

CLEANUP OPTIONS REPORT

RAPLEE PROPERTY
STANWOOD, WASHINGTON

REMEDIAL ACTION GRANT AGREEMENT
NO. TCPRA-2018-STANWO-00027



MAUL
FOSTER
ALONGI

Prepared for

CITY OF STANWOOD

STANWOOD, WASHINGTON

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Project No. 1030.01.04

Prepared by

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*The material and data in this report were prepared
under the supervision and direction of the undersigned.*

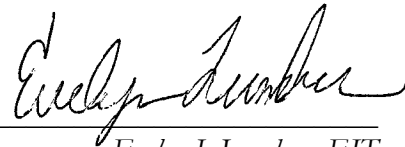
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ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
the City	City of Stanwood
COC	contaminant of concern
CUL	cleanup level
DRO	diesel-range organics
Ecology	Department of Ecology (Washington)
FEI	Focused Environmental Investigation
free product	Non-aqueous phase liquid
GPR	ground-penetrating radar
GRO	gasoline-range organics
MFA	Maul Foster & Alongi, Inc.
MTCA	Model Toxics Control Act
ORC	Oxygen Release Compound
ORO	heavy-oil-range organics
Pinnacle	Pinnacle GeoSciences, Inc.
PLIA	Pollution Liability Insurance Agency
QA/QC	quality assurance and quality control
SAIC	Science Applications International Corporation
SEPA	The Washington State Environmental Policy Act
the City	City of Stanwood
the Property	the Raplee property located at 9816 271st Street NW, Stanwood, WA
UST	underground storage tank
WAC	Washington Administrative Code

1 INTRODUCTION

Maul Foster & Alongi, Inc. (MFA) has prepared this cleanup options report for the City of Stanwood (the City) for the Raplee property located at 9816 271st Street NW in Stanwood, Washington (the Property) (Figure 1-1). This report identifies and evaluates potential cleanup options based on site-specific conditions, technical feasibility and cost, and regulatory requirements. The Property is owned by Ms. Kathleen Raplee and is currently vacant. Historically, the Property was used for retail automotive fuel operations, including a filling and service station.

1.1 Regulatory Framework

This report has been prepared in accordance with remedial action grant agreement No. TCPRA-2018-Stanwo-00027, dated July 6, 2018, between the Washington State Department of Ecology (Ecology) and the City. The agreement provides funding under Ecology's Integrated Planning Grant program.

This report is based on information provided in the Focused Environmental Investigation (FEI) report and previous historical environmental investigations (MFA, 2019).

1.2 Purpose and Objectives

The purpose of this report is to identify and evaluate potential cleanup options. The specific objectives are as follows:

- Summarize information from the FEI and identify data gaps.
- Identify feasible cleanup technologies to address contamination at the Property.
- Assemble feasible cleanup technologies into a range of potential cleanup options.
- Conduct a preliminary evaluation of the cleanup options against regulatory criteria.
- Identify the cleanup option most likely to be selected for implementation.

2 BACKGROUND

This section describes the physical location and characteristics of the Property, including the geology and hydrogeology, and summarizes the site history.

2.1 Property Description

The Property is located in the southeast quarter of section 24, township 32 north, and range 3 east of the Willamette Meridian (Figure 1-1). The approximately 0.21-acre Property is relatively level, sloping

slightly to the northwest. Access to the Property is from 271st Street NW or 270th Street NW, adjacent north and east of the Property, respectively.

The physical address of the Property is 9816 271st Street NW in Stanwood, Washington. The Property is bordered by 271st Street NW, residences, and law offices to the north; the intersection of 271st Street NW and 270th Street NW to the east; an alleyway and restaurant parking lot to the south; and the Stanwood Fannie Mae Duplex to the west. A hardware and lumber store, J E Hamilton & Sons, is adjacent to and southeast of the Property. The Stillaguamish River runs approximately 0.2 mile southwest of the Property. The Property is zoned as Mainstreet Business but is currently vacant.

The Property, surrounded by a chain-link fence, contains grassy areas and partially intact asphalt and concrete surfaces covered by perennial brush, along with asphalt and concrete rubble and debris from a prior building demolition.

2.2 Property History

According to previous environmental reports, the first recorded sale of the Property was in 1924, when the Lien family sold the Property to J. Norin Hafstad (Science Applications International Corporation [SAIC], 2006). In 1939, Mr. Hafstad sold the Property to Mr. Ed Peterson and his wife. In 1958, Standard Oil obtained a lease on the Property. The Property was the location of a Standard Oil (now Chevron Corporation) service station from approximately 1958 to when the lease expired in 1970. From 1970 to 1998, the Property's ownership passed through many parties. In 1984, the portion of the Property with the south-bounding alleyway was sold to the City. In 1998, Kathleen Raplee purchased the Property (SAIC, 2006).

Based on SAIC's review of a 1941 Sanborn map, the Property had been developed into a filling station by that time, with at least two underground storage tanks (USTs) in the northeast portion of the Property, a greasing facility in the eastern portion of the station structure, and a store in the western section. Therefore, the Property had been developed as a filling station prior to the Standard Oil lease in 1958 (SAIC, 2006).

2.3 Regulatory History

A petroleum hydrocarbon release from an UST at the property was reported to Ecology on January 10, 2005. Pertinent information from Ecology's database is as follows:

- Facility Site ID: 2132059
- Cleanup Site ID: 5275
- UST ID: 619125
- Alternate Names
- Standard 305192
- Standard Oil Station 30-5192 (former)
- Site Status: Cleanup Started

The Chevron Environmental Management Company was party to a Voluntary Cleanup Program agreement with Ecology from June 7, 2006 through July 9, 2012.

On October 31, 2019, Ecology requested that the Chevron Environmental Management Company address contamination at the Property through their multi-site agreement with the Pollution Liability Insurance Agency (PLIA).

2.4 Previous Environmental Investigations

In 2005, Glacier Environmental Services, Inc., decommissioned and removed three USTs in the south-central portion of the Property (see Figure 2-1). During the decommissioning process, Pinnacle GeoSciences, Inc. (Pinnacle) collected soil samples from the sidewalls and the bottom of the excavation area, as well as from below former product piping, dispenser islands, and stockpiles. Analytical results from the excavation soil samples identified concentrations of gasoline-range organics (GRO); heavy-oil-range organics (ORO); and benzene, toluene, ethylbenzene, and total xylenes (BTEX) above their respective Model Toxics Control Act (MTCA) Method A cleanup levels (CULs). In addition to these excavation exceedances, concentrations of lead and diesel-range organics (DRO) were identified in stockpile samples above their respective MTCA Method A CULs (Pinnacle, 2005).

In 2006, SAIC performed a site assessment of the Property and identified soil and groundwater impacted by GRO, DRO, ORO, and BTEX near the former UST area (SAIC, 2006). A summary of soil analytical results associated with this investigation is included in Table 2-1. Previous soil borings are shown on Figure 2-2. During this assessment, Apollo Geophysics conducted a ground-penetrating radar (GPR) survey of the Property to identify any anomalies in the subsurface (e.g., USTs). Based on Figure 2 of the 2005 Pinnacle report, the GPR survey showed anomalies indicative of in-place USTs in two areas on and adjacent to the Property (see Figure 2-1). The first GPR anomaly was identified as two USTs to the south of the Property in the right-of-way, directly under a steel 4-inch-diameter, high-pressure natural gas line. The exact depth and location of this line is currently unknown. The presence of these USTs was confirmed with an air-knife excavation. SAIC observed that the USTs contained liquid petroleum mixed with water (SAIC, 2006). The second GPR anomaly was identified as one UST in the west-central portion of the Property, as confirmed by SAIC while excavating soil from the area (SAIC, 2006). None of the USTs identified in the 2006 investigation were decommissioned.

