

## Materials Management Plan

Property Redevelopment Project  
Former Olympia Manufactured Gas Plant Site  
Olympia, Washington

for  
**Puget Sound Energy**

May 16, 2018



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**Property Redevelopment Project**  
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**Olympia, Washington**

**File No. 0186-774-04**

**May 16, 2018**

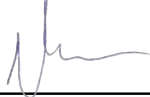
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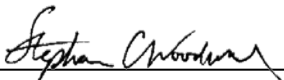
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Appendix A. Property Environmental Covenant

## 1.0 INTRODUCTION

We understand that the current property owner (The Rants Group) plans to redevelop the property located at 320 Columbia Street in Olympia, Washington (Property). The location of the Property is shown in Figure 1. GeoEngineers prepared this Materials Management Plan (Plan) at the request of Puget Sound Energy (PSE) for use by The Rants Group, their technical consultants and contractors (Redevelopment Team).

This Plan is intended for use by the Redevelopment Team when handling potentially contaminated or known contaminated soil and water during excavation activities as part of the Property Redevelopment Project. We understand that the redevelopment project is anticipated to begin in summer 2018. During the construction time frame, the Redevelopment Team will occasionally need to excavate soil (and/or remove groundwater, if needed) in areas inside and outside of the Property boundaries to accommodate the planned construction which includes installation of subsurface utilities, the completion of exploratory test pits and construction of foundation elements. Soil or groundwater removed from outside of the Property boundaries may be contaminated by chemical substances originating from within the Property boundaries.

For soil and groundwater sampling and profiling related activities, PSE's environmental consultant will perform the chemical analytical testing, review the chemical analytical results, provide end-use/disposal recommendations to PSE and complete the necessary waste profiles for waste disposal. It will be the Redevelopment Team's responsibility to coordinate and schedule the transportation of soil and/or water waste to the disposal facility selected by PSE.

It is assumed that no soil or water encountered during project work will be characterized as a 'hazardous' or 'dangerous' waste based on extensive Property characterization data. 'Hazardous' or 'dangerous' wastes will be properly managed and disposed if encountered by the Redevelopment Team.

It should be noted that the Redevelopment Team member(s) who encounter contaminated soil during construction shall be 40-hour hazardous waste operations and emergency response (HAZWOPER) trained and certified (in compliance with OSHA standard 29 CFR Part 1910.120) and meet the regulatory requirements identified in Section 8 below.

This Plan addresses comments provided by the Washington State Department of Ecology (Ecology) on May 7, 2018 (Ecology, 2018).

## 2.0 BACKGROUND

A manufactured gas plant (MGP) was previously located on the Property from about 1908 until the late 1940s, although manufactured gas was produced at the facility during only a small portion of this time. MGP operations impacted soil and, in an isolated area, groundwater beneath the Property. PSE investigated the extent of MGP-related impacts on the Property in cooperation with Ecology under the Voluntary Cleanup Program (VCP) (GeoEngineers, 2011). PSE then completed an environmental cleanup on the Property in the fall of 2012 (GeoEngineers, 2013a).

The purpose of the cleanup was to obtain regulatory closure for the Property under the Model Toxics Control Act (MTCA) and prepare the Property for redevelopment. The Property received a no further action (NFA) determination from Ecology in September 2015 after the cleanup was completed and an environmental covenant (EC) was filed with Thurston County. The cleanup generally removed contaminated soil from depths shallower than approximately 6 feet within the boundaries of the Property. The Property was restored using clean imported structural backfill (GeoEngineers, 2013a).

As noted by Ecology, another VCP site (Site SW1582) is located directly north of the Property. It is unlikely that contamination in soil and/or groundwater from Site SW1582 will be encountered during utility trench excavation work in and adjacent to Thurston Avenue, but may possibly be encountered. The chemicals of concern (COCs) in soil at Site SW1582 are consistent with the COCs on the Property, especially in the vicinity of Thurston Avenue. Therefore, the Redevelopment Team shall be aware that COCs, similar to those detected on the Property, may be encountered during utility trench excavation work north of the Property. If soil and/or groundwater contamination is encountered within the utility trench of Thurston Avenue, the Redevelopment Team's Contractor shall manage and dispose the material in accordance with this Plan.

## **2.1. Completed Remedial Action**

Nearly all contaminated soil above the groundwater table (approximately 6 feet below ground surface [bgs]) was removed from within the Property boundaries and transported to a permitted landfill for disposal. A visual barrier (orange construction fencing) was placed between the excavation sidewalls and the imported fill to demarcate the extent of the remedial excavation. The excavation sidewalls were generally vertical and coincided with the Property boundaries with two exceptions:

- The eastern excavation sidewall was inclined approximately 1H:1V (horizontal: vertical) and included a 3-foot horizontal setback from the eastern Property boundary (GeoEngineers, 2013a); and,
- The excavation sidewall did not extend to the northern Property boundary in an isolated area adjacent to a power pole.

Based on the preliminary redevelopment plans, construction activities will primarily occur within the Property boundaries at depths far shallower than 6 feet bgs. The majority of construction activities within the Property boundaries, therefore, will not encounter contaminated soil.

## **2.2. Current Environmental Conditions**

### **2.2.1. Residual Soil Contamination**

Soil samples were collected at the final limits of the Property remedial excavation during past investigation and cleanup activities (GeoEngineers 2011 and 2013a). Collectively, these analytical results characterize present-day soil conditions beneath the former remedial excavation and at the lateral limits of the former remedial excavation on the Property. The following constituents remain in soil at the Property at concentrations greater than MTCA cleanup levels: carcinogenic polycyclic aromatic hydrocarbons (cPAHs), benzene, gasoline-, diesel- and lube oil-range hydrocarbons, mercury and lead. The locations of these cleanup level exceedances are shown in Figure 2. Other contaminants were also detected in soil at concentrations less than MTCA cleanup levels; these analytical results are summarized in the data tables of past reports (GeoEngineers 2011).

### **2.2.2. Residual Groundwater Contamination**

Prior studies identified the presence of arsenic and cPAHs in groundwater at concentrations greater than MTCA Method A cleanup levels beneath the Property (GeoEngineers 2011). Lead and chromium concentrations also exceeded MTCA cleanup levels for groundwater during a single monitoring event but were less than cleanup levels during four subsequent groundwater monitoring events.

Post-remedy groundwater compliance monitoring is being completed every 18 months in accordance with an Ecology-approved plan (GeoEngineers 2013b). The groundwater samples are analyzed for cPAHs, benzene, diesel- and lube oil-range hydrocarbons, lead and mercury. These constituents have not been detected above MTCA cleanup levels in groundwater since compliance monitoring began in August 2013 (GeoEngineers 2018).

Based on past studies, arsenic is present in groundwater beneath the Property. Groundwater compliance monitoring, however, does not include analysis of arsenic because this constituent is not related to the former MGP operations.

### **2.3. Environmental Covenant**

Residual contaminated media beneath the Property is addressed by the EC. The terms of the EC must be honored to maintain regulatory closure. A copy of the final EC is presented in Appendix A.

Most of the conditions of the EC focus on preventing actions that would render the cleanup ineffective, such as exposing residual contaminated soil that remains beneath the Property without first notifying Ecology. Ecology has been notified of the impending redevelopment activities and they required preparation of this Plan. Key components of this Plan will be incorporated into the Redevelopment Team's construction plans and specifications.

## **3.0 PURPOSE**

The purpose of this Plan is to define procedures, roles and responsibilities for handling and disposal of potentially contaminated or known contaminated media that may be encountered during construction. The Redevelopment Team will be responsible for implementing this Plan. PSE's environmental consultant will perform the required sampling, submit the samples for chemical analysis and obtain waste disposal authorization from a disposal facility selected by PSE. The Redevelopment Team will coordinate and manage the off-site transport and disposal of construction-generated contaminated media.

Handling, storage, transport and disposal of contaminated media shall comply with Ecology guidance and applicable federal, state and local regulations. Ecology has indicated that the redevelopment activities must be conducted, at a minimum, under the City of Olympia's (City) Stormwater Management Manual and possibly also in accordance with Ecology's Construction Stormwater General Permit even though the Property does not trigger this requirement based on its size. The Redevelopment Team will be responsible for developing the Stormwater Pollution Prevention Plan (SWPPP), obtaining the necessary stormwater permit coverage under the City and/or Ecology's Construction Stormwater General Permit (if required by Ecology) and complying with the permit requirements during construction.

#### **4.0 GENERAL CONSTRUCTION PLANS**

Preliminary plans indicate that construction activities within the Property boundaries will be limited to depths shallower than 6 feet bgs except for the installation of driven hollow foundation pilings which is not anticipated to generate any contaminated media. For this reason, contaminated soil will not be encountered during construction within the Property boundaries except potentially along the eastern and northern Property boundaries (Section 2.1). Some of this soil, which exists in a localized area along the northern Property boundary and along the entire eastern Property boundary, will likely require excavation for new building foundation footings.

If the footprint of construction extends into potentially contaminated soil along the northern or eastern Property boundaries, the location of contaminated soil will be readily identifiable by the orange demarcation barrier placed at the boundary limits during cleanup.

Some construction activities, including the excavation of trenches for utility installation, are planned outside the Property boundaries where cleanup actions have not been performed (Figure 2). Based on existing characterization data at the Property boundaries and one data point outside the Property boundary (boring SB-19), MGP-related contamination may extend into these areas. Planned utility trenches in these areas may extend to depths ranging from 3 feet to 6 feet bgs. Existing sidewalk, curbing and pavement will also be removed to depths ranging between 0.5 feet to 1 foot bgs. The estimated volume of soil to be excavated in these off-Property areas is 450 cubic yards (in-place volume).

Based on our understanding of the depth of excavation required for construction activities, dewatering will not be required because it will be above the groundwater table elevation of approximately 6 feet bgs.

#### **5.0 WASTE PROFILING AND DISPOSAL AUTHORIZATION**

Surplus contaminated soil generated from redevelopment activities and not meeting the requirements identified Section 6.2 will be transported off-site for disposal at a permitted landfill selected by PSE. Based on discussions with the disposal facility utilized during the 2012 remedial excavation, the previous waste profile and associated analytical data does not represent the waste to be generated during planned redevelopment activities outside of the Property boundaries; therefore, soil to be excavated outside of the Property boundaries by the Redevelopment Team will be sampled and analyzed before construction activities to obtain waste disposal authorization. In general, soil will be sampled in-place (via pre-construction drilling discussed below) prior to excavation, so excavated soil may be loaded directly onto trucks for permitted off-site disposal during construction.

Based on conversations with the preferred disposal facility, the limited amount of contaminated soil that may be excavated from within the Property boundaries (Section 2.1) will not require additional sampling and analysis. Transport and off-site disposal of this soil may proceed using the existing waste profile from the 2012 remedial excavation.

Prior to transporting known or potentially contaminated waste off-Property, the Redevelopment Team member(s) responsible for construction work shall coordinate with PSE and its environmental consultant to verify that waste characterization profiling is complete for each waste type, and the permitted off-site facility has authorized receipt of the specified waste. Disposal authorizations for contaminated materials will be provided by PSE to the Redevelopment Team's contractor. PSE will be paying for costs related to

profiling, obtaining disposal authorization, transporting and disposing contaminated soil. PSE will provide the Redevelopment Team contact information, so they can coordinate the transport and disposal of contaminated soil based on their schedule needs. Sampling and waste profiling procedures are described below.

## **5.1. Soil Waste Profiling**

### **5.1.1. Pre-Characterization Drilling for Utility Trenches**

Soil generated from the planned utility trenches will be characterized prior to construction by completing borings with soil sampling along the utility trench corridors. PSE's environmental consultant will observe drilling activities and collect soil samples for field screening and chemical analysis. The analytical results will be used to obtain disposal authorization before construction to reduce or eliminate the need for temporary handling and stockpiling of excavated soil on the Property.

Four borings will be completed along the planned utility trench corridors using direct-push drilling technology to a maximum depth of 6 feet bgs at each boring location (Figure 2). Final boring locations may be adjusted in the field based on utility locations. Continuous cores will be observed from each boring and discrete samples collected at approximately 2 feet and 6 feet bgs. These sampling depths may be adjusted based on field screening results and the depth of the groundwater table. Field screening will include visual observations of staining, water sheen testing, and photoionization detector (PID) headspace vapor readings.

Soil samples selected for chemical analysis will be submitted to an Ecology accredited laboratory for analysis of contaminants of concern as discussed in Section 5.3 below. Collectively, soil chemical analytical results will be used to create a waste profile for soil disposal at an off-site landfill facility selected by PSE. The Redevelopment Team member(s) can then load trench spoils directly into trucks for transport to the permitted disposal facility approved by PSE.

Ecology has requested additional soil sampling in the utility trenches to further delineate COCs associated with the Site. To the extent feasible and where safely accessible, PSE will collect sidewall soil samples during construction in the southeastern and northwestern utility trenches. These sampling activities will be performed in general accordance with Appendix B of the Construction Work Plan (GeoEngineers, 2012), and the chemical analytical results will be presented in a post-construction report.

### **5.1.2. Shallow Test Pits to Observe Adjacent Building Foundation**

The Redevelopment Team plans to complete shallow test pits (to an estimated depth of up to 3 feet bgs) along the eastern Property boundary to expose the east-adjacent building foundation footings. These test pits will be completed as part of a geotechnical investigation to support design of the proposed Property building foundation. The number and location of the shallow test pits are presented on Figure 2. As outlined in Section 2.1, the former remedial excavation did not extend to the eastern Property boundary, so contaminated material may be encountered in the shallow test pits.

Soil generated from the shallow test pits shall be placed in temporary containers (e.g., labeled 55-gallon steel drums) and clean structural fill will be placed back into each test pit. This soil will be transported off-site for permitted disposal under the existing waste profile and disposal authorization.

### **5.1.3. Residual Contaminated Soil and Associated Construction Activities**

As indicated in Section 2.1, residual contaminated soil exists within the Property boundaries in a localized area along the northern and eastern Property boundaries at depths less than 6 feet bgs. It is anticipated shallower portions of this contaminated soil will be disturbed during construction of the new building foundation. Soil excavated in these areas for construction purposes may be directly loaded into trucks for off-site transport and disposal. Sampling and analysis of this soil (the localized area along the northern property boundary and along the eastern Property boundaries at depths less than 6 feet bgs) will not be required as described in this Plan. If the existing visual barrier is removed or damaged during excavation work within the Property boundaries, a new visual barrier (such as orange construction fencing) shall be placed to demarcate the remaining contaminated soil.

After construction effectively isolates contaminated soil remaining along portions of the northern and eastern Property boundaries, other construction activities within the Property boundaries will not encounter contaminated soil except for the installation of piles. Pile installation will not expose the underlying contaminated soil or create an exposure pathway for the deeper contaminated soil (greater than 6 feet bgs) to migrate to the ground surface. As a result, construction activities should not be complicated by the presence of underlying contaminated soil.

## **5.2. Potential Wastewater Profiling**

As previously indicated, water is not expected to be generated (via groundwater dewatering) to support the Property redevelopment activities. In the unlikely event that groundwater is encountered in utility trenches such that it requires extraction, it shall be managed and temporarily stored by the Redevelopment Team on the Property in containers. In this case, chemical analytical testing of the water will be performed by PSE's environmental consultant, in accordance with Section 5.3.2, prior to off-site disposal at a permitted facility.

Construction equipment that contacts potentially contaminated or known contaminated media shall be decontaminated appropriately, prior to use in other areas of the Property (e.g., the clean structural fill). Decontamination water shall be containerized on-Property and chemical analytical testing of the water will be performed by PSE's environmental consultant, in accordance with Section 5.3.2, prior to off-site disposal at a permitted facility.

Stormwater will be managed in accordance with the City's SWPPP guidelines. It is anticipated that there will be no stormwater discharges from the construction site. In the unlikely event that it becomes necessary to remove stormwater within the construction footprint, that water will be stored in temporary containers. Collected stormwater will be tested for Site-related contaminants, prior to off-site disposal at a permitted facility, if the stormwater may have contacted any contaminated soil.

## **5.3. Chemical Analytical Testing**

Chemical analytical testing will be required to characterize soil within utility trenches and potentially for soil or water wastes that may be temporarily stored on-Property. This testing is being conducted to meet disposal facility criteria necessary for disposal of soil and water waste, and to document any removed contaminated material from inside or outside of the Property boundaries.

### **5.3.1. Soil**

Soil samples selected for chemical analysis (during utility trench pre-characterization drilling, or temporary stockpiling or containerization activities identified in Section 6 below) will be submitted to an Ecology accredited laboratory for analysis of the following:

- Total Petroleum Hydrocarbons (TPH) including gasoline-, diesel-, and heavy-oil range petroleum hydrocarbons by Northwest Methods NWTPH-Gx and NWTPH-Dx respectively;
- Benzene by EPA Method 8260C;
- CPAHs by EPA Method 8270D/SIM; and
- Total metals, lead and mercury, by EPA Methods 6010B/7471A.

Additional sample volume, for benzene-, mercury- and lead-related analysis, will be placed on hold with the laboratory for potential follow-up Toxicity Characteristic Leaching Procedure (TCLP) analysis. TCLP analysis may be performed based on the preliminary analytical results in accordance with WAC 173-303-090,

This suite of analyses meets waste profiling requirements for the disposal facility and includes the COCs historically identified above MTCA cleanup levels on or adjacent to the Property.

### **5.3.2. Groundwater**

If groundwater is encountered during construction activities such that it must be removed and temporarily containerized on the Property, representative water samples will be collected by PSE's environmental consultant from the on-Property containers and submitted for the same chemical analysis described above (Section 5.3.1) or other potential analysis required by the disposal facility selected by PSE for waste disposal characterization. If groundwater is extracted for construction purposes, testing also would be conducted for arsenic even though it is not a Site-related COC.

## **6.0 WASTE HANDLING**

This section describes the manner in which contaminated, or potentially contaminated waste (soil or water) generated outside the Property boundaries, or inside the Property boundaries (near the utility pole or along the eastern Property boundary) will be handled prior to off-site transport and disposal. Other construction activities associated with Property redevelopment within the Property boundaries will be in clean structural fill and subject to the project SWPPP to be prepared by the Redevelopment Team.

### **6.1. Temporary On-Property Storage**

This section provides a basic overview of the on-Property temporary storage requirements and is not intended to be all inclusive of City SWPPP requirements. While construction logistics have not yet been fully developed by the Redevelopment Team, excavated soil or extracted groundwater may require temporary storage on the Property. If potentially contaminated soil is excavated and cannot be directly loaded onto trucks for off-site transport and disposal, the soil will be temporarily stored on the Property. The Redevelopment Team member(s) will be responsible for properly storing the soil in stockpiles or containers.

The means and methods for temporarily storing extracted groundwater will be at the discretion of the Redevelopment Team. While soil stockpiling details and best management practices (BMPs) will be described in a SWPPP prepared by the Redevelopment Team, in general excavated soil that cannot be directly loaded onto trucks shall be temporarily stored on the Property as follows:

- If soil is to be stockpiled or containerized, it shall be placed on an impervious surface (such as geomembrane or plastic sheeting), covered to prevent wind or precipitation from contacting the stockpile, and be in compliance with applicable erosion and stormwater control BMPs as outlined in the SWPPP.
- Wetting of stockpiled soils or other similar techniques may be necessary to reduce airborne dust. Air and/or dust monitoring shall be considered in the Redevelopment Team's health and safety plan.
- Storage areas for long-term storage of soil should consist of a bermed area that is lined with impervious material and located away from pits, surface water, or other excavated holes.
- Soil that contains excessive water shall not be stockpiled or placed in temporary storage containers without first draining the free liquids within the excavation area. If further stabilization is necessary, the Redevelopment Team member(s) will stabilize such soil by a method approved by Ecology and the PSE-selected offsite disposal facility.

If the entire construction site is not fully secured for access, access to the temporarily stockpiled or containerized soil shall be restricted by a properly labeled fence or other barrier pending chemical analysis of the soil or water and a decision by PSE on its final disposition. The access restrictions are intended to prevent entry by unauthorized personnel.

## **6.2. Excavated Soil Re-use**

If the Redevelopment Team chooses to re-use potentially contaminated soil, it will be submitted for the chemical analyses described in Section 5.4 (if not already tested) and re-used in accordance with Ecology's guidance on soil re-use (Ecology, 2016) and any other requirements (including pre-approval) required by the City of Olympia.

Ecology has indicated that soil excavated from the utility trenches are unlikely to meet the 'Category 1' soil requirements for re-use ((Table 12.2) Ecology, 2016). Therefore, excavated soil from utility trenches that does not meet Ecology's guidance on soil re-use (Ecology, 2016) shall be transported and disposed at a permitted disposal facility selected by PSE as described in Section 7.0 below.

## **7.0 WASTE DISPOSAL**

It is PSE's environmental consultant's responsibility to obtain soil and wastewater disposal authorization before construction is initiated. Once PSE approval has been provided to the Redevelopment Team, the Redevelopment Team will coordinate and schedule the transportation and disposal of soil and water wastes. They also will be responsible for obtaining all disposal records from the PSE-selected disposal facility. Copies of all disposal records from the disposal facility shall be provided to PSE.

## 7.1. Soil

Soil waste for disposal will be transported off-site at a permitted disposal facility approved by PSE. Contaminated soil may be loaded into truck and trailers for transport to the disposal facility. In accordance with WAC 173-350-300, loaded trucks or containers with will be covered before leaving the Property. Soil tracked outside the construction site by truck traffic shall be managed as prescribed in City and/or Ecology SWPPP requirements.

## 7.2. Water

If groundwater (or other waste water) is generated during construction, it will be temporarily stored on-site, profiled and transported to a permitted disposal facility selected by PSE.

