employees are not in a medical surveillance program because they do not fall into the category of "Employees Covered" in OSHA 1910.120(f)(2), which states a medical surveillance program is required for the following employees:

1. All employees who are or may be exposed to hazardous substances or health hazards at or above the permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year;
2. All employees who wear a respirator for 30 days or more a year or as required by state and federal regulations;

3. All employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation; and
4. Members of HAZMAT teams.

11.2. Spill Containment Plans (Drum and Container Handling)

Contractors or subcontractors will be responsible for developing and implanting Spill Prevention and Containment Plans for use during Site work.

11.3. Sampling, Managing and Handling Drums and Containers

Drums and containers used during the cleanup shall meet the appropriate Department of Transportation (DOT), OSHA and U.S. Environmental Protection Agency (EPA) regulations for the waste that they contain. Site operations shall be organized to minimize the amount of drum or container movement. When practicable, drums and containers shall be inspected and their integrity shall be ensured before they are moved. Unlabeled drums and containers shall be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled. Before drums or containers are moved, all employees involved in the transfer operation shall be warned of the potential hazards associated with the contents.

Drums or containers and suitable quantities of proper absorbent shall be kept available and used where spills, leaks or rupture may occur. Where major spills may occur, a spill containment program shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred. Fire extinguishing equipment shall be on hand and ready for use to control incipient fires.

11.4. Entry Procedures for Tanks or Vaults (Confined Spaces)

GeoEngineers employees shall not enter confined spaces to perform work unless they have been properly trained and with hands-on experience in the use of retrieval equipment. If a project requires confined space entry, please include a copy of the confined space permit and include the training documentation in this HASP.

Trenches greater than 4 feet in depth with the potential for buildup of a hazardous atmosphere are considered confined spaces.

11.5. Sanitation

Washrooms will be available for use during Site work.

11.6. Lighting

Site activities will be conducted during daylight hours. Artificial lighting will be used as necessary if work is conducted after daylight hours.

11.7. Excavation, Trenching and Shoring

All employees working on project sites where there is an excavation greater than 4 feet in depth shall be trained in excavation safety and shall utilize safe procedures. OSHA designates a 5-foot

depth for instituting excavation safety procedures; however GeoEngineers will use the more conservative depth of 4 feet as specified by states such as Washington, Oregon and California. This program is for the protection of employees while working in excavations; however, employees should not enter excavations if there is an alternative.

GeoEngineers employees often do not have stop work authority on projects controlled by other contractors. However, any GeoEngineers employee, regardless of job title, working in the field will be responsible for contacting the Project Manager if they observe practices on the job site that are serious safety violations that are not under their control. They will document the unsafe practices and will contact the site safety coordinator as identified by the client. If no one is on site, the Project Manager, once notified, will contact the client. This action establishes GeoEngineers' commitment to site health and safety on all job sites as our duty of care to the public, contractors and clients.

GeoEngineers is responsible for its subcontractors and will also be providing inspections and corrections of any work that subcontractors perform around excavations.

12.0 DOCUMENTATION TO BE COMPLETED FOR HAZWOPER PROJECTS

The following forms are required for Hazardous Waste Operations and Emergency Response (HAZWOPER) projects:

- Field Log
- Health and Safety Plan acknowledgment by GeoEngineers employees (Form 2)
- Contractors Health and Safety Plan Disclaimer (Form 3)
- Conditional forms available at GeoEngineers office: Accident Report

The Field Report is to contain the following information:

- Updates on hazard assessments, field decisions, conversations with subcontractors, client or other parties, etc.;
- Air monitoring/calibration results, including: personnel, locations monitored, activity at the time of monitoring, etc.;
- Actions taken;
- Action level for upgrading PPE and rationale; and
- Meteorological conditions (temperature, wind direction, wind speed, humidity, rain, snow, etc.).

13.0 REFERENCES

GeoEngineers, Inc. (GeoEngineers, 2014), "Engineering Design Report, Former Shell Oil Tank Farm Site, Anacortes, Washington," GEI File No. 5147-012-04, dated June 4, 2014.

Washington State Department of Ecology (Ecology, 2014). "Cleanup Action Plan (CAP), Former Shell Oil Tank Farm Site, Anacortes, Washington," dated February 3, 2014.

FORM 1
HEALTH AND SAFETY PRE-ENTRY BRIEFING
FORMER SHELL OIL TANK FARM SITE
FILE NO. 5147-012-04

Inform employees, contractors and subcontractors or their representatives about:

- The nature, level and degree of exposure to hazardous substances they're likely to encounter;
- All site-related emergency response procedures; and
- Any identified potential fire, explosion, health, safety or other hazards.

Conduct briefings for employees, contractors and subcontractors, or their representatives as follows:

- A pre-entry briefing before any site activity is started; and
- Additional briefings, as needed, to make sure that the Site-specific HASP is followed.

Make sure all employees working on the Site are informed of any risks identified and trained on how to protect themselves and other workers against the Site hazards and risks

Update all information to reflect current sight activities and hazards.

All personnel participating in this project must receive initial health and safety orientation. Thereafter, brief tailgate safety meetings will be held as deemed necessary by the Site Safety and Health Supervisor.

The orientation and the tailgate safety meetings shall include a discussion of emergency response, Site communications and site hazards.

Company Employee

Date	Topics	Attendee	Name	Initials

FORM 2
SITE SAFETY PLAN – GEOENGINEERS' EMPLOYEE ACKNOWLEDGMENT
FORMER SHELL OIL TANK FARM SITE
File No. 5147-012-04

All GeoEngineers' Site workers shall complete this form, which should remain attached to the Safety Plan and filed with other project documentation.

I hereby verify that a copy of the current Safety Plan has been provided by GeoEngineers, Inc., for my review and personal use. I have read the document completely and acknowledge an understanding of the safety procedures and protocol for my responsibilities on Site. I agree to comply with all required, specified safety regulations and procedures.

Print Name	Signature	Date

FORM 3
SUBCONTRACTOR AND SITE VISITOR SITE SAFETY FORM
FORMER SHELL OIL TANK FARM SITE
FILE NO. 5147-012-04

I verify that a copy of the current Site Safety Plan has been provided by GeoEngineers, Inc. to inform me of the hazardous substances on Site and to provide safety procedures and protocols that will be used by GeoEngineers' staff at the Site. By signing below, I agree that the safety of my employees is the responsibility of the undersigned company.

Print Name	Signature	Firm	Date

ATTACHMENT 2
Cultural Resources Assessment

A Cultural Resource Assessment for the Shell Oil Tank Farm Remedial Excavation Project Skagit County, WA

Prepared for
Port of Anacortes
100 Commercial Street
Anacortes, WA 98221

Prepared by:
Columbia Geotechnical Associates, Inc.
16541 Redmond Way
Suite 244C
Redmond, WA 98052

Authors:
Brett Lenz, PhD
Marcia Montgomery
Jim McNett

Cultural Resource Assessment for the Shell Oil Tank Farm
Remedial Excavation Project
Skagit County, WA

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1.0 Introduction

Project Description and Area of Potential Effect

The Port of Anacortes (Port) plans a cleanup of the Former Shell Oil Tank Farm Site (Site). The Site is formally referenced in the Washington State Department of Ecology (Ecology) databases as the Former Shell Oil Tank Farm Site (Ecology Facility Site Identification No. 4781157) and is generally located between 13th and 14th Street east of Commercial Avenue in Anacortes, Washington (Figure 1). The cleanup action is being conducted by the Port of Anacortes (Port) under a Washington State Department of Ecology (Ecology) consent decree. Ecology is managing the Site as part of the Fidalgo and Padilla Bay component of their Puget Sound Initiative program.

Cleanup activities are being performed by the Port to address petroleum hydrocarbon, carcinogenic polycyclic aromatic hydrocarbon (cPAHs), volatile organic compound (benzene) and metal (cadmium) contamination in soil that has resulted from historical uses of the property at which the Site is located. Cleanup activities are being completed pursuant to the Cleanup Action Plan (CAP; Ecology, 2014b) and Consent Decree. Site cleanup construction work is anticipated to occur over a period of approximately 3 months beginning in the fall of 2014.

2.0 Research Methods

Columbia Geotechnical Associates (CGA) conducted archaeological, ethnographic and historical literature review of local and regional source material at the Anacortes Museum, Anacortes Public Library, Anacortes Building Department, the Port of Anacortes and online sources. Background record searches included a review of the historic and archaeological site files on the Department of Archaeology and Historic Preservation's Washington Information System for Architectural and Archaeological Research Data (WISAARD) database, a review of early General Land Office maps, county atlases, early plat maps, historical aerial photographs and published local histories, project soil logs and photos.

Archaeological investigation of the nearby sites included an overview of the project area based on the Department of Archaeology and Historic Preservation (DAHP) archaeological records and consideration of prior archaeological research in the vicinity of the project area.