From April 2006 to July 2014, Gettler-Ryan Inc., on behalf of Leidos Engineering, LLC (Leidos; formerly SAIC), monitored the groundwater at four wells located on the Property (see Figure 2-1) (Leidos, 2014). The groundwater samples were analyzed for GRO, DRO, ORO, and BTEX. According to the most recent available groundwater monitoring report, only one of the four monitoring wells, MW-04, had concentrations of DRO and ORO above their respective MTCA Method A CULs. Additionally, MW-04 had measurable non-aqueous phase liquid (free product) during sampling events between January 2012 and July 2014, but samples from this well were not collected during those events (Leidos, 2014). A summary of groundwater analytical results for the Property is included in Table 2-2.

In February of 2019, MFA conducted focused onsite reconnaissance, well redevelopment, and groundwater sample collection from existing monitoring wells (MFA, 2019). The sampling showed

free product was present in MW-04 and likely contains concentrations of GRO, DRO, and/or ORO above MTCA Method A CULs. Monitoring well MW-02 contains concentrations of DRO and ORO above the MTCA Method A CUL, and no exceedances were observed in the downgradient well MW-01 and crossgradient well MW-03 (see Table 2-2).

2.5 Geology and Hydrogeology

The Property is located in the Snohomish River valley. According to the Geologic Map of the Stanwood Quadrangle, the Property vicinity is located on Quaternary younger alluvial and estuarine deposits (Minard, 1985). SAIC reported the presence of fill in the upper 4 feet of the borings, consisting of brown medium sand and sandy silt with fine gravel with trace rounded cobbles (SAIC, 2006). It is likely that during initial development of the Property, fill was placed to raise the grade above flood levels. During the 2006 well installation, SAIC encountered subsurface soils consisting primarily of gray silt or a silt/clay mixture from 4 to 14 feet below ground surface (bgs) (SAIC, 2006). When assessing petroleum impacts in the soils, contamination was found to be confined by a gray clay contact layer at 14 feet bgs. Because of the low hydraulic conductivity of the soil, the monitoring wells on the Property had been observed to have poor groundwater recharge and were initially pumped dry during purging (SAIC, 2006). During the February 2019 fieldwork, slow recharge was observed in the sampled monitoring wells.

Groundwater was encountered at depths ranging from 0.8 to 2.33 feet bgs (see Table 2-3). According to previous environmental investigations, shallow groundwater at the Property likely is associated with a shallow, unconfined aquifer. The groundwater at the Property flows northwest, consistent with topography as well as with previous investigation observations (see Figure 2-3) (SAIC, 2006). The groundwater gradient is relatively flat, with less than 2 feet of groundwater elevation difference across the Property. A groundwater gradient of approximately 0.026 ft/ft was calculated during the February 2019 monitoring event, consistent with previous investigation observations (see Figure 2-3) (MFA, 2019 and SAIC, 2006).

3 CONCEPTUAL SITE MODEL AND CLEANUP LEVELS

In the FEI report, a conceptual site model for the Property was prepared, in which information regarding existing and reasonably likely future land uses was summarized and used to develop a model describing potential human and ecological exposures (MFA, 2019).

3.1 Sources

Based on documented historical uses described by SAIC, historical soil and groundwater data, and groundwater data obtained from the FEI, it appears that the following historical operations/uses at the Property and/or at adjoining properties have contributed to contamination at the Property:

- Former leaking USTs on the Property

- Abandoned-in-place USTs on and adjacent to the Property
- Former filling station operations on the Property

3.2 Exposure Pathways and Potential Receptors

The following are potential exposure pathways:

- Incidental ingestion of soil or groundwater.
- Incidental contact with soil or groundwater.
- Inhalation of air vapors emanating from soil or groundwater.
- Ingestion, contact, and inhalation via use of groundwater as drinking water; currently the Property is connected to municipal drinking water and groundwater is unlikely to be used as a source of drinking water.

The Property is currently vacant and fenced but is zoned for Mainstreet business (i.e., commercial). Future use of the site may include commercial businesses or a public park. The following human receptors could be exposed to chemicals originating from the Property:

- Visitors
- Occupational workers
- Construction workers

3.3 Contaminants of Concern

The contaminants of concern (COCs) for the Property include GRO, DRO, ORO, and BTEX, and their associated concentrations in soil and groundwater, and vapor. MTCA Method A CULs for these COCs are provided in Tables 2-1 and 2-2. In addition, free product that may be highly mobile and not reliably contained is present.

3.4 Data Gaps

Based on previous investigations conducted at the Property, significant data gaps remain:

- The full lateral and vertical extent of impacts to soil (including potential vapor intrusion) is unknown.
- The lateral extent of free product observed floating on groundwater in monitoring well MW-04 is unknown.
- The lateral and vertical extent of groundwater impacts to the west and south of the Property is unknown.
- The existing abandoned UST(s) may be an on-going source of contamination.

4 POTENTIAL CLEANUP OPTIONS

While there are significant data gaps that need to be filled, a sense of what the cleanup might entail can be determined. This section identifies feasible cleanup technologies and assembles those technologies into potential options for addressing contamination in defined cleanup action areas.

4.1 Cleanup Action Areas

Proposed cleanup action areas consist of two areas along the southern parcel boundary of the Property. These areas, shown in Figure 4-1, were delineated based on historical soil boring and monitoring well data. The Southwest Cleanup Action Area includes an approximately 800 square foot area near MW-04 where free product was identified and an existing UST. The Southeast Cleanup Action Area includes an approximately 800 square foot area where soil contamination was identified and two existing off-property USTs.

4.2 Cleanup Technologies

Cleanup technologies considered for addressing contaminants include the following:

- Free product recovery
- Permeable reactive barriers
- Pump and treat system
- In-situ chemical oxidation
- Bioremediation via backfilling excavations
- Excavation and offsite disposal

Due to environmental, and hydrogeological conditions on the Property, pump and treat systems and permeable reactive barriers were not considered to be feasible and were not investigated further. The poor groundwater recharge observed during previous monitoring events and the tight lithology logged during previous environmental investigations limit the ability of a pump and treat system to effectively operate and remove impacted groundwater. Similarly, slow groundwater flow prevents a permeable barrier wall from reducing concentrations on the Property within a reasonable timeframe.

4.3 Potential Cleanup Options

Cleanup technologies were assembled into a range of cleanup options. The objectives of the cleanup options include:

- Remove sources of COCs from the Property

- Remove free product from the Property
- Prevent contaminant migration
- Reduce levels of COCs below the CULs in soil and groundwater or eliminate the exposure pathways

All options assume that:

- Supplemental environmental investigation work is required to delineate the extent of soil and groundwater impacts. The cost of this additional work is included in the cost estimate for each cleanup option.
- Contaminated soil, free product, and groundwater impacts do not extend off-property. If contamination is present off-property, costs will be higher.
- Cleanup of soil, free product, and groundwater eliminates the risk of vapor inhalation. This needs confirmation through the supplemental environmental investigation work.

Potential cleanup options are described below with estimated probable costs. Actual cleanup options and costs may be different based on the results of the supplemental environmental investigation work. A no action cleanup option was determined not to meet the minimum threshold requirements listed in Section 5.1 and was not considered.

4.3.1 Option 1—Excavation to Below the Smear Zone and Backfill with Bioremediation Compound

Option 1 addresses the probable source of groundwater contamination at MW-04 by removing the existing UST and soil with free product impacts (elevated COCs and/or free-product) from the Southwest Cleanup Action Area. In the Southeast Cleanup Action Area impacted soil is removed and adjacent existing USTs are decommissioned. At both cleanup action areas, impacted soil is excavated to approximately 2 feet below the smear zone. Any remaining soil impacts in the smear zone soil are addressed by the placement of an oxygen releasing compound (ORC) into the excavation base prior to backfilling.

Option 1 includes the following actions:

Supplemental environmental investigation—Conduct additional characterization to delineate the extent of soil and groundwater impacts. A targeted excavation extent confirmed by field samples may be developed without additional characterization.