## 8.0 WORKER HEALTH AND SAFETY REQUIREMENTS

The following worker health and safety protocols shall be implemented by the Redevelopment Team and their members(s) during construction activities that may encounter known or potentially contaminated media:

- Personnel involved in excavation and/or handling of any potentially contaminated soil or water shall conduct their work in accordance with applicable health and safety regulations and the Redevelopment Team's site safety and health plan. Information regarding the specific type, concentrations and distribution of contaminants at the Property should be provided to contractor personnel prior to beginning project work.
- Personnel working with potentially contaminated media shall comply with the provisions of WAC 173-340-810 (MTCA Cleanup Regulation, Worker Safety and Health). WAC 173-340-810 states that requirements under the federal Occupational and Safety Health Act (OSHA) and the Washington Industrial Safety and Health Act (WISHA) are applicable to the type of activities that will be conducted as part of the Property redevelopment (excavation and handling of potentially contaminated soil or groundwater).
- Personnel shall be in compliance with Hazardous Waste Operations and Emergency Response (HAZWOPER) Training in accordance with Chapter 296-843 WAC.

## **9.0 LIMITATIONS**

This Plan has been prepared on behalf of Puget Sound Energy, Puget Sound Energy may distribute copies of this report to their consultants and contractors, authorized agents and regulatory agencies as may be required for the Project. Information in this Plan may be used by the Redevelopment Team for construction planning purposes.

### **9.1. Environmental Services Are Performed for Specific Purposes, Persons and Projects**

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. The conclusions and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty, express or implied, applies to this Plan. The information contained herein is not intended for use by others, and it is not applicable to other sites.

### **9.2. Reliance Conditions for Third Parties**

This Plan was prepared for the exclusive use of the party(ies) to whom this Plan is addressed. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

### **9.3. Most Environmental Findings Are Professional Opinions**

Our interpretation of subsurface conditions at the Former Olympia MGP Property is based on field observations and chemical data from widely-spaced sampling locations. As such, actual subsurface conditions may differ from those indicated in this Plan. Further, it is always possible that contamination exists in areas of the sites that were not explored, sampled or analyzed.

### **9.4. Soil and Groundwater End Use**

GeoEngineers cannot assume responsibility for potential environmental liability arising out of the transfer of soil and/or groundwater from the subject property to another location, or the reuse of such soil and/or groundwater on-site in any instances that we did not recommend, know of, or control.

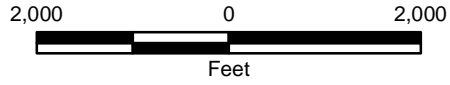
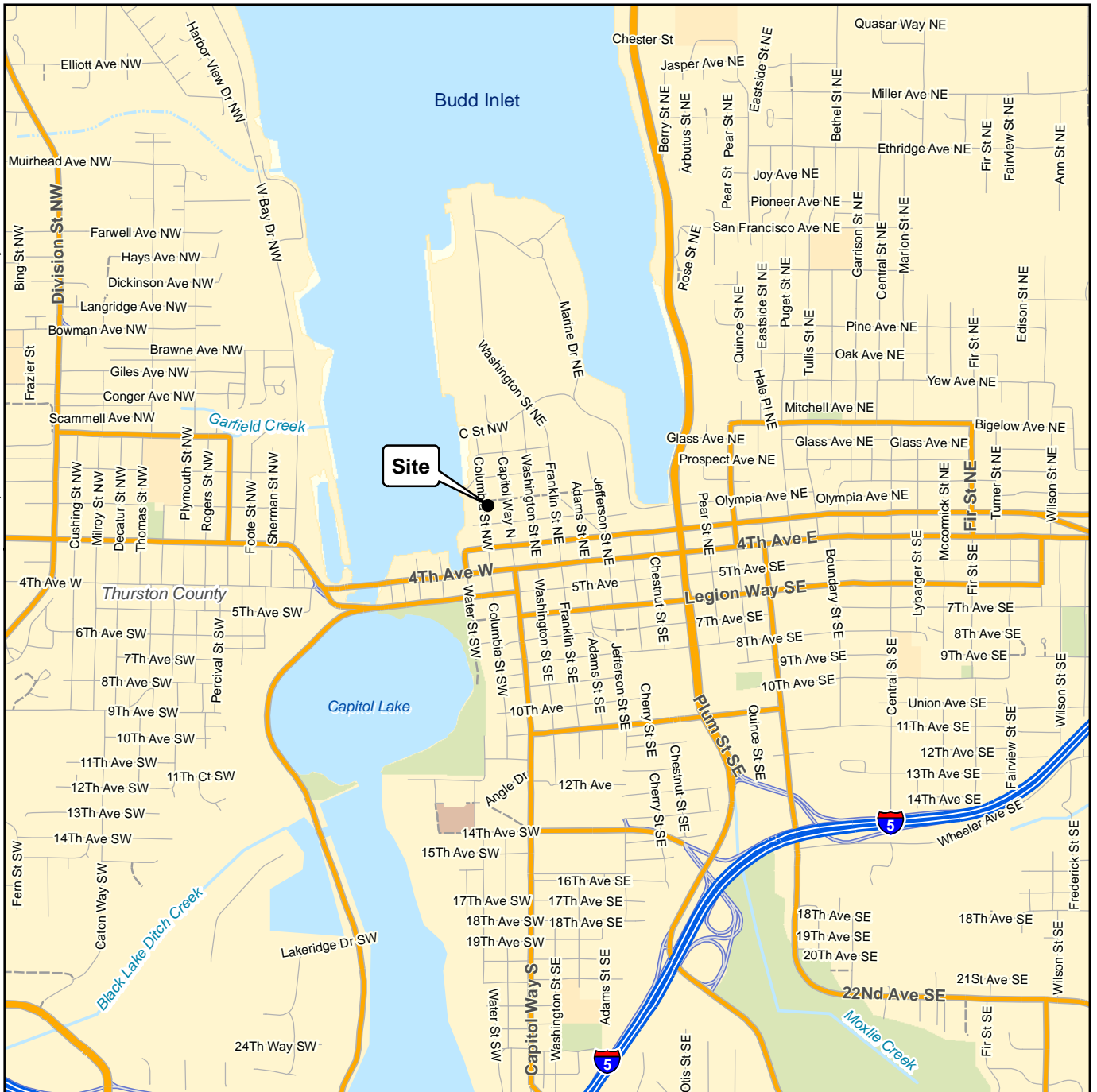
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We appreciate the opportunity to be of service to Puget Sound Energy. Please call if you have questions regarding this plan or require additional information.

## 10.0 REFERENCES

- Ecology 2016. "Guidance for Remediation of Petroleum Contaminated Sites." Toxics Cleanup Program Publication No. 10-09-057, revised June 2016.  
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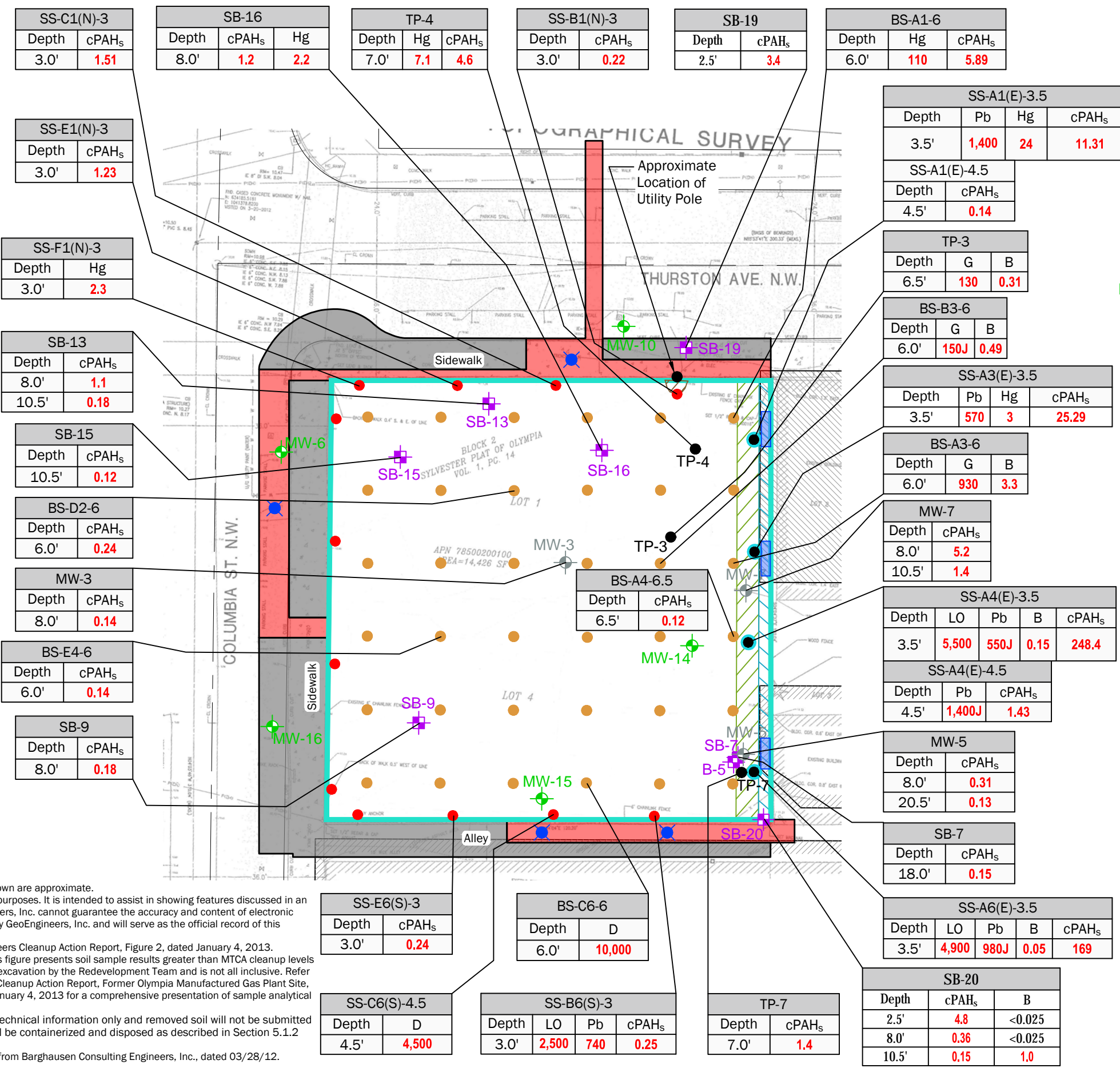
Notes:

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, Street Maps 2005  
 Transverse Mercator, Zone 10 N North, North American Datum 1983  
 North arrow oriented to grid north

<b>Vicinity Map</b>	
Former Olympia MGP Site Olympia, Washington	
	<b>Figure 1</b>

\\geoenr.com\Projects\0186774\CAD\04\Revised Final MMP\018677404\_T400\_MMP\_F02\_Property Redevelopment Project.dwg;TAB:F02 Date Exported: 05/08/18 - 15:45 by mwoods



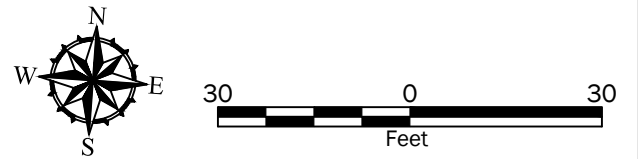
### Legend

- Property boundary/ Excavation Limit
- Existing Building
- Existing fence
- Confirmation soil sample (excavation base)
- Confirmation soil sample (excavation sidewall)
- Confirmation soil sample (excavation sidewall) where two samples were collected at two separate depths
- Proposed boring location for pre-construction soil characterization (to be completed by GeoEngineers)
- Proposed geotechnical test pit location (see note 5)
- Existing groundwater monitoring well
- Soil boring (completed during a previous investigation)
- Groundwater monitoring well decommissioned prior to commencing remedial excavation activities
- Test pit location (completed during a previous investigation)
- Remove Existing Concrete Curb, Sidewalk and Pavement (0.5' to 1.0' Depth) Area: Approximately 3,750 S.F.
- Planned Utility Trenching (3-6' Depth) for Property Redevelopment Area: Approximately 2,035 S.F.
- Sidewall sloped 1-foot horizontal: 1-foot vertical
- 3-foot setback from property line
- 4-foot setback from utility pole

**Soil analytical results (mg/kg) for contamination that remains in-place at concentrations greater than MTCA A cleanup levels.**

B = Benzene  
 cPAHs = Total carcinogenic polycyclic aromatic hydrocarbons – toxic equivalent concentration  
 LO = Lube oil-range hydrocarbons  
 D = Diesel-range hydrocarbons  
 G = Gasoline-range hydrocarbons  
 Hg = Mercury  
 Pb = Lead  
 J = The result is an estimated value.

**Red/bold** values exceed MTCA Method A cleanup levels



- ### Notes:
- The locations of all features shown are approximate.
  - 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.
  - Figure modified from GeoEngineers Cleanup Action Report, Figure 2, dated January 4, 2013.
  - Analytical data presented in this figure presents soil sample results greater than MTCA cleanup levels near proposed utility trenching excavation by the Redevelopment Team and is not all inclusive. Refer to GeoEngineers report titled "Cleanup Action Report, Former Olympia Manufactured Gas Plant Site, Olympia, Washington," dated January 4, 2013 for a comprehensive presentation of sample analytical data from the Property.
  - Test pit locations are for geotechnical information only and removed soil will not be submitted for chemical analysis. Soil will be containerized and disposed as described in Section 5.1.2

Data Source: PDF into raster image from Barghausen Consulting Engineers, Inc., dated 03/28/12.  
 Vertical Datum: NAVD 88.  
 Projection: NAD83 Washington State Planes, South Zone, US Foot.

**Property Redevelopment Project**

Former Olympia MGP Site  
Olympia, Washington

**GEOENGINEERS**

**Figure 2**



**APPENDIX A**  
**Property Environmental Covenant**



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300  
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

September 15, 2015

Mr. John Rork  
Puget Sound Energy  
P.O. Box 90868  
PSE-11N  
Bellevue, Washington 98009-0868

**Re: No Further Action at a Property associated with a Site**

- **Property Address:** 320 Columbia Street, Olympia, Washington 98501
- **Facility/Site No.:** 91682829
- **Cleanup Site ID No.:** 6851
- **VCP Project No.:** SW0984

Dear Mr. Rork:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your independent cleanup of a Property associated with the Columbia Square Properties facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

**Issues Presented and Opinion**

---

1. Is further remedial action necessary at the Property to clean up contamination associated with the Site?

**NO. Ecology has determined that no further remedial action is necessary at the Property to clean up contamination associated with the Site.**

**This opinion is dependent on the continued performance and effectiveness of the post-cleanup controls and monitoring specified below.**

2. Is further remedial action still necessary elsewhere at the Site?

**YES. Ecology has determined that further remedial action is still necessary elsewhere at the Site.**

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

### **Description of the Property and the Site**

---

This opinion applies only to the Property and the Site described below. This opinion does not apply to any other sites that may affect the Property. Any such sites, if known, are identified separately below.

#### **1. Description of the Property.**

The Property includes the following tax parcel in Thurston County, which were affected by the Site and addressed by your cleanup:

- 78500200100.

**Enclosure A** includes a legal description of the Property. **Enclosure B** includes a diagram of the Site that illustrates the location of the Property within the Site.

#### **2. Description of the Site.**

The Site is defined by the nature and extent of contamination associated with the following release:

- Total petroleum hydrocarbons (TPH) in the gasoline range (TPH-G), TPH in the diesel range (TPH-D), and TPH in the heavy oil range (TPH-O) into the soils.
- Volatile organic compounds (benzene) into the soils.
- Lead and mercury into the soils.
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs), into the soils and groundwater.

Those releases have affected more than one parcel of real property, including the parcel identified above.

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

**3. Identification of Other Sites that may affect the Property.**

Please note a parcel of real property can be affected by multiple sites. Please note that groundwater laboratory analytical results indicated total arsenic was present in the Property groundwater at concentrations that were above the MTCA Method A Groundwater Cleanup Levels. Additional off-Property groundwater sampling indicated the total arsenic contamination originated from an unknown, off-Site source, which also affects the Property. This opinion does not apply to any contamination associated with the off-Site unknown source of total arsenic groundwater contamination.

**Basis for the Opinion**

---

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

1. GeoEngineers, Inc. (GeoEngineers), **Cleanup Action Report, Former Olympia Manufactured Gas Plant Property, 320 Columbia Street NW, Olympia, Washington**, dated January 4, 2013.
2. GeoEngineers, **Revised Cleanup Action Plan, Former Olympia Manufactured Gas Plant Site, Olympia, Washington**, dated July 30, 2012.
3. GeoEngineers, **Groundwater Monitoring Technical Memorandum, October 2001 Monitoring Event, PSE Former Olympia MGP Site, 320 Columbia Street NW, Olympia, Washington**, dated December 21, 2011.
4. GeoEngineers, **Data Summary Report, Former Olympia Manufactured Gas Plant, Olympia, Washington**, dated October 25, 2011.
5. Ecology, **Further Action at a Property Opinion Letter**, dated February 23, 2009.

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

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

## **Analysis of the Cleanup**

---

### **1. Cleanup of the Property located within the Site.**

Ecology has concluded that **no further remedial action** is necessary at the Property to clean up contamination associated with the Site. That conclusion is based on the following analysis:

#### **a. Characterization of the Site.**

Ecology has determined your characterization of the Site is sufficient to establish cleanup standards for the Site and select a cleanup for the Property. The Site is described above and in **Enclosure B**.

The Site is on and around the location of the former Columbia Street Manufactured Gas Plant (MGP), located at 320 Columbia Street NW in Olympia, Thurston County, Washington (Property). The Property cleanup activities are being administered by Puget Sound Energy (PSE) as a legacy property. Starting in 1908, the Site operated as a MGP for about 16 years before it was converted into a gas storage facility; receiving coal gas that was manufactured in Tacoma. During the 1950s, the manufactured gas storage operations had ceased at the Site. After closing the gas storage operation, the Site was used as a warehouse until the 1970s and was then used as retail office space<sup>1</sup>.

In 1990, Estern Geotechnical, Inc. (Estern) conducted the removal of a 1,000-gallon underground storage tank (UST). The soil from the UST excavation was evaluated for TPH and benzene, toluene, ethylbenzene, and xylenes. The analytical results for the excavation bottom exceeded the soil cleanup level of 100 parts per million (ppm) for TPH. Estern allowed the excavation bottom soils to aerate for one week and then collected new samples and analyzed them; the new soil results were reported at 11 ppm for TPH. The excavation was backfilled to the original grade.

From 2006 until 2011, four investigations have been conducted to delineate the extent of the soil and groundwater contamination. These investigations identified benzene, cPAHs, TPH-G, TPH-D, TPH-O, lead, and mercury<sup>2</sup> as the major

---

<sup>1</sup> Environmental Partners, Inc., Summary of Findings, Historical Review and Focused Baseline Environmental Assessment, Parcels 7850-02-00100, 9900-00-06800, and 9900-08-32500 in Thurston County, 320 Columbia Street NW, Olympia, Washington, September 13, 2006.

<sup>2</sup> Total arsenic above the MTCA Method A Groundwater Cleanup Level was identified in the Site groundwater during the remedial investigation phase of the project. GeoEngineers offered to Ecology a scenario where the source of the groundwater total arsenic contamination was from an off-Site area. Ecology requested additional groundwater investigation to include up-gradient locations that were presumably off the Site. After their

constituents of concern (COCs) for the Site soil and groundwater. The majority of the soil contamination was found to be within 6 feet of the ground surface. Groundwater depth on the Property has ranged from approximately 4 feet to 6.5 feet below ground surface (bgs) (see Table 1).

In February 2009, Ecology provided a *Further Action at a Property Opinion Letter* for the Property. Ecology recommended additional monitoring wells to further define the COCs and the extents of the groundwater contamination plume.

In October 2010, GeoEngineers submitted a Cleanup Action Plan (CAP) for Ecology review and revised their plan in July 2012 after two interim investigations and a data analysis of previous investigation. Based on their analysis, the most wide-spread contaminate was cPAHs. GeoEngineers estimated that ninety-four percent of the total cPAH contaminant mass was within 6 feet of the ground surface (see Figure 4). In their feasibility study and disproportionate cost analysis (FS/DCA), GeoEngineers proposed:

- **Alternative 1:** Excavation of soil to a maximum depth of 15 feet bgs, as necessary to remove soil with concentrations of cPAHs exceeding the MTCA Method A cleanup level. Fifteen feet is the MTCA standard point of compliance for risk to human health through the direct contact pathway. Excavation to this depth would require dewatering and the use of structural controls to protect the integrity of surrounding buildings, sidewalks, and streets.
- **Alternative 2:** Excavation of soil to a maximum depth of approximately 6 feet bgs, with vertical sidewalls around the Property perimeter. Six feet bgs corresponds to the depth at which groundwater is encountered at the Property during low-water conditions. Trench boxes or other excavation methods would be used to protect the integrity of surrounding buildings, sidewalks, and streets.
- **Alternative 3:** Excavation of soil to a maximum depth of 6 feet bgs using sloped excavation sidewalls around the Property perimeter to protect the integrity of surrounding structures.

---

investigation, GeoEngineers did identify up-gradient arsenic groundwater contamination at similar concentrations to that which occurred in the Site and Property groundwater. The groundwater data from the up-gradient wells, plus the data indicating there was no arsenic in the Site soils led Ecology to determine the arsenic was not part of the Site but was part of a larger, yet unidentified source of the arsenic groundwater contamination.