3.0 Cultural Overview

Archaeological Overview

The first human occupation of Washington State may date back about 14,000 years to the Manis Mastodon site at Sequim, where a possible bone point and the spirally fractured bones of a mastodon suggest human hunting and butchering (Gustafson et al. 1979). The next phase of human occupation in Washington was between 13,000 and 13,500 years ago and referred to as the Clovis culture. There have been a few isolated locales in southern and central Puget Sound, but no campsite of this culture has yet been found in Washington. Following the Clovis period, there are the Early (approximately 12,000 to 7,000 years ago), then the Middle (7,000 to 3,500 years ago) and Late (3,500 to 150 years ago) periods. Sites deposited during the Early period, typically occur on high marine and river terraces, sometimes at a significant distance from modern water courses, and consist of concentrations of cobble cores, flakes, large ovate knives, and broad-stemmed and leaf-shaped projectile points (Wessen 1990).

Figure 1. Map showing the location of the Project Area

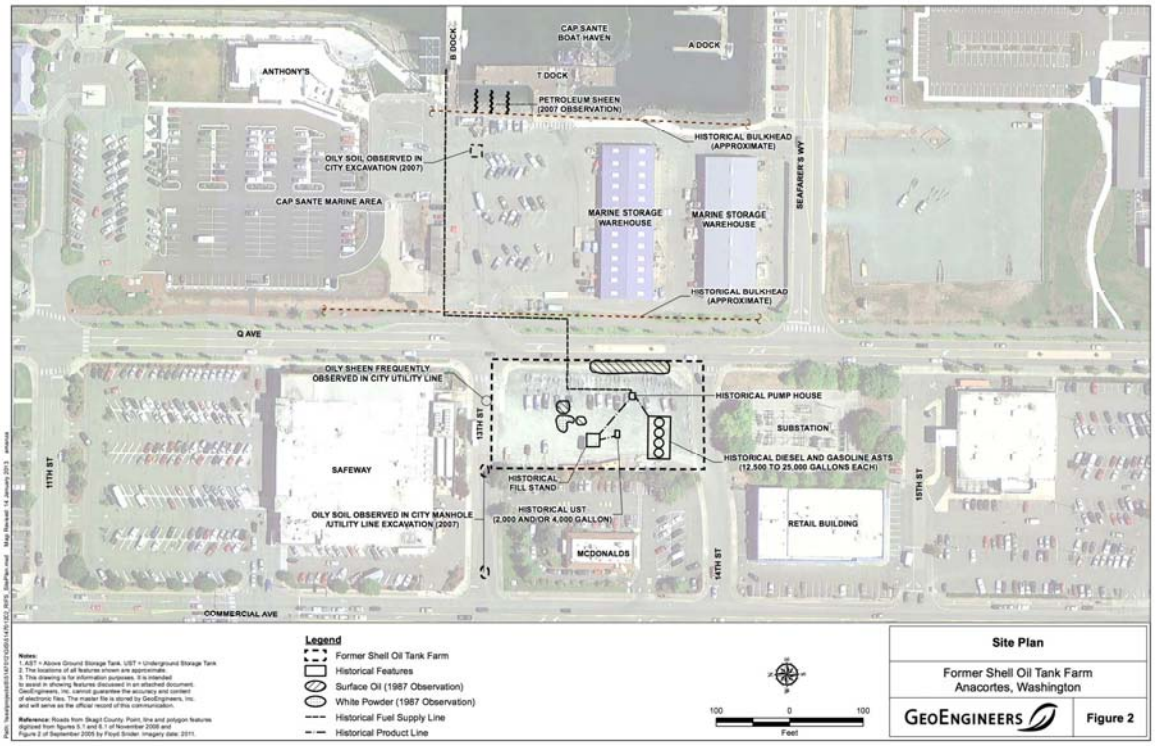

Figure 2. Aerial photograph showing the Shell Oil Tank Farm and adjacent area.

Eustatic Sea Level rise continued through the Early period into the Middle period, eventually stabilizing between 7-5 thousand years ago. This period of time marks a significant shift in the overall environmental scheme which allowed for the establishment of a concentrated littoral adaptation. Archaeological evidence defining this period is seen in significant, widely spread changes in subsistence economy and residential patterns. Few, yet persistent lanceolate points, not uncommon in Olcott assemblages are present during this time and ground stone, bone and antler tools, and smaller, triangular projectile points are common.

During the Late Period (3,500 to 150 years ago) human lifeways changed radically, as people focused increasingly on aquatic resources; the number and diversity of sites markedly increased. People maintained permanent villages on the coast and along the lower reaches of inland rivers (Chatters 1989; 1990). They used these as home bases and storage warehouses for fish, shellfish, game, and plant foods systematically gathered during the warmer seasons. Shell-middens built up in coastal settings (Grabert 1988). Cemeteries are found adjacent to larger villages, midden sites, and fishing camps and petroglyph sites occasionally occur in higher upland environments. Small camps, left by hunters, fishers, plant gatherers, and traders are found from the lowlands well into the mountains, but usually remain close to larger, permanent sources of water. Typically, these sites are located along trade routes that linked communities living east and west of the Cascades (Burtchard 2003). Open, temporary camps, occurring as lithic scatters, are common in these settings. Blazed cedars, stripped of bark in order to make basketry or with planks removed from the base of their trunks, are still found in the lowlands (Gunther 1973). Ethnographic records indicate that the Samish occupied the shoreline areas of Guemes Channel. In 1792 explorers noted two large houses on Guemes Island near the present day ferry landing. Known as *SWHAH-ee-melh*, this site became so popular many moved to *keh-LEH-tseelch* (ironwoods) located on the Fidalgo Island side of Guemes Channel. This latter village was settled in the early 1800s. At the

present town of Fidalgo, another place named *kwuh-kwulh-AW'k-awl* (camas) was used as a camp site while the Samish harvested camas from the prairie at the head of the bay. By the mid 1800s, four large houses reportedly occupied this site (Dailey 2013).

Historical Overview

Permanent non-Indian settlement began on Fidalgo Island in the 1860s. An 1872 General Land Office map shows no structures or other cultural features in the project area (General Land Office 1872). The U.S. Geodetic Survey produced a map in 1886 that depicts the low land northeast of the project area stretching between the Guemes Channel and Cap Sante Waterway as wetlands. East of the wetland at the shoreline was a building. The location of this early building was northeast of the project area (Gilbert 1886). The Seattle & Western Railroad planned to build a railroad between Sedro-Woolley and Anacortes, which encouraged settlement and platting of the community occurred by 1889. The original plat map for Anacortes shows the project area in Bowman's Central Ship Harbor Addition, named for Amos Bowman, the city's great promoter, who established Skagit County's first large lumber mill in Anacortes (Bowman 1890 and Carter 2011).

Incorporated in 1891, Anacortes with its waterside location became an important port community that included considerable industrial development along the shoreline. The railway line, eventually owned by Great Northern Railway, generally paralleled Guemes Channel at the north end of Fidalgo Island. The areas adjacent to the line were the first to develop industries thanks to the benefit of water and rail transportation. Fishing, canning, logging and lumber were the leading industries. Many of the lumber mills specialized in making shooks or thin sheets of wood that formed crates for carrying anything from fruit to oil cans. These lumber and box mills thrived from the late 1800s until the 1940s when corrugated cardboard boxes took their place.