Excavation and offsite disposal—Excavate extent of free product impacts in the Southwest Cleanup Action Area assumed to be approximately 150 cubic yards of material with a maximum depth of 5 feet. Excavate approximately 170 cubic yards of contaminated soil down to a maximum depth of 5.5 feet in the Southeast Cleanup Action Area. All excavated soil will be disposed of offsite at an

appropriate landfill. Dewatering will be required during excavation work. Dewatered liquids will be treated and discharged to the municipal sanitary sewer.

ORC—Apply solid phase ORC mixed with imported clean fill in the base of the excavation for long-term treatment of any remaining soil or migrating pollutants. Amount of ORC applied is dependent on concentration of contaminants in soil and groundwater as determined by the supplemental investigation. ORC should be preferentially applied to areas upgradient of deeper groundwater impacts and mixing into deeper soils should be considered where possible.

UST Decommissioning—Decommission two off-property USTs in the Southeast Cleanup Action Area that are located below a natural gas line. Remove any remaining product and dispose offsite at a licensed facility. Fill USTs with a controlled density, inert slurry material to decommission in-place.

UST Removal—Excavate and remove UST located in the Southwest Cleanup Action Area.

Institutional Controls—Record an environmental covenant to prevent future use of shallow groundwater until such a time that monitoring indicates no impacts remain.

Monitoring—Monitor groundwater on a quarterly (i.e., four times a year) basis for 5 years or until impacts are no longer observed.

Cost—The estimated probable cost for Option 1 is \$430,300 (-30/+50%). Details are presented in Table 4-1.

4.3.2 Option 2— Excavation above Water Table and In-situ Chemical Oxidation

Option 2 relies on a shallower excavation depth and in-situ injection of an oxidizing compound to address impacted soil and groundwater. Option 2 consists of the same elements as Option 1 (including free product removal) with the following changes:

Excavation and offsite disposal—Excavation in the Southeast and Southwest Cleanup Action Areas will only extend to a depth of 3 feet to remove contamination above the groundwater table for an estimated 180 cubic yards of soil removal. Dewatering within the excavation should not be required. Backfill excavation with clean material.

Oxidant Injections—Inject oxidant into subsurface soil to a depth of 14 feet. The number of injection points and amount of oxidant will depend on the results of the supplemental environmental investigation. For the purposes of this evaluation it is assumed that 4 injection events will occur over the course of 12 months.

Monitoring—Monitor groundwater on a quarterly (i.e., four times a year) basis for 2 years or until impacts are no longer observed.

Cost—The estimated probable cost for Option 2 is \$584,340 (-30/+50%). Details are presented in Table 4-2.

4.3.3 Option 3—Complete Excavation

Option 3 relies on excavation to remove all contaminated media on the Property. Option 3 consists of the same elements as Option 1 with the following changes:

Excavation and offsite disposal—Excavation to extent of soil impacts (i.e., approximately 14 feet) in the Southeast Cleanup Action Area. Excavate to extent of free product and soil impacts in Southwest Cleanup Action Area, for cost estimating purposes, this depth is assumed to be 4 feet bgs. The total amount of soil removed for Option 4 is assumed to be 530 cubic yards. Dewatering and shoring are required for the deeper excavation.

Institutional Controls—An environmental covenant to prevent future use of shallow groundwater is not required.

Monitoring—Monitor groundwater semi-annually for two years post remedy to confirm success of remedy.

Cost—The estimated probable cost for Option 3 is \$422,050 (-30/+50%). Details are presented in Table 4-3.

5 PRELIMINARY EVALUATION OF CLEANUP OPTIONS

5.1 Model Toxics Control Act Threshold Requirements

Criteria typically used to evaluate cleanup alternatives are defined in the MTCA regulation (Washington Administrative Code [WAC] 173-340-360). These criteria are as follows:

- Threshold requirements:
 - i. Protect human health and the environment
 - ii. Comply with cleanup standards (WAC 173-340-700 through 173-340-760)
 - iii. Comply with applicable state and federal laws (WAC 173-340-710)
 - iv. Provide for compliance monitoring (WAC 173-340-410 and 173-340-720 through 173-340-760)
- Other requirements:
 - i. Use permanent solutions to the maximum extent practicable
 - ii. Provide for a reasonable restoration timeframe
 - iii. Consider public concerns (WAC 173-340-600)

Regarding the threshold requirements, all options protect human health and the environment, and are expected to comply with the preliminary CULs presented in Tables 2-1 and 2-2. All options include compliance monitoring.

The option selected for implementation would be designed to comply with applicable state and federal laws.

Regarding other requirements, a determination whether a cleanup option uses permanent solutions to the maximum extent practicable involves a regulatory defined evaluation procedure. This procedure is only used when a liable person does not agree to implement the permanent cleanup option identified by Ecology. Option 3 is the most permanent cleanup option.

In terms of restoration time frames, each option has the following estimated timeframes to meet the preliminary CULs presented in Tables 2-1 and 2-2: Option 1, 5 years; Option 2, 2 years; Option 3, 2 years.

Finally, public concerns are collected and addressed during the regulatory cleanup process through opportunities to review and comment on cleanup documents.

6 CONCLUSIONS

Significant data gaps remain. Filling these gaps would provide more certainty regarding the scope and cost of cleanup, including the need to consider vapor mitigation systems (venting systems or vapor barriers) during planning for future development.

Option 3 would likely be selected for implementation based on the information in this report. It is the most permanent cleanup option and the least expensive.

Chevron Environmental Management Company is considering adding the Property to their multi-site agreement with the PLIA.

LIMITATIONS

The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

REFERENCES

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TABLES



Table 2-1
Summary of Soil Analytical Results
Raplee Property
City of Stanwood
Stanwood, Washington

Location	Sample Name	Sample Depth (feet bgs):	Collection Date:	GRO	DRO	ORO	Total Heavy Oils ^a	Benzene	Ethylbenzene	Toluene	Total Xylenes	Total Lead
MTCNA Method A Cleanup Level (mg/kg):				30	2000	2000	2000	0.03	6	7	9	250
SB-2	SB-2-3	3	2/7/2006	340	1200	8700	9900	0.3	0.1	< 0.08	2.1	--
	SB-2-14	14	2/7/2006	48	140	970	1110	0.2	0.01	< 0.02	0.2	6.85
	SB-2-18	18	2/7/2006	< 1.1	< 3.0	< 10	ND	< 0.006	< 0.006	< 0.006	< 0.02	--
SB-3	SB-3-6	6	2/7/2006	< 1.1	15	150	165	< 0.005	< 0.005	< 0.005	< 0.2	6.03
	SB-3-15	15	2/7/2006	< 0.9	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.01	--
SB-5	SB-5-18	18	2/7/2006	< 1.0	< 3.0	< 10.0	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
SB-6	SB-6-6	6	2/7/2006	< 1.2	< 3.0	< 10	ND	< 0.006	< 0.006	< 0.006	< 0.02	--
	SB-6-14	14	2/7/2006	< 1.0	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
SB-8	SB-8-6	6	2/7/2006	< 0.9	< 3.0	17	18.5	< 0.005	< 0.005	< 0.005	< 0.01	--
SB-10	SB-10-6	6	2/7/2006	< 1.6	< 3.0	< 10	ND	< 0.008	< 0.008	< 0.008	< 0.02	--
	SB-10-16	16	2/7/2006	< 0.9	< 3.0	< 10	ND	< 0.004	< 0.004	< 0.004	< 0.01	--
SB-11	SB-11-4	4	2/7/2006	2000	68	230	298	23	44	25	240	--
	SB-11-6	6	2/7/2006	65	7.2	37	44.2	3.6	0.9	0.5	9.7	4.4
	SB-11-14	14	2/7/2006	18	< 3.0	13	14.5	5.6	0.4	0.2	2	--
	SB-11-19	19	2/7/2006	< 1.0	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
SB-12	SB-12-17	17	2/7/2006	< 0.9	< 3.0	11	12.5	< 0.005	< 0.005	< 0.005	< 0.01	--
SB-13	SB-13-10	10	2/7/2006	5.1	27	190	217	0.007	< 0.004	< 0.004	0.03	--
	SB-13-20	20	2/7/2006	< 0.9	< 3.0	< 10	ND	< 0.004	< 0.004	< 0.004	< 0.01	--
SB-14	SB-14-4	4	2/7/2006	19	25	73	98	0.02	0.003	0.012	0.006	35.4
	SB-14-17	17	2/7/2006	< 0.9	< 3.0	11	12.5	< 0.005	< 0.005	< 0.005	< 0.01	--
SB-15	SB-15-14	14	2/7/2006	< 1.4	< 3.0	< 10	ND	< 0.007	< 0.007	< 0.007	< 0.02	--