GeoEngineers recommended and PSE selected Alternative 3. Ecology reviewed the FS/DCA, concurred with the assessment, and approved the CAP.

In October 2013, GeoEngineers implemented the preferred cleanup alternative on the Property involving excavation and disposal of contaminated soil. An artesian well was uncovered and capped in the process.

In January 2013, GeoEngineers submitted the *Cleanup Action Report* for review. In their report, GeoEngineers concluded the cleanup objectives had been met and available analytical data indicated the soil-to-indoor air pathway would not be complete on the property. In addition, groundwater data indicated the groundwater-to-indoor air pathway was likely to be incomplete on the Property (see Table 2). GeoEngineers requested Ecology provide a Property-specific *No Further Action (NFA)* Opinion Letter. Ecology review of the soil analytical results indicated PAHs and the other COCs did not extend past the southern and western property boundaries. PAHs concentrations above the MTCA Method A Soil CUL on the eastern boundary and on the northern boundary next to the treated wooden telephone pole and at a location that extended under the sidewalk and possibly under Thurston Avenue. Groundwater analytical results from monitoring wells MW-6, MW-10, MW-15, and MW-16 further indicated that PAHs were not detected above the laboratory reporting limits or were not above the MTCA Method A Groundwater CUL, further indicating groundwater impacts were limited to the Property. **Ecology concluded the cleanup objectives were met and indicated the Property would qualify for a Property-specific NFA Opinion Letter with the application of institutional controls under an Environmental Covenant.**

In October 2013, GeoEngineers provided a *Groundwater Compliance Monitoring Plan*. Ecology reviewed and approved the plan and stipulated it must be filed as an addendum to the environmental covenant attached to the Property.

**b. Establishment of cleanup standards for the Site.**

Ecology has determined the cleanup levels and points of compliance you established for the Site meet the substantive requirements of MTCA.

The point of compliance (POC) for protection of groundwater was established in the soils throughout the Site. For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, a conditional POC was established in the soils

throughout the Property from the ground surface to 6 feet bgs; a building is planned to be built on the compacted fill further isolating the residual PCS below 6 feet bgs. In addition, the conditional POC for the groundwater was established at the Property boundary; groundwater COC concentrations must be below the applicable MTCA Method A Groundwater CULs at monitoring wells MW-6, MW-10, MW-15, and MW-16 at the Property boundaries (see Figure 2). Applicable MTCA Method A Soil CULs are established must be used for soils across the Site.

**c. Selection of cleanup for the Property.**

Ecology has determined the cleanup you selected for the Property meets the substantive requirements of MTCA. The cleanup meets the minimum cleanup requirements and does not exacerbate conditions or preclude reasonable cleanup alternatives elsewhere at the Site.

GeoEngineers selected a preferred cleanup alternative for addressing the hazardous substances in soil at the Property. That action involved most of the soil on the Property to be excavated down to 6 feet bgs. The excavated soil would be disposed of off the Property. The preferred alternative also would use a conditional POC for groundwater that would be set at the Property boundaries; all COCs would have to meet the applicable CULs at those wells (POCs).

**Ecology concurred with this proposed alternative and agreed with its implementation. The Property is currently undeveloped. Future proposed uses of the Property could include mixed use of the Property. Analytical data suggests this alternative is protective of human health and the environment with covenants and institutional controls applied at the Property.**

**d. Cleanup of the Property.**

Ecology has determined the cleanup you performed meets the applicable Site cleanup standards within the Property. This determination is dependent on the continued performance and effectiveness of the post-cleanup controls and monitoring specified below.

In October 2012, GeoEngineers orchestrated the excavation and removal of contaminated soil from the entire 0.33-acre Property to an average depth of 6 feet bgs. Once the excavation was completed, 36 soil samples were collected from the

bottom of the excavation; the excavation bottom was divided into thirty-six 20-foot by 20-foot grid sections. One soil sample was collected from each grid and analyzed for the COCs attributed to that grid area. In addition, soil samples were also collected from the north, east, and south side walls of the excavation at selected locations. Soil analytical results indicated the bulk of the metals and cPAH contamination on the Property was removed down to 6 feet bgs with the notable exception of the floor along the east wall of the excavation and the eastern side wall itself.

In this area, residual contamination above the applicable MTCA Soil CULs was left in place due to concerns of undercutting and destabilizing the building on the adjacent property (Gardner's Restaurant) (see Figure 2 [2015]). Also, residual mercury and cPAH soil contamination slightly above the applicable MTCA CULs remained under the city sidewalk located on the north side wall (under the city sidewalks) and residual TPH-D and TPH-O soil contamination above the applicable CULs remained in the southern excavation bottom and southern side wall (under the alley gravel cap) (see Figure 2 [2015]).

Due to the cohesiveness and integrity of the Property soils, additional contaminated soil was excavated along the south, west, and north side walls. As a result, much of the soil that was thought to be inaccessible under Alternative 3 was removed without the additional costs associated with structural shoring of the excavation. Once the cleanup action was completed, the excavation was backfilled with clean structural fill and gravel to the former grade. The structural fill acts as a cap to prevent direct-contact with the residual soil contamination.

Approximately 4,400 tons of contaminated soil and other subsurface structures were excavated and removed from the Property. The excavated material was transported to and disposed of at Waste Management's Riverbend Subtitle D Landfill in McMinnville, Oregon.

## 2. **Cleanup of the Site as a whole.**

Ecology has concluded that **further remedial action** under MTCA is still necessary elsewhere at the Site. In other words, while your cleanup constitutes the final action for the Property, it constitutes only an **"interim action"** for the Site as a whole.

## **Post-Cleanup Controls and Monitoring**

---

Post-cleanup controls and monitoring are remedial actions performed after the cleanup to maintain compliance with cleanup standards. This opinion is dependent on the continued performance and effectiveness of the following:

### **1. Compliance with institutional controls.**

Institutional controls prohibit or limit activities that may interfere with the integrity of engineered controls or result in exposure to hazardous substances. The following institutional controls are necessary at the Property:

- Restriction on any intrusive activities without written approval from Ecology.
- Restriction on groundwater use, for any purpose, without written approval from Ecology.

To implement that control, an Environmental Covenant will be recorded on the following parcel of real property in Thurston County:

- 78500200100.

Ecology approved the recorded Covenant. A copy of the Covenant is included in **Enclosure B**.

### **2. Performance of confirmational monitoring.**

Confirmational monitoring is necessary at the Property to confirm the long-term effectiveness of the cleanup. The monitoring data will be used by Ecology during periodic reviews of post-cleanup conditions. Ecology has approved the monitoring plan you submitted. A copy of the plan is included in **Enclosure C**.

## **Periodic Review of Post-Cleanup Conditions**

---

Ecology will conduct periodic reviews of post-cleanup conditions at the Property to ensure that they remain protective of human health and the environment. If Ecology determines, based on a periodic review, that further remedial action is necessary at the Property, then Ecology will withdraw this opinion.

### **Listing of the Site**

---

Based on this opinion, Ecology will update the status of remedial action at the Site on our database of hazardous waste sites. However, because further remedial action is still necessary elsewhere at the Site, we will not remove the Site from our lists of hazardous waste sites. Furthermore, the Property will remain listed as part of the Site because the cleanup of the Property does not change the boundaries of the Site.

### **Limitations of the Opinion**

---

**1. Opinion does not settle liability with the state.**

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

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

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

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

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

**3. State is immune from liability.**

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

### **Contact Information**

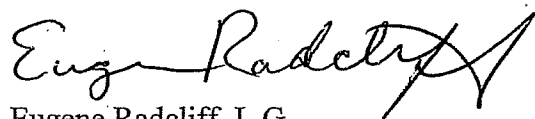
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Thank you for cleaning up your Property under the Voluntary Cleanup Program (VCP). We look forward to working with you to clean up the remainder of the Site.

Mr. John Rork  
September 18, 2015  
Page 11

For more information about the VCP and the cleanup process, please visit our web site: [www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm](http://www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm). If you have any questions about this opinion or the termination of the Agreement, please contact me by phone at (360) 407-7404 or by e-mail at [erad461@ecy.wa.gov](mailto:erad461@ecy.wa.gov).

Sincerely,



Eugene Radcliff, L.G.  
VCP Site Manager  
SWRO Toxics Cleanup Program

GER: knf

Enclosures (9): A – Legal Description of the Property, Including Site Description, Legal Description, Figures and Tables

Figure 1	Vicinity Map
Figure 2	Remedial Excavation Limits and Soil Analytical Results
Figure 2 [2015]	August 2013 and February 2015 Ground Water Compliance Monitoring
Figure 4	Calculated Relative Mass of Total cPAHs by Depth Below Ground Surface
Table 1	Measured Groundwater Levels in Monitoring Wells
Table 2	Groundwater Chemical Analytical results (August 2013 and February 2015)

B – Environmental Covenant and Groundwater Compliance Monitoring Plan

By certified mail: 9171082133393970418962

cc: Mr. Nick Rohrbach, GeoEngineers, Inc.  
Mr. Patrick Rants, The Rants Group  
Olympia Longshoreman Benevolent Association  
JFL Holdings LLC  
Mr. Oran Johnson  
Mr. Gerald Tousley, Thurston County Health Department  
Ms. Richelle Perez, Ecology  
Ms. Carol Johnston, Ecology  
Ms. Dolores Mitchell, Ecology

**Enclosure A**

**Legal Description of the Property  
Including Site Description, Legal Description,  
Figures and Tables**

# Site Description

## Media of Concern: Soil and Groundwater

The former Columbia Street Manufactured Gas Plant (MGP) Site is located at 320 Columbia Street NW in Olympia, Washington (Property) (see Figure 1). The Property consists of one contiguous parcel totaling 0.33 acres located on the east side of Columbia Street. This Property is located approximately 300 feet east of West Bay (Puget Sound) in downtown Olympia. The entire Property is vacant; the lot is graded flat and is paved with gravel. The total 0.33 acres of the Property has been excavated to a depth of at least 6 feet below ground surface (bgs) and backfilled and compacted with clean fill to the former grade. Columbia Street NW, a city park, and Puget Sound bound the Property on the west. Thurston Avenue and a hotel bound the property to the north. A commercial property with a building bound the Property to the east, an alley and commercial buildings bound the Property to the south. The Thurston County Office of the Assessor<sup>1</sup> (TCOA) notes the tax parcel number as 78500200100.

## The legal description of the property is:

**Abbreviated Legal Description<sup>2</sup>** – Section 14 Township 18 Range 2W Quarter SW NW Plat SYLVESTER TOWN OF OLYMPIA 2 1 & 4 Document 001/014.

and

**Legal Description<sup>3</sup>** – Lots 1 and 4 in Block 2 of Sylvester Plat of Olympia, as recorded in Volume 1 of Plats, page 14.

## Latitude and Longitude<sup>4</sup>:

47° 2' 50" and 122° 54' 3"

The Washington Department of Natural Resources – Division of Geology & Earth Sciences, Washington State Geologic Information Portal<sup>5</sup> describes the downtown area of Olympia as a continuous mass of Quaternary unconsolidated or semi-consolidated alluvial clay, silt, sand, gravel, and cobble deposits; which can include layers or pockets of peat, muck, diatomite, beach sands, lacustrine, estuarine, marsh, glacial, colluvium, volcaniclastic or tephra deposits, plus anthropogenic modified lands and artificial fill.

The United States Department of Agriculture, Natural Resources Conservation Service (NRCS) website<sup>6</sup> identifies the Property soil as Xerorthents, typically found on 0 to 5 percent slopes and most often observed as area of tidal flats. Xerorthents parent material is described a sandy and loamy cut and fill material and found in areas with typical mean annual precipitation ranging

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<sup>1</sup> <http://www.geodata.org/website/cadastral/viewer.htm>

<sup>2</sup> Thurston Geodata Center:

<http://www.geodata.org/website/cadastral/resultparcel.asp?parcel=78500200100&submit=Go%21>

<sup>3</sup> As provided in the Environmental Covenant in Enclosure B.

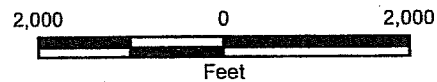
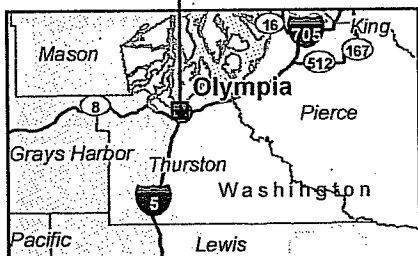
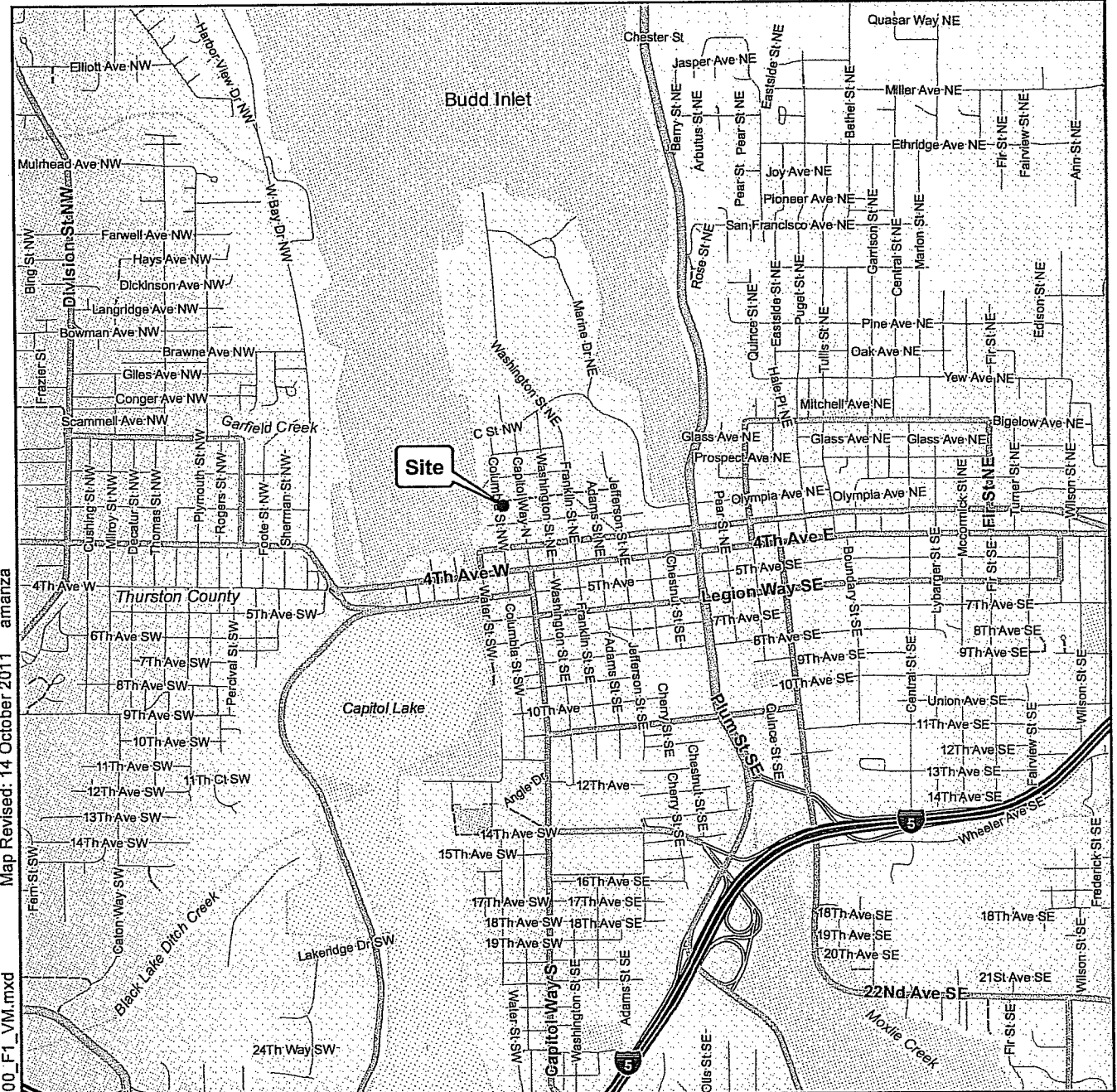
<sup>4</sup> <http://www.itouchmap.com/latlong.html>

<sup>5</sup> <https://fortress.wa.gov/dnr/geology/?Theme=wigm>

<sup>6</sup> <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

from 30 inches to 60 inches and where mean annual air temperature can range from 39 to 50 degrees Fahrenheit. Xerorthents are classified as *somewhat excessively drained* with a capacity to transmit water (Ksat) as *moderately high to high*. The typical xerorthents profile from 0 to 60 inches bgs is described as a variable mixture of the material described in the previous paragraph.

Locally at the Property, well logs of the shallow surface soil was described to consist of 1.5 to 4 feet of fine to medium sand with varying amounts of silt and gravel, interpreted as structural fill. Soils encountered below the structural fill generally consisted of gray to brown, fine to coarse sand with variable amounts of silt, gravel, and shell fragments. This material was interpreted as hydraulic fill from dredging of Budd Inlet in the 1800s and early 1900s. Groundwater was encountered approximately 4.5 to 6.5 feet below ground surface (bgs) and groundwater measurements imply a shallow groundwater gradient that migrates towards West Bay.