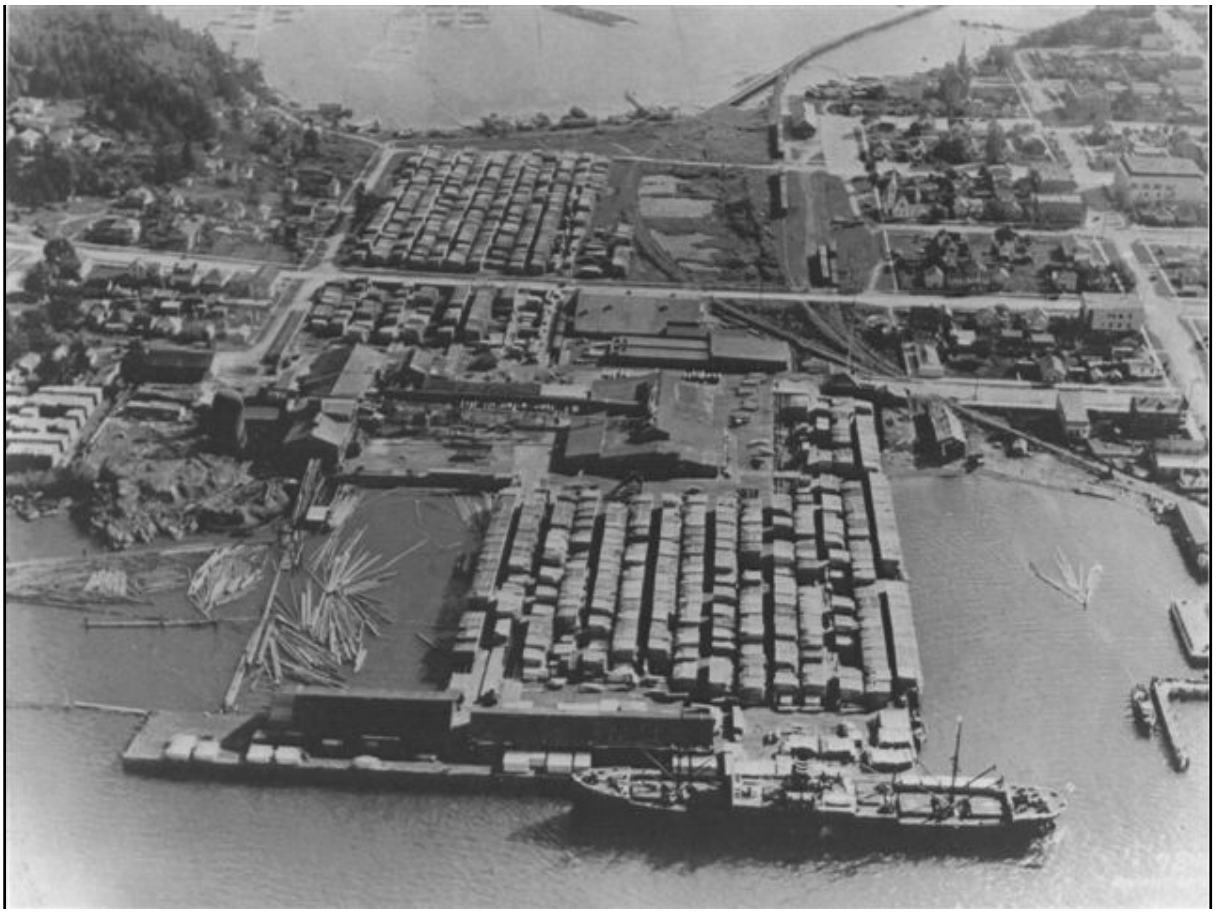

Figure 3. This 1917 aerial photograph shows the Anacortes Lumber and Box Company mill along the waterfront of Guemes Channel. The project area is to the right (southwest) of this photograph (courtesy of Port of Anacortes).

4.0 Previous Study and Literature Review Findings

This section includes a brief description of the known archaeological and historical resources identified within the project area as well as a synopsis of related, nearby cultural resources studies. The Shell Oil Tank Farm property is located south of the industrial development area of the Anacortes shoreline along Guemes Channel (Figure 3). The property is located within the limits of the City of Anacortes and is a rectangular parcel of land approximately 200x150 feet in size. It is flanked by retail and industrial properties on all sides.

Archaeological Resources

Archaeological resources are known to exist along the historical Anacortes shoreline. Large midden sites representing winter villages and smaller sites related to camping and shellfish processing are common in similar settings. Archaeological sites are recorded within a 2 mile radius from the Project area but no recorded sites are known to exist on or immediately adjacent to the Shell Oil Tank Farm property. The nearest recorded sites include shell midden sites 45SK13 (Bryan 1953), located at the Guemes Island ferry dock; 45SK43 (Bryan 1954a; Moura 2003; Schalk 2004; Trost 2005), located approximately 1.5 to 2 mi. southeast of the Project; 45SK44 (Bryan 1954b; Conca 1985), located just over 2 mi. southeast of the

Project; and 45SK294 (Barsh 2003), located around 0.75 mi southwest of the Project.

Results of Previous Cultural Resource Studies at Adjacent Properties

In 2007, Landau Associates conducted a cultural resources survey for the Ports Cap Sante Marine clean-up project area located immediately east of the Shell project area. The project consisted of geotechnical borings to identify the extent of soil contaminated with "gasoline-range petroleum hydrocarbons and associated constituents" (Goetz et al. 2007). Although the sediments included sands with shell fragments and decomposing wood remnants, no cultural resources were identified during this project. Archaeological monitoring conducted by Historic Research Associates (HRA) during the removal of contaminated soils at the Cap Sante Marine clean-up project area identified one archaeological site (a former bulkhead; Site 45SK371). The site was characterized by pilings and associated features observed in dredged fill soils, as well as loose fragments of wood, glass fragments, and a rubber tire inner tube and tire fragment (Gilpin and Thompson 2008). Due to the previous disturbance of the surrounding soil, HRA determined that the site was not eligible for the National Register of Historic Places (NRHP). No other archaeological materials of historical significance were identified.

In 2009, archaeological investigations associated with Port of Anacortes redevelopment activities resulted in the identification of archaeological sites SK00411 and SK00410 (Gilpin 2009) 10 blocks north of the Shell project area. Site SK00411 consisted of a shell midden with historic industrial features and site SK00410 included the remnants of a pre 1959 shipway used for moving ships on land (Gilpin et al. 2009). Both of these sites are located along the shoreline. In 2003, the Wyman's Marina (historically known as Robinson Marina) was inventoried as part of a neighborhood inventory project and determined not eligible for the National Register of Historic Places (NRHP).

In 2012 Cultural Resource Consultants conducted a cultural resources assessment for MJB Properties, LLC prior to development of an outdoor dry boat storage facility at 2801 T Avenue in Anacortes, Washington (Hartmann 2012). No archaeological or historic resources were identified in the project area, which was considered to have low potential for intact, buried cultural deposits. It was recommended by Cultural Resources Consultants that the project proceed as planned without further consideration for cultural resources.

Historic Research Associates (Thompson 2009) considered the potential effects on archaeological resources at a Port of Anacortes Scott Mill remediation project immediately east of the Shell project area. They identified the zone of highest potential as lying between the historic, disturbed surface sediments and the underlying glacial sediment in areas proximal to the modern and old shorelines. HRA and Columbia Geotechnical Associates (Lenz (2010) conducted archaeological monitoring of these areas and did not identify archaeological material.

Together, these surveys indicate that archaeological resources exist in some places along the shoreline areas of Anacortes, but they are presently unknown from the Shell Tank farm project. Similarly, Historic buildings are present in the uplands away from the shore, but none are located on the Shell Oil Tank Farm property.

5.0 Review of Project Area Soil Boring Logs

CGA reviewed the logs of 38 borings within the ranging from 12 to 20 feet below ground surface. No conclusive evidence of buried cultural resources is present in the boring logs.

6.0 Conclusions and Recommendations

Several cultural resource studies have been completed documenting archaeological, ethnographic and historical findings in the near vicinity of the Former Shell Oil Tank Farm project area. Boring logs for the project site and the results of previous survey work (described above) suggest that the project area is comprised of historic-era fill. Geotechnical investigations at the project site documented extensive fill deposits in the project area from filling activities completed in the late 1920s. The presence of deep fill deposits on the tidelands and in the bay makes the archaeological potential of the project area very low, particularly so as the distance to the old shoreline increases. Such disturbances limit the possibility of identifying intact archaeological deposits.

In the unlikely event of the inadvertent discovery of archaeological materials or human remains, work should be immediately halted in the area, the discovery covered and secured against further disturbance, and contact initiated with law enforcement personnel, the DAHP State Physical Anthropologist, and authorized representatives of the concerned Indian Tribes.

7.0 References

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ATTACHMENT 3
State Environmental Policy Act (SEPA) Checklist

NOTICE OF DETERMINATION OF NON-SIGNIFICANCE (DNS)

Project Name: Former Shell Oil Tank Farm Site Cleanup Action

Location: The project site is generally located between 13th and 14th Streets and along Q Avenue, Section 19, Township 35 North, Range 2 East in Anacortes, Skagit County, Washington.

Proponent: Port of Anacortes

Description of Proposal:

The Port of Anacortes (Port) proposes to implement cleanup of a 0.6 acre upland property at the former Shell Oil Tank Farm site located within the City of Anacortes. Elevated levels of petroleum hydrocarbons, benzene, carcinogenic polynuclear aromatic hydrocarbons (cPAHs), and cadmium have been identified in soils on the site and are the result of historic uses of the property. The site is currently covered with a compact crushed gravel surface and used as a short-term parking area for vehicles and boat trailers associated with Cap Sante Marina. The site has been investigated under an agreed order from the Department of Ecology (Ecology), and a Remedial Investigation (RI) and Feasibility Study (FS) have been prepared under requirements of the Model Toxics Control Act (MTCA). The Port, in cooperation with Ecology, has prepared a Draft Cleanup Action Plan (DCAP), which describes the proposed cleanup project. Cleanup of the site is expected to last for approximately eight weeks, and after the project is complete, the site will be returned to the existing use as a short-term parking area. The project elements include:

- Excavate and remove approximately 3,000 cubic yards (cy) of contaminated soil and an additional approximately 1,000 cy of overburden from the site. Due to lack of space for separation of materials, excavated materials are expected to be transported off site for disposal at a permitted facility, in accordance with applicable regulations and disposal facility requirements.