**Table 2-1
Summary of Soil Analytical Results
Raplee Property
City of Stanwood
Stanwood, Washington**

Location	Sample Name	Sample Depth (feet bgs):	Collection Date:	GRO	DRO	ORO	Total Heavy Oils ^a	Benzene	Ethylbenzene	Toluene	Total Xylenes	Total Lead
MTCA Method A Cleanup Level (mg/kg):				30	2000	2000	2000	0.03	6	7	9	250
SB-16	SB-16-4	4	2/7/2006	< 1.3	< 3.0	< 10	ND	< 0.006	< 0.006	< 0.006	< 0.02	--
	SB-16-14	14	2/7/2006	< 1.0	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
SB-18	SB-18-4	4	2/7/2006	1.5	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
	SB-18-14	14	2/7/2006	< 1.0	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
SB-19	SB-19-4	4	2/7/2006	< 1.1	--	--	--	< 0.006	< 0.006	< 0.006	< 0.02	--
	SB-19-12	12	2/7/2006	< 1.0	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
SB-20	SB-20-6	6	2/7/2006	< 1.0	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
	SB-20-14	14	2/7/2006	< 1.1	< 3.0	< 10	ND	< 0.006	< 0.006	< 0.006	< 0.02	--
SB-21	SB-21-6	6	2/7/2006	< 1.1	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
SB-22	SB-22-14	14	2/7/2006	< 1.0	< 3.0	< 10	ND	< 0.005	< 0.005	< 0.005	< 0.02	--
SB-23	SB-23-5	5	4/5/2006	45	40	170	210	1.6	0.39	< 0.052	3.2	--

NOTES:

Detections are in **bold** font.

Detections above MTCA Method A cleanup levels are shaded.

Results were obtained from the 2006 site assessment by SAIC (SAIC, 2006).

-- = not analyzed.

< = concentration is less than reported value.

DRO = diesel-range hydrocarbons.

GRO = gasoline-range hydrocarbons.

MTCA = Model Toxics Control Act.

ND = not detected.

ORO = motor-oil-range hydrocarbons.

Total xylenes = sum of m,p-xylene and o-xylene.

U = analyte not detected.

ug/L = micrograms per liter (parts per billion).

^aTotal concentrations were calculated using one-half the method reporting limit for non-detects. Where all components were non-detect, the calculated total is "ND."

Table 2-2
Summary of Groundwater Analytical Results
Raplee Property
City of Stanwood
Stanwood, Washington

Location	Collection Date:	GRO	DRO	ORO	Total Heavy Oils ^a	Benzene	Ethylbenzene	Toluene	Total Xylenes
MTC Method A Cleanup Level (ug/L):		800	500	500	500	5	700	1,000	1,000
Screening Levels for Groundwater Protective of Vapor Intrusion (ug/L):		--	--	--	--	2.4	2,800	15,000	333
MW-01	05/03/2006	< 240	310	120	430	< 2.5	4.7	< 2.5	11
	08/02/2006	< 48	260	330	590	< 0.5	< 0.5	< 0.5	< 1.5
	10/10/2006	< 48	150	< 100	200	< 0.5	< 0.5	< 0.5	< 1.5
	01/15/2007	< 240	< 160	< 200	ND	< 2.5	< 2.5	< 2.5	< 7.5
	04/25/2007	< 50	190	130	320	< 0.5	< 0.5	< 0.5	< 1.5
	07/15/2007	< 500	< 81	< 100	ND	< 5.0	< 5.0	< 5.0	< 15
	10/03/2007	< 250	130	< 100	50	< 2.5	< 2.5	< 2.5	< 7.5
	01/03/2008	< 50	130	< 100	50	< 0.5	< 0.5	< 0.5	< 1.5
	02/28/2009	< 50	610	610	1220	< 0.5	< 0.5	< 0.5	< 1.5
	07/22/2009	< 50	650	720	1370	< 0.5	< 0.5	< 0.5	< 1.5
	01/08/2010	< 50	350	160	510	< 0.5	< 0.5	< 0.5	< 1.5
	07/20/2010	< 50	130	100	230	< 0.5	< 0.5	< 0.5	< 1.5
	01/21/2011	< 50	< 160	650	730	< 0.5	< 0.5	< 0.5	< 1.5
	08/05/2011	< 50	190	130	320	< 0.5	< 0.5	< 0.5	< 1.5
	01/27/2012	< 50	< 30	< 69	ND	< 0.5	< 0.5	< 0.5	< 1.5
	07/02/2012	< 50	< 29	< 68	ND	< 0.5	< 0.5	< 0.5	< 1.5
	01/11/2013	< 50	< 29	< 67	ND	< 0.5	< 0.5	< 0.5	< 1.5
	07/12/2013	< 50	< 29	< 68	ND	< 0.5	< 0.5	< 0.5	< 1.5
	01/10/2014	< 50	< 29	< 67	ND	< 0.5	< 0.5	< 0.5	< 1.5
	07/16/2014	< 50	< 29	< 67	ND	< 0.5	< 0.5	< 0.5	< 1.5
02/22/2019	100 U	180	300 U	330	1 U	1 U	1 U	3 U	
	100 U	200	300 U	350	1 U	1 U	1 U	3 U	

Table 2-2
Summary of Groundwater Analytical Results
Raplee Property
City of Stanwood
Stanwood, Washington

Location	Collection Date:	GRO	DRO	ORO	Total Heavy Oils ^a	Benzene	Ethylbenzene	Toluene	Total Xylenes
MTC A Method A Cleanup Level (ug/L):		800	500	500	500	5	700	1,000	1,000
Screening Levels for Groundwater Protective of Vapor Intrusion (ug/L):		--	--	--	--	2.4	2,800	15,000	333
MW-02	05/03/2006	< 240	1400	560	1960	13	< 2.5	< 2.5	< 7.5
	08/02/2006	220	2000	1800	3800	20	< 0.5	< 0.5	1.6
	10/10/2006	< 240	1400	790	2190	16	< 2.5	< 2.5	< 7.5
	01/15/2007	< 240	810	270	1080	9.3	< 2.5	< 2.5	< 7.5
	04/25/2007	250	830	480	1310	13	< 0.5	< 0.5	< 1.5
	07/15/2007	< 500	7800	< 1000	8300	13	< 5.0	< 5.0	< 15
	10/03/2007	< 250	1600	1100	2700	4.9	< 2.5	< 2.5	< 7.5
	01/03/2008	460	1400	800	2200	6.7	< 0.5	1.0	< 1.5
	02/28/2009	450	2700	2800	5500	2.5	< 0.5	0.6	< 1.5
	07/22/2009	360	2500	4000	6500	1.1	< 0.5	0.8	1.5
	01/08/2010	470	1800	1400	3200	< 0.5	0.7	0.5	< 1.5
	07/20/2010	420	2000	1600	3600	< 0.5	< 0.5	0.8	< 1.5
	01/21/2011	390	2000	1900	3900	< 0.5	0.6	< 0.5	< 1.5
	08/05/2011	< 250	830	880	1710	< 2.5	< 2.5	< 2.5	< 7.5
	01/27/2012	56	< 29	< 68	ND	< 0.5	< 0.5	< 0.5	< 1.5
	07/02/2012	< 250	31	110	141	< 2.5	< 2.5	< 2.5	< 7.5
	01/11/2013	130	32	160	192	< 0.5	0.6	< 0.5	< 1.5
	07/12/2013	< 50	< 29	< 68	ND	< 0.5	< 0.5	< 0.5	< 1.5
01/10/2014	< 50	< 29	< 67	ND	< 0.5	< 0.5	< 0.5	< 1.5	
07/16/2014	< 50	< 30	< 69	ND	< 2.0	< 0.5	< 0.5	< 1.5	
02/22/2019	190	1900	1900	3800	1 U	1 U	1 U	3.4	

