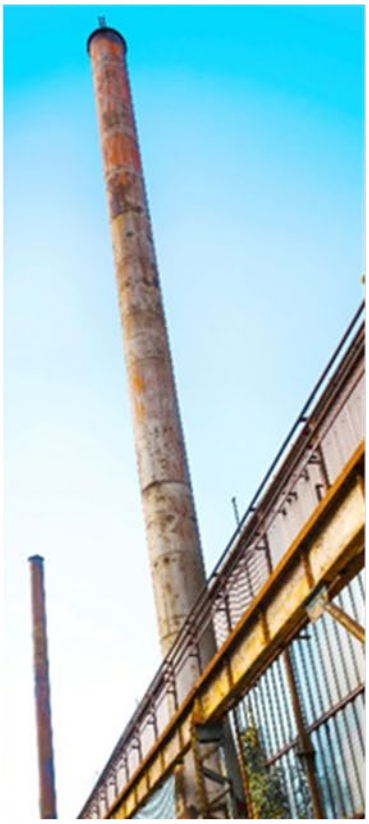
Cleanup Action Work Plan

Shell Harbor Island Terminal
2555 13th Avenue
Seattle, Washington

PlaNet Site ID. MIGUS357032



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1. Introduction

1.1 Site Information

Site Name:	Shell Harbor Island Terminal
Site Address:	2555 13th Avenue, Seattle, WA
Project Consultant:	GHD Services Inc.
Project Consultant Contact Information:	Jeff Gaarder 721 4th Avenue, #2626 Kirkland, Washington, 98033 Office – 206-451-4955 Mobile – 707-333-0795
Current Owner:	Triton West MLP

1.2 Purpose

GHD Services Inc. (GHD) prepared this Cleanup Action Work Plan (work plan) on behalf of Equilon Enterprises LLC dba Shell Oil Products US (SOPUS) for the purpose of completing a remedial excavation at 2555 13th Avenue, Seattle, King County, Washington (Property). The excavation is proposed following a gasoline release on October 1, 2020. The work will comply with the Washington State Department of Ecology's (Ecology) Washington Administrative Code (WAC) 173-340 (Model Toxics Control Act [MTCA]).

1.3 Site Description

The Shell Harbor Island Terminal is a petroleum distribution facility located on Harbor Island, which is approximately one mile southwest of downtown Seattle at the mouth of the Duwamish River (Figure 1). The site is comprised of three parcels located at 2555 13th Avenue Southwest, 1835 13th Avenue Southwest, and 1711 13th Avenue Southwest. These parcels are designated as the Main Tank Farm, North Tank Farm, and Shoreline Manifold Area, respectively (Figure 2). The gasoline release occurred at the Pump House located south of the Main Tank Farm in the western portion of the property.

1.4 Fuel Release Background

On October 1, 2020 a gasoline release occurred from a failed pump inside the Pump House during tanker truck fueling operations. Areas affected by the release include the Pump House interior, Manifold Pit East, and limited areas outside the Pump House on the ground surface at its northern and southern entryways. The estimated release volume is 580 gallons and it appears that most of the fuel was released to the concrete lined Manifold Pit East. The volume of gasoline affecting the

ground surface outside the northern and southern entryways of the Pump House is estimated at 45 and 86 gallons, respectively.

Shell contracted with NRC Environmental Services, Inc. (NRC) to perform emergency response efforts that included pumping a fuel water mixture from the Manifold Pit East, and removing impacted gravel from limited areas outside the Pump House. NRC will also support the proposed remedial excavation efforts.

Shell contracted with GHD to perform an initial assessment of the release outside the Pump House on October 2, 2020. The scope of the assessment included (1) field testing soil beneath areas where gravel removal occurred due to gasoline impacts, (2) measuring the depth to groundwater in the closest well to the Pump House, and (3) determining soil texture in the spill area.

1.4.1 Field Testing Results

GHD staff measured volatile organic compounds using a photo-ionization detector (PID) at the impacted areas located outside the north and south ends of the Pump House where NRC had removed approximately 3 inches of affected gravel during cleanup. Insitu soil impacts were measured at a depth of approximately 2 to 3 inches below ground surface (bgs) by coring a small hole into the soil, inserting the PID tip into the hole, and covering the PID tip with a nitrile-gloved hand. The results indicate the following:

- Soil consists of silty sand and/or poorly graded sand
- PID readings in soil adjacent to the south end of the pump house ranged from 25 to 3,900 parts per million (ppm)
- PID readings in soil adjacent to the north end of the pump house ranged from 6 to 2,207 ppm
- In general, the outer edge of impacts extend a few feet beyond the area where gravel was removed
- Total area affected by spill is approximately 300 square feet at the north end and 600 square feet on the south end

Well MW-105 is the nearest groundwater monitoring well to the Pump House and is located approximately 125 feet upgradient to the southwest. The depth to water in this well was 5.61 feet below top of casing. No separate phase product (SPH) was measured and no gasoline odors were observed.

2. Rationale for Scope of Work

The rationale for the scope of work is to attempt to remove elevated levels of gasoline impacted soil and to determine if the release has impacted groundwater. If groundwater is impacted, then the groundwater surface will be observed for SPH and samples will be collected for chemical analyses.

Impacted soil within the affected areas located outside the northern and southern entryways of the Pump House will be excavated to a maximum depth of approximately 6 feet bgs, which corresponds to the groundwater surface. Because the extent of impacts are unknown, it is possible that the vertical extent of impacts is limited to shallow soil above groundwater. Therefore, field PID readings

will be used to guide the excavation's horizontal and vertical extents. Additionally, the excavation's extent will be controlled by subsurface utility conflicts and other nearby structural limitations. The proposed excavation extents are shown on Figure 3.

3. Excavation Plan

3.1 Scope of Work

All work will be conducted according to the Standard Operating Procedures in Section 3.4 of this work plan and the Shell Sampling and Analysis Plan dated March 2012. The scope of work may be amended based on observations during field work. If impacts are observed using field screening techniques at the final extents of the excavation, field staff will contact the Project Manager to coordinate additional actions.

The proposed scope of work outlined in the following sections of this work plan has been developed using the rationale discussed in Section 2.