- The areas where residual soil contamination remains in-place will be addressed by treatment with an oxygen-releasing material during backfilling activities, confirmation monitoring of groundwater, engineering controls (e.g. protective concrete, asphalt, or topsoil caps) and institutional controls (e.g. property covenants, signage, or other notification).

- Restore/finish upland ground surfaces with clean imported fill and crushed rock surfacing.

- Existing utility infrastructure (power, phone, sewer, water, etc.) on and adjacent to the site would remain undisturbed and protected in place during cleanup activities.

- To verify that the cleanup action is protective of groundwater, groundwater will be sampled via existing or replacement monitoring wells on a quarterly basis for four consecutive quarters. Additional groundwater sampling may be necessary if initial monitoring indicates the potential for contaminant transfer to groundwater.

Lead Agency: The lead agency under the State Environmental Policy Act is the Port of Anacortes.

Determination: As lead agency, the Port has determined that this proposal will not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed SEPA environmental checklist and other supporting documents. This information is available to the public on request, and is available for review at the Port's administrative offices located at 100 Commercial Ave., Anacortes WA, 98221. The Port's office is open 8:00 AM to 5:00 PM on weekdays. The SEPA Checklist and complete DNS can also be reviewed on the Port's website: www.portofanacortes.com.

Comment Period: This DNS is issued under WAC 197-11-340; the lead agency will not act on this proposal for 30 days from the date of publication listed below. Agencies, Tribes, and members of the public are invited to comment on the DNS. Written comments must be received within the thirty day period at the address provided below:

Becky Darden, Project Manager
Port of Anacortes
100 Commercial Ave.
Anacortes, WA 98221

Comments may also be submitted to the Port by E-mail: becky@portofanacortes.com

Comments will not otherwise be accepted by telephone or personal conversation.

Concurrent public comment period under MTCA: The Department of Ecology is inviting comments on the drafts of the DCAP, Consent Decree, RI and FS, and Public Participation Plan for this site. The DCAP describes the recommended cleanup and restoration actions for the Site and follow-up monitoring requirements. Additional information about the MTCA process and public comment period may be found at: https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=4846.

Publication date: December 6, 2013

Signed and dated this 4th day of December, 2013 by Robert W. Hyde, Port of Anacortes SEPA Responsible Official

SIGNED: 

Robert W. Hyde
Port of Anacortes SEPA Responsible Official

STATE ENVIRONMENTAL POLICY ACT (SEPA) CHECKLIST

A. BACKGROUND

1. **Name of proposed project, if applicable:**

   Former Shell Oil Tank Farm Site Cleanup Action

2. **Name of applicant:**

   Port of Anacortes

3. **Address and phone number of applicant and contact person:**

   Becky Darden
   Project Manager
   Port of Anacortes
   100 Commercial Ave.
   Anacortes, WA 98221
   (360) 299-1831

4. **Date checklist prepared:**

   December 03, 2013

5. **Agency requesting checklist:**

   Port of Anacortes

6. **Proposed timing or schedule (including phasing, if applicable):**

   Implementation of the cleanup action (construction of the project) is anticipated to begin in third quarter of 2014.

7. **Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.**

   No.

8. **List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.**

   - GeoEngineers, Inc. 2013. Draft Remedial Investigation and Feasibility Study. Former Shell Oil Tank Farm, prepared for the Washington Department of Ecology on behalf of the Port of Anacortes, January 17, 2013.
   - Washington Department of Ecology, Draft Cleanup Action Plan (DCAP), Former Shell Oil Tank Farm, April 19, 2013.

9. **Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.**

   None are known.

10. **List any government approvals or permits that will be needed for your proposal, if known.**

    The proposed action will be conducted as a remedial action under a Consent Decree with the Washington Department of Ecology (Ecology) within the authority of the state Model Toxics Control Act (MTCA). The proposed action is exempt from the procedural requirements of state and local permits that would otherwise be required, per RCW 70.105D.090. However, the proposed action is required to demonstrate substantive compliance with appropriate state and local permits. These may include: City of Anacortes building and construction permits, including grading and drainage approvals.

11. **Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)**

    The Port of Anacortes (Port) proposes to implement cleanup of a 0.6 acre upland property at the former Shell Oil Tank Farm site generally located between 13th and 14th Streets and along Q Avenue within the City of Anacortes. Elevated levels of petroleum hydrocarbons, benzene, carcinogenic polynuclear aromatic hydrocarbons (cPAHs), and cadmium have been identified in soils on the site and are the result of historic uses of the property. The site is currently covered with a compact crushed gravel surface and used as a short-term parking area for vehicles and boat trailers associated with Cap Sante Marina. The site has been investigated under an agreed order from Ecology, and a Remedial Investigation (RI) and Feasibility Study (FS) have been prepared under requirements of the MTCA. The Port, in cooperation with Ecology, has prepared a DCAP, which describes the proposed cleanup project. Cleanup of the site is expected to last for approximately eight weeks, and after the project is complete, the site will be returned to the existing use as a short-term parking area. The project elements include:

    - Excavate and remove approximately 3,000 cubic yards (cy) of contaminated soil and an additional approximately 1,000 cy of overburden from the site. Due to lack of space for separation of materials, excavated materials are expected to be transported off site for disposal at a permitted facility, in accordance with applicable regulations and disposal facility requirements.

    - The areas where residual soil contamination remains in-place will be addressed by treatment with an oxygen-releasing material during backfilling activities, confirmation monitoring of groundwater, engineering controls (e.g. protective concrete, asphalt, or topsoil caps) and institutional controls (e.g. property covenants, signage, or other notification).

    - Restore/finish upland ground surfaces with clean imported fill and crushed rock surfacing.

    - Existing utility infrastructure (power, phone, sewer, water, etc.) on and adjacent to the site would remain undisturbed and protected in place during cleanup activities.

    - To verify that the cleanup action is protective of groundwater, groundwater will be sampled

via existing or replacement monitoring wells on a quarterly basis for four consecutive quarters. Additional groundwater sampling may be necessary if initial monitoring indicates the potential for contaminant transfer to groundwater.

12. **Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.**

The project site is generally located between 13th and 14th Street and along Q Avenue, in Anacortes, Skagit County, Washington. Section 19, Township 35 North, Range 2 East. Vicinity maps and site plans are presented on Sheets 1 and 2.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. **General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other . . . . .**

b. **What is the steepest slope on the site (approximate percent slope)?**

The site is flat.

c. **What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.**

Most of the upland area consists of multiple layers of historic fill that have been deposited on top of native glacial deposits and marine sediments. The fill material consists of fine to medium sand with varying amounts of silt and gravel. Detailed soil sampling and characterization was conducted as part of the RI for the proposed cleanup action. Petroleum hydrocarbons, cPAHs, benzene, and/or cadmium have been found in soil at the site above Washington State cleanup levels. These contaminated soils have been identified for remediation as part of the cleanup action.

d. **Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.**

Portions of the general project area are identified as geologically hazardous on the City of Anacortes' Natural Resource and Critical Areas maps. This designation is due to historic filling in the area, which means the site could be susceptible to liquefaction or subsidence during a major seismic event.

e. **Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.**

Approximately 4,000 cy of soil and overburden materials will be removed and will be hauled off site. Approximately 4,000 cy of clean soil will be used on site as backfill. Backfilling of excavated areas will be performed to restore existing grades. Grading of the disturbed upland areas of the site will occur after cleanup activities are complete, in order to restore grades at the site, restore crushed rock surfacing, and to return the site to the existing use as a parking area.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Erosion is not expected due to the focused area and scope of excavation activities and the flat topography of the site. The site is currently not vegetated.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

The site is currently covered with a surface of compacted gravel. No change in impervious surfaces is proposed. After backfilling, the site will be restored with similar surface material and will return to use as a parking area.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Contractors will be required to implement Best Management Practices (BMPs) for erosion control during active construction and excavation consistent with Ecology's Stormwater Management Manual for Western Washington. These may include covering of stockpiles and prevention of soils from entering storm drains through the use of fabric filter fences, straw bales, interceptor swales, check dams, and/or similar measures.

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Short term air emissions are expected to be limited to diesel and gasoline engine emissions from trucks and other heavy equipment being used for excavation, backfilling, and grading.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No. Sources of emissions in the planning area include refineries, industrial and commercial operations, and vehicle traffic on streets and highways which would not affect the proposed project.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

None are proposed.

3. Water

a. **Surface:**

1) **Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**

No surface water body is directly adjacent to the site.

2) **Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

No work is proposed within 200 feet of the nearest surface water, Fidalgo Bay.

3) **Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

No dredging or filling of surface waters or wetland is proposed.

4) **Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.**

No.

5) **Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.**

No.

