ASSOCIATED
ENVIRONMENTAL
GROUP, LLC

WORK PLAN FOR SUPPLEMENTAL REMEDIAL INVESTIGATION

Conducted on:

WEST VIEW MART
971 Ault Field Road
Oak Harbor, Washington

Prepared for:

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AEG Project #: 07-199

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1.0 INTRODUCTION

Associated Environmental Group, LLC (AEG) is proposing a Supplemental Remedial Investigation (RI) at the West View Mart property, located at 971 Ault Field Road in Oak Harbor, Island County, Washington (the Site). Tasks to be completed for the supplemental phase of this RI are based on previous environmental investigations completed at the Site and the Washington State Department of Ecology (Ecology) Further Action letter dated April 29, 2011. The investigation will be performed in general accordance with the American Society for Testing and Materials (ASTM) Standard E 1903-97, *Standard Guide Environmental Site Assessments: Phase II Environmental Site Assessment Process* and ASTM Standard EE 1689 – 95 (Reapproved 2008), *Standard Guide for Developing Conceptual Site Models for Contaminated Sites,* the Ecology Publication No. 01-09-073, *Workbook Tools for Calculating Soil and Ground Water Cleanup Levels under the Model Toxics Control Act Cleanup Regulation, Users Guide for MTCATPH 11.1 & MTCASGL 11.0, Revised December 2007*.

1.1 Subject Site

The Site, a retail gasoline station and convenience store, is positioned on the south side of Ault Field Road approximately 350 feet east of the intersection of Ault Field Road and Langley Boulevard in Oak Harbor, Island County, Washington. The corresponding Island County Tax Parcel number is 13327-502-2990. The Site is situated in Section 27, Township 33 North, and Range 1 East and is approximately 1.05 acres in size. The Site is currently occupied by a Texaco-brand gasoline station with an associated convenience store. The gas station occupies the northern portion of the property which includes four underground storage tanks (gasoline and diesel fuels), one pump island with two dispensers under one canopy, and associated asphalt and concrete paved parking area. Two other buildings are present at the Site: a custom automotive paint shop with associated parking and storage area is located adjacent to the south of the convenience store; and a warehouse building is located on the far southern end of the property. The area adjacent to the east end of the convenience store is fenced by chain-link fence and serves as a boat storage yard for one of the tenants. Access to the Site is from Ault Field Road. Figure 1, *Site & Vicinity Map,* presents the general boundaries and vicinity area of the Site. Figure 2, *Site Plan,* present the layout of the property. Photographs of the Site are presented in Appendix A, *Site Photographs*.

1.2 Previous Environmental Work Summary

<u>UST Decommissioning – 1991</u>

Prior to the underground storage tanks (USTs) decommissioning in October 1991, the Site had six USTs including the following: 1) two 1,000 gallon diesel fuel USTs located west of the convenience store; 2) two 2,000 gallon gasoline fuel USTs located west of the convenience store; 3) one 500 gallon heating oil or waste oil UST located west of the convenience store; and 4) one 8,000 gallon gasoline fuel UST located east of the convenience store. In 1991, Materials Testing

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& Consulting, Inc. (MTC) conducted a UST Site Assessment at the Site during tank decommissioning activities. MTC assessed an area onsite for potential petroleum hydrocarbons soil contamination. This area was proposed for re-locating the UST system. MTC also assessed areas east and west of the convenience store that were currently housing the six USTs that were to be removed, and the north-central portion of the Site adjacent to Ault Field Road. This latter area was the proposed location for the new UST system. Four soil samples were collected from the test pit in the north-central area of the Site at various depths, ranging from five feet below ground surface (bgs) to 12 feet bgs according to MTC. Soil analytical results indicated the presence of total petroleum hydrocarbons (TPH) at all sample points. The samples collected at eight feet bgs and nine feet bgs exhibited concentrations above the Ecology soil cleanup levels at that time. Subsequently, the dimensions of the excavation pit were increased to comprise the entire area of the proposed new UST system (to be installed). While no more soil samples were obtained from this excavation pit, an organic vapor monitoring equipment was utilized to field screen soil removed from the excavation pit to assess if petroleum contaminated soil was still present. According to the field screening activities, petroleum contaminated soil (PCS) was still present along the north, south, and southwest portions of the excavation pit. The PCS was left in place due to concerns for the structural integrity of the Site's fuel island and retail sign.