3.2 Remedial Excavation

The remedial excavation will be performed using an air knife in combination with hand digging. Based on soil field screening results, the extent of impacted soil is expected to be approximately 12 feet by 25 feet outside the northern entryway and approximately 25 feet by 25 feet outside the southern entryway. Excavation is limited by subsurface utilities and structures. GHD anticipates the total depth will not exceed 5 to 6 feet bgs which is the anticipated depth to groundwater. The vertical and lateral limits of the excavation may be extended or reduced in the field based on evidence of contamination, or lack of contamination as determined by visual observation and PID measurements. GHD estimates the total volume of soil removed will be less than 100 cubic yards. The proposed excavation extent is shown on Figure 3. Confirmation soil samples will be collected once the anticipated excavation vertical and lateral extents are achieved. The actual locations of the confirmation soil samples will be dependent upon field screening, but in general include bottom and sidewall samples.

Confirmation soil samples will be analyzed for the following analytes:

- TPHg using Method NWTPH-Gx
- BTEX using EPA Method 8260B

Upon completion of confirmation sampling, the excavation will be backfilled with clean fill material and compacted in lifts to surface grade.

3.2.1 Utilities

Prior to initiating groundbreaking, public and private utility locates will be conducted. There are numerous utilities in the proposed excavation areas so air knife and hand digging will be performed to clear the utilities. If additional utilities are identified during the public or private utility locate that are located within the excavation footprint, these utilities will also be addressed as part of pre-field planning.

3.3 Excavation Dewatering

Groundwater is at a depth of approximately 5 to 6 feet bgs. At this time, excavation below the water table will not be performed. If the excavation extends to groundwater, however, the excavation water will be purged prior to sampling. Groundwater removed from the excavation will be temporarily stored on-Property in an above ground storage tank. The stored groundwater will be disposed of according to SOPUS procedures and applicable regulatory requirements.

3.4 Standard Operating Procedures

A detailed standard operating procedure specific for excavation and confirmatory sampling is attached as Appendix A. Backfill will be completed in accordance with SOPUS specifications attached as Appendix B.

3.4.1 Health and Safety Plan

GHD will prepare a comprehensive Site-Specific Health and Safety Plan to protect site workers. The plan will be reviewed and signed by each site worker and kept on the site during field activities.

3.4.2 Utility Clearance

The proposed excavation area will be cleared through Washington Utilities Coordinating Council (WUCC) prior to beginning work. A private utility locating service will also be used to verify clearance from subsurface utilities or other obstructions.

3.4.3 Investigation-Derived Waste and Soil Disposal

IDW will include personal protective equipment, decontamination fluids, pumped groundwater (from dewatering) and excavated soil. Excavated soil will be loaded into roll-off bins and transported to an approved disposal facility. Pumped groundwater from the excavation will be temporarily stored in an above ground holding tank and then transferred to an approved disposal facility. Any other IDW will be placed in properly labeled 55-gallon drums. The IDW will be disposed of according to SOPUS procedures and applicable regulatory requirements.

3.4.4 Certification

The scope of work described in this cleanup action plan will be performed under the supervision of a Washington state licensed geologist.