6) **Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

Discharges to surface water during the cleanup are not anticipated.

b. **Ground:**

1) **Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.**

Groundwater conditions at the site suggest that soil excavations extending below approximately 3 to 6 feet below ground surface will encounter groundwater. Construction dewatering may be required during deeper excavations to facilitate excavations and reduce the water content of excavated soils. If necessary, water collected during dewatering activities may be stored in tanks prior to disposal in the sanitary sewer. If necessary, the water will be treated prior to disposal to comply with sanitary sewer discharge standards.

2) **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the system,**

the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

Not applicable.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Stormwater collection from the site will be through the existing catch basins and piping on and adjacent to the site, with eventual discharge via existing stormwater outfalls to Fidalgo Bay.

2) Could waste materials enter ground or surface waters? If so, generally describe.

There is a small potential that waste materials could enter ground or surface waters due to an accidental spill during construction.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Care will be taken to prevent any petroleum products, chemicals, or other toxic materials from entering the water. Contractors will be required to have spill response plans and will have spill kits, absorbent pads and other appropriate materials necessary to contain and clean up an accidental spill at the site.

4. Plants

a. Check or circle types of vegetation found on the site:

_____ deciduous tree: alder, maple, aspen, other
_____ evergreen tree: fir, cedar, pine, other
_____ shrubs
_____ grass
_____ pasture
_____ crop or grain
_____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
_____ water plants: water lily, eelgrass, milfoil, other: macroalgae
_____ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

There is no significant vegetation on the site. An existing strip of street landscaping adjacent to the site along Q Avenue will remain in place.

c. **List threatened or endangered species known to be on or near the site.**

None are known.

d. **Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:**

None is proposed. The site is a gravel parking lot and will be returned to the same use after the cleanup is complete.

5. **Animals**

a. **Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:**

Observed birds and animals-

birds: hawk, heron, eagle, songbirds, gulls, common loon, Brandt's cormorant, osprey, great blue heron
fish: salmon, bull trout, crab

Several bald eagle nesting territories occur in the vicinity, primarily near Fidalgo Bay, West Guemes Channel and Guemes Island. A great blue heron nesting colony is on March's Point approximately 4 miles southeast of the site. Several osprey nesting territories also occur in the Anacortes area, but these are located more than one mile inland. Numerous waterfowl and shorebirds also use the area, primarily in the winter and during migration.

b. **List any threatened or endangered species known to be on or near the site.**

Federally listed or threatened species that may occur in the adjacent Fidalgo Bay area include the Puget Sound Chinook salmon, Puget Sound Steelhead, Coastal-Puget Sound Bull Trout, Marbled Murrelet, Southern Resident Orca, Stellar Sea Lion, Humpback Whale, and Leatherback Sea Turtle.

c. **Is the site part of a migration route? If so, explain.**

The site is not part of a migration route.

d. **Proposed measures to preserve or enhance wildlife, if any:**

The cleanup site is an existing gravel parking area in downtown Anacortes, with no habitat value. Following the cleanup action, it will be returned to its present use. No impacts to wildlife are anticipated, and no mitigation measures are proposed.

6. **Energy and natural resources**

a. **What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.**

Both electrical and fossil fuel sources will be required to operate construction equipment at the site.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

None are proposed.

7. Environmental health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

Potential discharges to stormwater and potentially surface waters during the cleanup include accidental spills or leakage of petroleum products from construction equipment used during the project. The contractor will be required to prepare a health and safety plan for work in areas where it is expected that contaminated soils may be encountered.

1) Describe special emergency services that might be required.

No special emergency service requirements are anticipated.

2) Proposed measures to reduce or control environmental health hazards, if any:

Implementation of a contractor spill control plan and BMPs will minimize risks of accidental spills during construction. The contractor(s) will be required to prepare and implement a health and safety plan for work associated with site cleanup. Within contaminated areas, all workers will be required to have current HAZMAT handling training and equipment.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

Existing noise will not affect the project.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Construction noise associated with a variety of construction equipment will occur. This could include truck engines, generators and other small engines, excavators, backhoes, and other heavy equipment. Construction would occur during normal working hours (Monday through Friday, 7 AM to 10 PM). The project will comply with environmental noise standards set by the State of Washington, WAC 173-60, which

establishes limits on the level and duration of noise crossing property boundaries. Temporary construction noise is exempt from state noise limits during daytime hours, per WAC 173-60-050(3)(a).

3) **Proposed measures to reduce or control noise impacts, if any:**

Construction activities will be carried out in a manner consistent with the City Municipal Code and State environmental noise standards.

8. **Land and shoreline use**

a. **What is the current use of the site and adjacent properties?**

The site is currently used as a short-term parking area for vehicles and trailers associated with Cap Sante Marina. Adjacent properties include an electrical sub-station, commercial and retail uses.

b. **Has the site been used for agriculture? If so, describe.**

No, the site was the location of the former Shell Oil Tank Farm.

c. **Describe any structures on the site.**

There are currently no structures on the site.

d. **Will any structures be demolished? If so, what?**

No.

e. **What is the current zoning classification of the site?**

Commercial.

f. **What is the current comprehensive plan designation of the site?**

The City of Anacortes 2012 Comprehensive Plan designates the site as Commercial.

g. **If applicable, what is the current shoreline master program designation of the site?**

Not applicable.

h. **Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.**

No.

i. **Approximately how many people would reside or work in the completed project?**

Not applicable.

j. Approximately how many people would the completed project displace?

Not applicable.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not applicable.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

The proposed cleanup action is consistent with the goals of the City of Anacortes Comprehensive Plan, and would not interfere with existing or future uses in the area.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low income housing.

Not applicable.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low income housing.

Not applicable.

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

No structures are proposed.

b. What views in the immediate vicinity would be altered or obstructed?

Views in the immediate vicinity will not be altered or obstructed by the completed project.

c. Proposed measures to reduce or control aesthetic impacts, if any:

None are proposed.

11. Light and glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

No lighting is proposed.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

c. What existing off-site sources of light or glare may affect your proposal?

None.

d. Proposed measures to reduce or control light and glare impacts, if any:

None are proposed.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

Significant formal and informal recreational and shoreline public access exists in areas east of the site at Cap Sante Marina and Seafarers' Memorial Park.

b. Would the proposed project displace any existing recreational uses? If so, describe.

Use of the site for off-site parking by users and tenants of Cap Sante Marina will be temporarily displaced during the cleanup action. These users will be accommodated within on-site existing parking at the marina. There are no proposed long-term changes to the existing use.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

None are proposed.

13. Historic and cultural preservation

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

There are no known historic places or objects located on or next to the site.

The stern-wheeler WT Preston, listed on the National Register of Historic Places, is located north of the Site at the eastern terminus of 8th Street at Q Avenue. The vessel served as a US Army Corps of Engineers snag boat until 1981, when it was transported to Anacortes and dry berthed. The Fraternal Order of Eagles Aerie #249 is listed as a City of Anacortes Historic Landmark.

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

Although the site has been subject to development and filling, it is possible that the project area could contain prehistoric archeological deposits beneath the areas of historic fill such as materials associated with occupation, shellfish gathering, fishing and other activities. No specific landmarks or evidence of historic, archeological, scientific, or cultural significance are known within the areas affected by the proposal.

c. **Proposed measures to reduce or control impacts, if any:**

In the event cultural or archeological resources are encountered, work in the immediate area will be stopped and the area protected until such time an assessment can be made on the significance of the discovery, followed with the development of a plan for disposition of the discovery, and then lastly implementation of the plan.

14. Transportation

a. **Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.**

The site is located adjacent to downtown Anacortes on Q-Avenue, which is a north-south truck route to State Route (SR) 20 through the main commercial area of town.

b. **Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?**

The site is directly served by public transit with a SKAT southbound bus stop located on Q Avenue at 17th Street, and a northbound bus stop located just south of 15th Street. Route 410 makes a loop through Anacortes and provides service between the Anacortes Ferry Terminal and the March's Point Park & Ride lot.

c. **How many parking spaces would the completed project have? How many would the project eliminate?**

The existing parking uses will be temporarily displaced during the cleanup action. There are no proposed long-term changes to existing parking and no parking spaces will be eliminated.

d. **Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).**

No new roads or improvement will be required.

e. **Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.**

The project is in the immediate vicinity of Port of Anacortes Cap Sante Marina and the western shores of Fidalgo Bay. These areas are used for a wide variety of recreational and commercial boating and shipping activities.

f. **How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.**

Excavated materials and clean backfill will be transported to and from the site in double-dump trucks (dump truck with "pup" trailer). It is expected that there will be approximately 10 to 12 truck trips per day during the active period of excavation/backfill. Construction workers may also travel to and from the site, and this may generate an estimated 6 to 10 vehicle trips per day to the site vicinity.

g. Proposed measures to reduce or control transportation impacts, if any:

None are proposed. The truck and vehicle traffic is within the existing capacity of adjacent roadways and is not expected to have any impact on existing levels of service.