According to MTC, the five USTs located west of the convenience store were removed. The soil encountered during excavation activities was observed to have heavy petroleum sheen and odor. No free product or groundwater was encountered during excavation activities. PCS was over-excavated to an undocumented depth and stockpiled onsite. The south side of the excavation pit was excavated to obtain access to the 500 gallon waste oil or heating oil UST. This waste oil or heating oil tank was noted to have holes upon examination after removal (MTC, 1992). MTC collected two sidewall soil samples at a depth of 5 feet bgs. Soil analytical results for these samples indicated detections of TPH above the Ecology soil cleanup levels at that time. Soil samples were not obtained at the base because borings were planned to be completed within the footprint of the excavation pit. However, the excavation was structurally limited by the convenience store to the east and buildings to the west. Therefore, PCS was left in place.

MTC did not observe holes in the 8,000 gallon gasoline fuel tank, located east of the convenience store, upon its decommissioning. However, soil encountered during excavation activities had noticeable olfactory indications of petroleum hydrocarbons impact. The excavation pit for this tank was over-excavated, and soil samples collected by MTC from the north and south sidewalls at unknown depths did not exhibit detections of TPH or gasoline associated volatile organic compounds (VOC) including benzene, toluene, ethylbenzene, or total xylenes (BTEX). This excavation pit was also structurally limited to the east and west by the convenience store and the Site's property boundary. It is unclear if soil in these two directions (east and west) had indications of petroleum hydrocarbons impairment. In total, approximately 300 cubic yards of PCS was excavated at the Site (MTC, 1992). MTC did not report the type nor

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source of backfill used to backfill the excavation pits nor where the excavated PCS was disposed; however, MTC reported that soil remediation via aeration was implemented at the Site.

Subsequent to the UST decommissioning and removal, a new UST system was installed at the Site adjacent to the south of Ault Field Road. The new USTs installed included: 1) three 6,000 gallon gasoline fuel USTs (regular grade, plus grade, super grade); and 2) one 2,000 gallon diesel fuel UST. All tanks installed were single-walled steel tanks with an epoxy resin coating. The associated product lines installed were single-walled suction style piping.

Vapor Extraction System (VES) Installation – 1991

In addition to the UST site assessment conducted, MTC also advanced nine borings in order to characterize the vertical and horizontal extent of PCS at the Site. MTC completed these borings as vapor extraction wells. Borings were advanced to depths ranging from 24.5 feet bgs to 44.5 feet bgs at locales throughout the Site including within the footprints of the former UST excavations and in areas around the perimeter of the new UST system and fuel dispensing island. These extraction wells were connected via header piping to a manifold which was connected to an air compressor located on the west side of the convenience store. All extraction wells were constructed of 4 inch diameter PVC piping. The bottom 20 feet of each well contained slotted pipe to allow for vapor extraction. While exact soil sampling locations and depths are unclear during the advancement of borings, soil analytical results indicated detections of TPH and BTEX at levels above the Ecology soil cleanup levels (at that time) at depths ranging from 23 feet to 24.5 feet bgs at borings/extraction wells numbers 5 and 6 (MTC, 1992). No groundwater was encountered in any of the borings constructed on this Site.

Ultimately, MTC concluded the following: "*Six USTs were removed from the West View Mart property in October 1991. Petroleum contamination was detected in both east and west basins* (excavations). *Due to the closeness of both the building on the property and a neighboring building removal of the contamination by excavation was not possible. During the new tank basin construction petroleum contamination was found on the north side of the island in the 5 ft range. Nine test holes/vapor extraction wells were positioned around the pump island and in the east and west tank basins. The data suggests, based on field observations of the new basin* (new UST system) *and the contamination found in the test hole samples from around the new island, that leakage from the island has significantly contributed to the contamination in this area.*" According to MTC, periodic monitoring of the VES was to be conducted (MTC, 1992).