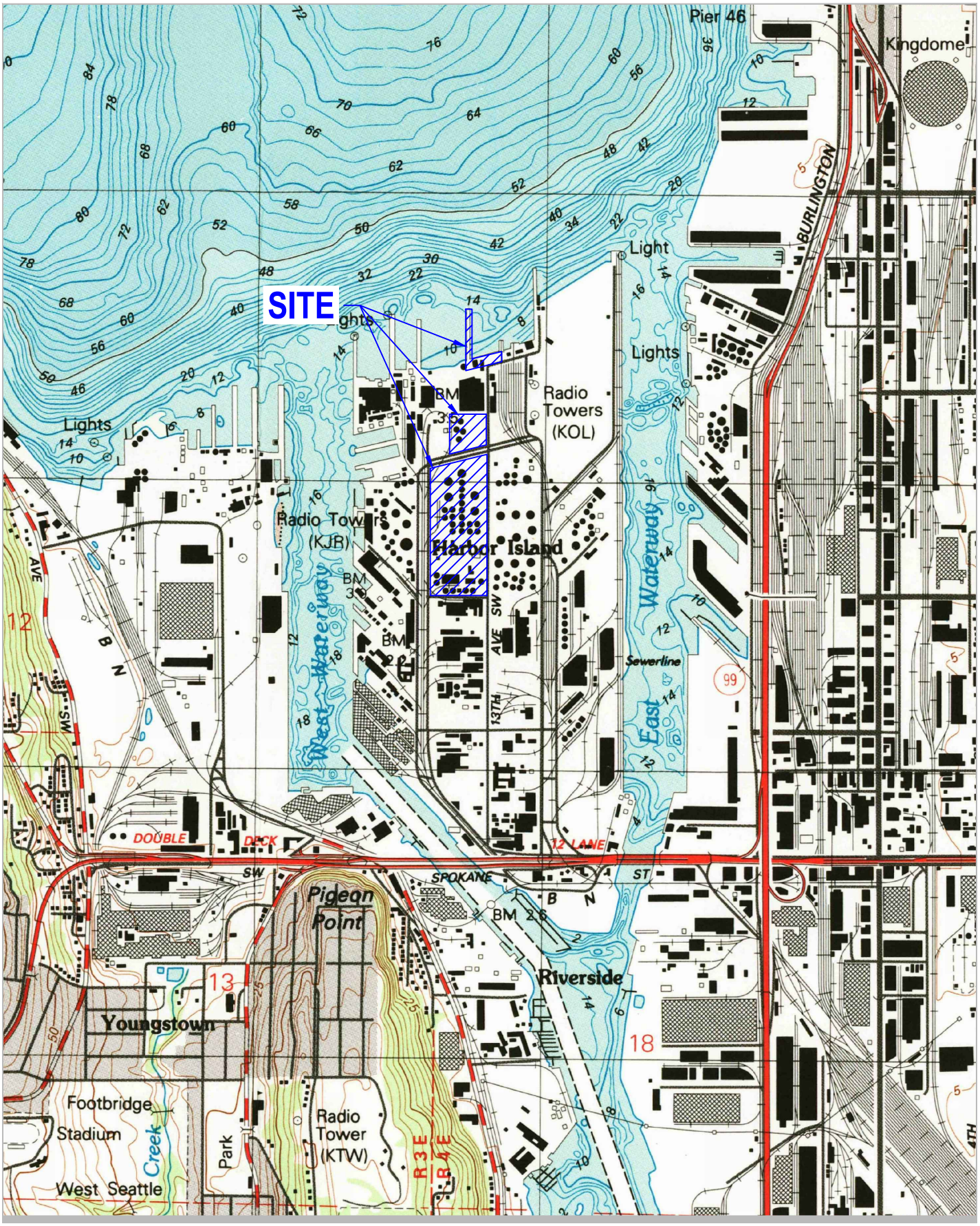
All of Which is Respectfully Submitted,

GHD

Jeff Gaarder

Brian Peters, LG

Figures



0 750 1500 ft

N

GHD

SHELL DISTRIBUTION TERMINAL
2555 13th AVENUE SW
SEATTLE, WASHINGTON

Project No. **11208654**
Date **October 2020**

SITE LOCATION MAP

FIGURE 1

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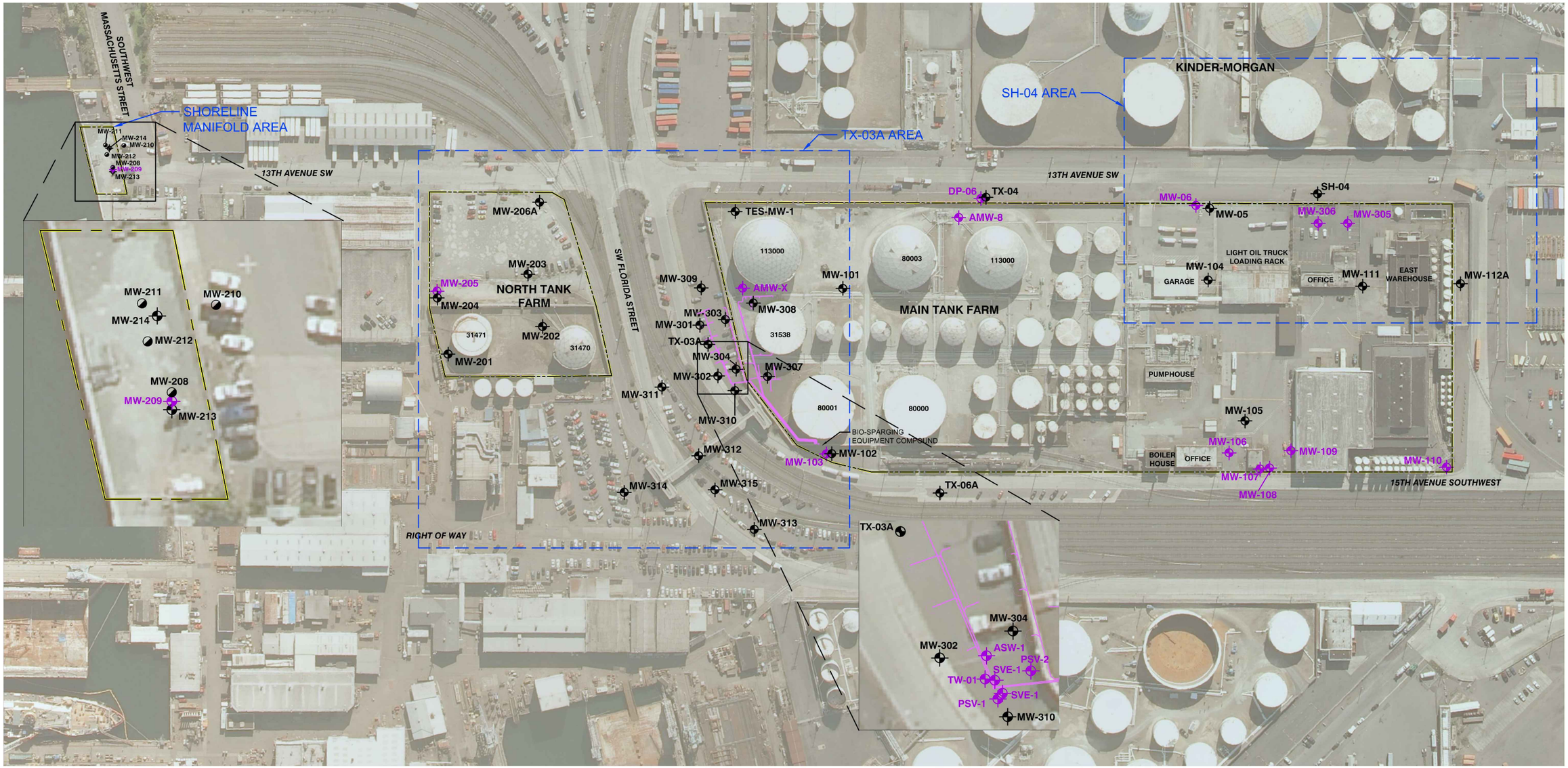
Data Source: USGS Quad Map Seattle South, WA 1983.



Map Features

- MW-212 — Monitoring Well Location (Included in Current Groundwater Monitoring Program)
- MW-210 — Product Recovery / Monitoring Well Location
- MW-103 — Additional Well Location (Not Included in Current Groundwater Monitoring Program)
- Shell Property Line
- Bio-Sparging Well Location
- Bio-Sparging Line (System start on May 25, 2017)