Table 2-2
Summary of Groundwater Analytical Results
Raplee Property
City of Stanwood
Stanwood, Washington

Location	Collection Date:	GRO	DRO	ORO	Total Heavy Oils ^a	Benzene	Ethylbenzene	Toluene	Total Xylenes
MTC A Method A Cleanup Level (ug/L):		800	500	500	500	5	700	1,000	1,000
Screening Levels for Groundwater Protective of Vapor Intrusion (ug/L):		--	--	--	--	2.4	2,800	15,000	333
MW-03	05/03/2006	< 240	580	240	820	< 2.5	< 2.5	< 2.5	< 7.5
	08/02/2006	< 48	350	380	730	< 0.5	< 0.5	< 0.5	< 1.5
	10/10/2006	< 48	310	140	450	< 0.5	< 0.5	< 0.5	< 1.5
	01/15/2007	< 240	250	< 100	300	< 2.5	< 2.5	< 2.5	< 7.5
	04/25/2007	< 50	260	110	370	< 0.5	< 0.5	< 0.5	< 1.5
	07/15/2007	< 500	250	150	400	< 5.0	< 5.0	< 5.0	< 15
	10/03/2007	< 250	330	260	590	< 2.5	< 2.5	< 2.5	< 7.5
	01/03/2008	< 50	280	210	490	< 0.5	< 0.5	< 0.5	< 1.5
	02/28/2009	< 50	290	190	480	< 0.5	< 0.5	< 0.5	1.6
	07/22/2009	< 50	780	830	1610	< 0.5	< 0.5	< 0.5	< 1.5
	01/08/2010	< 50	680	360	1040	< 0.5	< 0.5	< 0.5	< 1.5
	07/20/2010	< 50	330	190	520	< 0.5	< 0.5	< 0.5	< 1.5
	01/21/2011	< 50	< 160	630	710	< 0.5	< 1.5	< 0.5	< 1.5
	08/05/2011	< 50	230	210	440	< 0.5	< 0.5	< 0.5	< 1.5
	01/27/2012	< 50	< 30	< 70	ND	< 0.5	< 0.5	< 0.5	< 1.5
	07/02/2012	< 50	< 29	< 67	ND	< 0.5	< 0.5	< 0.5	< 1.5
	01/11/2013	< 50	< 28	< 66	ND	< 0.5	< 0.5	< 0.5	< 1.5
	07/12/2013	< 50	< 29	< 68	ND	< 0.5	< 0.5	< 0.5	< 1.5
01/10/2014	< 50	< 29	< 68	ND	< 0.5	< 0.5	< 0.5	< 1.5	
07/16/2014	< 50	< 29	< 68	ND	< 2.0	< 0.5	< 0.5	< 1.5	
02/22/2019		100 U	94	300 U	244	1 U	1 U	1 U	3 U

Table 2-2
Summary of Groundwater Analytical Results
Raplee Property
City of Stanwood
Stanwood, Washington

Location	Collection Date:	GRO	DRO	ORO	Total Heavy Oils ^a	Benzene	Ethylbenzene	Toluene	Total Xylenes	
MTC A Method A Cleanup Level (ug/L):		800	500	500	500	5	700	1,000	1,000	
Screening Levels for Groundwater Protective of Vapor Intrusion (ug/L):		--	--	--	--	2.4	2,800	15,000	333	
MW-04	05/03/2006	< 240	7900	< 1000	8400	< 2.5	< 2.5	< 2.5	< 7.5	
	08/02/2006	73	7300	< 1000	7800	< 0.5	< 0.5	< 0.5	2.8	
	10/10/2006	< 48	7900	2200	10100	< 0.5	< 0.5	< 0.5	< 1.5	
	01/15/2007	< 240	8300	3000	11300	< 2.5	< 2.5	< 2.5	< 7.5	
	04/25/2007	89	9300	2000	11300	< 0.5	< 0.5	< 0.5	< 1.5	
	07/15/2007	< 500	850	320	1170	< 5.0	< 5.0	< 5.0	< 15	
	10/03/2007	< 250	8500	< 2100	9550	< 2.5	< 2.5	< 2.5	< 7.5	
	01/03/2008	61	9100	2200	11300	< 0.5	< 0.5	< 0.5	< 1.5	
	02/28/2009	56	5400	2100	7500	< 0.5	< 0.5	< 0.5	< 1.5	
	07/22/2009	100	14000	7600	21600	< 0.5	< 0.5	< 0.5	< 1.5	
	01/08/2010	75	13000	18000	31000	< 0.5	< 0.5	< 0.5	< 1.5	
	07/20/2010	69	12000	13000	25000	< 0.5	< 0.5	< 0.5	< 1.5	
	01/21/2011	50	14000	< 1800	14900	< 0.5	< 0.5	< 0.5	< 1.5	
	08/05/2011	<i>Unable to sample because of presence of free product.</i>								
	01/27/2012	<i>Unable to sample because of presence of free product.</i>								
	07/02/2012	<i>Unable to sample because of presence of free product.</i>								
	01/11/2013	<i>Unable to sample because of presence of free product.</i>								
	07/12/2013	<i>Unable to sample because of presence of free product.</i>								
01/10/2014	<i>Unable to sample because of presence of free product.</i>									
07/16/2014	<i>Unable to sample because of presence of free product.</i>									
02/22/2019	<i>Unable to sample because of presence of free product.</i>									

Table 2-2
Summary of Groundwater Analytical Results
Raplee Property
City of Stanwood
Stanwood, Washington

NOTES:

Detections are in **bold** font.

Detections above MTCA Method A cleanup levels are shaded.

Screening Levels for Groundwater Protective of Vapor Intrusion are shaded blue.

Results prior to 2019 were obtained from the August 2014 groundwater report by Leidos (Leidos, 2014).

< = concentration is less than reported value.

DRO = diesel-range hydrocarbons.

GRO = gasoline-range hydrocarbons.

MTCA = Model Toxics Control Act.

ND = not detected.

ORO = motor-oil-range hydrocarbons.

Total xylenes = sum of m,p-xylene and o-xylene.

U = analyte not detected.


ug/L = micrograms per liter (parts per billion).

^aTotal concentrations were calculated using one-half the method reporting limit for non-detects. Where all components were non-detect, the calculated total is "ND."

**Table 2-3
Groundwater Level Measurements
Raplee Property
City of Stanwood
Stanwood, Washington**

Well ID	Relative Well Elevation^a	Date	Time	DTP (feet)	DTW (feet)	DTB (feet)
MW-01	98.32	02/22/2019	8:32 AM	--	2.18	14.17
MW-02	99.58	02/22/2019	8:13 AM	--	1.58	14.46
MW-03	99.16	02/22/2019	8:22 AM	--	0.80	13.56
MW-04	100.00	02/22/2019	8:40 AM	2.32	2.33	13.76
NOTES: DTB = depth to bottom. DTP = depth to product. DTW = depth to water. ^a Well elevations are relative to an arbitrary datum of 100 feet at MW-04, the topographically highest well (SAIC, 2006).						