VES Performance Monitoring – 1995

In 1995, EDGE Analytical (Edge) issued a status report entitled "*Status of Petroleum Cleanup at West View Mart*" discussing the performance monitoring completed at the Site's VES. Initially the readings obtained from the VES exceeded 2,000 parts per million (ppm) petroleum vapors. By 1994 the levels had decreased to 125 ppm and as of the issue date of the Edge report in July

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1995, measurable levels had decreased to 25 ppm. The report did not present the scope of work for performance monitoring nor field methodologies employed. Edge concluded and recommended the following: *"Substantial improvements to soil petroleum levels are anticipated with the corresponding decrease in exhaust vapor concentrations. The VES is apparently accomplishing its designed purpose. It is recommended that the individual wells be isolated to determine those areas where the petroleum contamination persists. This would serve to speed up the cleanup. In order to determine if the cleanup process is complete confirmation soil samples would need to be collected by boring the targeted areas"* (Edge, 1995).

VES Performance Monitoring – 2004

In 2004, Slotta Design and Construction (SDC) was contracted to perform a VES monitoring event at the Site. Vapor samples were collected in glass bulbs and analyzed for gasoline range TPH and BTEX. SDC selected the following sampling scheme to assess the efficacy of the system: 1) one vapor sample where all nine extraction wells ball valves were open; 2) one vapor sample where only extraction wells 1, 2, and 3's ball valves were open; 3) one vapor sample where only extraction wells 4, 5, and 6 ball valves were open; and 4) one vapor sample where only extraction wells 7, 8, and 9 ball valves open. Based on the vapor analytical results, SDC reported that 0.07 ppm to 0.15 ppm petroleum hydrocarbons constituents were being removed from the Site. SDC also concluded that extraction wells 7, 8, and 9 had the highest concentration of petroleum hydrocarbons being extracted through the VES. SDC also stated that it was likely that PCS remains at the Site and that the VES should remain in use. However, SDC recommended that the current VES be repaired and that an air sparge system be added in order to aid in increased volatilization of petroleum hydrocarbons in soil (SDC, 2004).

VES Performance Monitoring – August/2007

AEG was retained in August 2007 to sample the VES and assess the Site's current status with respect to the VES. Vapor samples were extracted from all wells individually through the VES. Analytical results of the vapor sample collected from extraction well 7 indicated presence of gasoline range TPH and BTEX. AEG concluded that the Site subsurface was still impacted by petroleum hydrocarbons. AEG also noted that the VES was in need of repair (AEG, August 2007).

Phase I ESA – December/2007

AEG completed a Phase I ESA on the Site in December 2007 due to an impending sale of the property by the owner at that time – Mr. Bill Massey. AEG concluded that historical and current recognized environmental conditions (RECs) were present at the Site and recommended the following:

"AEG recommends the following: 1) repair the vapor extraction system; 2) monitor the extraction wells; 3) submit vapor samples from the wells for analysis of petroleum

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hydrocarbons; 4) if analytical results of vapor samples indicate no detectable concentrations of constituents of concern then conduct subsurface investigation via a GeoProbe or other drilling methodology at specific areas at the subject site to confirm that petroleum hydrocarbons is no longer impacting the subsurface at the subject site; 5) enroll the subject site in Ecology's Voluntary Cleanup Program with the goal of obtaining a no further action status determination for the subject site" (AEG, December 2007).

SVE Maintenance and Continued Performance Monitoring – 2008 through 2009

Based on the recommendations of the Phase I ESA, AEG was retained by the new property owners to repair the VES and take bi-annual vapor samples from the system and screen them via a Photoionization Detector (PID) until no vapor detections are present.