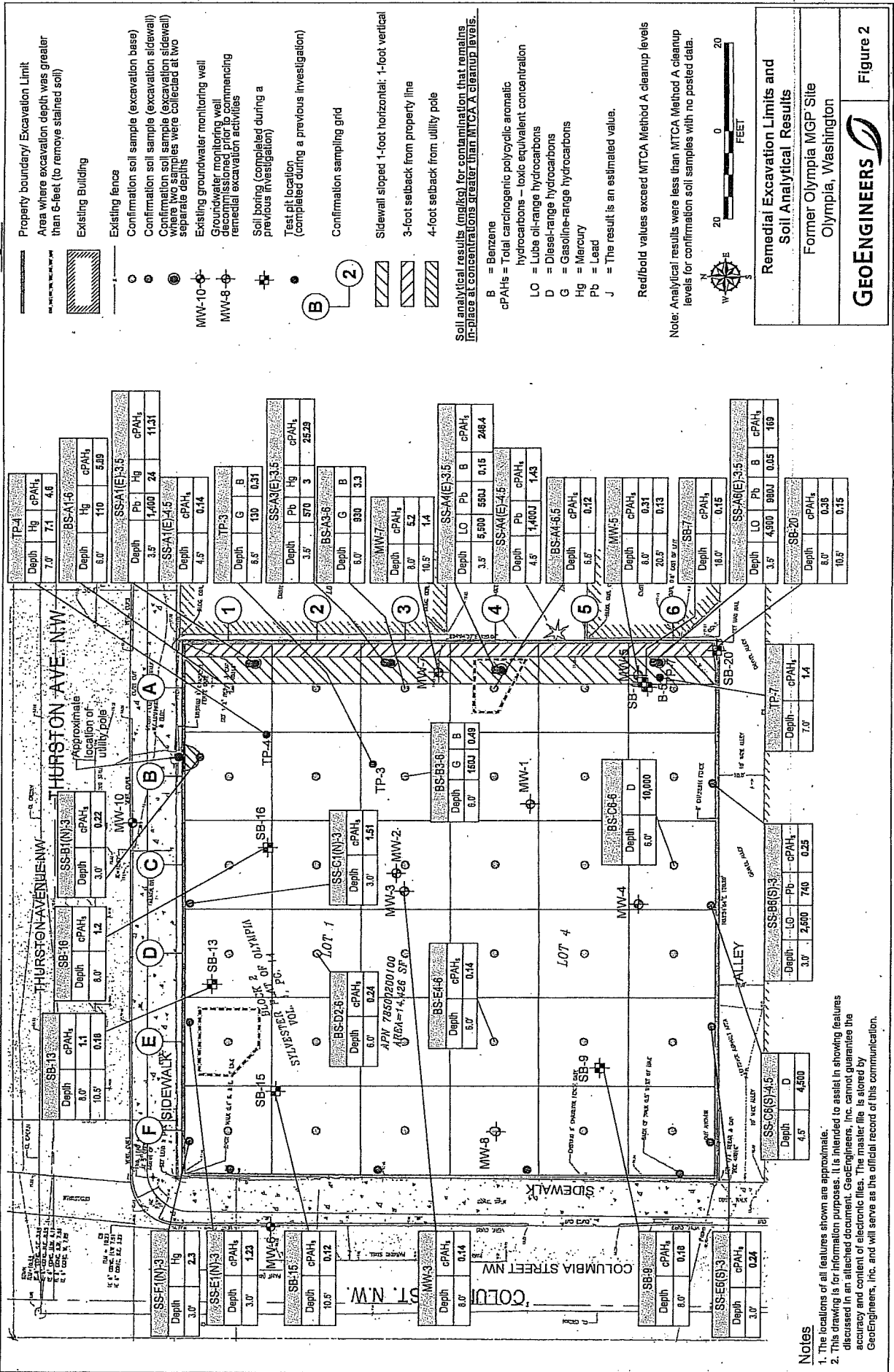
Vicinity Map

Former Olympia MGP Site  
Olympia, Washington



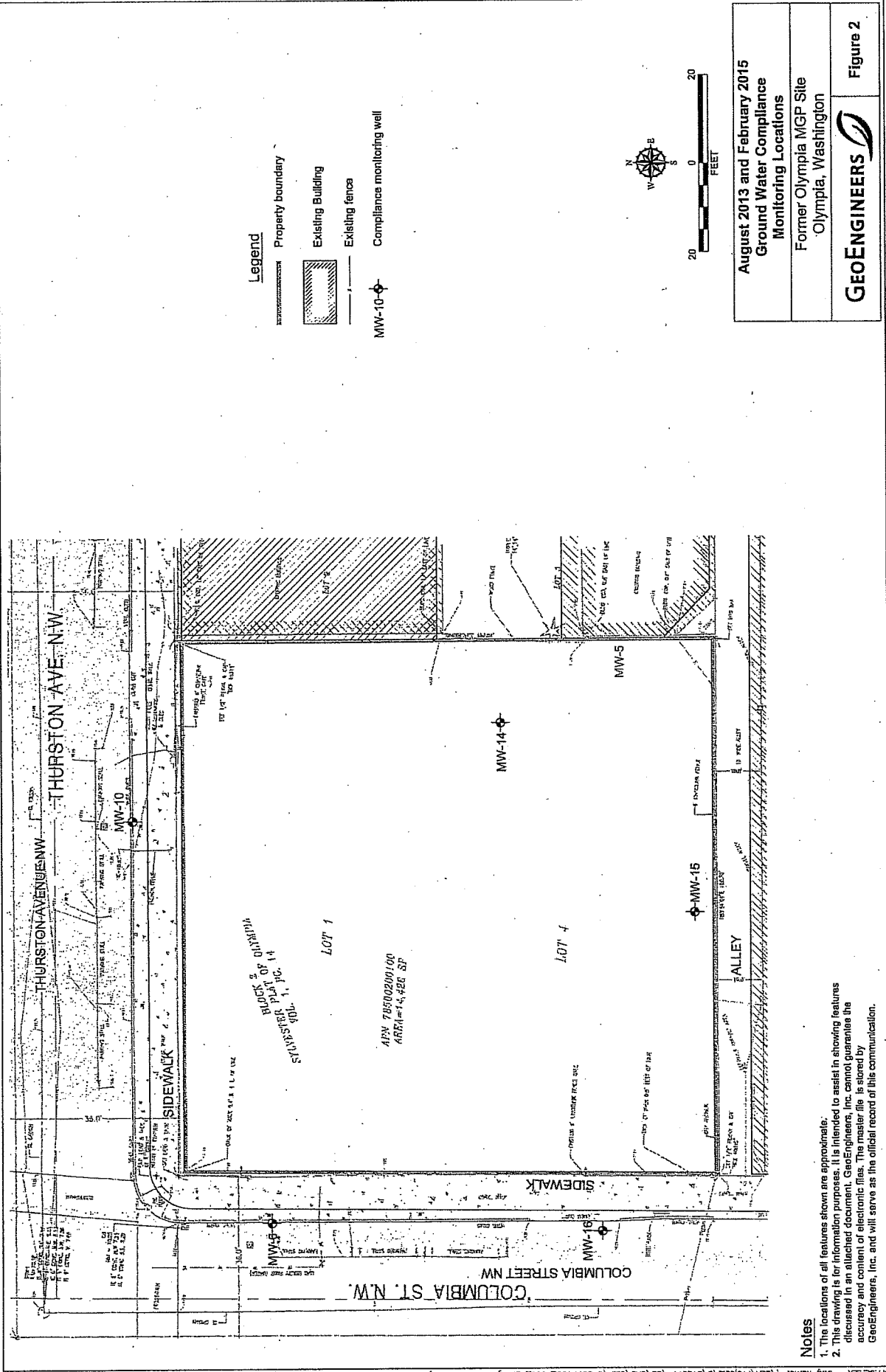
Figure 1

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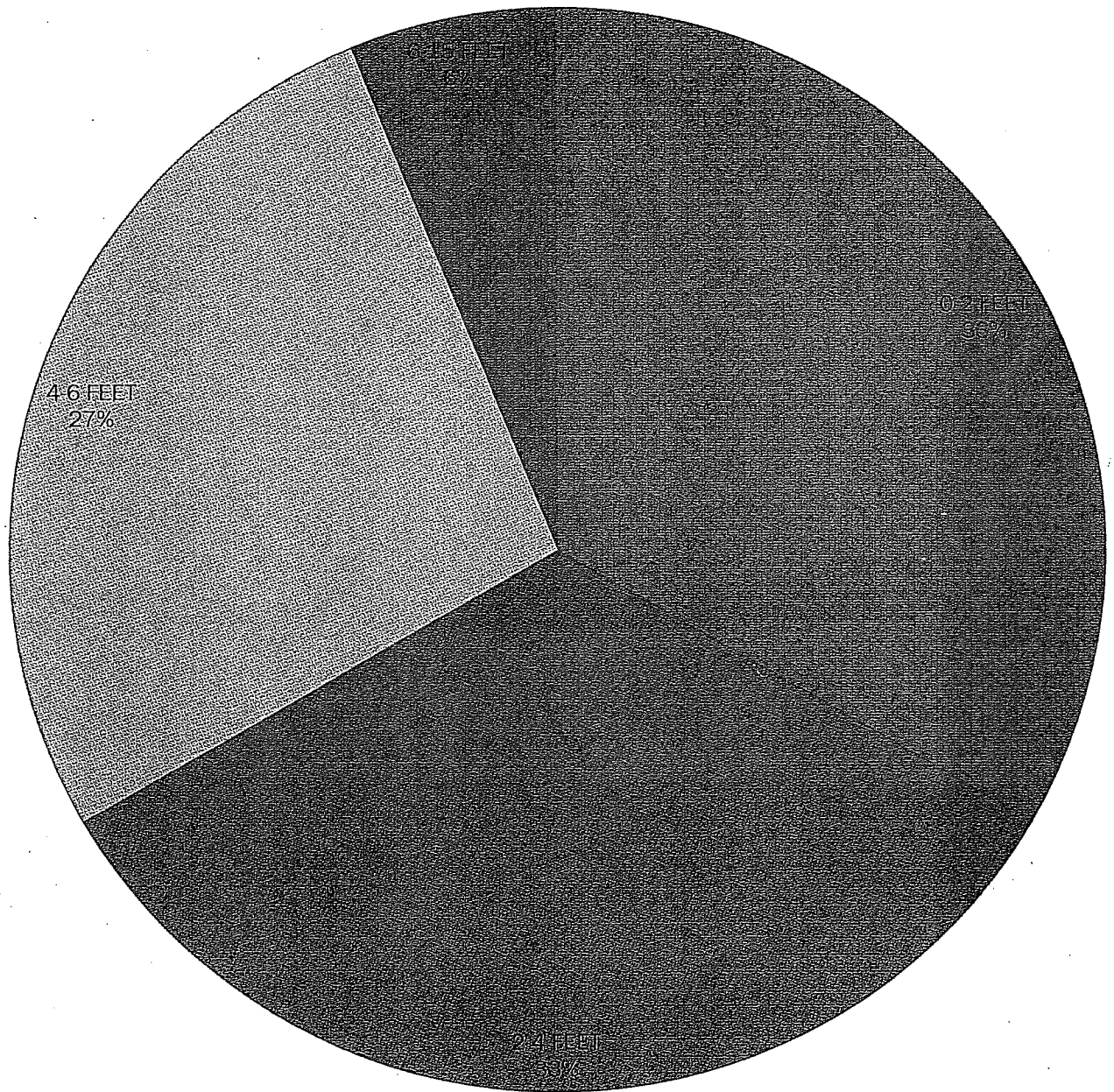
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**Calculated Relative Mass of Total cPAHs  
by Depth Below Ground Surface**

Former Olympia MGP Site  
Olympia, Washington

GEOENGINEERS 

Figure 4

**Table 1**  
**Measured Groundwater Levels in Monitoring Wells**  
**2008-2015**  
PSE Former Olympia MGP Site  
Olympia, Washington

Monitoring Well	Screened Interval (feet bgs)	Shallow/Deep Well	Top-of-Casing Elevation <sup>1</sup> (feet NAVD88)	Date	Measured Depth to Groundwater <sup>2</sup> (feet below TOC)	Calculated Groundwater Elevation (feet NAVD88)
MW-6 <sup>3</sup>	11.1 <sup>3</sup>	Shallow	13.69	8/26/08	5.37	8.32
				10/6/08	5.37	8.32
				11/3/09	5.08	8.61
				2/15/10	4.46	9.23
				5/26/10	5.08	8.61
				1/6/11	4.88	8.81
				4/19/11	4.90	8.79
				7/18/11	NM	-
				10/18/11	NM	-
				8/26/13	5.16	8.53
2/26/15	4.78	8.91				
MW-10 <sup>3</sup>	14.0 <sup>3</sup>	Shallow	13.76	8/26/08	5.31	8.45
				10/6/08	5.25	8.51
				11/3/09	5.14	8.62
				2/15/10	4.66	9.1
				5/26/10	4.96	8.8
				1/6/11	4.91	8.85
				4/19/11	4.92	8.84
				7/18/11	NM	-
				10/18/11	NM	-
				8/26/13	5.30	8.46
2/26/15	4.91	8.85				
MW-14 <sup>4</sup>	4 to 20	Shallow	14.64	8/26/13	6.24	8.40
				2/26/15	5.95	8.69
MW-15 <sup>4</sup>	4 to 20	Shallow	14.20	8/26/13	5.81	8.39
				2/26/15	5.38	8.82
MW-16 <sup>4</sup>	4 to 20	Shallow	13.39	8/26/13	4.98	8.41
				2/26/15	4.51	8.88

**Notes:**

<sup>1</sup>MW-6 and MW-10 Elevations surveyed in December 2010 by Barghausen Consulting Engineers, Inc. relative to NAVD88. MW-14, MW-15, and MW-16 elevations are based on a laser level survey (utilizing the same datum) performed by GeoEngineers.

<sup>2</sup>Water levels measured with an electronic water level indicator.

<sup>3</sup>Pre-existing monitoring well installed by others; screened interval unknown. Value shown for bottom of screened interval is the approximate depth to bottom of well casing measured with an electronic water level indicator on February 15, 2010.

<sup>4</sup>Monitoring well installed by Cascade Drilling and observed by GeoEngineers in August 2013.

bgs = Below ground surface

MW = Monitoring well

NAVD88 = North American Vertical Datum of 1988.

NM = Not measured

TOC = Top of well casing

**Table 2**  
**Groundwater Chemical Analytical Results (August 2013 and February 2015)**  
 Former Olympia Manufactured Gas Plant Site  
 Olympia, Washington

Analyte	Units	Location ID		Sample Date		MW-6		MW-9		MW-10		MW-14		MW-15		MW-16		MW-18								
		MW-6-082813-W	MW-6-082813-W	8/28/2013	8/28/2013	MW-9-022615-W	MW-9-022615-W	2/26/2015	2/26/2015	MW-10-022615-W	MW-10-022615-W	2/26/2015	2/26/2015	MW-14-022615-W	MW-14-022615-W	8/28/2013	8/28/2013	MW-15-022615-W	MW-15-022615-W	2/26/2015	2/26/2015	MW-16-022615-W	MW-16-022615-W	2/26/2015	2/26/2015	
Benzene by GC/MS	µg/L	5	5	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Total Polycyclic Aromatic Hydrocarbons (NTPH-D4)	µg/L	0.5	0.5	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
Chlorobenzene hydrocarbons	µg/L	0.5	0.5	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U
Linear Chlorinated Hydrocarbons	µg/L	NE	NE	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U
CPAHs by H27-DB-SIM	µg/L	NE	NE	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U
Benzofluoranthene	µg/L	NE	NE	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U
Chrysene	µg/L	NE	NE	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U
Benzofluoranthene	µg/L	NE	NE	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U
Benzofluoranthene	µg/L	NE	NE	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U
Indeno(1,2,3-cd)pyrene	µg/L	NE	NE	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U
Fluorene	µg/L	NE	NE	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U
Fluorene	µg/L	NE	NE	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U
Total CPAHs TEC	µg/L	0.1	0.1	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
Metals by 200.9/7410	µg/L	0.015	0.015	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
Total Lead	mg/L	0.015	0.015	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Dissolved Lead <sup>2</sup>	mg/L	0.002	0.002	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Total Mercury	mg/L	0.002	0.002	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Dissolved Mercury <sup>2</sup>	mg/L	0.002	0.002	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U

**Notes:**  
 \*Method Toxic Control Act (MTC) Method A cleanup levels for possible groundwater (Washington Administrative Code (WAC) 173-340-720(3)).  
 \*Groundwater samples analyzed for dissolved metals were field filtered with a 45 micron filter.  
 \*Field duplicate sample of MW-14.  
 CPAHs = Carcinogenic polycyclic aromatic hydrocarbons  
 mg/L = milligrams per liter  
 NE = Cleanup level not established  
 T = Calculated by GeoEngineers.  
 TEC = Total toxic equivalent concentration calculated per WAC 173-340-708(5)(f)(iii)(A). For non-detect constituents, one-half the method reporting limit was used in the calculation. All values calculated using toxicity equivalency factors from WAC 173-340 Table 709-2 (Nov. 2007).  
 U = The analyte was analyzed for, but was not detected above the listed method reporting limit.  
 µg/L = micrograms per liter  
 -- = Constituent not analyzed  
 Chemical analyses performed by OnSite Environmental, Inc. in Redmond, Washington.

**Enclosure B**

**Environmental Covenant and Groundwater  
Compliance Monitoring Plan**

After Recording Return  
Original Signed Covenant to:  
Eugene Radcliff, L.G.  
Toxics Cleanup Program  
Department of Ecology  
Southwest Regional Office  
300 Desmond Dr SE  
Lacey, WA 98503-1274

### Environmental Covenant

Grantor: Evergreen Olympic Properties Inc. d/b/a The Rants Group  
Grantee: State of Washington, Department of Ecology  
Brief Legal Description: Lots 1 & 4 Blk 2 Sylvester's  
Tax Parcel Nos.: 7850-02-00100  
Cross Reference:

#### RECITALS

- a. This document is an environmental (restrictive) covenant (hereafter "Covenant") executed pursuant to the Model Toxics Control Act ("MTCA"), chapter 70.105D RCW and Uniform Environmental Covenants Act ("UECA"), chapter 64.70 RCW.
- b. The Property that is the subject of this Covenant is part or all of a site commonly known as Columbia Square Properties (Facility ID 91682829). The Property is legally described in Exhibit A, and illustrated in Exhibit B, both of which are attached (hereafter "Property"). If there are differences between these two Exhibits, the legal description in Exhibit A shall prevail.
- c. The Property is the subject of remedial action under MTCA. This Covenant is required because residual contamination remains on the Property after completion of remedial actions. Specifically, the following principle contaminants remain on the Property:

4456419  
07/23/2015 04:06 PM Covenant  
Thurston County Washington  
DEPARTMENT OF ECOLOGY

Pages: 83



Medium	Principle Contaminants Present
Soil	Gasoline-, diesel- and lube oil-range petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), benzene, lead, and mercury
Groundwater	cPAHs
Surface Water/Sediment	Not applicable (N/A)

d. It is the purpose of this Covenant to restrict certain activities and uses of the Property to protect human health and the environment and the integrity of remedial actions conducted at the site. Records describing the extent of residual contamination and remedial actions conducted are available through the Washington State Department of Ecology. This includes the following documents:

"Supplemental Site Investigation Report, Former Columbia Street Manufactured Gas Plant Property, Olympia, Washington," prepared by GeoEngineers, January 29, 2010.

"Data Summary Report, Former Olympia Manufactured Gas Plant Site, Olympia, Washington," prepared by GeoEngineers, October 17, 2011.

"Revised Cleanup Action Plan, Former Columbia Street Manufactured Gas Plant Property, Olympia, Washington," prepared by GeoEngineers, July 30, 2012.

"Construction Work Plan, Former Olympia Manufactured Gas Plant Site, Olympia, Washington," prepared by GeoEngineers, September 19, 2012.

"Cleanup Action Report, Former Olympia Manufactured Gas Plant Property, Olympia, Washington," prepared by GeoEngineers, January 4, 2013.

e. This Covenant grants the Washington State Department of Ecology, as holder of this Covenant, certain rights specified in this Covenant. The right of the Washington State Department of Ecology as a holder is not an ownership interest under MTCA, Chapter 70.105D RCW or the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") 42 USC Chapter 103.

#### COVENANT

Evergreen Olympic Properties Inc. d/b/a The Rants Group, as Grantor and owner of the Property hereby grants to the Washington State Department of Ecology, and its successors and assignees, (hereafter "Ecology") the following covenants. Furthermore, it is the intent of the Grantor that such covenants shall run with the land and be binding on all current and future owners of any portion of, or interest in, the Property.

##### Section 1. General Restrictions and Requirements.

The following general restrictions and requirements shall apply to the Property:

a. **Interference with Remedial Action.** The Grantor shall not engage in any activity on the Property that may impact or interfere with the remedial action and any operation, maintenance, inspection or monitoring of that remedial action without prior written approval from Ecology.

b. **Protection of Human Health and the Environment.** The Grantor shall not engage in any activity on the Property that may threaten continued protection of human health or the environment without prior written approval from Ecology. This includes, but is not limited to, any activity that results in the release of residual contamination that was contained as a part of the remedial action or that exacerbates or creates a new exposure to residual contamination remaining on the Property.

c. **Continued Compliance Required.** Grantor shall not convey any interest in any portion of the Property without providing for the continued adequate and complete operation, maintenance and monitoring of remedial actions and continued compliance with this Covenant.

d. **Leases.** Grantor shall restrict any lease for any portion of the Property to uses and activities consistent with this Covenant and notify all lessees of the restrictions on the use of the Property.

e. **Amendment to the Covenant.** Grantor must notify and obtain approval from Ecology at least sixty (60) days in advance of any proposed activity or use of the Property in a manner that is inconsistent with this Covenant. Before approving any proposal, Ecology must issue a public notice and provide an opportunity for the public to comment on the proposal. If Ecology approves the proposal, the Covenant will be amended to reflect the change.

## **Section 2. Specific Prohibitions and Requirements.**

In addition to the general restrictions in Section 1 of this Covenant, the following additional specific restrictions and requirements shall apply to the Property.

### **a. Land use.**

There are no land use restrictions because the cleanup was conducted using MTCA cleanup levels for unrestricted land use.

### **b. Containment of soil/waste materials.**

The remedial action for the Property includes containment of some contaminated soil that could not be practicably removed. The remaining contaminated soil is contained under a cap consisting of approximately 6 feet of clean imported fill. The 6-foot-thick cap is located as illustrated in Exhibit B. The primary purpose of this cap is to minimize the potential for contact with the contaminated soil. As such, the following restrictions shall apply within the area illustrated in Exhibit B:

Any activity on the Property that will compromise the integrity of the cap including: drilling; digging; piercing the cap with sampling device, post, stake or similar device; grading; excavation; installation of underground utilities; removal of the cap; or, application of loads in excess of the cap load bearing capacity, is prohibited without prior written approval by Ecology. The Grantor shall report to Ecology within forty-eight (48) hours of the discovery of any damage to the cap. Unless an alternative plan has been approved by Ecology in writing, the Grantor shall promptly repair the damage and submit a report documenting this work to Ecology within thirty (30) days of completing the repairs.

**c. Groundwater use.**

The groundwater beneath the Property remains contaminated and shall not be extracted for any purpose other than temporary construction dewatering, investigation, monitoring or remediation. Drilling of a well for any water supply purpose is strictly prohibited. Groundwater extracted from the Property for any purpose shall be considered potentially contaminated and any discharge of this water shall be done in accordance with state and federal law.

**d. Monitoring**

Several groundwater monitoring wells are located on or adjacent to the Property to monitor the performance of the remedial action. Groundwater conditions are being monitored in accordance with the Groundwater Compliance Monitoring Plan dated October 8, 2013 and an associated Addendum #1, dated November 5, 2014 as presented in Exhibit C. The Grantor shall maintain clear access to those devices located on the Property and maintain the functional integrity of the groundwater monitoring well network and protect that network from damage or replace damaged components to maintain the intended purpose and functionality of the network. The Grantor shall report to Ecology within forty-eight (48) hours of the discovery of any damage to any monitoring device. Unless Ecology approves of an alternative plan in writing, the Grantor shall promptly repair the damage and submit a report documenting this work to Ecology within thirty (30) days of completing the repairs.

**Section 3. Access.**

- a. The Grantor shall maintain clear access to all remedial action components necessary to construct, operate, inspect, monitor and maintain the remedial action.
- b. The Grantor freely and voluntarily grants Ecology and its authorized representatives, upon reasonable notice, the right to enter the Property at reasonable times to evaluate the effectiveness of this Covenant and associated remedial actions, and enforce compliance with this Covenant and those actions, including the right to take samples, inspect any remedial actions conducted on the Property, and to inspect related records.
- c. No right of access or use by a third party to any portion of the Property is conveyed by this instrument.

**Section 4. Notice Requirements.**

- a. **Conveyance of Any Interest.** Because the anticipated use may be a multi-tenant/owner use where residents will not be exposed to residual contamination, Ecology waives the requirement that Grantor provide notice to Ecology of conveyances of interests in parts of the Property illustrated in Exhibit B. However, waiver of this notice to Ecology for these transactions does not constitute waiver of this notice requirement for the entire Property nor a waiver of the requirement to provide notice in any document conveying interest in the entire Property as follows:
  - i. Notify Ecology at least thirty (30) days in advance of the conveyance.
  - ii. Include in the conveying document a notice in substantially the following form, as well as a complete copy of this Covenant:

**NOTICE: THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL COVENANT GRANTED TO THE WASHINGTON STATE DEPARTMENT OF ECOLOGY AND RECORDED WITH THE THURSTON COUNTY AUDITOR. USES AND ACTIVITIES ON THIS PROPERTY MUST COMPLY WITH THAT COVENANT, A COMPLETE COPY OF WHICH IS ATTACHED TO THIS DOCUMENT.**

iii. Unless otherwise agreed to in writing by Ecology, provide Ecology with a complete copy of the executed document within thirty (30) days of the date of execution of such document.

b. **Reporting Violations.** Should the Grantor become aware of any violation of this Covenant, Grantor shall promptly report such violation to Ecology.

c. **Emergencies.** For any emergency or significant change in site conditions due to Acts of Nature (for example, flood, fire) resulting in a violation of this Covenant, the Grantor is authorized to respond to such an event in accordance with state and federal law. The Grantor must notify Ecology of the event and response actions planned or taken as soon as practical but no later than within 24 hours of the discovery of the event.

d. Any required written notice, approval, or communication shall be personally delivered or sent by first class mail to the following persons. Any change in this contact information shall be submitted in writing to all parties to this Covenant.