0 100 200 ft

N

GHD

SHELL DISTRIBUTION TERMINAL
2555 13th AVENUE SW
SEATTLE, WASHINGTON

SITE PLAN

Project No. **11208654**
Date **October 2020**

FIGURE 2

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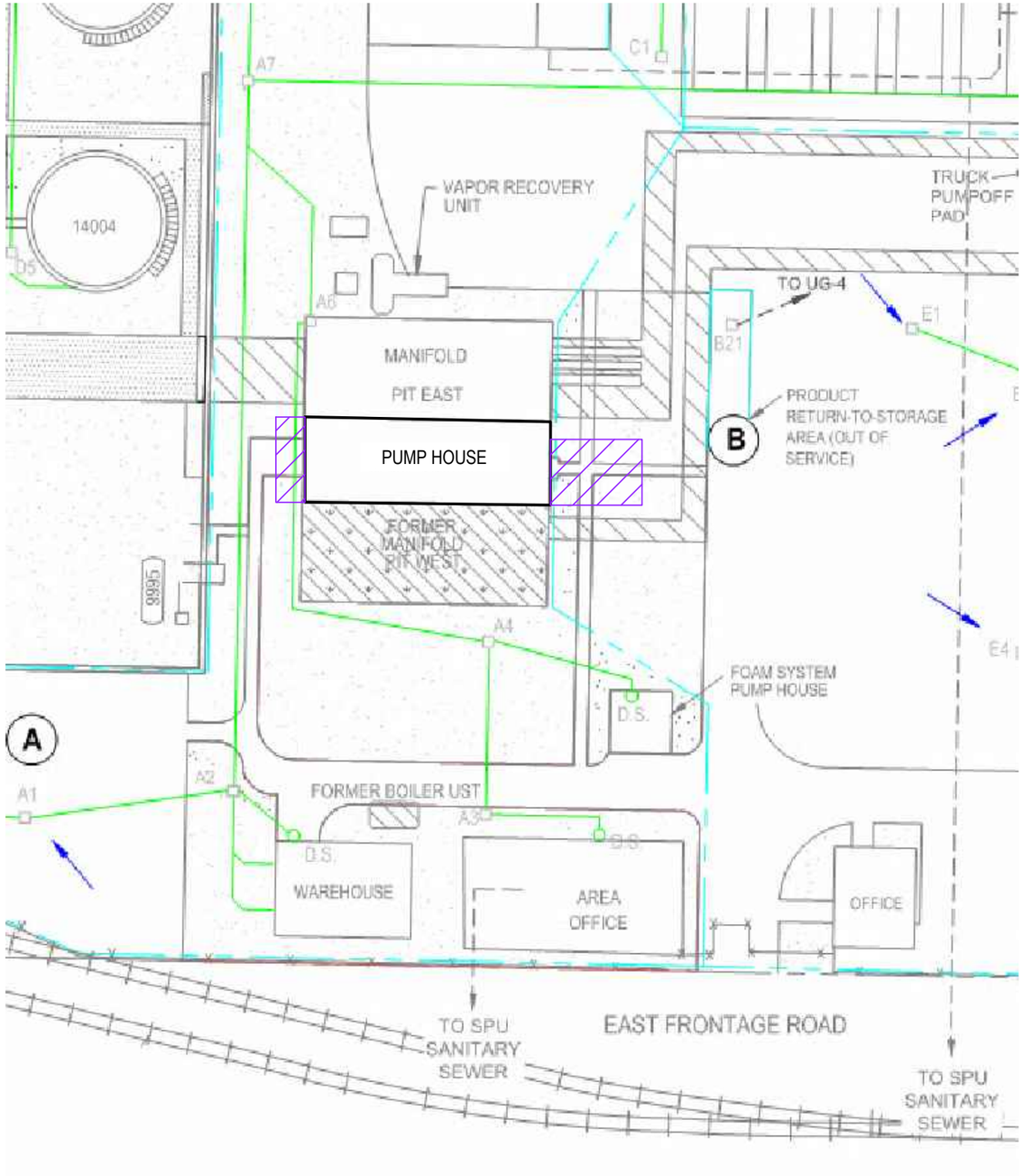
Data Source: AECOM Site Map dated 2/3/2020.



LEGEND:

- 80001 — Tank and Number
- Property Line
- Fence
- Fire Wall or Containment Wall
- D.S. — Roof Drain Downspout
- A7 — Catch Basin
- Drain
- Drip Pan
- Railroad Track
- (A) — Drainage Basin I.D.
- V1 — Out-Of-Service Containment Drain Valve
- V2 — Containment Drain Valve
- Manhole Cover
- Shut-Off Valve
- Aboveground Pipelines
- Aboveground Pipelines
- Underground Pipelines
- Storm Drain
- Sanitary Sewer
- Approximate Drainage Basin Boundary
- Approximate Stormwater Flow Direction
- Demolished Structure
- Gravel Surface
- Asphalt Concrete Pavement
- Concrete Pad
- Grass
- PROPOSED EXCAVATION AREA

NOTE:

1. The drainage system shown in this drawing is for informational use only and is not based on a survey.
2. The location of the drainage system is approximate and is based on drawings provided by Equilon (formerly Texaco), selective dye and/or hydraulic testing and IT Corporation's (formerly EMCON) best understanding of the site conditions at the time.
3. The lubes operations, including use of the boiler, warehouses, blending building, lube oil loading rack, the southern railcar unloading area, and southeast, south, and southwest tank farms, ceased in December 2003. The lubes infrastructure was demolished in 2012.

0 25 50 ft

N

GHD

SHELL DISTRIBUTION TERMINAL
2555 13th AVENUE SW
SEATTLE, WASHINGTON

Project No. **11208654**
Date **October 2020**

PROPOSED SOIL EXCAVATION

FIGURE 3

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Plot Date: 05 October 2020 3:02 PM

Data Source: PES Environmental, Inc. Main Terminal Drainage Map 6/19.

Appendices

Appendix A
Soil Excavation and Confirmatory Sampling – Standard Operating Procedures

Table of Contents

List of Quality System Forms

1. Soil Excavation and Confirmatory Sampling Standard Operating Procedures

1.1 Introduction

The excavation of drums and contaminated soil is a specialized remedial activity which requires a qualified contractor working under a GHD specification (and contract). The contract will require the contractor to not only direct/conduct the actual field work but may also stipulate the direction/ performance of remedial activities. Requirements may include; field analytical/ screening and completion of required documentation. The primary function of the GHD representative in such a contract will be to observe the activities of the contractor to insure the requirements of the specification are upheld.

The remainder of this section is organized as follows:

- Section 1.2 Background
- Section 1.3 Planning and Preparation
- Section 1.4 Safety and Health
- Section 1.5 Quality Assurance/Quality Control
- Section 1.6 Equipment Decontamination
- Section 1.7 Regulatory Framework
- Section 1.8 Excavation Activities
- Section 1.9 Confirmatory Soil Sampling
- Section 1.10 Backfilling
- Section 1.11 Waste Removal
- Section 1.12 Follow-up Activities

1.2 Background

Excavation activities are governed by the following:

- OSHA Standard (29 CFR 1926.650-652) specifies safety requirements for excavations.
- Complete GHD's ASETS - "Excavation Safety for Competent Persons" training course before overseeing any excavation work.

It is important to highlight that GHD does not prescribe its own guidance for remedial excavation or confirmatory soil sampling. Each project should be carried out by regulatory guidance for a state or province.