15. Public services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No.

b. Proposed measures to reduce or control direct impacts on public services, if any.

Not applicable.

16. Utilities

a. Circle utilities currently available at the site: *electricity*, *natural gas*, *water*, *refuse service*, *telephone*, *sanitary sewer*, septic system, other.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Electrical, gas, and water utilities may be encountered during excavation. Remediation and construction activities will be coordinated with the appropriate utility providers.

Utilities and providers at the site are as follows:

Electricity	Puget Sound Energy
Natural gas	Cascade Natural Gas
City of Anacortes	Water, Sewer, Refuse Service

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature:

Becky Darden, Project Manager
Port of Anacortes

Date Submitted: **December 03, 2013**

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Feet

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. can not 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.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

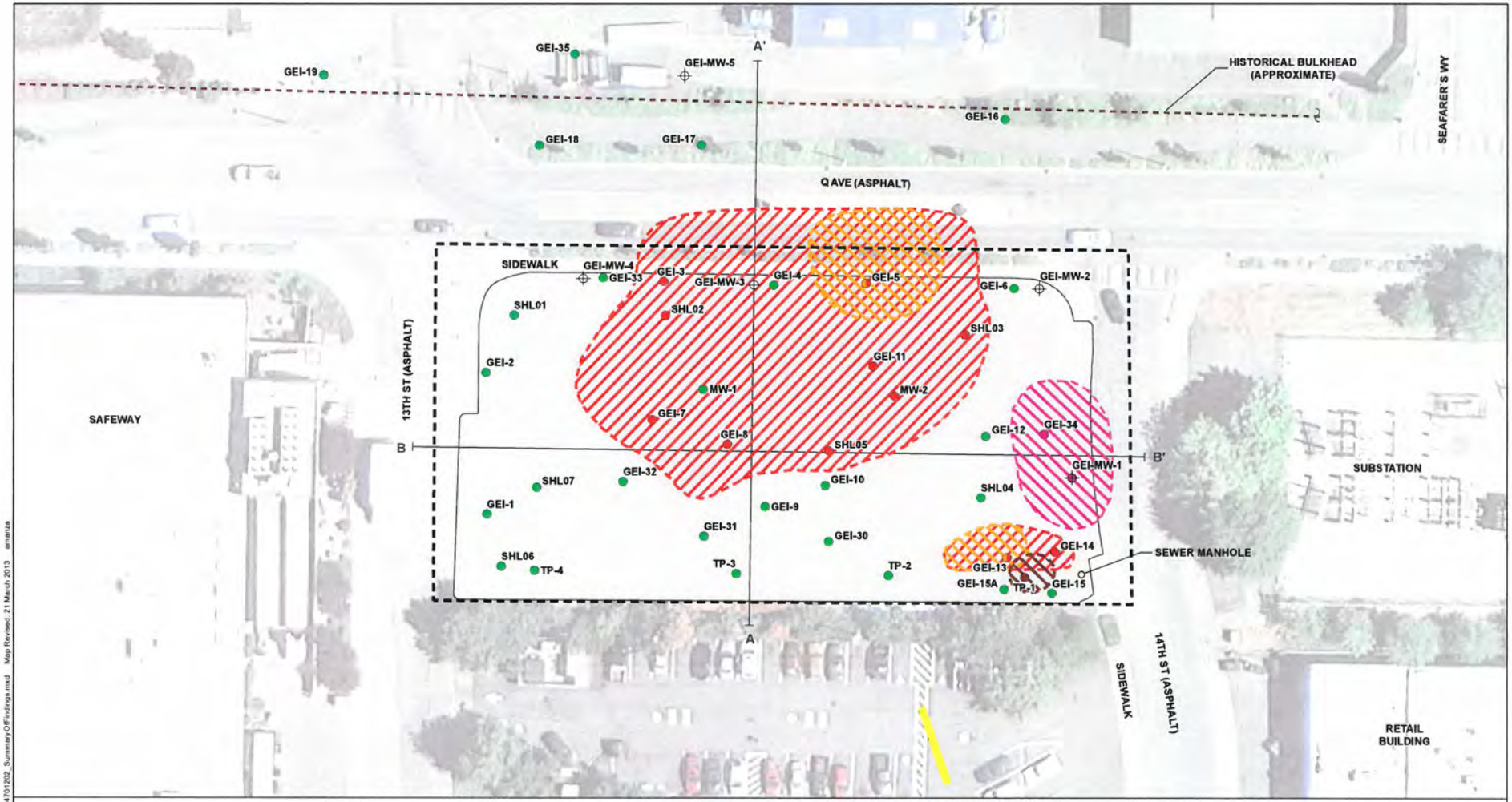
Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Former Shell Oil Tank Farm Site
Anacortes, Washington

Sheet 1

Path: \\sea\projects\51\47012\GIS\DCAP\51470202_VicinityMap.mxd Map Revised: 21 March 2013 amanza



40 0 40
Feet

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: Roads from Skagit County. Point, line and polygon features digitized from figures 5.1 and 6.1 of November 2006 and Figure 2 of September 2005 by Floyd Snider. Imagery date: 2011.

Legend

- Soil Exploration Location
- Monitoring Well Location
- TPH Exceeds Soil Cleanup Level
- Benzene Exceeds Soil Cleanup Level
- cPAH Exceeds Soil Cleanup Level
- Cadmium Exceeds Soil Cleanup Level
- COCs (TPH, Benzene, cPAHs, and/or Cadmium) Less Than Soil Cleanup Level
- Cross Section
- Former Shell Oil Tank Farm
- Gravel Surface

Area With Contaminants of Concern (COCs) Exceeding Soil Cleanup Level

- Approximate Area of TPH Exceedance in Soil
- Approximate Area of Benzene Exceedance in Soil
- Approximate Area of cPAH Exceedance in Soil
- Approximate Area of Metals (Cadmium) Exceedance in Soil

cPAH Carcinogenic Polycyclic Aromatic Hydrocarbons
TPH Petroleum Hydrocarbons (Gasoline, Diesel and/or Heavy Oil)

Current Site Conditions

Former Shell Oil Tank Farm Site
Anacortes, Washington

Sheet 2

Path: \\seaprojects\SI\514701\2\GIS\DOCAP\514701202_SummaryOfFindings.mxd Map Revised: 21 March 2013 amanza

ATTACHMENT 4
June 2014 Site Data Collection

GeoEngineers
Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington 98101
206.728.2674

July 15, 2014

Port of Anacortes
100 Commercial Avenue
Anacortes, Washington 98221

Attention: Jenkins Dossen

Subject: Geotechnical Data
Former Shell Oil Tank Farm Site
Anacortes, Washington
File No. 5147-012-05

This letter summarizes geotechnical data collected at the Former Shell Oil Tank Farm Site (Site) generally located between 13th Street and 14th Street west of Q Avenue in Anacortes, Washington. Three soil borings were completed at the Site to collect subsurface geotechnical data including soil classification and blow counts information. The geotechnical data obtained will be provided as a reference in the bid package for the Former Shell Oil Tank Farm Cleanup Action to assist the Contractor in their design of a shoring system to complete the excavation. The contractor will be responsible for the design and implementation of the shoring system.

Three borings GT-1 through GT-3 were completed at the Site on June 24 and 25, 2014 to the depth of approximately 41.5 feet below ground surface (bgs). Boring locations are shown on Figure 1. Borings were completed using hollow stem auger (HSA) drilling technique and soil samples were collected using standard penetration test (SPT) samplers. Blow counts were recorded for each sample interval collected using 140 pound automatic hammer with 30 inch drop. Drilling was completed by Cascade Drilling of Woodinville, Washington. At each boring location, soil samples were collected at 2.5 feet intervals from 0 to 20 feet bgs and at 5 feet intervals from 20 feet bgs to the bottom of the boring. Soil observed was classified in general accordance with Unified Soil Classification System (USCS). Boring logs documenting soil sample intervals, soil classification, and blow counts information are presented in Attachment A.

Geotechnical laboratory tests (Sieve and Atterberg Limits) were completed on select samples collected from GT-1 through GT-3 to refine the visual soil classification. Sieve test was completed on three samples (S-5 collected from GT-1 and GT-2 and S-3 collected from GT-3) and Atterberg Limits test was completed on three samples (S-11 collected from GT-1, S-6 collected from GT-2 and S-7 collected from GT-3). Sieve and Atterberg Limits tests were performed at GeoEngineers, Inc.'s (GeoEngineers) geotechnical laboratory located in Redmond, Washington and results are presented in Attachment B.

Please feel free to contact us if you have any questions.

Sincerely,
GeoEngineers, Inc.