Evergreen Olympic Properties Inc. d/b/a The Rants Group Attn: Patrick Rants 724 Columbia St. NW, Suite 200 Olympia, WA 98501 Phone contact: 360 943-8060	Environmental Covenants Coordinator Washington State Department of Ecology Toxics Cleanup Program P.O. Box 47600 Olympia, WA 98504 - 7600 (360) 407-6000
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As an alternative to providing written notice and change in contact information by mail, these documents may be provided electronically in an agreed upon format at the time of submittal.

**Section 5. Modification or Termination.**

a. If the conditions at the site requiring a Covenant have changed or no longer exist, then the Grantor may submit a request to Ecology that this Covenant be amended or terminated. Any amendment or termination of this Covenant must follow the procedures in Chapter 64.70 RCW and Chapter 70.105D RCW and any rules promulgated under these chapters.

**Section 6. Enforcement and Construction.**

a. This Covenant is being freely and voluntarily granted by the Grantor.

b. Grantor shall provide Ecology with an original signed Covenant and proof of recording within ten (10) days of execution of this Covenant.

c. Ecology shall be entitled to enforce the terms of this Covenant by resort to specific performance or legal process. All remedies available in this Covenant shall be in addition to any

and all remedies at law or in equity, including Chapter 70.105D RCW and Chapter 64.70 RCW. Enforcement of the terms of this Covenant shall be at the discretion of Ecology, and any forbearance, delay or omission to exercise its rights under this Covenant in the event of a breach of any term of this Covenant is not a waiver by Ecology of that term or of any subsequent breach of that term, or any other term in this Covenant, or of any rights of Ecology under this Covenant.

d. The Grantor, upon request by Ecology, shall be obligated to pay for Ecology's costs to process a request for any modification or termination of this Covenant and any approval required by this Covenant.

e. This Covenant shall be liberally construed to meet the intent of the Model Toxics Control Act, chapter 70.105D RCW and Uniform Environmental Covenants Act, chapter 64.70 RCW.

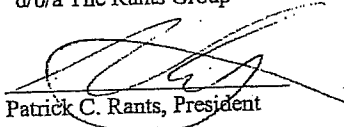
f. The provisions of this Covenant shall be severable. If any provision in this Covenant or its application to any person or circumstance is held invalid, the remainder of this Covenant or its application to any person or circumstance is not affected and shall continue in full force and effect as though such void provision had not been contained herein.

g. A heading used at the beginning of any section or paragraph or exhibit of this Covenant may be used to aid in the interpretation of that section or paragraph or exhibit but does not override the specific requirements in that section or paragraph.

The undersigned Grantor warrants he/she holds the title to the Property and has authority to execute this Covenant.

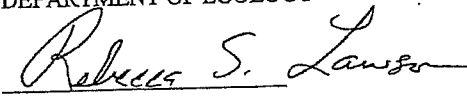
EXECUTED this 5<sup>th</sup> day of May, 2015.

Evergreen Olympic Properties Inc.  
d/b/a The Rants Group

  
Patrick C. Rants, President

Dated: 5-5-15

STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

  
Section Manager

Dated: 5/28/15

GRANTOR INDIVIDUAL ACKNOWLEDGMENT

STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_

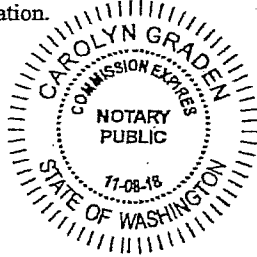
On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, I certify that \_\_\_\_\_ personally appeared before me, and acknowledged that he/she is the individual described herein and who executed the within and foregoing instrument and signed the same at his/her free and voluntary act and deed for the uses and purposes therein mentioned.

\_\_\_\_\_  
Notary Public in and for the State of  
Washington, residing at \_\_\_\_\_  
My appointment expires \_\_\_\_\_

GRANTOR CORPORATE ACKNOWLEDGMENT

STATE OF Washington  
COUNTY OF Thurston

On this 5<sup>th</sup> day of May, 2015, I certify that Patrick C. Rantz personally appeared before me, acknowledged that he/she is the President of the corporation that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that he/she was authorized to execute said instrument for said corporation.



Carolyn Graden  
Notary Public in and for the State of  
Washington, residing at Olympia, WA  
My appointment expires 11/8/18

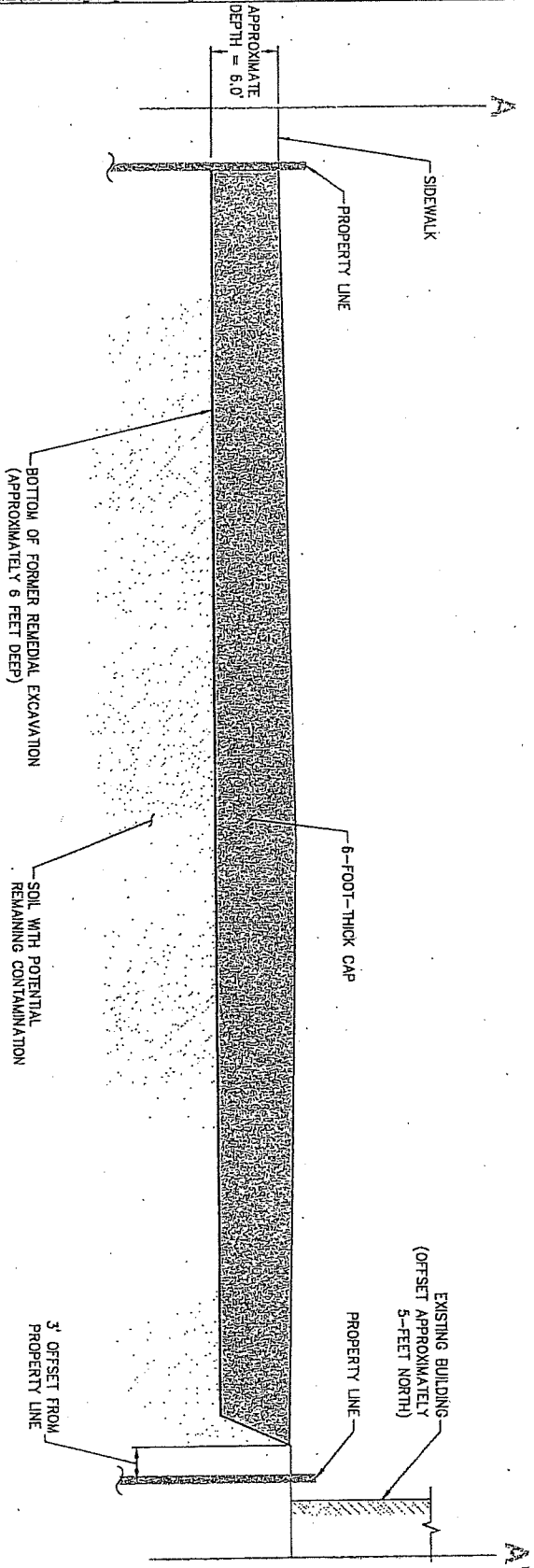
**Exhibit A**

**LEGAL DESCRIPTION**

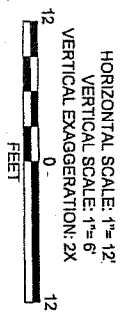
Lots 1 and 4 in Block 2 of Sylvester Plat of Olympia, as recorded in Volume 1 of Plats, page 14.



**Exhibit B**  
**PROPERTY MAP**



- 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: Data based on sketch provided by GeoEngineers staff.



**Note:**  
 1. See Exhibit B-1 for Section A-A' location.

<b>Columbia Street Property</b>	
<b>Cross Section View of Cap</b>	
Former Olympia MGP Site 320 Columbia Street NW Olympia, Washington	
<b>GEOENGINEERS</b>	<b>Exhibit B-2</b>

**Exhibit C**

**GROUNDWATER COMPLIANCE MONITORING PLAN**

RECEIVED

OCT 14 2013

WA State Department  
of Ecology (SWRO)

**Groundwater Compliance Monitoring Plan**

320 Columbia Street NW  
Olympia, Washington

*for*

**Puget Sound Energy**

October 8, 2013

**GEOENGINEERS** 

1101 South Fawcett Avenue, Suite 200  
Tacoma, Washington 98402  
253.383.4940

# Groundwater Compliance Monitoring Plan

**320 Columbia Street NW  
Olympia, Washington**

**File No. 0186-774-03**

**October 8, 2013**

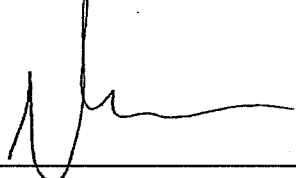
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## 1.0 INTRODUCTION

This Groundwater Compliance Monitoring Plan (GWCMP) describes the procedures for performing groundwater monitoring to assess compliance with Model Toxic Control Act (MTCA) cleanup levels at the 320 Columbia Street NW property (Property), located in Olympia, Washington. Puget Sound Energy (PSE) entered into the Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program (VCP) in September 2008 with the goal of achieving a No Further Action (NFA) determination for the Property. The remedial actions selected for the Property in cooperation with Ecology included the removal of soil with chemical concentrations greater than MTCA cleanup levels to the maximum extent practicable and post-remediation compliance groundwater monitoring. Remedial excavation activities were completed in October 2012 (GeoEngineers, 2013).

The purpose of the activities described in this GWCMP is to evaluate groundwater conditions beneath the Property after completing the 2012 cleanup action. This GWCMP describes procedures for monitoring well installation, well development, and groundwater sampling and analysis.

The following section, Section 2.0, describes the Property and Section 3.0 provides information on past investigations and remedial actions. The procedures for groundwater compliance monitoring are presented in Section 4.0. The standard operating procedures for field investigation activities are provided in Appendix A. A Quality Assurance Project Plan (QAPP) is included as Appendix B. A Health and Safety Plan (HASP) for groundwater compliance monitoring has been prepared under separate cover.

## 2.0 PROPERTY LOCATION AND DESCRIPTION

The Property occupies approximately 0.33 acres at the southeast corner of the intersection of Columbia Street NW and Thurston Avenue NW in Olympia, Washington and is currently vacant. It is identified as Thurston County tax parcel number 78500200100 and is located in the southwest quarter (SW 1/4) of the northwest quarter (NW 1/4) of Section 14, Township 18 North, Range 2 West of the Public Land Survey System land grid. The Property is bounded by Thurston Avenue NW to the north, Columbia Street NW to the west, and commercial properties to the east and south. Budd Inlet is located approximately 300 feet west of the Property (Figure 1).

## 3.0 PROPERTY BACKGROUND

### 3.1. Property History

The Property was developed as a manufactured gas plant (MGP) in 1908 by the Olympia Gas and Power Company. The Olympia MGP produced gas from oil and distributed the gas through underground pipes to limited areas of Olympia for residential uses such as lighting, heating, and cooking. The Olympia MGP was a primary source of Olympia's residential gas supply between April 1908 and August 1910. By August 1910, construction of a gas pipeline between Tacoma and Olympia was completed. This pipeline carried gas produced at an MGP in Tacoma and became Olympia's primary gas source. Consequently, from 1910 until approximately 1923 or 1924, the

Olympia MGP served as a backup/auxiliary plant, producing gas only as needed during temporary interruptions in the Tacoma gas supply.

Historical records indicate that all gas production at the Olympia MGP ceased by approximately 1924. The Property was used for the storage and distribution of Tacoma-produced gas from approximately 1924, or possibly as early as 1910, until the late 1940s. A 50-foot diameter aboveground spherical gas storage tank called a "Hortonsphere" was present on the Property from at least 1934 until the late 1940s. By the early 1950s, it appears that all gas production and storage facilities were dismantled, and a new office building/warehouse had been constructed on the Property. The Property was owned by Washington Natural Gas from the early 1950s until 1974, and a private law firm (Bean & Gentry) owned the Property from 1974 until 2008. A 1,000-gallon gasoline underground storage tank (UST) and a fuel dispenser were installed by Washington Natural Gas in 1965. Bean & Gentry removed the UST and fuel dispenser in 1990.

The Property is currently owned by The Rants Group (TRG) and has been vacant since October 2009, when the office building was demolished to allow environmental sampling within the building footprint.

### **3.2. Previous Site Investigations and Remedial Actions**

Four phases of environmental investigation were conducted at the Property between 2006 and 2011. Detailed summaries of these previous investigations are presented in the Data Summary Report (GeoEngineers, 2011). The previous investigations identified carcinogenic polycyclic aromatic hydrocarbons (cPAHs), benzene, gasoline- and lube oil-range petroleum hydrocarbons, lead, and mercury in Property soil at concentrations exceeding MTCA Method A cleanup levels. In addition, cPAHs have been detected in shallow groundwater at concentrations exceeding the MTCA Method A cleanup level near the eastern Property boundary. These contaminants were identified as chemicals of concern (COCs) in the revised CAP (GeoEngineers, 2012a).

The preferred cleanup alternative for the Property included the following: excavation of soil containing COC concentrations exceeding MTCA cleanup levels for unrestricted land use; off-site disposal of the excavated soil at a permitted facility, and; use of institutional controls. Institutional controls are needed because all contaminated soil was not removed from the Property, but rather, was removed to the maximum extent practicable. A disproportionate cost analysis was presented in the revised CAP to select the extent of excavation. In addition to mitigating risks associated with direct contact with contaminated soil, the selected remedy also reduced the risk of impacts to groundwater as a result of removing most of the contaminated soil from the Property.

The remedial action included removal and off-site disposal of approximately 4,400 tons of soil from the Property. The final limits of the completed excavation measured approximately 120 feet by 120 feet and extended to a total depth of approximately 6 feet below ground surface. The excavation depth approximately coincided with the depth of groundwater. The excavation sidewalls were generally vertical along the north, west and south sides of the Property. The eastern excavation sidewall sloped at an inclination of approximately 1H:1V (horizontal:vertical).

Discrete confirmation soil samples were collected at the limits of the remedial excavation and analyzed in accordance with the sampling and analysis plan (SAP) provided in the Construction

Work Plan (GeoEngineers, 2012b). Analytical results for all confirmation soil samples are presented in the Cleanup Action Report (GeoEngineers, 2013). Present-day soil conditions beneath the Property are characterized by a combination of confirmation soil samples collected during the remedial action and soil samples collected during pre-remedial investigations. All analytical results that document present-day (post remedy) MTCA exceedances in soil beneath the Property are shown in Figure 2.

### 3.3. Summary of Previous Groundwater Investigation Results

Several groundwater investigations were performed on and adjacent to the Property between 2006 and 2010. Groundwater analytical results from these investigations were compared to MTCA cleanup levels (Table 1). The results of the previous groundwater investigations were discussed in the Data Summary Report (GeoEngineers, 2011). Figure 3 presents analytical results for contaminants that were detected in groundwater at concentrations greater than MTCA cleanup levels during the previous monitoring events.

Arsenic and cPAHs were detected at concentrations exceeding MTCA groundwater cleanup levels during several previous sampling events. The arsenic has been shown to be unrelated to historic activities on the Property (GeoEngineers, 2011). The only reoccurring exceedances of cPAHs have been in MW-7. Carcinogenic PAHs have a low aqueous solubility and do not readily partition into groundwater or typically migrate significant distances in the dissolved phase. As a result, the cPAH exceedances in MW-7 are believed to have been derived from contaminated soil in that immediate area.

Lead and chromium also were detected at concentrations exceeding MTCA cleanup levels during a single previous monitoring event, but did not exceed cleanup levels in four subsequent monitoring events.

Groundwater level measurements from previous monitoring events indicate that the groundwater gradient beneath the Property is relatively flat, with no consistent groundwater flow direction.

## 4.0 GROUNDWATER COMPLIANCE MONITORING

### 4.1. Introduction

Groundwater compliance monitoring will be performed to assess concentrations of various constituents (detailed below) in groundwater beneath the Property. The monitoring program will include the following:

- Groundwater sampling in two existing monitoring wells (MW-6 and MW-10) and three new monitoring wells (MW-14 through MW-16), located as shown in Figure 4.
- The following criteria were used to select analytes to be tested during future groundwater compliance monitoring:
  - Previous groundwater data – Future groundwater analysis will be conducted for cPAHs because this analyte group exceeded MTCA cleanup levels on numerous occasions, even though the exceedances occurred in only one monitoring well (MW-7).

Groundwater samples will not be tested for arsenic because it has been shown to be unrelated to historic activities on the Property (Table 2). Chromium also has been eliminated from consideration because it exceeded the cleanup level in only one of 42 samples, and was not detected in four subsequent (consecutive) monitoring events.

- Remaining soil contamination – Groundwater compliance samples will be analyzed for total and dissolved lead, total and dissolved mercury, benzene, and diesel- and lube oil-range hydrocarbons because these contaminants remain in soil at concentrations that could potentially impact groundwater.

Potential impacts to groundwater were evaluated using the fixed parameter three-phase model (Washington Administrative Code (WAC) 173-340-747) for mercury and benzene. The number in which the remaining mercury and benzene concentrations exceed values protective of groundwater is very limited: six of 62 soil samples for mercury and six of 74 soil samples for benzene (Figure 2). The potential threat to groundwater by lead and diesel- and lube oil-range hydrocarbons was based on constituent concentrations exceeding the MTCA Method A soil cleanup level remaining in soil within and adjacent to the Property; the Method A soil cleanup levels are considered protective of groundwater.

Inclusion of total and dissolved lead, total and dissolved mercury, benzene, and diesel- and lube oil-range hydrocarbons in the groundwater compliance monitoring plan is considered to be very conservative because these constituents were never detected in groundwater at concentrations exceeding cleanup levels during past groundwater monitoring events, prior to removing substantial contaminant mass by remedial excavation.

Five other constituents were detected in remaining soil at concentrations exceeding values theoretically protective of groundwater. These include gasoline-range hydrocarbons, ethylbenzene, m- and p-xylene, pentachlorophenol and copper. These constituents will not be included in groundwater compliance sampling and analysis because they were detected in soil at a frequency less than the constituents discussed above, and have never been detected in groundwater at concentrations exceeding cleanup levels.

- Constituent analysis will vary between monitoring wells based on the criteria described above, as presented in Table 2.
- Collection of geochemical parameters including pH, redox potential, dissolved oxygen, temperature, conductivity and turbidity.
- Groundwater levels will be measured in the five compliance monitoring wells.

Future modifications to the monitoring program will be considered, if appropriate, based on monitoring results and discussions with Ecology.

#### **4.2. Groundwater Monitoring Locations**

Groundwater compliance sampling locations were selected based on the results of previous groundwater sampling events and soil conditions at the Property after the cleanup (Table 2).

Two existing and three new monitoring wells in and around the former remedial excavation will be used for groundwater compliance monitoring. The proposed groundwater compliance monitoring locations are shown in Figure 4. Existing monitoring well MW-6 is located near the northwest Property boundary and existing monitoring well MW-10 is located along the northern Property boundary. These wells will be sampled to provide adequate spatial coverage along the northern and western portions of the Property, and assess potential impacts from contaminated soil remaining in the vicinity of each well.

New monitoring wells will be installed at three locations. Groundwater monitoring well MW-14 will be installed near the eastern Property boundary, in the vicinity of the greatest remaining concentrations of cPAHs in soil (Figure 4). Monitoring well MW-15 will be installed adjacent to the southern Property boundary, close to the location where residual diesel- and lube oil-range hydrocarbons were detected in the southern sidewall of the remedial excavation. Monitoring well MW-16 will be installed west of the southwest Property boundary to provide spatial coverage west of the Property.

Monitoring wells MW-14 through MW-16 will be constructed by a licensed drilling contractor in accordance with Washington Administrative Code (WAC) 173-160, Minimum Standards for Construction and Maintenance of Wells. Upon completion of each soil boring, and prior to well installation, the water level within the boring will be measured to help select an appropriate well design. The tops of well screens will be positioned above the seasonal high groundwater table elevation. It is expected that the wells will be completed to depths of approximately 20 feet below ground surface (bgs) with approximately 10 to 15 feet of screen, similar to previous groundwater monitoring wells installed on the Property.

One soil sample from the well screen interval of each soil boring (MW-14 through MW-16) will be selected for chemical analysis based on field screening results and/or sample depth relative to groundwater depth. In the absence of positive field screening results, the soil sample will be collected from the upper part of the saturated zone. These samples will be placed in laboratory-supplied containers and submitted for chemical analysis of most of the constituents that will be analyzed in groundwater, including the following: cPAHs, diesel- and lube oil-range petroleum hydrocarbons, benzene and/or total mercury. The purpose of these analyses is to characterize soil conditions in the well screen intervals to support the interpretation of future groundwater monitoring results.

Following completion of the monitoring well, the well will be sufficiently developed prior to collecting groundwater samples. The standard operating procedures for field activities are included in Appendix A.