Table 4-1
Option 1 – Excavation to Below the Smear Zone and
Backfill with Bioremediation Compound Probable Cost
Raplee Property
City of Stanwood, Stanwood, Washington

Title:	Option 1 - Excavation to Below the Smear Zone and Backfill w/ Bioremediation Compound Probable Cost		 <p>MAUL FOSTER ALONG</p> <p>1329 North State Street, Suite 301 Bellingham, WA 98225 360.594.6262 (p) 360.594.6270 (f) www.maulfoster.com</p>
Project:	Raplee Property Cleanup Options Report		
Client:	City of Stanwood		
Project #/Task:	1030.01.04	Initial	
Prepared By:	E. Lundeen	EL	
Checked By:	M. Tarbert	MT	
Date:	11/13/2019		
Revision #.:	0		

Cost Estimate Summary - Feasibility Level

Schedule 'A' - Preliminary Actions	\$	80,000
Schedule 'B' - Site Preparation	\$	9,750
Schedule 'C' - Excavation and Disposal	\$	75,250
Schedule 'D' - Institutional Controls	\$	10,000
Schedule 'E' - ORC Backfill	\$	22,300
Schedule 'F' - Permitting and Technical Services	\$	24,000
Schedule 'G' - Design and Project Management	\$	44,000
Schedule 'H' - Monitoring	\$	79,000
Schedule 'I' - Contingency	\$	86,000
Total:	\$	430,300

- Assumptions:**
1. The Point of Compliance will be the parcel boundaries of Property and the extent of the contamination is confined to the two areas of concern shown in Figure 4-1.
 2. Groundwater encountered during excavation can be discharged to the local sanitary sewer.
 3. Groundwater will be monitored quarterly 5 years.
 4. Two USTs will be decommissioned. A ground penetrating radar survey will be utilized to confirm that additional USTs are not present.
 5. All USTs identified have a capacity of 2,000 gallons and contain 6-inches of a water and free-product mixture.
 6. A 30% contingency is included to account for site and design uncertainty.
 7. Limited bucket mixing of ORC below the water table is assumed. Use of soil auguring should be considered to distribute ORC to address deeper contamination.
 8. Probable cost is a decision making tool and should be considered to represent a range reflecting - 30%/+50%.

Table 4-1
Option 1 – Excavation to Below the Smear Zone and
Backfill with Bioremediation Compound Probable Cost
Raplee Property
City of Stanwood, Stanwood, Washington

Schedule 'A' - Preliminary Actions					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
A.1	Additional Site Characterization	1	LS	\$ 44,000.00	\$ 44,000.00
A.2	UST Excavation and Removal	1	LS	\$ 24,000.00	\$ 24,000.00
A.3	UST Decommission In-Place	1	LS	\$ 12,000.00	\$ 12,000.00
Subtotal Schedule 'A':					\$ 80,000

Schedule 'B' - Site Preparation					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
B.1	Mobilization/Demobilization	10%	LS	-	\$ 7,000.00
B.2	Temp. erosion and sedimentation control	1	LS	\$ 1,000.00	\$ 1,000.00
B.3	Clearing and Grubbing	0.25	AC	\$ 7,000.00	\$ 1,750.00
Subtotal Schedule 'B':					\$ 9,750

Schedule 'C' - Excavation and Disposal					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
C.1	Excavation and contaminated material management	320	BCY	\$ 35.00	\$ 11,200.00
C.2	Waste characterization	1	LS	\$ 900.00	\$ 900.00
C.3	Dewatering and Treatment System	1	LS	\$ 800.00	\$ 800.00
C.4	Offsite waste transportation and disposal	470	TON	\$ 95.00	\$ 44,650.00
C.5	Backfill and Compaction	360	LCY	\$ 49.00	\$ 17,700.00
Subtotal Schedule 'C':					\$ 75,250

Schedule 'D' - Institutional Controls					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
D.1	Environmental Covenant	1	LS	\$ 10,000.00	\$ 10,000.00
Subtotal Schedule 'D':					\$ 10,000

Schedule 'E' - ORC Backfill					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
E.1	Bioremediation Product (e.g., ORC Advanced)	1,300	LB	\$ 11.00	\$ 14,300.00
E.3	Completion Report/As-Built	1	LS	\$ 8,000.00	\$ 8,000.00
Subtotal Schedule 'E':					\$ 22,300

Schedule 'F' - Permitting and Technical Services					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
F.2	Dewatering Permit	1	LS	\$ 5,000.00	\$ 5,000.00
F.3	Completion Reporting	1	LS	\$ 7,000.00	\$ 7,000.00
F.4	Planning documents	1	LS	\$ 12,000.00	\$ 12,000.00
Subtotal Schedule 'F':					\$ 24,000


Table 4-1
Option 1 – Excavation to Below the Smear Zone and
Backfill with Bioremediation Compound Probable Cost
Raplee Property
City of Stanwood, Stanwood, Washington

Schedule 'G' - Design and Project Management					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
G.1	Project management	8%	LS	-	\$ 14,000.00
G.2	Remedial design	15%	LS	-	\$ 18,000.00
G.3	Construction management	10%	LS	-	\$ 12,000.00
Subtotal Schedule 'G':					\$ 44,000

Schedule 'H' - Monitoring and Periodic Costs					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
H.1	Quarterly monitoring (Years 0-5)	1	LS	\$79,000.00	\$ 79,000.00
Subtotal Schedule 'H':					\$ 79,000

Schedule 'I' - Contingency					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
G.4	Contingency (30%)	30%	LS	-	\$ 86,000.00
Subtotal Schedule 'I':					\$ 86,000

Table 4-2
Option 2 - Excavation Above Water Table and
In-Situ Chemical Oxidation Probable Cost
Raplee Property
City of Stanwood, Stanwood, Washington

Title:	Option 2 - Excavation Above Water Table and In-Situ Chemical Oxidation Probable Cost		 M A U L F O S T E R A L O N G I 1329 North State Street, Suite 301 Bellingham, WA 98225 360.594.6262 (p) 360.594.6270 (f) www.maulfooster.com
Project:	Raplee Property Cleanup Options Report		
Client:	City of Stanwood		
Project #/Task:	1030.01.04	Initial	
Prepared By:	E. Lundeen	EL	
Checked By:	M. Tarbert	MT	
Date:	11/13/2019		
Revision #.:	0		

Cost Estimate Summary - Feasibility Level

Schedule 'A' - Preliminary Actions	\$	80,000
Schedule 'B' - Site Preparations	\$	4,750
Schedule 'C' - Excavation and Disposal	\$	44,640
Schedule 'D' - Chemical Oxidation Injections	\$	229,850
Schedule 'E' - Institutional Controls	\$	10,000
Schedule 'F' - Permitting and Technical Services	\$	17,000
Schedule 'G' - Design and Technical Services	\$	61,000
Schedule 'H' - Monitoring and Periodic Costs	\$	42,100
Schedule 'I' - Contingency	\$	95,000
Total:	\$	584,340

Assumptions:

1. The Point of Compliance will be parcel boundaries of the Property and the extent of the contamination is confined to the two areas of concern shown in Figure 4-1.
2. Groundwater encountered during excavation can be discharged to the local sanitary sewer.
3. Injections will occur over four events. Mobilization and hole reports for the four events have been included.
4. Injection near the existing underground gas line must be considered during design to ensure line safety. The oxidant or injection methodology may be adjusted.
5. Groundwater will be monitored quarterly for two years after the injections are complete.
6. A ground penetrating radar survey will not find any additional underground storage tanks (USTs).
7. All USTs identified have a capacity of 2,000-gallons and contain 6-inches of a water and free-product mixture.
8. A 30% contingency is included to account for site and design uncertainty.
9. Probable cost is a decision tool and should be considered to represent a range reflecting -30%/+50%.