Abhijit R. Joshi, PE
Environmental Engineer

AJ:BJT:KHC:JMH:cam

Attachments:
Figure 1. Geotechnical Boring Locations
Attachment A: Boring Logs
Attachment B: Sieve and Atterberg Limits Test Results

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: Base aerial photo provided by Port of Anacortes on 4-25-14.

Legend

Former Shell Oil Tank Farm

GT-1 Boring Location

N E S W

30 0 30

FEET

Geotechnical Boring Locations

Former Shell Oil Tank Farm Site
Anacortes, Washington

GeoEngineers

Figure 1

P:\15\14701205\CAD\5\14701205-05 Fig 1 Geotechnical Boring Locations.dwg\TAB:LANDSCAPE Modified by TMICHAUD on Jul 08, 2014 - 15:10

ATTACHMENT A
Boring Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	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
MORE THAN 50% PASSING NO. 200 SIEVE	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	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	6/24/2014	6/24/2014	41.5	RST / GEW/KHC	Cascade Drilling LP	Hollow-Stem Auger

Surface Elevation (ft) / Vertical Datum	13.25 NAVD88	Hammer Data	140 (lbs) / 30 (in) Drop
Drilling Equipment	CME-55		
Latitude / Longitude	556399.6052 / 1209431.9926	System Datum	Geographic NAD83
Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)	
Notes:			

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							GP	Gray fine gravel with silty sand (crushed gravel) (dry) (fill)			
								SP-SM	Gray very fine sand with silt and shell fragments (loose, moist)			
10		12	6		1					NS	<1	
									Wet at approximately 4 feet			Groundwater observed at approximately 4 feet below ground surface during drilling
	5	14	3		2			ML	Gray silt (soft, wet)	NS	<1	
5								SP	Dark gray fine sand with occasional shell fragments and trace silt (loose, wet)			
		13	11		3					NS	<1	
	10	13	3		4					NS	<1	
									Increasing shell fragment content	NS	<1	
0		18	0/1.5		5 SA			SM	Gray silty fine to coarse sand with shell fragments and occasional gravel (very loose, wet)	NS	<1	Sample by hammer weight MC=21%; %F=25%
	15	18	3		6					NS	<1	
								CL	Gray lean clay with orange mottling and occasional gravel (stiff to very stiff, moist)	NS	<1	
-5		18	16		7					NS	<1	
	20	18	12		8					NS	<1	
-10												
	25	18	11		9					NS	<1	
-15									Grades to medium stiff			
	30	18	5		10					NS	<1	
-20												
	35											

Note: See Figure A-1 for explanation of symbols.

Log of Boring GT-1

GeoEngineers

Project: Former Shell Tank Farm
Project Location: Anacortes, Washington
Project Number: 5147-012-05

Figure A-2
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
-25	35	18	6	11 AL					NS	<1	MC=25%; LL=39; PI=18
	40	17	9	12				Grades to stiff			

Note: See Figure A-1 for explanation of symbols.

Log of Boring GT-1 (continued)

GeoEngineers

Project: Former Shell Tank Farm
Project Location: Anacortes, Washington
Project Number: 5147-012-05

Figure A-2
Sheet 2 of 2

Drilled	Start 6/25/2014	End 6/25/2014	Total Depth (ft) 41.5	Logged By RST / Checked By GEW/KHC	Driller Cascade Drilling LP	Drilling Method Hollow-Stem Auger
Surface Elevation (ft) 13.75 / Vertical Datum NAVD88			Hammer Data 140 (lbs) / 30 (in) Drop		Drilling Equipment CME-55	
Latitude 556191.1765 / Longitude 1209433.0639			System Datum Geographic NAD83		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:						

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							GP	Gray fine gravel with silty sand (crushed rock) (dense, dry) (fill)			
								ML	Brown silt with sand, occasional gravel and occasional shell fragments (soft, moist) (fill)			
		13	4		1					SS	<1	
	5	15	8		2					NS	<1	
										SS	<1	Slight petroleum odor
								SP	Brown fine to medium sand with gravel (round rock) (loose, moist)	NS	<1	Groundwater observed at approximately 6 feet below ground surface during drilling
		18	5		3			SP	Gray fine to medium sand with occasional gravel and occasional shell fragments (loose, wet)	HS	49	
								SP-SM	Dark gray fine to coarse sand with silt and occasional gravel (loose, wet)	NS	5	
	10	14	10		4					NS	<1	
												Black staining
		13	3		5 SA					NS	<1	MC=14%' %F=5%
	15	18	17		6 AL			CL	Gray lean clay with sand (stiff to very stiff, moist)	NS	<1	MC=19%; LL=40; PI=21
		18	15		7					NS	<1	
	20	18	12		8					NS	<1	
	25	18	10		9					NS	<1	
	30	18	2		10				Grades to soft to very soft	NS	<1	Drove first footing weight of hammer
	35											

Note: See Figure A-1 for explanation of symbols.

Seattle: Date:7/10/14 Path:W:\SEATTLE\PROJECTS\5147012\05\GINT\5147012O5.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_STANDARD

Log of Boring GT-2

GeoEngineers

Project: Former Shell Tank Farm
Project Location: Anacortes, Washington
Project Number: 5147-012-05

Figure A-3
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
-25	35	18	9	11				Grades to stiff	NS	<1	
	40	18	2	12				Grades to very soft to soft			Drill drove 1 foot with hammer weight

Note: See Figure A-1 for explanation of symbols.

Log of Boring GT-2 (continued)

GeoEngineers

Project: Former Shell Tank Farm
Project Location: Anacortes, Washington
Project Number: 5147-012-05

Figure A-3
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	6/25/2014	6/25/2014	41.5	RST / GEW/KHC	Cascade Drilling LP	Hollow-Stem Auger

Surface Elevation (ft) / Vertical Datum	12.5 NAVD88	Hammer Data	140 (lbs) / 30 (in) Drop
Latitude / Longitude	556294.0316 1209504.4449	System Datum	Geographic NAD83

Drilling Equipment: CME-55

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							GP	Brown gravel with silty sand (crushed rock) (dense, dry) (fill)			
10		14	6		1			SP-SM	Light gray very fine sand with silt and occasional shell fragments (loose, moist)	NS	<1	
	5	13	11		2			SP-SM	Gray fine to medium sand with silt, gravel and occasional shell fragments (medium dense, wet)	NS	<1	Groundwater encountered at approximately 5 feet below ground surface during drilling
5		16	9		3 SA					NS	<1	MC=15%; %F=7%
	10	18	18		4					NS	<1	
								SM	Gray silt with fine to medium sand, occasional gravel and occasional shell fragments (very loose to loose, moist)	NS	<1	
0		16	5		5					NS	<1	
	15	16	1		6					NS	<1	Drove sampler 1 foot with weight of hammer
								CL	Gray with orange mottling lean clay and trace organic matter (wood fragments) (soft, moist)	NS	<1	
-5		18	3		7 AL					NS	<1	MC=22%' LL=39; PI=19 Drove sampler with weight of hammer
	20	18	4		8			CL	Gray clay (soft to medium stiff, moist)	NS	<1	
-10												
	25	18	5		9					NS	<1	
-15												
	30	18	8		10				Grades to medium stiff to stiff	NS	<1	
-20												
	35											

Note: See Figure A-1 for explanation of symbols.

Log of Boring GT-3

GeoEngineers

Project: Former Shell Tank Farm
Project Location: Anacortes, Washington
Project Number: 5147-012-05

Figure A-4
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
-25	35	18	0	11				Grades to very soft	NS	<1	Drove sampler with weight of hammer
	40	18	0	12							Drove sampler with weight of hammer

Note: See Figure A-1 for explanation of symbols.

Log of Boring GT-3 (continued)

GeoEngineers

Project: Former Shell Tank Farm
Project Location: Anacortes, Washington
Project Number: 5147-012-05