1.3 Planning and Preparation

Prior to undertaking any soil excavation and confirmatory soil sampling:

- Review the Work Plan
- Conduct preliminary site visit if practical to assess logistics for excavation, equipment staging, truck loading, exclusion/econ/support zones, overhead utilities and underground utilities, buildings, etc.
- Review and sign the Health and Safety Plan (HASP)
- Review and modify the Job Safety Analysis specific for the site work
- Complete a Vendor Evaluation Form (QSF-012) and file in the Project file for any vendors that do not have full approval status or are not listed on the Approved Vendor List (QSL-004). Completion of a Safety and Health Schedule (QSF-030 for Canadian work, QSF-031 for U.S. work) is necessary for all vendors who complete field services. Prior to mobilization on site, the vendor must submit the form to the Regional Safety and Health Manager for review and approval (if not already posted on QSL-004).
- Review GHD's Safety & Manual for the specific county for Applied Safety and Environmental Training Solutions (ASETS) guidelines for excavation work
- Review quality assurance/quality control (QA/QC) requirements. See Shell Backfill Specification included in Appendix C to Report 060486(1)
- Review the investigation report for contamination depths, stratigraphy, and groundwater level
- Ensure characterization of contamination as best as possible, if applicable
- Ensure all permits and licenses have been received and reviewed
- Confirm all plans and permits/approvals for transportation and disposal of excavated waste
- Contact GHD's Waste Services Group
- Review provincial or state screening and sampling requirements, if applicable
- Coordinate removal of contaminated soil with the contractor (licensed waste hauler)
- Contact regulatory agency - some require 14 days prior notification
- Contact the excavation contractor to verify that equipment meets GHD and OSHA standards, such as backhoe - hydraulic hoses in good condition, chains and cables contain rating tags, trench boxes contain rating specs, ladders are in good condition, etc.
- Complete a Field Requisition Form (QSF-014) and assemble all equipment and personal protective equipment (PPE) [e.g., photoionization detector (PID), oxygen and lower explosive limit (LEL) meter, tape measure, first aid kit, fire extinguishers, cascade air system or self-contained breathing apparatus (SCBA)] if Level B work, spill response equipment, etc.
- Contact GHD chemistry group to arrange:
- SSOW (Simplified Scope of Work)

- Accredited laboratory
- Sample containers
- Coolers
- Shipping details
- Sampling start date
- Expected duration of sampling program
- U.S. laboratories typically need state accreditation
- Arrange access to the site and confirm site contact(s)
- Arrange for confined space entry, if applicable
- Initiate a Property Access/Utility Clearance Data Sheet (Form QSF-019)
- Obtain client sign-off(s). Follow all Shell Permit to Work and MBI procedures
- Verify backfilling (compaction testing), confirmatory sampling, and site restoration requirements in accordance with SOPUS Backfill Specifications

1.4 Safety and Health

GHD is committed to conducting field activities in accordance with sound safety and health practices. GHD adheres to high safety standards to protect the safety and health of all employees, subcontractors, customers, and communities in which they work. The safety and health of our employees takes precedence over cost and schedule implications.

Field personnel are required to implement the Safety Means Awareness Responsibility Teamwork (SMART) program as follows:

- Assure the Health and Safety Plan (HASP) is specific to the job and approved by a Regional Safety & Health Manager
- Confirm that all HASP elements have been implemented for the job
- A Job Safety Analysis (JSA) for each task has been reviewed, modified for the specific site conditions and communicated to all appropriate site personnel. The JSAs are a component of the HASP
- Incorporate Stop Work Authority; Stop, Think, Act, Review (STAR) process; Safe Task Evaluation Process (STEP); Observations process; Near Loss and Incident Management process in the day-to-day operations of the job
- Review and implement applicable sections of the GHD Safety & Health Policy Manual
- Confirm that all site personnel have the required training and medical surveillance , as defined in the HASP

- Be prepared for emergency situations, locating safety showers, fire protection equipment, evacuation route, rally point, and first aid equipment before you begin working, and make sure that the equipment is in good working order
- Maintain all required Personal Protective Equipment (PPE), safety equipment, and instrumentation necessary to perform the work effectively, efficiently and safely
- Be prepared to call the GHD Incident Hotline at 1-866-529-4886 for all incidents involving injury/illness, property damage, and vehicle incident and/or significant Near Loss

It is the responsibility of the Project Manager to:

- Ensure that all GHD field personnel have received the appropriate health and safety and field training and are qualified to complete the work
- Provide subcontractors with a Job Hazard Analysis to enable them to develop their own HASP
- Ensure that all subcontractors meet GHD's (and the Client's) safety requirements

1.5 Quality Assurance/Quality Control

A well-designed QA/QC program will:

- Ensure that data of sufficient quality are obtained in order to facilitate good site management
- Allow for monitoring of staff and contractor performance
- Verify the quality of the data for the regulatory agency

The QA/QC program is developed on a site-specific basis. QA/QC requirements are discussed in detail in Section 3.9.

The Draft SOPUS Sampling and Analysis Plan shall be used to complete the confirmation sampling scope of work.

1.6 Equipment Decontamination

Prior to use and between excavation locations at an environmental site, the excavation and sampling equipment must be decontaminated in accordance with the Work Plan, the Quality Assurance Project Plan (QAPP), or the methods presented in this section.

The minimum was procedures for decontamination of excavating equipment are:

- High pressure, hot water detergent wash (brushing as necessary to remove particulate matter)
- Potable, hot water, high pressure rinse

On environmental sites, the soil sampling equipment (trowels, spoons, shovels, and bowls) are typically cleaned as follows:

- Wash with potable water and laboratory detergent, using a brush as necessary to remove particulates.
- Rinse with potable water.
- Rinse with deionized water.

- Air dry for as long as possible.

1.7 Regulatory Framework

Excavation and sampling associated to Underground Storage Tanks (USTs) is regulated separately as compared to drum removal, landfill excavation or other remedial excavation. Consequently, all remedial excavations must first be determined to be UST or non-UST related prior to locating the applicable authority.

In the U.S.:

The UST regulatory requirements in the United States are governed on a state-by-state basis. There are a few states that may defer to the USEPA in their region, for a complete directory and link to the requirements for each state, including five US territories use the following web site:

http://www.epa.gov/OUST/states/statcon1.htm

1.8 Excavation Activities

- Confirm that utility clearance process has been completed.
- Complete SOPUS Permit for excavation activities
- Confirm that an Excavation Competent person is on-site at all times during work activities to assure regulatory compliance.
- No one is allowed to enter an excavation deeper than 4 feet without the specific permission and safety systems confirmed by the Excavation Competent person.
- Locate, isolate, and lock out of all known utility systems such as electrical, water, phone, etc.
- Excavate and stockpile "clean" soil upwind of the excavation at least 2 feet from the edge of the excavation, it can be used for backfill material.
- Excavate contaminated soil and either stockpile for characterization and eventual disposal or for direct load and haul.
- Remove and store contaminated groundwater (Vac truck, lined roll-off box, temporary treatment system).
- Confirmatory soil sampling (including groundwater and/or sediment sampling, if required).
- Characterize for disposal of all waste liquids.
- Site restoration.
- Removal of contaminated soil cannot occur until the appropriate waste classification and disposal facility has been determined.
- Potential asbestos must not be removed unless an abatement container licensed for asbestos removal conducts the work.
- The client is considered the generator of all materials disposed of and will sign all manifests prior to removal of contaminated materials from the site.