#### **4.3. Monitoring Well Sampling and Analysis**

Low-flow/low-turbidity sampling techniques will be used to minimize the suspension of sediment in the groundwater samples. Parameters including electrical conductivity, dissolved oxygen, pH, turbidity, oxidation-reduction potential and temperature will be collected using water quality instruments. Groundwater samples for laboratory analyses will be collected once water quality parameters have stabilized in accordance with the field procedures presented in Appendix B.

Groundwater samples for laboratory analysis will be collected in laboratory-prepared containers, placed into a cooler with ice and logged on the chain-of-custody in accordance with quality assurance procedures. Additional information regarding field and laboratory quality assurance/quality control (QA/QC) procedures is provided in the QAPP (Appendix B).

The laboratory analyses that will be performed on groundwater samples and rationale supporting the selected analysis are summarized in Table 2. Groundwater samples will be submitted for analysis of one or more of the following constituents based on the rationale provide in Section 4.1:

- cPAHs by EPA Method 8270-SIM;
- Benzene by EPA Method 8260;
- Diesel- and lube oil-range hydrocarbons by Ecology Method NWTPH-Dx;
- Total and dissolved lead by EPA Method 200.8; and
- Total and dissolved mercury by EPA Method 7470.

Chemical analyses to be conducted on each groundwater sample, including certain contingency analyses that may be conducted on the groundwater sample from MW-16, are summarized in Table 2. A concise summary of the analytical program for each monitoring well is presented below.

Constituents to be Analyzed	Compliance Monitoring Well				
	MW-6	MW-10	MW-14	MW-15	MW-16
cPAHs	X	X	X	X	X
Benzene		X	X	X	X <sup>1</sup>
Diesel- and lube oil-range hydrocarbons			X	X	X <sup>1</sup>
Total and dissolved lead			X	X	
Total and dissolved mercury	X	X	X		X

Notes:

<sup>1</sup>These samples will be submitted for analyses of these constituents only if these constituents are first detected at concentrations exceeding MTCA cleanup levels in monitoring wells MW-14 or MW-15.

The analytical program summarized above and in Table 2 may be modified depending on analytical results. No changes will be made without first discussing and obtaining approval from Ecology.

#### 4.4. Groundwater Level Measurements

Groundwater levels will be measured in each the five compliance monitoring wells during each monitoring event. The groundwater level data will be used to calculate relative groundwater elevations and estimate groundwater gradients (if any).

#### 4.5. Groundwater Compliance Criteria

The groundwater chemical analytical sample results for each monitoring event will be compared against the MTCA Method A values presented in Table B-2 in Appendix B. The specific chemicals to be compared to MTCA Method A compliance criteria are cPAHs, benzene, diesel- and lube-oil

petroleum hydrocarbons and mercury. A discussion of the chemical analytical results compared to the compliance criteria for each monitoring event will be provided in a summary technical memorandum as presented in Section 5.0.

## 5.0 SCHEDULE

Groundwater monitoring will be performed on an 18-month interval. Monitoring well installation and the initial round of groundwater monitoring will be performed after review and approval of this GWCMP by Ecology. The first summary technical memorandum will be prepared after completing the second monitoring event scheduled for February 2015. Summary technical memoranda will be submitted after each monitoring event thereafter. Report submittals to Ecology shall consist of two hard copies and one electronic (pdf) version. Each technical memorandum will present the following:

- Summary of the sampling activities;
- Tabulated summary of field- and laboratory-derived water quality data;
- Discussion of the monitoring data relative to groundwater compliance cleanup levels;
- Laboratory analytical reports; and
- Data quality review of the laboratory analytical results.

Validated analytical results from each monitoring event also will be submitted to Ecology's electronic environmental information management (EIM) system. Changes to the interval between sampling events may be considered depending on analytical results and discussions with Ecology.

## 6.0 REFERENCES

GeoEngineers, Inc., 2011. "Data Summary Report, Former Olympia Manufactured Gas Plant Site, Olympia, Washington." GEI File No. 0186-774-00, dated October 25, 2011.

GeoEngineers, Inc., 2012a. "Revised Cleanup Action Plan, Former Columbia Street Manufactured Gas Plant Property, Olympia, Washington." GEI File No. 00186-774-01, dated July 30, 2012.

GeoEngineers, Inc., 2012b. "Construction Work Plan, Former Olympia Manufactured Gas Plant Site, Olympia, Washington." GEI File No. 0186-774-02, dated September 19, 2012.

GeoEngineers, Inc., 2013. "Cleanup Action Report, Former Olympia Manufactured Gas Plant Property, Olympia, Washington." GEI File No. 0186-774-02, dated January 4, 2013.

**Table 1.**  
**Groundwater Chemical Analytical Results (2006-2010)**  
 Former Olympie Manufactured Gas Plant Site  
 Olympia, Washington

Analyte	MTCA Method A Cleanup Level <sup>1</sup>	Well/Sample ID/ Sample Date	B-2	B-3	B-4	B-5	B-6	MW-1		MW-2	MW-2/DUP-110309*	MW-2	MW-2	MW-2	MW-2
								9/13/2008	10/9/2008						
<b>Volatile Organic Compounds (EPA 811/8021B/8260B)</b>															
Benzene	5		2U	2U	2U	2	2U	0.50U	-	-	1.0U	1.0U	1.0U	1.0U	-
1,1-Dichloroethane	-		2U	2U	2U	2U	2U	-	-	-	-	-	-	-	-
1,2-Dichloroethane	-		2U	2U	2U	2U	2U	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	-		2U	2U	2U	2U	2U	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	-		2U	2U	2U	2U	2U	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	-		2U	2U	2U	2U	2U	-	-	-	-	-	-	-	-
Toluene	1,000		-	-	-	-	-	0.60U	-	1.0U	1.0U	1.0U	1.0U	1.0U	-
Ethylbenzene	700		-	-	-	-	-	0.60U	-	1.0U	1.0U	1.0U	1.0U	1.0U	-
Xylene, m,p	1,000 (a)		-	-	-	-	-	1.0U	-	1.0U	1.0U	1.0U	1.0U	1.0U	-
Xylene, o	1,000 (a)		-	-	-	-	-	1.0U	-	1.0U	1.0U	1.0U	1.0U	1.0U	-
1,2-Dichloroethane (EDC)	0.01		-	-	-	-	-	-	-	0.0094U	0.0095U	-	-	-	-
1,2-Dichloroethane (EDC)	0.01		-	-	-	-	-	-	-	0.20U	0.20U	-	-	-	-
Methyl Tertiary Butyl Ether (MTBE)	20		-	-	-	-	-	-	-	0.20U	0.20U	-	-	-	-
<b>Total Petroleum Hydrocarbons (MTPH-O, D4)</b>															
Gasoline Range	0.8/1 (b)		0.050U	0.37	0.050U	0.050U	0.050U	0.10U	-	0.10U	0.10U	0.10U	0.10U	0.10U	-
Diesel Range	0.5		0.13U	0.13U	0.13U	0.13U	0.13U	0.25U	-	0.25U	0.25U	0.25U	0.25U	0.25U	-
Low Oil Range	0.5		0.25U	0.25U	0.25U	0.25U	0.25U	0.40U	-	0.40U	0.40U	0.40U	0.40U	0.40U	-
<b>Semi-volatile Organic Compounds (EPA 821/80-SIM)</b>															
<b>nPAHs</b>															
Naphthalene	-		0.08	1.0	0.15	0.44	0.05	-	-	-	-	-	-	-	-
2-Acetylnaphthalene	-		0.02	4.1	0.05	0.05	0.02U	-	-	-	-	-	-	-	-
2-Methylnaphthalene	-		0.02	7.9	0.05	0.05	0.02	-	-	-	-	-	-	-	-
Total Naphthalenes	160		0.02	12.0	0.10	0.10	0.04	-	-	-	-	-	-	-	-
Acenaphthylene	-		0.05	0.04	0.05	0.05	0.02U	-	-	-	-	-	-	-	-
Acenaphthene	-		0.73	0.05	0.45	0.59	0.39	-	-	-	-	-	-	-	-
Fluorene	-		0.02U	0.04	0.04	0.07	0.02U	-	-	-	-	-	-	-	-
Phenanthrene	-		0.08	0.37	0.18	0.48	0.03	-	-	-	-	-	-	-	-
Anthracene	-		0.02U	0.03	0.03	0.44	0.02U	-	-	-	-	-	-	-	-
Fluoranthene	-		0.02U	0.15	0.09	0.6	0.05	-	-	-	-	-	-	-	-
Pyrene	-		0.02U	0.29	0.15	1.1	0.09	-	-	-	-	-	-	-	-
Benzo[a]hijanylene	-		0.02U	0.28	0.33	1.2	0.15	0.0095U	-	0.081	-	-	-	-	-
<b>oPAHs</b>															
Benzo[a]anthracene	-		0.02U	0.04	0.04	0.04	0.02	0.0095U	-	0.0094U	0.0094U	0.0094U	0.0094U	0.0094U	-
Chrysene	-		0.02U	0.07	0.05	0.1	0.03	0.0095U	-	0.0094U	0.0094U	0.0094U	0.0094U	0.0094U	-
Benzo[b]fluoranthene	-		0.02U	0.07	0.07	0.07	0.04	0.0095U	-	0.0094U	0.0094U	0.0094U	0.0094U	0.0094U	-
Benzo[k]fluoranthene	-		0.02U	0.07	0.05	0.05	0.03	0.0095U	-	0.0094U	0.0094U	0.0094U	0.0094U	0.0094U	-
Benzo[e]pyrene	-		0.02U	0.1	0.11	0.11	0.03	0.0095U	-	0.0094U	0.0094U	0.0094U	0.0094U	0.0094U	-
Indeno[1,2,3-cd]pyrene	-		0.02U	0.15	0.15	0.15	0.07	0.0095U	-	0.0094U	0.0094U	0.0094U	0.0094U	0.0094U	-
Benzo[ghi]perylene	-		0.02U	0.04	0.04	0.04	0.02U	0.0095U	-	0.0094U	0.0094U	0.0094U	0.0094U	0.0094U	-
Total oPAHs TEC	0.1		0.015U	0.14	0.14	0.14	0.050	0.0072U	-	0.0071U	0.0071U	0.0071U	0.0071U	0.0071U	-
<b>Metals (EPA 200.8/335.4/9026/7470A)</b>															
Total Arsenic	0.005		-	-	-	-	-	0.024	-	0.048	0.048	0.048	0.048	0.048	0.048
Disolved Arsenic <sup>2</sup>	0.005		0.009	0.014	0.012	0.027	0.008	-	-	0.037	-	-	-	-	-
Total Chromium	0.050		-	-	-	-	-	0.422	-	0.11U	0.11U	0.11U	0.11U	0.11U	-
Disolved Chromium <sup>2</sup>	0.050		0.007U	0.007U	0.007U	0.007U	0.007U	-	-	0.011U	0.011U	0.011U	0.011U	0.011U	-
Total Copper	0.25 (b)		-	-	-	-	-	0.032	-	0.0011U	0.0011U	0.0011U	0.0011U	0.0011U	-
Total Lead	0.015		-	-	-	-	-	0.0092	-	0.0011U	0.0011U	0.0011U	0.0011U	0.0011U	-
Disolved Lead <sup>2</sup>	0.015		0.003U	0.003U	0.003U	0.003U	0.003U	-	-	0.00080U	0.00080U	0.00080U	0.00080U	0.00080U	-
Total Mercury	0.002		0.0002U	0.0002U	0.0002U	0.0002U	0.0002U	-	-	0.00080U	0.00080U	0.00080U	0.00080U	0.00080U	-
Disolved Mercury <sup>2</sup>	0.002		0.0002U	0.0002U	0.0002U	0.0002U	0.0002U	-	-	0.00080U	0.00080U	0.00080U	0.00080U	0.00080U	-
Total Cadmium	0.005		0.0005U	0.0005U	0.0005U	0.0005U	0.0005U	-	-	0.0005U	0.0005U	0.0005U	0.0005U	0.0005U	-
Disolved Cadmium <sup>2</sup>	0.005		0.0005U	0.0005U	0.0005U	0.0005U	0.0005U	-	-	0.0005U	0.0005U	0.0005U	0.0005U	0.0005U	-
Total Cyanide	0.2 (d)		-	-	-	-	-	-	-	-	-	-	-	-	-

Analyte	Units	MTOA Method A Cleanup Level <sup>1</sup>	Well/Sample ID/ Sample Date <sup>1</sup>	MW-3 9/29/2008	MW-3 10/9/2008	MW-3 11/9/2008	MW-3 12/9/2008	MW-3 1/7/2009	MW-3 2/19/2009	MW-3 3/19/2009	MW-3 4/19/2009	MW-3 5/26/2010	MW-4 8/26/2010	MW-4 11/9/2011	MW-5 2/15/2012	MW-5 8/28/2012	MW-5 4/7/2014	MW-5 1/19/2011
<b>Volatile Organic Compounds (EPA 801.1/802.1/826.0)</b>																		
Benzene	ug/l	5																
Isopropylbenzene	ug/l																	
m-Propyl Benzene	ug/l																	
1,3,5-Trimethylbenzene	ug/l																	
1,2,4-Trimethylbenzene	ug/l																	
Toluene	ug/l	1,000																
Ethylbenzene	ug/l	700																
Xylene, m-p	ug/l	1,000 (B)																
Xylene, o-p	ug/l	1,000 (B)																
Xylene, m-p	ug/l	1,000 (B)																
1,2-Dichlorobenzene (EDB)	ug/l	0.01																
1,2-Dichloroethane (EDC)	ug/l	5																
Methyl Tertiary Butyl Ether (MTBE)	ug/l	20																
<b>Total Petroleum Hydrocarbons (MTHM-62/73)</b>																		
Gasoline Range	mg/l	0.5 (I)																
Diesel Range	mg/l	0.5																
Luber Oil Range	mg/l	0.5																
<b>Semi-volatile Organic Compounds (EPA 82700-500)</b>																		
<b>n-PAHs</b>																		
Naphthalene	ug/l																	
1-Methylpiperidine	ug/l																	
2-Methylpiperidine	ug/l																	
Total Naphthalenes	ug/l	100																
Acenaphthylene	ug/l																	
Acenaphthene	ug/l																	
Fluorene	ug/l																	
Phenanthrene	ug/l																	
Anthracene	ug/l																	
Fluoranthene	ug/l																	
Pyrene	ug/l																	
Benzo(a)pyrene	ug/l																	
<b>n-PAHs</b>																		
Benzo(a)anthracene	ug/l																	
Chrysenes	ug/l																	
Benzo(b)fluoranthene	ug/l																	
Benzo(k)fluoranthene	ug/l																	
Benzo(e)pyrene	ug/l																	
Indene(1,2,3-c)pyrene	ug/l																	
Dibenz(a,h)anthracene	ug/l																	
Total PAHs TEC	ug/l	0.1																
<b>Metals (EPA 200.8/335.4/8020/740A)</b>																		
Total Arsenic	mg/l	0.005																
Dissolved Arsenic <sup>2</sup>	mg/l	0.005																
Total Chromium	mg/l	0.050																
Dissolved Chromium <sup>2</sup>	mg/l	0.050																
Total Lead	mg/l	0.050 (B)																
Dissolved Lead <sup>2</sup>	mg/l	0.050																
Total Mercury	mg/l	0.002																
Dissolved Mercury <sup>2</sup>	mg/l	0.002																
Total Cadmium	mg/l	0.005																
Dissolved Cadmium <sup>2</sup>	mg/l	0.005																
Total Cyanide	mg/l	0.2 (B)																





Notes:

- <sup>1</sup> MTCX Method A cleanup levels for potable groundwater (WAC 173-340-720(3)).
- <sup>2</sup> Groundwater samples analyzed for dissolved metals were field-filtered with a 45 micron filter.
- <sup>3</sup> Well MW-9 and MW-10 were designated MW-NW and MW-N, respectively, in EPI (2008).
- (a) Total value for all xylenes.
- (b) Cleanup level for gasoline-range total petroleum hydrocarbons is 0.8 mg/l when benzene is present and 1. mg/l when benzene is not present.
- (c) MTCX Method A value not established; listed value is the MTCX Method B cleanup level (standard formula value) for potable groundwater (WAC 173-340-720(4)(b)).
- (d) Federal Primary Maximum Contaminant Level (MCL) (40 C.F.R. 141).
- MTCX = Washington State Model Toxics Control Act
- ug/l = Micrograms per liter
- mg/l = Milligrams per liter
- \* Field duplicate sample
- R typ = Feet below ground surface
- cPAHs = Carcinogenic polycyclic aromatic hydrocarbons
- ncPAHs = Noncarcinogenic polycyclic aromatic hydrocarbons (results are shown only for ncPAHs that have been historically detected)
- TEC = Total toxic equivalent concentration calculated per WAC 173-340-708(6)(ii)(A). For non-detected constituents, omit that the method reporting limit was used in the calculation. All values calculated using toxicity equivalency factors from WAC 173-340-708(2) (Rev. 2007).
- = Constituent not analyzed or cleanup level not established
- J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
- U = The analyte was analyzed for, but was not detected above the listed method reporting limit.

Chemical analyses (except cyanide) performed by OnSite Environmental, Inc. in Redmond, WA; cyanide analysis performed by Analytical Resources, Inc. in Seattle, Washington. Detections are shown in bold typeface. Yellow highlighted cells indicate values that exceed the established MTCX cleanup level.

**Table 2**  
**Groundwater Compliance Monitoring Program Rationale**  
 Former Olympia MGP Site  
 Olympia, Washington

Historical Groundwater Analytical Results			Include Analyte in Groundwater Compliance Monitoring?		Proposed Compliance Sampling Locations	
Analyte	Number of Exceedances <sup>1</sup>	Location of Exceedances	Yes	No	Monitoring Well(s)	Rationale for Sampling Location
cPAHs <sup>2</sup>	4/45	Former monitoring well MW-7	X		All compliance monitoring wells	cPAHs are the only analytes detected in groundwater at concentrations exceeding the cleanup level more than one monitoring event.
Total Lead, Dissolved Lead	1/47 (Total), 0/8 (Dissolved)	Former monitoring well MW-3	X		MW-14 and -15	Lead concentrations greater than the MTCA Method A cleanup level in soil remain in close proximity to two of the proposed new monitoring wells, MW-14 and -15.
Total Chromium, Dissolved Chromium	1/42 (Total), 0/2 (Dissolved)	Former monitoring well MW-4		X	N/A	N/A
Total Arsenic, Dissolved Arsenic	48/71 (Total), 10/24 (Dissolved)	Multiple wells		X	N/A	N/A
Total Mercury, Dissolved Mercury	0/40 (Total), 0/2 (Dissolved)	None	X		MW-6, -10, -14 and -16	Total and dissolved mercury will be analyzed in monitoring wells generally located near remaining soil that contains mercury at concentrations exceeding values theoretically protective of groundwater.
Benzene	0/30	None	X		MW-10, -14, -15 and -16 <sup>4</sup>	Benzene will be analyzed in monitoring wells generally located near remaining soil that contains benzene at concentrations exceeding values theoretically protective of groundwater.
Diesel- and Lube Oil-range Hydrocarbons <sup>5</sup>	0/31	None	X		MW-14, -15 and -16 <sup>4</sup>	Diesel- and lube oil-range hydrocarbons will be analyzed in monitoring wells generally located near remaining soil that contains these constituents at concentrations exceeding MTCA Method A cleanup levels for soil.

**Notes:**

<sup>1</sup> Number of samples exceeding the cleanup level / total number of groundwater samples analyzed for this constituent, excluding groundwater samples obtained from temporary sampling points.

<sup>2</sup> cPAHs = carcinogenic polycyclic aromatic hydrocarbons

<sup>3</sup> GeoEngineers, Inc., 2011. "Data Summary Report, Former Olympia Manufactured Gas Plant Site, Olympia, Washington." October 17, 2011.