Figure A-4
Sheet 2 of 2

ATTACHMENT B
Sieve and Atterberg Limits Test Results

5147-012-05 SAS: SAS 07-9-2014

GEOENGINEERS

SIEVE ANALYSIS RESULTS

FIGURE B-1

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

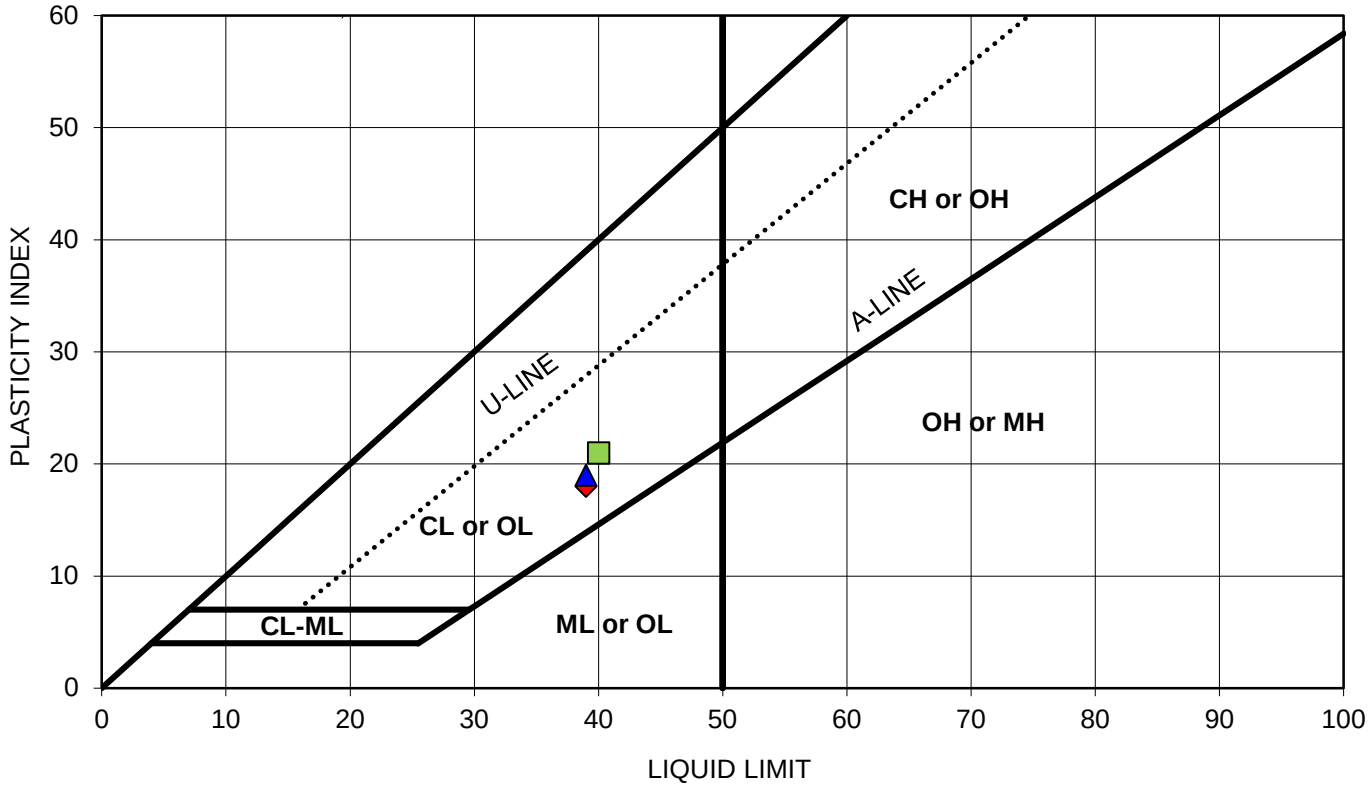
SYMBOL	EXPLORATION NUMBER	DEPTH (ft)	SOIL CLASSIFICATION
◆ ■ ●	GT-1 GT-2 GT-3	12½ 12½ 7½	Silty sand (SM) Poorly graded sand with silt and gravel (SP-SM) Poorly graded sand with silt and gravel (SP-SM)

GEOENGINEERS

FIGURE B-2

ATTERBERG LIMITS TEST RESULTS

PLASTICITY CHART



SYMBOL	EXPLORATION NUMBER	SAMPLE DEPTH (ft)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SOIL DESCRIPTION
◆	GT-1	25	26	39	18	Lean clay (CL)
■	GT-2	15	19	40	21	Lean clay with sand (CL)
▲	GT-2	17½	22	39	19	Lean clay (CL)

GeoEngineers
Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington 98101
206.728.2674

July 16, 2014

Port of Anacortes
100 Commercial Avenue
Anacortes, Washington 98221

Attention: Jenkins Dossen

Subject: Waste Characterization TCLP Analysis Results
Former Shell Oil Tank Farm Site
Anacortes, Washington
File No. 5147-012-04

This letter presents results of Toxicity Leaching Characteristic Procedure (TCLP) analysis performed for disposal characterization of contaminated material that will be generated during cleanup action of Former Shell Oil Tank Farm Site (Site). The Site is subject to a formal cleanup action under the regulatory authority of the Washington State Department of Ecology (Ecology). The Site is generally located between 13th Street and 14th Street west of Q Avenue in Anacortes, Washington.

The existing soil chemical analytical data of the Site presented in the Remedial Investigation Data Report (GeoEngineers, 2013) was provided to landfill facilities to request disposal authorization of contaminated material that will be generated during Site's cleanup action. Based on review of the existing data, the landfill facilities requested TCLP analysis of lead at sampling location GEI-7 at the depth of 2.5 feet below ground surface (bgs) for the purposes of completing the waste profile application.

A sample (GEI-7R-2.5) was collected by GeoEngineers, Inc. (GeoEngineers) at GEI-7 at the depth of 2.5 feet bgs for TCLP lead analysis on June 25, 2014. This sample was collected during Site's geotechnical data collection field effort (GeoEngineers, 2014). The TCLP lead analysis was completed at OnSite Environmental, Inc. of Redmond, Washington. The TCLP lead was not detected in sample GEI-7R-2.5 at the practical quantitation limit (PQL) of 0.2 milligrams/liter (mg/L). The laboratory report of TCLP lead analysis is presented in Attachment 1 and will be provided to the landfill facilities to complete the waste profile application.

REFERENCES

GeoEngineers, Inc. (GeoEngineers, 2013), "Remedial Investigation Data Report, Former Shell Tank Farm, Anacortes, Washington," GEI File No. 5147-012-02, prepared for the Washington State Department of Ecology on behalf of Port of Anacortes, April 19, 2013.

GeoEngineers, Inc. (GeoEngineers, 2014), "Geotechnical Data, Former Shell Tank Farm Site, Anacortes, Washington," GEI File No. 5147-012-05, prepared for the Port of Anacortes, July 15, 2014.

Please feel free to contact us if you have any questions.

Sincerely,
GeoEngineers, Inc.

Abhijit R. Joshi, PE
Environmental Engineer

AJ:JMH:cam

Attachments:
Attachment 1: Laboratory Report

ATTACHMENT 1
Laboratory Report

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

June 30, 2014

Robert Trahan
GeoEngineers, Inc.
600 Stewart, Suite 1700
Seattle, WA 98101-1233

Re: Analytical Data for Project 5147-012-05
Laboratory Reference No. 1406-225

Dear Robert:

Enclosed are the analytical results and associated quality control data for samples submitted on June 26, 2014.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: June 30, 2014
Samples Submitted: June 26, 2014
Laboratory Reference: 1406-225
Project: 5147-012-05

Case Narrative

Samples were collected on June 25, 2014 and received by the laboratory on June 26, 2014. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: June 30, 2014
Samples Submitted: June 26, 2014
Laboratory Reference: 1406-225
Project: 5147-012-05

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
GEI-7R-2.5	06-225-01	Soil	6-25-14	6-26-14	

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TCLP LEAD
EPA 1311/6010C

Matrix: TCLP Extract
Units: mg/L (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-225-01					
Client ID:	**GEI-7R-2.5**					
Lead	**ND**	0.20	6010C	6-27-14	6-27-14	

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TCLP LEAD
EPA 1311/6010C
METHOD BLANK QUALITY CONTROL

Date Prepared:	6-26-14
Date Extracted:	6-27-14
Date Analyzed:	6-27-14
Matrix:	TCLP Extract
Units:	mg/L (ppm)
Lab ID:	MB0627TM1

Analyte	Method	Result	PQL
Lead	6010C	**ND**	0.20

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TCLP LEAD
EPA 1311/6010C
DUPLICATE QUALITY CONTROL

Date Prepared: 6-26-14
Date Extracted: 6-27-14
Date Analyzed: 6-27-14

Matrix: TCLP Extract
Units: mg/L (ppm)

Lab ID: 06-225-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Lead	**ND**	**ND**	NA	0.20	

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TCLP LEAD
EPA 1311/6010C
MS/MSD QUALITY CONTROL

Date Prepared: 6-26-14
Date Extracted: 6-27-14
Date Analyzed: 6-27-14

Matrix: TCLP Extract
Units: mg/L (ppm)

Lab ID: 06-225-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Lead	10.0	**9.34**	93	**9.43**	94	1	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: GeoEngineers
Project Number: 5147-012-05
Project Name: Former Shell Oil Tank Farm
Project Manager: Robert Trahan
Sampled by: Robert Trahan

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ 1 Day
- ☒ 2 Days
- ☐ 3 Days
- ☐ Standard (7 Days) (TPH analysis 5 Days)
- ☐ _____ (other)

Laboratory Number: 06-225

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals/ MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A	TCLP Lead						% Moisture
1	GEI-TR-2.5	6/25/14	15:30	S	2																X						X

	Signature	Company	Date	Time
Relinquished		GEI	6/26/14	1245
Received		OSE	6/26/14	1245
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐

Electronic Data Deliverables (EDDs) ☐ _____