- In no case should GHD personnel sign manifest forms on behalf of the client as a generator, unless written authorization is given by a Shareholder.

For reporting purposes, the following must be documented:

- Chronology of events.
- Summary of tank and piping condition findings.
- Soil and groundwater conditions.
- Waste materials generated (soil, groundwater, wash/rinse fluids, tank bottoms).
- Soil sample locations.
- Record waste disposal activities and locations.
- Label photographs.
- Retain all manifests, weigh scale receipts, and other releases.
- Retain all chain-of-custody records.
- Return field equipment and any other supplies, rented or owned.

1.9 Soil Screening and Confirmatory Sampling

Confirmatory sampling procedures will vary from project to project due to the different parameters of concern and/or the different regulatory requirements as provided by the state/province/federal jurisdiction, where the site is located. The primary goal of confirmatory sampling is to collect the required number of representative samples for chemical analysis that will be used to document post-excavation conditions relevant to regulatory standards. Confirmation samples will be collected in accordance with SOPUS Draft Sampling and Analysis Plan.

1.9.1 Soil screening

Soil screening is required for any remedial excavation. It is used as a general form of quantitative field determination for contaminated soil. It is also used as a preliminary assessment for clean soil, which must be verified through confirmatory sampling.

Common devices used for screening include photoionization detector, flameionization detector, multi-gas meter, organic vapor analyzer, explosimeter, single or dual gas tube analyzer, or radiological survey instrument. In addition, soil may be monitored visually for discoloration or other signs that could indicate contamination. Backup instruments are recommended, such that they should be available at the site at all times, if approved by the Project Manager.

More advanced screening of the soil may be required to include, but not limited to; hydrogen cyanide gas, mercury vapor, and polychlorinated biphenyl (PCB) screening. These tests may be used for initial segregation of clean soils from contaminated soils as well as to determine the compatibility of mixed soils.

1.9.2 Confirmatory Sampling

Confirmatory samples are generally collected from the sides and bottom of an excavation to substantiate the screening process as discussed above and to show that contaminated soil has either been removed or if left in-place, to what extent contaminated soil remains. Confirmatory samples may also include "clean soil" that had been removed from an excavation and stockpiled to access underlying contaminated material. Based on the analytical results, confirmation of "clean soil", may be placed back into the excavation upon completion of the work.

The Work Plan will likely require sampling of both contaminated soil and clean soil associated with and excavation. Analytical results from the contaminated soil will be used for waste characterization/compatibility testing in preparation for treatment or disposal of contaminated soil.

As with drum removal procedures, prior consideration must be given to how a sample will be removed from the base or sidewalls of the excavation. Extended reach sampling equipment or use of the excavating equipment (if properly decontaminated) may be required. See Section 4.13 - Surficial Soil Sampling, for more detailed sampling information.

Random, Biased, and Grid-Based Sampling

Unless there is a strong indication of contaminant presence, such as staining, then soil sample locations should be selected randomly from within the excavation.

If any areas show evidence of contamination, such as staining, biased samples will be collected from those areas to characterize the contamination present or left in place. Background and/or control samples are considered biased, since they are collected in locations that are intended to represent non-site-impacted conditions.

When sampling involves large excavation areas, a grid-based soil sampling program is usually used. There is no single grid size that is appropriate for all excavations. Refer to your state/province/federal guidance for the requirements.

It is also important to consider the presence of structures and preferred pathways that might promote contaminant migration. Stratigraphic contact zones are good sample locations where contaminate accumulation is likely such as sand/clay, sand/silt contacts or fill material/natural material contacts. These areas represent a worst-case scenario when screening and visual determinations indicate no impact.

Grab Versus Composite Samples

A grab sample is collected to identify and quantify compounds at a specific location or interval. The sample is comprised of no more than the minimum amount of soil necessary to fill the sample container. Composite samples are a mixture of a given number of subsamples and are collected to characterize the average composition in a given surface area.

Composite samples with the exception of VOC analyses, should be placed in a stainless steel bowl to be homogenized prior to filling sample containers. This step can be bypassed if only one sample container is required to be filled and the laboratory is instructed to homogenize the sample upon receipt.

It is important that soil samples be mixed thoroughly to ensure that the sample interval or area is adequately represented. Round stainless bowls work best for sample mixing, whereby, mixing involves stirring in a circular motion while occasionally turning the material over. The sample container should be filled completely; no space should remain in the sample containers.

Note that soil collected for VOCs shall not be mixed.

1.9.3 Sample collection Procedure

Sampling techniques are dependent upon the sample interval of interest, the type of soil material to be sampled, and the requirements for handling the sample after retrieval. The most common method for collection of excavation soil samples involves the use of a the backhoe bucket. Soil samples may also be collected with spoons and push tubes. Remember, no one may enter an excavation greater than 4 feet without the specific permission and safety systems confirmed by the Excavation Competent person on site. In each case, the sampling device must be constructed of an inert material with smooth surfaces which can be readily cleaned. The cleaning protocol involves the use of a sequence of cleaning agents and water designed to remove surface contaminants. The sampling equipment is cleaned between sample locations. A typical soil sampling protocol is outlined below:

- Soil samples will be collected using a precleaned stainless steel trowel or other appropriate tool. Each sample will consist of soil from the surface to the depth specified within the Work Plan. Sampling in ditches will be done only when there is no water present.
- A new pair of disposable gloves will be used at each sample location.
- Prior to use, at each sample location, all sampling tools will be decontaminated in accordance with the Work Plan.
- A precleaned sampling tool will be used to remove the sample from the layer of exposed soil. The collected soil will be placed directly in a clean, prelabeled sample jar and sealed with a Teflon-lined cap. Samples to be split for duplicate analyses will first be homogenized in a precleaned stainless steel bowl.
- Samples will be placed in ice or cooler packs in laboratory supplied coolers after collection.

In the event that the soil conditions are not as the sampler was led to believe by the Work Plan or if there are unexpected distinct layers of soil present (e.g., a layer of high organic carbon content overlying a layer of fine grained soil), then the sampling personnel should report the conditions to the Project Coordinator immediately for resolution.

Also, the sampling team members should immediately report any conditions to the Project Coordinator that they believe may have a negative effect on the quality of the results.