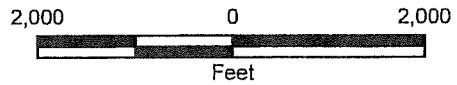
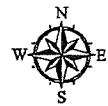
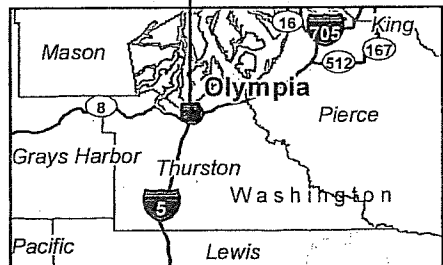
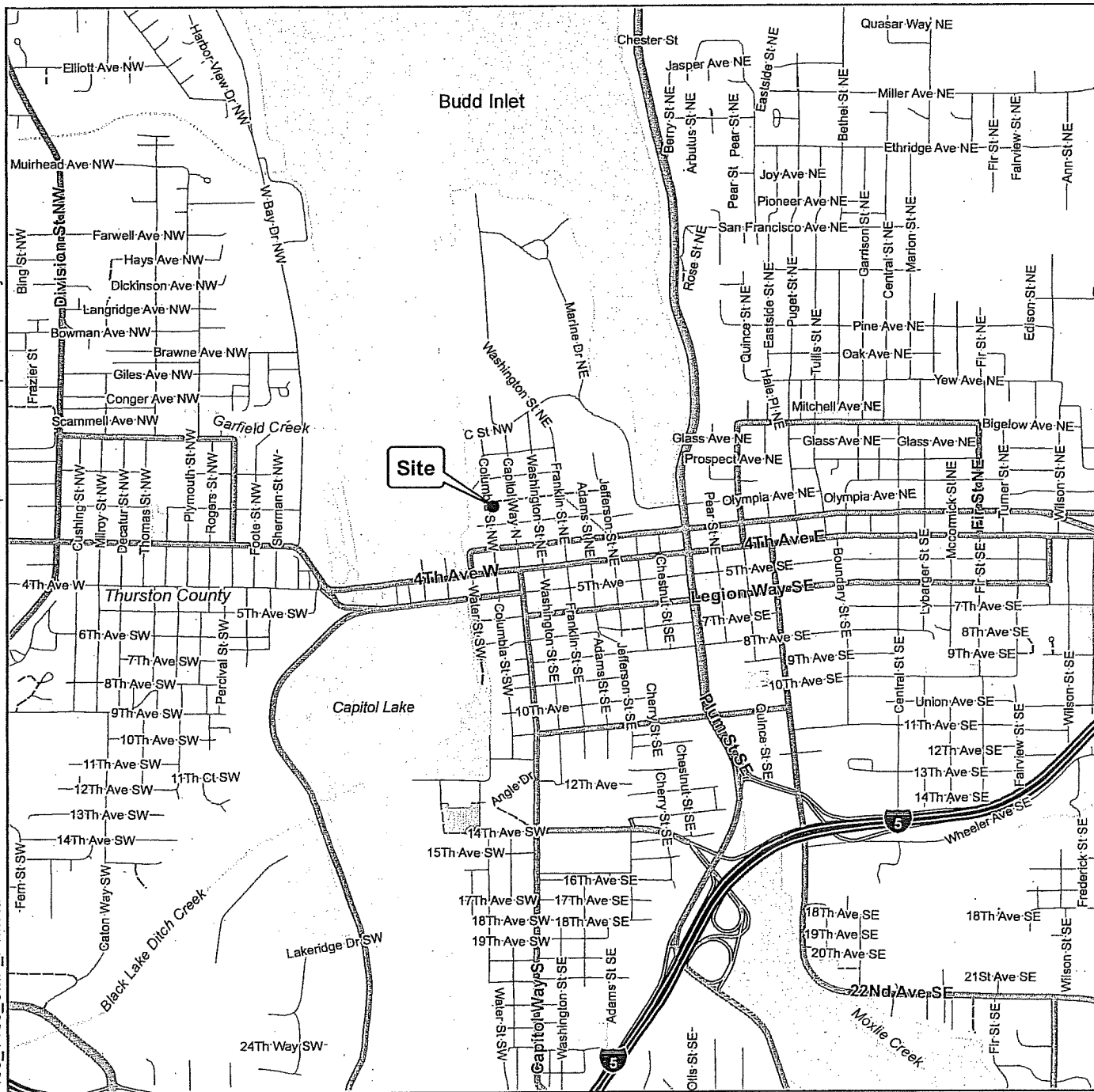
<sup>4</sup> A contingency sample will be collected from MW-16 and placed on hold with the laboratory. The sample will be analyzed only if the analyte is first detected at concentrations exceeding the MTCA Method A cleanup level in MW-14 or MW-16. The groundwater samples collected from MW-14 and MW-15 will be analyzed on an appropriate turnaround time to allow the contingency sample from MW-16 to be analyzed, if necessary, within applicable holding times.

<sup>5</sup> Based on current Ecology guidance, the silica gel/acid cleanup step will be eliminated from the laboratory analysis. In the event that diesel- and/or lube oil-range hydrocarbons are detected in groundwater, the use of silica gel/acid cleanup may be reconsidered with Ecology's input for subsequent monitoring events.

N/A = Not applicable

Map Revised: 03 April 2013 syl


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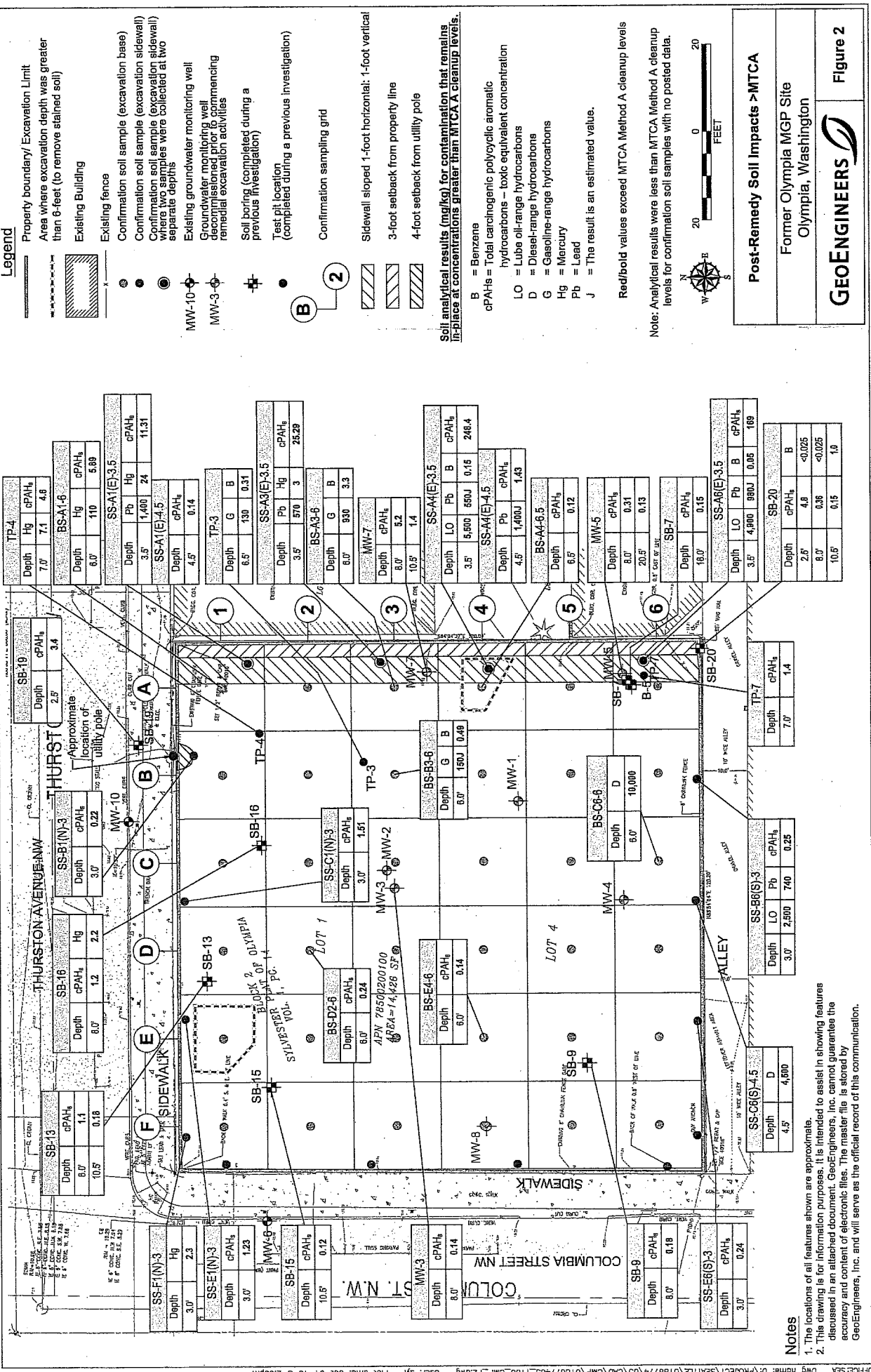


Notes:

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.

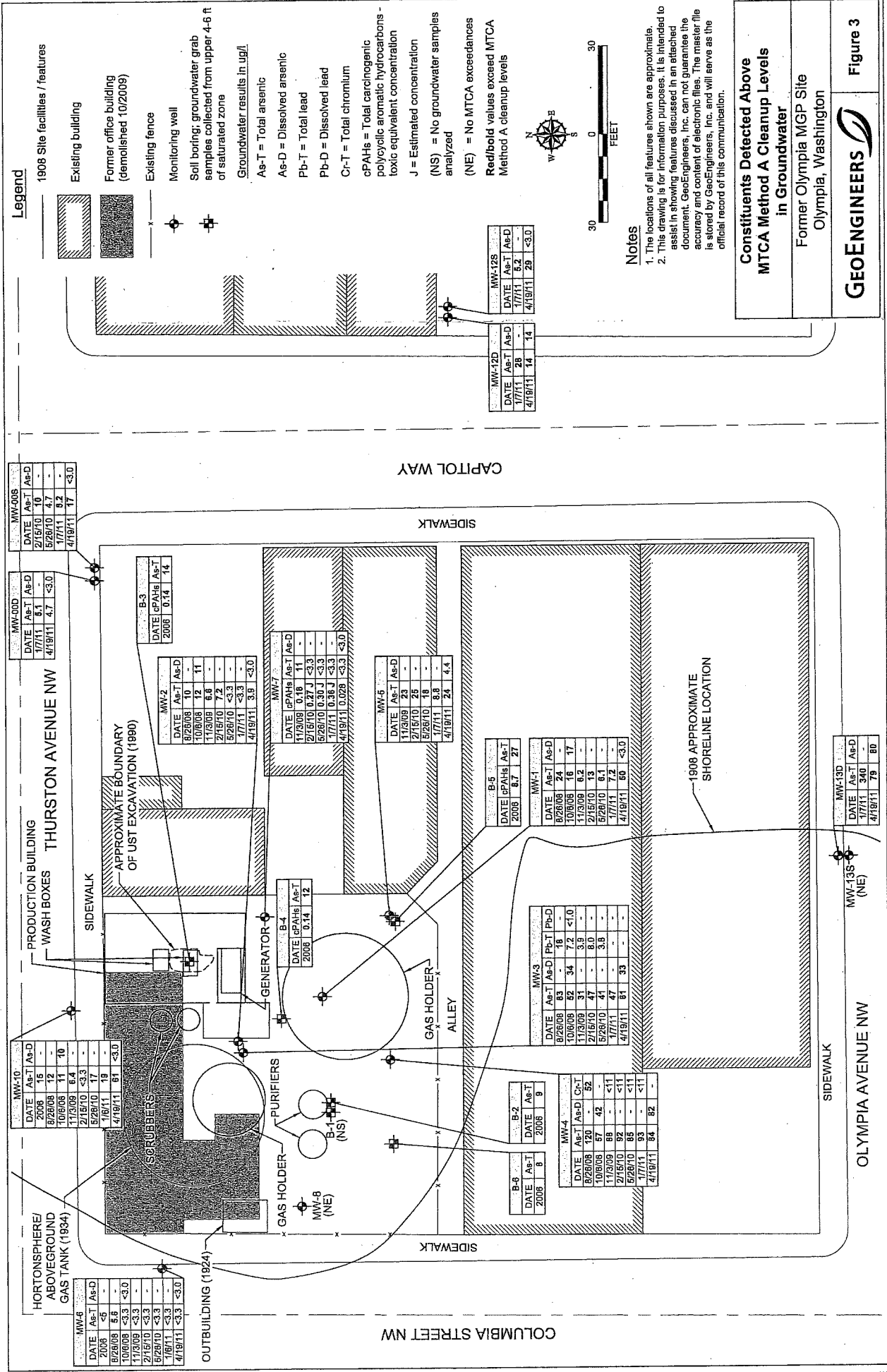
Data Sources: ESRI Data & Maps, Street Maps 2005  
 Transverse Mercator, Zone 10 N North, North American Datum 1983  
 North arrow oriented to grid north

<b>Vicinity Map</b>	
Former Olympia MGP Site Olympia, Washington	
<b>GEOENGINEERS</b> 	<b>Figure 1</b>



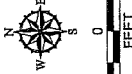
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**Legend**

- 1908 Site facilities / features
- Existing building
- Former office building (demolished 10/2009)
- Existing fence
- Monitoring well
- Soil boring; groundwater grab samples collected from upper 4-6 ft of saturated zone
- Groundwater results in ug/l
- As-T = Total arsenic
- As-D = Dissolved arsenic
- Pb-T = Total lead
- Pb-D = Dissolved lead
- Cr-T = Total chromium
- cPAHs = Total carcinogenic polycyclic aromatic hydrocarbons toxic equivalent concentration
- J = Estimated concentration
- (NS) = No groundwater samples analyzed
- (NE) = No MTC A exceedances
- Red/bold values exceed MTC A Method A cleanup levels



**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.

**Constituents Detected Above  
MTC A Method A Cleanup Levels  
in Groundwater**

Former Olympia MGP Site  
Olympia, Washington

**GEOENGINEERS**

**Figure 3**

MW-10	As-T	As-D
2008	15	-
8/26/08	12	-
10/6/08	11	10
11/3/09	6.4	-
2/15/10	<3.3	-
5/26/10	17	-
7/6/11	14	<3.0
4/19/11	8.4	<3.0

MW-6	As-T	As-D
2008	5	-
8/26/08	5.8	<3.0
10/6/08	<3.3	<3.0
11/3/09	<3.3	-
2/15/10	<3.3	-
5/26/10	<3.3	-
7/6/11	<3.3	-
4/19/11	<3.3	<3.0

MW-12D	As-T	As-D
2008	14	14
1/7/11	28	-
4/19/11	14	14

MW-12S	As-T	As-D
2008	14	14
1/7/11	5.2	-
4/19/11	29	<3.0

MW-13S	As-T	As-D
2008	79	80
1/7/11	340	-
4/19/11	79	80

MW-13D	As-T	As-D
2008	8.7	27
10/6/08	24	-
11/3/09	16	17
2/15/10	6.2	-
5/26/10	6.5	-
7/6/11	7.1	-
4/19/11	60	<3.0

MW-1	As-T	As-D
2008	8.7	27
10/6/08	24	-
11/3/09	16	17
2/15/10	6.2	-
5/26/10	6.5	-
7/6/11	7.1	-
4/19/11	60	<3.0

MW-2	As-T	As-D
2008	10	11
8/26/08	10	11
10/6/08	6.8	-
11/3/09	7.2	-
2/15/10	<3.3	-
5/26/10	<3.3	-
7/6/11	<3.3	-
4/19/11	3.9	<3.0

MW-7	cPAHs	As-T	As-D
2008	0.18	11	-
11/3/09	0.27	<3.3	-
5/26/10	0.30	<3.3	-
7/6/11	0.38	<3.3	-
4/19/11	0.028	<3.3	<3.0

MW-5	As-T	As-D
2008	23	-
11/3/09	25	-
2/15/10	18	-
5/26/10	18	-
7/6/11	8.8	-
4/19/11	24	4.4

MW-3	As-T	As-D	Pb-T	Pb-D
2008	83	18	18	-
10/6/08	62	34	7.2	<1.0
11/3/09	31	3.9	3.9	-
2/15/10	47	6.0	6.0	-
5/26/10	47	3.5	3.5	-
7/6/11	81	33	-	-
4/19/11	81	33	-	-

MW-4	As-T	As-D	Cr-T
2008	120	52	52
8/26/08	120	52	52
10/6/08	57	42	-
11/3/09	88	<11	<11
2/15/10	92	<11	<11
5/26/10	85	<11	<11
7/6/11	93	<11	<11
4/19/11	84	82	-

B-2	As-T
2008	8

B-6	As-T
2008	6

B-4	cPAHs	As-T	As-D
2008	0.14	12	-

B-5	As-T	As-D
2008	8.7	27

B-3	cPAHs	As-T	As-D
2008	0.14	14	-

MW-908	As-T	As-D
2/15/10	10	-
5/26/10	6.7	-
7/7/11	6.7	-
4/19/11	17	<3.0

MW-00D	As-T	As-D
2008	5.1	-
4/19/11	4.7	<3.0

MW-00S	As-T	As-D
2008	5.1	-
4/19/11	4.7	<3.0



A topographic map showing contour lines and a dashed path. The map is oriented vertically on the page. The contour lines represent elevation, with several peaks and valleys. A dashed line indicates a path or route across the terrain. The path starts near the top left, moves down and right, then loops around a central peak, and continues down and right towards the bottom right. The text "APPENDIX A" is positioned above "Standard Operating Procedures for Field Activities".

**APPENDIX A**  
**Standard Operating Procedures for Field Activities**

## **APPENDIX A**

### **STANDARD OPERATING PROCEDURES FOR FIELD ACTIVITIES**

This appendix identifies the field procedures to be implemented during groundwater compliance monitoring.

#### **A.1. Underground Utility Locate**

Prior to drilling, an underground utility locate (public and private) will be conducted in the area of the proposed boring locations to identify subsurface utilities and/or potential underground physical hazards. A public utility locate (one-call) will be performed, and a private utility locating company will be contracted to mark underground utilities in the vicinity of the proposed borings.

#### **A.2. Monitoring Well Construction**

Drilling and construction of the monitoring wells will be conducted by a Washington State licensed driller in accordance with the *Minimum Standards for Construction and Maintenance of Wells* (Chapter 173-160 WAC). Wells will be constructed of 2-inch-diameter, flush-threaded Schedule 40 polyvinyl chloride (PVC) casing with machine-slotted PVC screen (0.010 inch). Installation of the wells will be observed by a GeoEngineers representative, who will maintain a detailed log of the materials encountered during drilling and depths and construction details of the wells. The borings are anticipated to be advanced to a depth of approximately 20 feet bgs. The screened intervals are anticipated to extend between approximately 4 feet and 20 feet bgs.

Following placement of the well screen and casing in the borehole, a filter pack will be installed around the well screen. The filter pack will extend from the bottom of the well to a minimum of 1 foot above the top of the well screen. Filter pack material will consist of commercially prepared 10-20 silica sand.

A bentonite seal at least 1-foot thick will be placed above the sand pack. Each well will be completed with a concrete seal extending from the top of the bentonite seal to slightly above the ground surface. The concrete seal will be exposed at the surface surrounding the well monument. Locking steel flush-mount monuments will be cemented in place from the surface to a depth of about 1.5 feet bgs.

#### **A.3. Monitoring Well Development**

The monitoring wells will be developed to stabilize the filter pack and formation materials surrounding the well screens and establish the hydraulic connection between the well screens, filter pack and surrounding soil. The well screens will be gently surged with a decontaminated stainless steel bailer or electrical purge pump (such as a 'whale' brand pump) after installation. Development will continue until a minimum of five casing volumes of water have been removed and turbidity of the discharged water decreases. The goal of well development will be to reduce the turbidity of the water to less than 25 NTU. Up to 10 well volumes of water will be removed from the wells, if needed, to attain the 25 NTU goal. The removal rate and volume of groundwater removed will be recorded during well development procedures. Water that is removed from the well during well development activities will be stored on site in labeled 55-gallon drums, pending off-site disposal at a permitted facility. Depths to water in the monitoring wells will be measured prior to development.

#### **A.4. Groundwater Monitoring and Sampling**

Water levels will be measured in each compliance monitoring well during each groundwater monitoring event. Groundwater levels will be measured to the nearest 0.01 foot using an electric water level indicator. The water levels will be measured relative to the top of the north side of the casing rim.

Groundwater samples will be obtained using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in the samples. Groundwater samples will be obtained from monitoring wells using dedicated down-hole tubing and a peristaltic pump. Groundwater will be pumped at an approximate rate of 0.5 liter per minute.

Water quality will be measured using a flow-through cell (e.g., a Horiba U-22 or similar equipment) during purging. The following water quality parameters will be monitored during purging: electrical conductivity, dissolved oxygen, pH, oxidation-reduction potential, turbidity and temperature. It will be assumed that ambient groundwater conditions will have been reached once the parameters measured by the water quality instrument vary by less than 10 percent on three consecutive measurements. The stabilized field measurements will be documented on field forms. If all field parameters do not stabilize after five well volumes of water have been removed, samples will be collected.

Following well purging, the flow through cell will be disconnected and groundwater samples will be collected in laboratory-prepared containers.

The samples will be placed into a cooler with ice and logged on the chain-of-custody using the procedures described in the Quality Assurance Project Plan (QAPP) provided in Appendix B.

#### **A.5. Decontamination**

Sampling equipment will be decontaminated using procedures described in the QAPP.

#### **A.6. Sample Handling**

Sample handling procedures, including labeling, container and preservation requirements; and holding times are described in the QAPP.

#### **A.7. Disposal of Investigation-Derived Materials**

##### **A.7.1. Soil**

Soil cuttings from the borings for MW-14 through MW-16 will be placed in a labeled and sealed 55-gallon drums. The drums will be temporarily stored on site pending off-site disposal at a permitted disposal facility.

##### **A.7.2. Groundwater and Decontamination Water**

Development and purge water removed from the monitoring wells and decontamination water generated during all sampling activities will be stored on site in labeled and sealed in 55-gallon drums. The drums will be temporarily stored on site until they can be transported off-site for disposal at a permitted disposal facility.

**A.7.3. Disposition of Incidental Waste**

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

A topographic map showing contour lines and a dashed path. The map is oriented vertically with a dashed line winding through the terrain. The text 'APPENDIX B' and 'Quality Assurance Project Plan (QAPP)' is printed in the upper right quadrant.

**APPENDIX B**  
**Quality Assurance Project Plan (QAPP)**

## **APPENDIX B**

### **QUALITY ASSURANCE PROJECT PLAN**

The QAPP serves as the primary guide for the integration of quality assurance (QA) and quality control (QC) functions into monitoring activities. The QAPP presents the objectives, procedures, organization, functional activities and specific QA and QC activities designed to achieve data quality goals established for the project. This QAPP is based on guidelines specified in WAC Chapter 173-340-820 and Environmental Protection Agency (EPA) Guidelines (EPA 2004, 2008).

Throughout the project, environmental measurements will be conducted to produce data that are scientifically valid, of known and acceptable quality and meet established objectives. QA/QC procedures will be implemented so that precision, accuracy, representativeness, completeness and comparability (PARCC) of data generated meet the specified data quality objectives.

#### **B.1. Project Organization and Responsibility**

Descriptions of the responsibilities, lines of authority and communication for the key positions for QA and QC are provided below. The project organization facilitates the efficient performance of project work, allows for an independent quality review and permits resolution of any QA issues before submittal.