Table 4-2
Option 2 - Excavation Above Water Table and
In-Situ Chemical Oxidation Probable Cost
Raplee Property
City of Stanwood, Stanwood, Washington

Schedule 'A' - Preliminary Actions						
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>		<i>Total Cost</i>
A.1	Additional Site Characterization	1	LS	\$	44,000.00	\$ 44,000.00
A.2	UST Excavation and Removal	1	LS	\$	24,000.00	\$ 24,000.00
A.3	UST Decommission In-Place	1	LS	\$	12,000.00	\$ 12,000.00
Subtotal Schedule 'A':					\$	80,000

Schedule 'B' - Site Preparation						
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>		<i>Total Cost</i>
B.1	Mobilization/demobilization	10%	LS	\$	-	\$ 2,000.00
B.2	Temp. erosion and sedimentation control	1	LS	\$	1,000.00	\$ 1,000.00
B.3	Clearing and Grubbing	0.25	AC	\$	7,000.00	\$ 1,750.00
Subtotal Schedule 'B':					\$	4,750

Schedule 'C' - Excavation and Disposal						
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>		<i>Total Cost</i>
C.1	Excavation and contaminated material management	200	BCY	\$	35.00	\$ 7,000.00
C.2	Waste characterization	1	LS	\$	900.00	\$ 900.00
C.3	Dewatering and Treatment System	1	LS	\$	800.00	\$ 800.00
C.4	Offsite waste transportation and disposal	270	TON	\$	95.00	\$ 25,650.00
C.5	Backfill and Compaction	210	LCY	\$	49.00	\$ 10,290.00
Subtotal Schedule 'C':					\$	44,640

Schedule 'D' - Chemical Oxidation Injections						
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>		<i>Total Cost</i>
D.1	Additional Characterization	1	LS	\$	5,000.00	\$ 5,000.00
D.2	Mobilization/Demobilization	4	LS	\$	900.00	\$ 3,600.00
D.3	Injection Daily Rate	8	Day	\$	5,500.00	\$ 44,000.00
D.4	Forklift	8	Day	\$	300.00	\$ 2,400.00
D.5	Drilling Permit/Reporting/Misc.	1	LS	\$	12,400.00	\$ 12,400.00
D.6	Chemical oxidant product and transport	49,850	LB	\$	3.00	\$ 149,550.00
D.7	Injection/Decommissioning Hole Reports	80	EA	\$	98.00	\$ 7,900.00
D.8	Monitoring Well Decommissioning (MW-02, MW-04) including separate mobilization	1	LS	\$	5,000.00	\$ 5,000.00
Subtotal Schedule 'D':					\$	229,850

Table 4-2
Option 2 - Excavation Above Water Table and
In-Situ Chemical Oxidation Probable Cost
Raplee Property
City of Stanwood, Stanwood, Washington

Schedule 'E' - Institutional Controls						
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>	
E.1	Environmental Covenant	1	LS	\$ 10,000.00	\$	10,000.00
Subtotal Schedule 'E':					\$	10,000


Schedule 'F' - Permitting and Technical Services						
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>	
F.1	Dewatering Permit	1	LS	\$ 5,000.00	\$	5,000.00
F.2	Planning documents	1	LS	\$ 12,000.00	\$	12,000.00
Subtotal Schedule 'F':					\$	17,000

Schedule 'G' - Design and Project Management						
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>	
G.1	Project management	8%	LS	-	\$	14,600.00
G.2	Remedial design	15%	LS	-	\$	27,400.00
G.3	Construction management	10%	LS	-	\$	19,000.00
Subtotal Schedule 'G':					\$	61,000

Schedule 'H' - Monitoring and Periodic Costs						
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>	
H.2	Completion Report Year 2	1	LS	\$ 9,600.00	\$	9,600.00
H.3	Quarterly monitoring (Years 0-2)	1	LS	\$ 32,500.00	\$	32,500.00
Subtotal Schedule 'H':					\$	42,100

Schedule 'I' - Contingency						
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>	
I.1	Contingency (30%)	30%	LS	-	\$	95,000.00
Subtotal Schedule 'I':					\$	95,000

Table 4-3
Option 3 - Complete Excavation Probable Cost
Raplee Property
City of Stanwood
Stanwood, Washington

Title: Option 3 - Complete Excavation Probable Cost		 MAUL FOSTER ALONG 1329 North State Street, Suite 301 Bellingham, WA 98225 360.594.6262 (p) 360.594.6270 (f) www.maulfoster.com
Project:	Raplee Property Cleanup Options Report	
Client:	City of Stanwood	
Project #/Task:	1030.01.04 Initial	
Prepared By:	E. Lundeen EL	
Checked By:	M. Tarbert MT	
Date:	11/13/2019	
Revision #.:	0	

Cost Estimate Summary - Feasibility Level		
Schedule 'A' - Preliminary Actions	\$	80,000
Schedule 'B' - Site Preparation	\$	13,950
Schedule 'C' - Excavation and Disposal	\$	188,000
Schedule 'D' - Permitting and Technical Services	\$	24,000
Schedule 'E' - Design and Project Management	\$	37,000
Schedule 'F' - Monitoring	\$	16,300
Schedule 'G' - Contingency	\$	62,800
Total:	\$	422,050

Assumptions:

1. The Point of Compliance will be the parcel boundaries of the Property and the extent of the contamination is confined to the two areas of concern shown in Figure 4-1.
2. Groundwater encountered during excavation can be discharged to the local sanitary sewer.
3. Additional groundwater monitoring will not be required after four sampling events have occurred.
4. Confirmation sampling from the excavation will not change the extent of the excavation.
5. Two USTs will be decommissioned. A ground penetrating radar survey will be utilized to confirm that additional USTs are not present.
6. All USTs identified have a capacity of 2,000-gallons and contain 6-inches of a water and free-product mixture.
7. Groundwater will be monitored on a semi-annual basis for two years post remedy.
8. A 30% contingency is included to account for site and design uncertainty.
9. Probable cost is a decision making tool and should be considered to represent a range reflecting - 30%/+50%.

Table 4-3
Option 3 - Complete Excavation Probable Cost
Raplee Property
City of Stanwood
Stanwood, Washington

Schedule 'A' - Preliminary Actions					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
A.1	Additional Site Characterization	1	LS	\$ 44,000.00	\$ 44,000.00
A.2	UST Excavation and Removal	1	LS	\$ 24,000.00	\$ 24,000.00
A.3	UST Decommission In-Place	1	LS	\$ 12,000.00	\$ 12,000.00
Subtotal Schedule 'A':					\$ 80,000

Schedule 'B' - Site Preparation					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
B.1	Mobilization/demobilization	10%	LS	\$ -	\$ 11,200.00
B.2	Temp. erosion and sedimentation control	1	LS	\$ 1,000.00	\$ 1,000.00
B.3	Clearing and Grubbing	0.3	AC	\$ 7,000.00	\$ 1,750.00
Subtotal Schedule 'B':					\$ 13,950

Schedule 'C' - Excavation and Disposal					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
C.1	Excavation and contaminated material management	540	BCY	\$ 35.00	\$ 18,900.00
C.3	Performance sampling and analysis	1	LS	\$ 1,700.00	\$ 1,700.00
C.4	Shoring	1	LS	\$ 56,000.00	\$ 56,000.00
C.5	Dewatering and Treatment System	1	LS	\$ 5,000.00	\$ 5,000.00
C.6	Offsite waste transportation and disposal	800	TON	\$ 95.00	\$ 76,000.00
C.7	Backfill and Compaction	620	LCY	\$ 49.00	\$ 30,400.00
Subtotal Schedule 'C':					\$ 188,000

Schedule 'D' - Permitting and Technical Services					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
D.1	Dewatering Permit	1	LS	\$ 5,000.00	\$ 5,000.00
D.2	Completion Report	1	LS	\$ 7,000.00	\$ 7,000.00
D.3	Planning documents	1	LS	\$ 12,000.00	\$ 12,000.00
Subtotal Schedule 'D':					\$ 24,000

Schedule 'E' - Design and Project Management					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
E.1	Project management	8%	LS	\$ -	\$ 9,000.00
E.2	Remedial design	15%	LS	\$ -	\$ 16,800.00
E.3	Construction management	10%	LS	\$ -	\$ 11,200.00
Subtotal Schedule 'E':					\$ 37,000