Generally it is not advisable to collect samples containing excessive amounts of large particles such as gravel. Gravel presents difficulties for the laboratory in terms of sample preparation and may not be truly representative of contaminant concentrations in nearby soil.

All conditions at the time of sample collection should be properly documented in the field log book. This should include a thorough description of the sample characteristics, including grain size, color, and general appearance, as well as date/time of sampling and labeling information. The location of

the sampling point should be described in words and three measurements should be taken to adjacent permanent structures so that the sample location can be readily identified in the field at a future date if necessary. It is often advisable to have a licensed land surveyor accurately survey the locations.

VOC Sampling

In general, most regions or states require soil sampled for VOCs (in the U.S.) to be preserved using US EPA method 5035 (verify with your region or state). This method consists of three preservation types (depending on site conditions one of these will be used): the Encore sampler, the vial/sodium bisulfate, and the vial/methanol. Each method is specific to site conditions and therefore the sampler and the laboratory needs to discuss the method best suited for the project.

During the sampling program, the sampling team leader should stay in contact with the GHD chemist assigned to the project such that the GHD chemist can properly inform the contract laboratory with the progress of the work. This includes submitting sample summaries and/or copies of completed chain-of-custody forms to the GHD chemist.

Finally, some GHD QAPPs require a designation of a QA/QC officer for field activities. The sampling team leader may be required to conduct certain field audit activities and at minimum, should be familiar with and responsible for completion of all QA/QC sample activities.

1.10 Backfilling

The excavation may only be backfilled after approval by the site engineer (GHD site representative or responsible contractor). Excavations should be backfilled with approved clean imported fill or native soils previously stockpiled which have been deemed suitable based on screening/testing protocols specified in the Work Plan. Backfilling of the excavation should proceed in lifts of no more than 12 inches, placing material in the opposite order of removal with each lift being compacted to the density specified. The GHD on-site representative should document the volume/weight of material brought on site for backfill as this information will likely be required for payment or other regulatory records.

Note:	*In deep excavations not meeting entry criteria, equipment used for compacting backfill material will have to be approved in advance. Particular attention to compacting standards must be paid in areas where future settlement could cause damage to surface structures/pavements.*

If immediate backfilling is specified and the potential exists for re-excavation in order to remove additional soils, the excavation should be lined with filter fabric or polyethylene sheeting prior to backfilling. This will allow re-excavation to proceed quickly to the limits of the original excavation.

SOPUS Backfill Specifications will be followed for this project.

1.11 Waste Removal

Waste Manifests

The transportation of contaminated materials to off-site disposal facilities requires documentation on appropriate federal and/or state/provincial manifests, as required. Manifest forms must be consistent with applicable federal and/or state/provincial regulations. Usually, the site contractor will prepare and provide GHD with copies of manifests and/or other records for each shipment of material from the site (or as otherwise required by the project specifications). The site contractor is responsible for maintaining manifests from the time the manifested material leaves the site to the time of ultimate disposal, unless other specified responsibilities have been established.

For the purpose of transportation and off-site disposal, the Client will be considered the generator of all materials disposed of and will sign all manifests prior to removal of contaminated materials from the site. In no case shall GHD on-site personnel sign manifest forms on behalf of the Client as a generator unless written authorization is given by the Client and a GHD Shareholder.

Waste Removal

The waste removal activity will be coordinated by the Project Manager such that all disposal facilities are designated and approved prior to commencing any field activities. The contractor is required to load waste into licensed hauling vehicles. The type of vehicle may vary according to the waste classification. Also, more than one disposal facility may be specified for various waste depending on the results of the waste compatibility and characterization results.

Depending upon site conditions, the contractor will be required to decontaminate the tires and axles of haulage vehicles upon leaving the site.

The GHD on-site representative is required to collect various documents from the contractor during the waste removal operation. These include:

- Manifests, as discussed in the previous section;
- Weigh scale receipts - copies of weigh scale receipts must be submitted to cra on approved forms and must be signed by the weigh scale operator or his designated agent and must include the following:
- Location, date and time of weighing,
- Measured weights,
- Vehicle and container identification,
- Shipment identification number, and
- Manifest number; and
- Certificates of disposal issued by the disposal facility for each shipment delivered to the disposal facility.

1.12 Follow-Up Activities

Once the excavation and site restoration activities have been substantially completed, the following tasks should be completed:

- All field data and field notes will be submitted to the Project Manager and project file;
- The location of the excavations, including the location of all confirmatory soil sample locations will be plotted on a site plan and submitted to the Project Manager;
- A summary write-up on field activities including such items as: number of excavations, field procedures, waste handling, and confirmation soil sampling procedures, and any problems encountered;
- A photographic log of site activities should be completed (pictures labeled in sequential order) and given to the Project Manager;
- Field book or field sheers should be kept at the appropriate GHD office;
- Obtain all post excavation submittals required of the subcontractor

Appendix B
SOPUS Backfill Specification

Downstream-One

Retail Network Engineering

Backfill Specification for Post Demolition Work at Retail Service Stations

Date: June 11, 2007

Version: 1.2

" The requirements and guidelines set by this document shall not be applicable and shall not be implemented where they do not meet minimum requirements of local laws and regulations. In all cases, the minimum requirements set by applicable local laws and regulations must be met when conducting activities associated with this document."

1 Introduction

1.1 Scope

This specification identifies backfill materials and backfilling procedures to be used for excavations resulting from the demolition and removal of buildings and equipment located on a retail site. This specification does not apply to design backfill for site construction projects where buildings, roads, and underground equipment is to be installed. In those cases, backfill requirements are to be engineered within the project construction design scope of work. This specification applies to but is not limited to the following works;

- Removal of Underground Storage Tanks and Pipe-work Systems.
- Removal of Electrical Vaults.
- Removal of basements and building foundations.
- Removal of sign pole and electrical pole foundations.
- Removal of oil water separators, oil pits, and storm basins.
- Site grading.

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2 Backfill Material Selection

2.1 Backfill Material Selection Criteria

- If the immediate or near future use of the area to be backfilled is required to provide structural support of buildings, foundations, footings, underground storage tanks systems and pipe-work, utilities (vaults, sewer lines), or drive areas, then the use of “structural fill” is required. Otherwise, non-structural backfill that meets the requirements stated in 2.4 below may be used.
- Meets local regulatory definition of clean backfill materials. At minimum backfill material must contains less than 100ppm TPH and less than 10ppm BETX.