##### ***B.1.1. Project Leadership and Management***

The Project Manager's duties consist of providing concise technical work statements for project tasks, selecting project team members, determining subcontractor participation, establishing budgets and schedules, adhering to budgets and schedules, providing technical oversight, and providing overall production and review of project deliverables. Nick Rohrbach is the Project Manager for activities at the Property. The Principal-in-Charge is responsible to PSE for fulfilling contractual and administrative requirements of the project. Steve Woodward is the Principal-in-Charge.

##### ***B.1.2. Field Coordinator***

The Field Coordinator is responsible for the daily management of activities in the field. Specific responsibilities include the following:

- Develops schedules and allocates resources for field tasks.
- Coordinates data collection activities to be consistent with information requirements.
- Collects field data and submits samples to laboratory.
- Assures that data are correctly and completely reported.
- Implements field sampling in accordance with GWCMP requirements.
- Schedules sample delivery to the analytical laboratory.
- Assures that appropriate sampling, testing and measurement procedures are followed.
- Participates in QA corrective actions as required.

The Field Coordinator for activities at the Property will be determined at the time of field activities.

### **B.1.3. Quality Assurance Leader**

The GeoEngineers project Quality Assurance Leader is Mark Lybeer, who is responsible for the project's overall QA. The Project QA Leader is responsible for coordinating QA/QC activities as they relate to the acquisition of field data. The QA Leader has the following responsibilities:

- Serves as the official contact for laboratory data QA concerns.
- Responds to laboratory data, QA needs, resolves issues, and answers requests for guidance and assistance.
- Reviews the implementation of the QAPP and the adequacy of the data generated from a quality perspective.
- Maintains the authority to implement corrective actions as necessary.
- Reviews and approves the laboratory QA Plan.
- Evaluates the laboratory's final QA report for any condition that adversely impacts data generation.
- Ensures that appropriate sampling, testing, and analysis procedures are followed and that correct quality control checks are implemented.
- Monitors laboratory compliance with data quality requirements.

### **B.1.4. Laboratory Management**

The Laboratory's QA Coordinator administers the Laboratory QA Plan and is responsible for QC. Specific responsibilities of this position include:

- Ensures implementation of the QA Plan.
- Serves as the laboratory point of contact.
- Activates corrective action for out-of-control events.
- Issues the final QA/QC report.
- Administers QA sample analysis.
- Complies with the specifications established in the project plans as related to laboratory services.
- Participates in QA audits and compliance inspections.

The chemical analytical laboratory QA Coordinator will be determined by the laboratory (Onsite Environmental Laboratory, Redmond, Washington).

## **B.2. DATA QUALITY OBJECTIVES**

The QA objective for technical data is to collect environmental monitoring data of known, acceptable and reportable quality. The QA 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 acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for PARCC parameters and by testing data against these criteria.

The sampling design, field procedures, laboratory procedures and QC procedures are set up to provide high-quality data for use in this project. Specific data quality factors that may affect data usability include quantitative factors (precision, bias, accuracy, completeness and reporting limits) and qualitative factors (representativeness and comparability). The measurement quality objectives (MQO) associated with these data quality factors are summarized in Table B-1.

#### **B.2.1. Analytes**

Groundwater samples will be submitted for analysis of a selected combination of the following:

- cPAHs by EPA Method 8270-SIM;
- Benzene by EPA Method 8260;
- Diesel- and lube oil-range hydrocarbons by Ecology Method NWTPH-Dx;
- Total and dissolved lead by EPA Method 200.8, and;
- Total and dissolved mercury by EPA Method 7470.

#### **B.2.2. Detection Limits**

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Individual instruments often can detect but not accurately quantify compounds at concentrations lower than the MDL, referred to as the instrument detection limit (IDL). Although results reported near the MDL or IDL 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) or reporting limit (RL). The contract laboratory will provide numerical results for all analytes and report them as detected above the RL or undetected at the RL.

Achieving a stated detection limit for a given analyte is helpful in providing statistically useful data. Intended data uses, such as comparison to numerical criteria or risk assessments, typically dictate specific project target reporting limits (TRLs) necessary to fulfill stated objectives. For this project, the TRLs are less than MTCA Method A cleanup levels. The project analytes, applicable cleanup levels, and laboratory TRLs are shown in Table B-2. The TRLs were obtained from Onsite Environmental, Redmond, Washington. The analytical methods and processes selected will provide RLs less than the TRLs under ideal conditions. Therefore, a particular TRL is considered a target because several factors may influence final RLs. Data users must be aware that high non-detect values, although correctly reported, can bias statistical summaries. Careful interpretation is required to correctly characterize site conditions.

### **B.2.3. 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) and laboratory control 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 and field duplicate comparisons. This value is calculated by:

$$RPD = 100[(X_s - X_d)/(X_s + X_d)]/2$$

Where:

RPD = relative percent difference

X<sub>s</sub> = sample analytical result

X<sub>d</sub> = duplicate sample analytical result

The RPD will be calculated for appropriate sample sets 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 (EPA, 2004; EPA, 2008) that address criteria exceedances and courses of action. The relative percent difference goal for this effort is 50 percent in analyses, unless the duplicate sample concentrations are less than 5 times the reporting limit.

### **B.2.4. 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 value 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.

Accuracy will be expressed as the percent recovery of a surrogate compound (also known as "system monitoring compound"), a matrix spike result, or from a standard reference material where:

$$PR = 100(X_{ss} - X_s)/T$$

Where:

PR = percent recovery

X<sub>ss</sub> = spike sample analytical result

X<sub>s</sub> = sample analytical result

T = known spike concentration

Persons performing the evaluation must review one or more pertinent documents (EPA 2004, EPA 2008) that address criteria exceedances and courses of action. Accuracy criteria for surrogate spikes, matrix spikes and laboratory control spikes are found in Table B-1.

#### **B.2.5. Representativeness, Completeness and Comparability**

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 GWCMP and 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.

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.

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.

#### **B.2.6. 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. Holding times for the analytes in this project are shown in Table B-3.

### **B.2.7. Blanks**

According to the National Functional Guidelines for Organic Data Review (EPA, 2008), “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; 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 EPA’s National Functional Guidelines for Organic Data Review and professional judgment. Blanks are discussed further in Section B.6.

## **B.3. SAMPLE COLLECTION, HANDLING AND CUSTODY**

### **B.3.1. Sampling Equipment Decontamination**

Groundwater samples will be collected from each well using dedicated down-hole tubing in each monitoring well and a peristaltic pump. General decontamination procedures for any other equipment (e.g., the water level indicator) will consist of the following: 1) wash with non-phosphate detergent solution (Alconox and distilled water), 2) rinse with distilled water, and 3) second distilled water rinse. Field personnel will limit cross-contamination by changing gloves between sampling events or more frequently as needed. Wash water used to decontaminate the sampling equipment will be combined with well purge water in on-site drums for proper off-site disposal.

### **B.3.2. Sample Containers and Labeling**

The Field Coordinator will establish field protocol to manage field sample collection, handling and documentation. Samples obtained will be placed in appropriate laboratory-prepared containers. Sample containers and preservatives are listed in Table B-3.

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

- project number,
- sample name, and
- date and time of collection.

Samples will be named according to the following example:

- MW-06-052813-W,  
Where:
  - “MW-06” indicates monitoring well number 6,
  - “052813” indicates May 28, 2013, and
  - “W” indicates the sample is a water sample

The sample collection activities will be noted on field logs. The Field Coordinator will monitor consistency between this GWCMP, sample containers/labels, field logs and the chain of custody.

### **B.3.3. Sample Storage**

Samples will be placed in a cooler with “wet ice” immediately after they are collected. The objective of the cold storage will be to attain a sample temperature of approximately 4 – 6 degrees Celsius. Holding times will be observed during sample storage.

### **B.3.4. Sample Shipment**

The samples will be transported and delivered to the analytical laboratory in coolers. Field personnel will transport and hand-deliver samples to the laboratory or to a laboratory courier. All analyses for this project are anticipated to be performed using the Onsite Environmental laboratory and sample shipping is not anticipated.

### **B.3.5. 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 laboratory or courier. A chain-of-custody form will be completed at the end of the field day for samples being shipped to the laboratory. Information to be included on the chain-of-custody form includes:

- Project name and number.
- Sample identification numbers.
- Date and time of sampling.
- Sample matrix and number of containers from each sampling point, including preservatives used.
- Analyses to be performed or samples to be archived.
- Names of sampling personnel and transfer of custody acknowledgment spaces.

The original chain-of-custody record will be signed by the field collector and bear a unique tracking number. Field personnel shall retain carbon copies and place the original and remaining copies in a plastic bag, placed within the cooler or taped to the inside lid of the cooler before sealing the container for transport. This record will accompany the samples during transit by the field team member or courier to the laboratory.

### **B.3.6. 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 analysts name or initial, and the time and date of analysis.

### **B.3.7. Field Documentation**

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will maintain daily field logs while on site. The field logs will be prepared on field report forms. Entries in the field logs and associated sample documentation forms will be made in pencil on Rite-in-the-Rain logs, or

waterproof ink on standard paper, and corrections will consist of line-out deletions that are initialed and dated. Individual logs will become part of the project files.

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

- Sample location and description
- Sampler's name(s)
- Date and time of sample collection
- Type of sample
- Type of sampling equipment used
- Field instrument readings as appropriate
- 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, etc.)
- Sample preservation

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

- Names of field personnel
- Time of Property arrival/departure
- Other personnel present at the Property, as appropriate
- Summary of pertinent meetings or discussions with regulatory agency personnel
- Deviations from the GWCMP, HASP and QAPP procedures
- Changes in personnel and responsibilities with reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

The handling, use and maintenance of field logs are the field coordinator's responsibilities.

## **B.4. CALIBRATION PROCEDURES**

### ***B.4.1. Field Instrumentation***

Equipment and instrumentation calibration facilitates accurate and reliable field measurements. Field and laboratory equipment used on the project will be calibrated and adjusted in general accordance with the manufacturer's recommendations. Methods and intervals of calibration and maintenance will be based on the type of equipment, stability characteristics, required accuracy, intended use and environmental conditions.

#### **B.4.2. Laboratory Instrumentation**

For analytical chemistry, calibration procedures will be performed in general accordance with the methods cited and laboratory standard operating procedures. Calibration documentation will be retained at the laboratory and readily available for a period of six months.

### **B.5. DATA REPORTING AND LABORATORY DELIVERABLES**

The laboratory will report data in formatted hardcopy and digital form. Analytical laboratory measurements will be recorded in standard formats that display, at a minimum, the field sample identification, the laboratory identification, reporting units, qualifiers, analytical method, analyte tested, analytical result, extraction and analysis dates, and detection limit (RL only). Each sample delivery group will be accompanied by sample receipt forms and a case narrative identifying data quality issues. Laboratory electronic data deliverables (EDD) will be established by GeoEngineers, Inc., with the contract laboratory. Final results will be sent to the Project Manager.

### **B.6. INTERNAL QUALITY CONTROL**

Table B-4 summarizes the types and frequency of QC samples to be collected, including both field QC and Laboratory QC samples. The following sections describe field and laboratory QC samples.

#### **B.6.1. Field Quality Control**

Field QC samples serve as a control and check mechanism to monitor the consistency of sampling methods. The following sections provide a description of field QC samples.

##### **FIELD DUPLICATES**

In addition to replicate analyses performed in the laboratory, field duplicates also serve as measures for precision. Field duplicates are used to evaluate the consistency of the sampling techniques used by field personnel. Additionally, field duplicates are used to evaluate the precision and consistency of laboratory analytical procedures and methods.

One field duplicate groundwater sample will be collected during each round of monitoring and analyzed for the same analytes as the parent sample. The field duplicate will be collected by "splitting" the water approximately equally between parent and duplicate containers for each analyte.

##### **TRIP BLANKS**

One trip blank will be placed in each cooler that contains samples to be analyzed for benzene. The blank samples will be analyzed for benzene (same as the parent sample).

#### **B.6.2. Laboratory Quality Control**

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

- method blanks
- internal standards

- calibrations
- matrix spike/matrix spike duplicates (MS/MSD)
- laboratory control spikes/spike duplicates (LCS/LCSD)
- laboratory replicates or duplicates
- surrogate spikes

#### **LABORATORY BLANKS**

Laboratory procedures employ the use of several types of blanks but the most commonly used blank for QA/QC assessments are method blanks. Method blanks are laboratory QC samples that consist of either a soil-like material having undergone a contaminant destruction process or high performance liquid chromatography (HPLC) water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis. Method blanks are particularly useful during volatiles analysis since VOCs can be transported in the laboratory through the vapor phase. If a substance is found in the method blank then one (or more) of the following occurred:

- Measurement apparatus or containers were not properly cleaned and contained contaminants.
- Reagents used in the process were contaminated with a substance(s) of interest.
- Contaminated analytical equipment was not properly cleaned.
- Volatile substances in the air with high solubility or affinities toward the sample matrix contaminated the samples during preparation or analysis.

It is difficult to determine which of the above scenarios occurred if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. Given method blank results, validation rules assist in determining which substances in samples are considered "real," and which ones are attributable to the analytical process. Furthermore, EPA 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."

#### **CALIBRATIONS**

Several types of calibrations are used, depending on the method, to determine whether the methodology is "in control" by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations and continuing calibration verification.

#### **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. 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 known amount of one or more of the target analytes ideally at a concentration of 5 to 10 times higher than the sample result. A percent recovery is calculated by subtracting the sample result from the spike result, dividing by the spiked amount, and multiplying by 100.

The samples for the MS and MSD analyses should be collected from a sampling location that is believed to exhibit 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 these analyses. This MS/MSD sample will be a composite to achieve a level of representativeness and reproducibility in the data. For the first round of groundwater monitoring, the MS/MSD sample will be collected from one of the downgradient/crossgradient wells at the Property (i.e., not MW-14 or MW-15). Subsequent choosing of the location for MS/MSD samples will be based on results of the first round of sampling.

#### **LABORATORY CONTROL SPIKES/LABORATORY CONTROL SPIKE DUPLICATES (LCS/LCSD)**

Also known as blanks spikes, LCS samples are similar to MS samples in that a known amount of one or more of the target analytes are spiked into a prepared media and a percent recovery of the spiked substances are calculated. The primary difference between a MS and LCS is that the LCS spike media is considered "clean" or contaminant free. For example, HPLC 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. LCS data must be reviewed in context with other controls to determine if out-of-control events occur.

#### **LABORATORY REPLICATES/DUPLICATES**

Laboratories often 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, but most commonly occur as a second analysis on the extracted media.

#### **SURROGATE SPIKES**

The purposes of using a surrogate are to verify the accuracy of the instrument being used and extraction procedures. Surrogates are substances similar to, but not one of, the target analytes. A known concentration of surrogate is added to the sample and passed through the instrument, noting the surrogate recovery. Each surrogate used has an acceptable range of 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 range of acceptance a possibility of false positives exist, although non-detected results are considered accurate.

## **B.7. DATA REDUCTION AND ASSESSMENT PROCEDURES**

### ***B.7.1. Data Reduction***

Data reduction involves the conversion or transcription of field and analytical data to a useable format. The laboratory personnel will reduce the analytical data for review by the QA Leader and Project Manager.

### ***B.7.2. Field Measurement Evaluation***

Field data will be reviewed at the end of each day by following the QC checks outlined below. Field data documentation will be checked against the applicable criteria as follows:

- Sample collection information
- Field instrumentation and calibration
- Sample collection protocol
- Sample containers, preservation and volume
- Field QC samples collected at the frequency specified
- Sample documentation and chain of custody protocols
- Sample delivery

Cooler receipt forms and sample condition forms provided by the laboratory will be reviewed for out-of-control incidents. If anything is found to be out-of-control the Project Manager will implement corrective actions to ensure that additional out-of-control incidents do not occur. The final report will contain what effects, if any, the out-of-control incident may have on data quality. Sample collection information will be reviewed for correctness before inclusion in a final report.

#### ***B.7.3. Field Quality Control Evaluation***

A field QC evaluation will be conducted by reviewing field logs and daily reports, discussing field activities with staff, and reviewing field QC samples (trip blanks and field duplicates). Trip blanks will be evaluated using the same criteria as method blanks.

#### ***B.7.4. Laboratory Data Quality Control Evaluation***

The laboratory data assessment will consist of a formal review of the following QC parameters:

- Holding times
- Method blanks
- Matrix spike/spike duplicates
- Laboratory control spikes/spike duplicates
- Surrogate spikes
- Replicates

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

#### ***B.7.5. Corrective Action***

Any deviation from the established criteria will be documented, and the data will be qualified, as appropriate. If significant quality assurance problems are encountered, appropriate corrective action as determined by GeoEngineers' Project Manager, GeoEngineers' Associate/Principal and/or the analytical laboratory will be implemented as appropriate.

**B.8. REFERENCES**

Environmental Protection Agency. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, OSWER 9240.1-45, EPA 540-R-04-004. October 2004.

Environmental Protection Agency. Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, EPA-540-R-08-01. June 2008.

Washington State Department of Ecology. Model Toxics Control Act (MTCA) Cleanup Regulations, Washington Administrative Code, Chapter 173-340-820. October 2007.

**Table B-1**  
**Groundwater Monitoring Measurement Quality Objectives**  
 Former Olympia MGP Site  
 Olympia, Washington

Laboratory Analysis	Reference Method	Check Standard (LCS) %R Limits <sup>1</sup>	Matrix Spike (MS) %R Limits <sup>1</sup>	Surrogate Standards (SS) %R Limits <sup>2</sup>	MS Duplicate Samples or Lab Duplicate RPD Limits <sup>3</sup>	Field Duplicate Samples RPD Limits <sup>3</sup>
Total Metals (Hg)	EPA 7470	80%-120%	75%-125%	NA	≤20%	≤50%
Benzene	EPA 8260	78%-125%	78%-117%	62%-122%	≤15%	≤30%
Petroleum Hydrocarbons	NWTPH-Dx	63%-125%	NA	50%-150%	NA	≤30%
cPAHs	EPA 8270 - SIM	40%-130%	40%-130%	37%-137%	≤33%	≤30%

**Notes:**

<sup>1</sup> Percent recovery limits are based on laboratory control limits. Limits will vary for individual analytes, but will be inside of the limits shown.

<sup>2</sup> Surrogate standard limits are based on laboratory control limits, or are dictated by the method.

<sup>3</sup> RPD control limits are only applicable if the concentrations are greater than 5 times the method reporting limit (MRL). For results less than 5 times the MRL, the difference between the sample and duplicate must be less than the MRL.

NA = Not applicable

LCS = Laboratory control sample

%R = Percent recovery

RPD = Relative percent difference

cPAHs = Carcinogenic polycyclic aromatic hydrocarbons

**Table B-2**  
**Groundwater Monitoring Cleanup Levels and Target Reporting Limits**  
 Former Olympia MGP Site  
 Olympia, Washington

Chemical of Concern (µg/l)	MTCA <sup>1</sup> Cleanup Level	Target Laboratory Reporting Limit
Benzene <sup>2</sup>	5	0.20
Diesel-Range Total Petroleum Hydrocarbons <sup>2</sup>	500	250
Lube Oil-Range Total Petroleum Hydrocarbons <sup>2</sup>	500	400
cPAHs (TEC)	0.1	0.070
Mercury <sup>2</sup>	2	0.50

**Notes:**

<sup>1</sup> MTCA Method A cleanup levels for potable groundwater (WAC 173-340-720[3]).

<sup>2</sup> Analyte to be included in first event of groundwater monitoring. Subsequent analysis during future groundwater monitoring events will be determined after consultation with the Department of Ecology.

TEC = Total toxic equivalent concentration calculated per WAC 173-340-708.

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

µg/l = micrograms per liter

**Table B-3**  
**Groundwater Monitoring Test Methods, Sample Containers, Preservation and Holding Time<sup>1</sup>**

Former Olympia MGP Site  
 Olympia, Washington

Analysis	Method	Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times
Total Metals (Hg)	EPA 7470	100ml	500ml poly	HNO3 pH<2, Cool to 4 C	28 days
Benzene	EPA 8260	40ml	Three 40mL VOA Vials	HCl pH<2, Cool to 4 C	14 days
Petroleum Hydrocarbons	NWTPH-DX	500ml	Two 500ml amber glass	HCl pH<2, Cool to 4 C	14 days
cPAHs	EPA 8270 SIM	1 Liter	2-1 L amber glass container	0 to 6 degrees C	7 days until extraction

**Notes:**

<sup>1</sup> Holding Times are based on elapsed time from date of collection

mL = Milliliter

C = Celcius

L = Liter

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

**Table B-4**  
**Groundwater Monitoring Quality Control Samples Type and Frequency**  
 Former Olympia MGP Site  
 Olympia, Washington

Parameter	Field Quality Control			Laboratory Quality Control			
	Field Duplicates	Trip Blanks	Method Blanks	LCS	MS / MSD	Lab Duplicates	
Total Metals (Hg)	1 per round of monitoring	NA	1/batch	1/batch	1 /batch	1/batch	
Benzene	1 per round of monitoring	Minimum 1 within each cooler	1/batch	1/batch	1 /batch	NA	
TPH - Dx	1 per round of monitoring	NA	1/batch	1/batch	NA	1/batch	
cPAHs	1 per round of monitoring	NA	1/batch	1/batch	1 /batch	NA	

**Notes:**

An analytical batch is defined as a group of samples taken through a preparation procedure and sharing a method blank, LCS, and MS/ MSD (or MS and lab duplicate).

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

NA = Not applicable

LCS = Laboratory control sample

MS = Matrix spike sample

MSD = Matrix spike duplicate sample

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