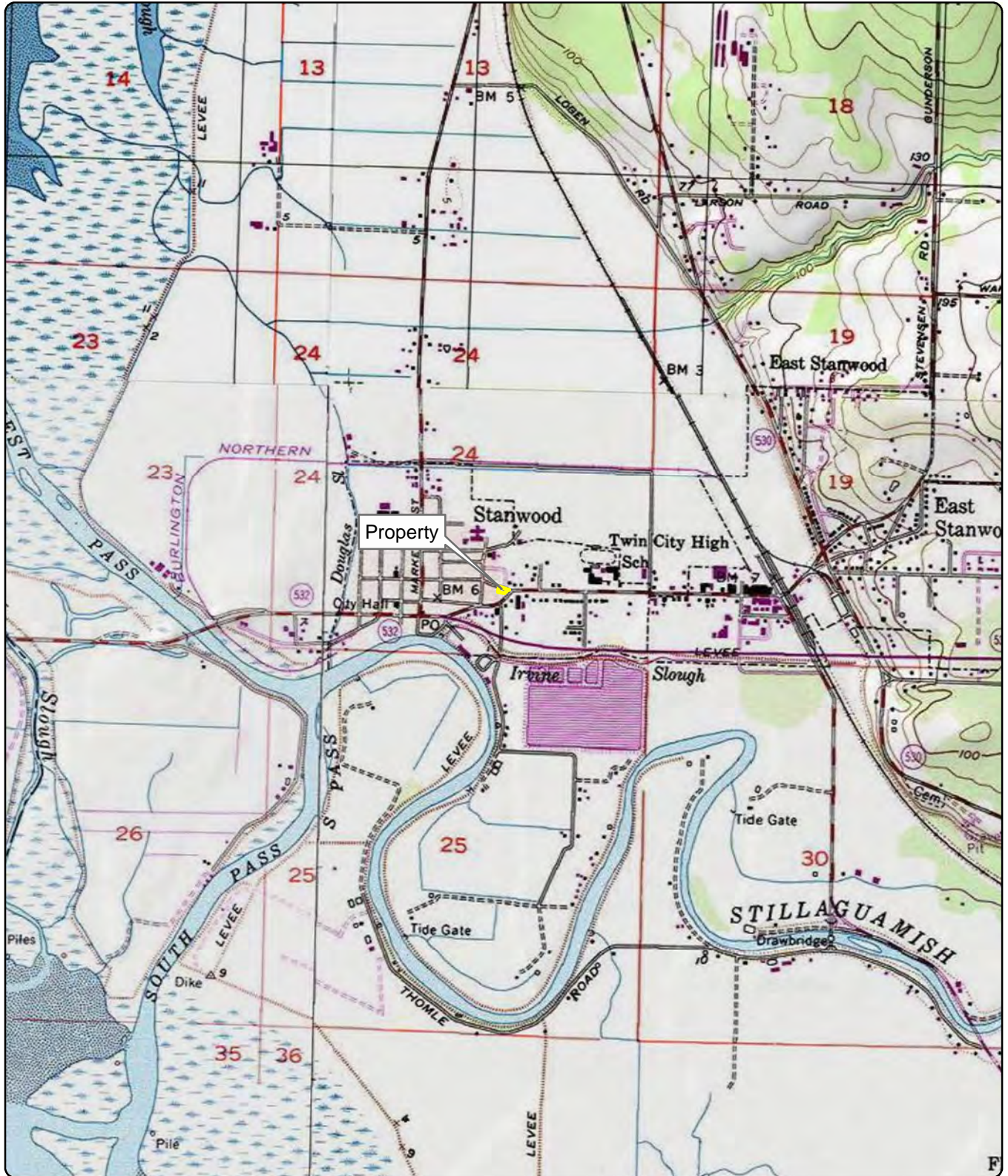
Schedule 'F' - Monitoring					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
F.1	Semi-annual monitoring (Years 1-2)	1	LS	\$16,300.00	\$ 16,300.00
Subtotal Schedule 'F':					\$ 16,300

Table 4-3
Option 3 - Complete Excavation Probable Cost
Raplee Property
City of Stanwood
Stanwood, Washington

Schedule 'G' - Contingency					
<i>Description</i>		<i>Quantity</i>	<i>Unit</i>	<i>Unit Cost</i>	<i>Total Cost</i>
G.1	Contingency (30%)	30%	LS	\$ -	\$ 62,800.00
Subtotal Schedule 'G':				\$	62,800

FIGURES





Source: US Geological Survey (1969) 7.5-minute topographic quadrangle: Stanwood
 SE corner of Section 24, Township 32 North, Range 3 East
 Property boundary obtained from Snohomish County GIS.

Legend
 Property Parcel

Figure 1-1
Property Location

Raplee Property
 Stanwood, Washington





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Produced By: aguse
Approved By:
Print Date: 3/27/2019



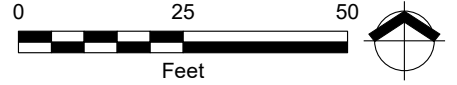
**Figure 2-1
Property Features**

Raplee Property
Stanwood, Washington

Legend

-  Monitoring Well
-  Former Product Lines
-  Tax Lot
-  Existing UST (SAIC, 2006)
-  Former Building
-  Former Service Island
-  Former UST (Pinnacle, 2005)
-  Property Parcel

Notes:
All property feature locations are approximate.
UST = underground storage tank.



Source: Aerial photograph obtained from Mapbox. Property boundary obtained from Snohomish County GIS.












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Print Date: 4/25/2019
Approved By: jputnam
Produced By: jputnam
Project: 1030.01

Figure 2-2 Historical Investigation Locations

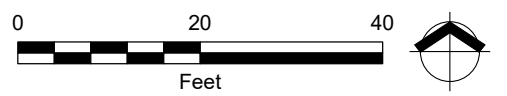
Raplee Property
Stanwood, Washington

Legend

-  Historical Soil Borings
-  Monitoring Well
-  Former Product Lines
-  Tax Lot
-  Existing UST (SAIC, 2006)
-  Former Building
-  Former Service Island
-  Former UST (Pinnacle, 2005)
-  Property Parcel



Notes:
All property feature locations are approximate.
UST = underground storage tank.








Source: Aerial photograph obtained from Mapbox. Property boundary obtained from Snohomish County GIS.



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Figure 2-3 Potentiometric Groundwater Contours Raplee Property Stanwood, Washington

Legend

-  Potentiometric Groundwater Contour
-  Approximate Groundwater Flow Direction
-  Monitoring Well
-  Property Parcel
-  Tax Lot



Notes:
 All property feature locations are approximate.
 TOC elevations are expressed in feet relative to an arbitrary datum of 100.00 feet at MW-1 (SAIC, 2006).
 TOC = top of casing.












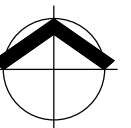
Source: Aerial photograph obtained from Mapbox. Property boundary obtained from Snohomish County GIS.

Figure 4-1 CLEANUP ACTION AREAS

Raplee Property
Stanwood, WA

LEGEND:

HISTORICAL SOIL BORINGS	 SB-#
MONITORING WELL	 MW#/SB#
FORMER PRODUCT LINES	
EXISTING UST (SAIC, 2006)	
FORMER BUILDING	
FORMER SERVICE ISLAND	
FORMER UST (PINNACLE, 2005)	
PARCEL BOUNDARY	
PROPOSED ACTION AREAS	



NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.



This figure prepared as supplemental visual information only and should not be used for construction purposes. Only plan sheets approved, stamped and signed by a registered professional engineer in the state of governing jurisdiction shall be used for construction. Additionally, only plans approved by the applicable governing jurisdiction(s) shall be used for final construction unless otherwise expressly noted in writing by the engineer of record.

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