2.2 Imported Structural Backfill Material Requirement*

- Structural Backfill Material shall be gravel, sand, clay, or silt, or a mixture of these constituents with Plasticity Index between 6 and 20 (expressed as percent water in soil) and liquid limit maximum of 40 (expressed as percent water in soil).
- Chemical stabilization is acceptable when approved by the Shell Engineer or Designated Shell Representative, if modification of liquid limit (LL) and plasticity index (PI) are necessary to obtain satisfactory compaction.

* Requirements established by PIP CVS02100 Rev May 2001.

- The moisture content of the material being compacted shall be within +/-3% of the optimum moisture content as determined by compaction curves generated by testing of the soil. The Contractor shall condition the moisture content of fill materials as necessary to achieve the required moisture content without additional cost to Shell.
- Material must be of uniform size, not frozen, and not contain any trash or debris.

2.3 Use of onsite excavation or native soils

- Onsite excavation soils may be used if the listed general requirements and requirements for the Structural Backfill Material can be met. Backfill materials selected must be certified that requirements in 2.2, are met by a qualified person using industry accepted analyses methods.

2.4 Use of Non-Structural Backfill Materials

- Must be comparable to surrounding native soils in cohesiveness, water density, and particulate size.

3 Backfilling Requirements

3.1 General

- Contractor shall adhere to applicable Shell Permit to Work System requirements.
- Backfilling procedures must be conducted in accordance with local regulatory requirements.
- All existing open excavations are to be appropriately barricaded and fenced.
- All areas shall be maintained using temporary erosion and sediment control measures in accordance with local industry practices and requirements.
- Demolition activities with excavations deeper than 1.5 meters (5 feet) shall be immediately backfilled unless local regulatory requirements prohibit immediate backfilling. In those cases, backfilling shall take place as soon as allowed. The excavation is to remain properly fenced and barricaded until backfilling is complete. Exceptions may be provided by the conditions of section 3.4. These exceptions however, must be reviewed and approved by the Local Engineering Team Lead or Manager.

3.2 Compaction

- Backfill material is to be compacted using no more than 200mm (8”) lifts.
- It is the responsibility of the contractor to select a compaction method that is a approved industry method compatible with the selected backfill material.
- Structural Fill that is non-granular shall achieve at least 90% compaction (using ASTM D1557 or equivalent compaction using alternative standard).
- Structural Fill that is granular material shall achieve at least 80% relative density (using ASTM D4253 or equivalent compaction using alternative standard).
- Non-structural Fill, not classified as sand, shall achieve at least 85% compaction (using ASTM D1557 or equivalent compaction using alternative standard).
- If sand is used for non-structural fill (in case surrounding soil is sand), shall achieve at least 70% relative density (using ASTM D4253 or equivalent compaction using alternative standard).
- Compaction by water jetting or flooding is not permitted.

3.3 Quality Control

- Compaction shall be measured/determined for each backfill lift.
- Compaction tools/equipment should be instrumented with compaction measuring devices that will determine the compaction achieved or maximum when maximum compaction has been obtained.
- The contractor shall obtain representative sampling of compaction measurements for each lift.
- A tabulation of compaction measurements are to be submitted with the project completion package to the Shell Engineer or Shell Representative at the conclusion of project.

3.4 Subsequent UST Installation by a Non-Shell Party

- In cases where underground storage tanks are to be installed by a Non-Shell Party subsequent to demolition of and removal of tanks by Shell and transfer of property title to a Non-Shell party, unless the Non-Shell Party is able to coordinate the simultaneous installation of the new UST System at no additional cost to Shell or delay in the removal of the existing UST System, Shell shall backfill the excavation with un-compacted fill

4 Reference Documents

4.1 Standards – for reference in absence of local industry standards for determination soil compaction of structural fill materials.

- ASTM D1557 - *Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 56,000 ft-lbf/ft3 (2700 kN-m/m3) – This standard may be referenced for determining optimum moisture density or proctor density for structural fill.*
- ASTM D698 - *Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-lbf/ft3 (600 kN-m/m3) This standard may be referenced for determining optimum moisture density or proctor density for structural fill.*
- ASTM D4253 - *Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table*
- PIP (Process Industry Practices - Civil) CVS 02100 Rev. May 2001 - *Site Preparation, Excavation, and Backfill Specification.*

5 Acronyms

- TPH – Concentration of *Total Petroleum Hydrocarbon*
- BETX – *Concentrations of Benzene, Ethylbenzene, Toluene, and Xylenes.*
- ASTM – *American Society of Testing Materials*

6 Definitions

For the purpose of this specification, the following definitions are provided;

- Shell Engineer – A Facility Engineer or Special Projects Engineer employed by Shell.
- Designated Shell Representative – A Engineering Consultant or Project Management Contract Firm working under contract by Shell.
- Structural Fill - Fill or backfill placed beneath or immediately surrounding footings, grade beams, or mats, or beneath slabs, buildings, roads, paved areas, and parking areas.
- Plasticity Index (PI) - a numerical measure of the plasticity of a soil which corresponds to the range of moisture contents, expressed as percent water by dry weight of soil, within which the soil has plastic properties. Soils with a high PI tend to be predominantly clay, those with a lower PI tend to be predominantly silt, and those with a PI of 0 tend to have little or no silt or clay (Definition from Wikipedia Encyclopedia).

- Liquid Limit (LL) - known as the upper plastic limit, is the percent water content at which a soil changes from the liquid to a plastic. (Definition from Wikipedia Encyclopedia).
- Optimum Moisture Content – Percent water content in soil in which the soil can be compacted to the maximum dry unit weight. This value is obtained from a generated compaction curve where compaction tests are conducted for soil samples with varying moisture contents.
- Non-Structural fill Material – Fill or Backfill materials which do not meet the requirements set out in 2.2 for Structural Fill or there is no documentation that demonstrates the fill material meets the requirements for structural fill material.
- Compaction – The measured density of the soil relative to the Modified Proctor Density expressed as a percentage.
- Modified Proctor Density – *The maximum dry density of a soil.*

7 Document Properties

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Revision No	Revision Date	Author(s)	Comments/Major Changes
0.1	31/8/06	Brett Hovland	First Draft
1.0	12/12/06	Brett Hovland	Final Issue based upon Network Engineering and Environmental Comments
1.1	11/06/07	Brett Hovland	Clarification of Definitions (WCF comments), JRB Comments.
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Summary of Changes since last revision

Section / Topic	Short Description of the Change
Section 3	Clarification of conditions and requirements for allowing excavation to remain open.

Distribution list / recipients of document

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about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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