Subsurface Investigation – November/2009

Based on the low or non detectable results from the VES screening, AEG conducted a subsurface investigation at the Site in November 2009 in order to evaluate the soil and groundwater conditions. Six borings were advanced to a maximum of 19 feet bgs in areas of potential environmental concern. Groundwater was not encountered due to the glacial till soil conditions. Soil analytical results indicated elevated concentrations of gasoline range TPH (68 milligrams per kilogram [mg/Kg] to 7,720 mg/Kg) at levels exceeding the Ecology MTCA Method A soil cleanup level. Benzene, above cleanup level, was also present in soil at three boring locations.

AEG concluded the following, as extracted from the *Subsurface Investigation* report, dated December 22, 2009:

The Site's subsurface (soil) is impacted by gasoline range TPH and associated VOC. Areas adjacent to the east and west of the convenience store, which housed former USTs (refer to Figure 2), are contaminated at depths of 9 feet and 14 feet bgs. These depths indicate that the fill used to backfill these excavation pits have since been adversely impacted. Soil analytical results indicate that areas adjacent to the current UST system/fuel island are contaminated at shallow depths, at approximately four feet bgs to 6 ½ feet bgs. The higher detections of gasoline range TPH and benzene were exhibited at locales inferred to be downgradient of the current UST system/fuel island, primarily borings B-3 and B-4. There were no elevated detections of constituents of concern exhibited at boring B-6 (located adjacent to the east of the current UST system). This boring represents the inferred upgradient locale at the Site.

Complete vertical characterization of the extent of petroleum contaminated soil at the Site is necessary in order to estimate the extent of contamination at the Site for cleanup action. The areas adjacent to and downgradient of the current UST system/fuel island pose particular environmental concern due to the elevated detections and the need to evaluate whether the petroleum contamination is associated with a malfunction within the current UST system. The

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integrity of the Site's current underground storage tanks and product lines needs to be evaluated.

In our professional opinion, the low to non-detectable concentrations of volatile organic compounds in vapor samples collected from the current VES are not representative of the subsurface conditions at the Site.

Furthermore, the potential exists for diesel fuel and/or heating oil/waste oil stored in the former USTs to adversely impact the Site. MTC reported that upon examination during the decommissioning activities the heating oil/waste oil tank had holes. It appears that previous environmental laboratory analyses for the Site's soil and/or groundwater did not include analyses for presence of diesel/heavy oil range TPH (AEG, 2009).

Supplemental Remedial Investigation – August/2010

A total of four hollow-stem soil borings were advanced (MW-1 through MW-4) by AEG on June 14 and 15, 2010. All four borings were completed as 2-inch diameter dedicated monitoring wells. However, groundwater was not encountered to the total drilling depth of 30 feet bgs for any of the monitoring wells. Some water was encountered at 5 feet bgs in MW-1 but was ephemeral and was determined to be present from construction activities. The monitoring wells were placed in the locations as shown in Figure 3. Soil samples were analyzed for gasoline range TPH, gasoline and diesel range organics as per MTCA WAC 173-340-900, Table 830-1, *Required Testing for Petroleum Releases*.

Soil analytical results indicated elevated concentrations of gasoline range TPH and/or BTEX at all borings at levels above MTFA Method A soil cleanup levels for these constituents. At boring MW-1, gasoline range TPH was 319 mg/K at 10 feet bgs. At boring MW-2 elevated detections of gasoline range TPH and benzene was detected at a depth of 10 feet bgs. Benzene and ethylbenzene were elevated at a depth of 5 feet bgs at boring MW-3. Gasoline range TPH (at 5,680 mg/Kg) and benzene (0.38 mg/Kg) were above MTCA Method A soil cleanup levels at MW-4 (Table 2). The Ecology MTCA Method A soil cleanup levels for gasoline range TPH and benzene are 30 mg/Kg and 0.03 mg/Kg, respectively. No diesel range TPH, carcinogenic polynuclear aromatic hydrocarbons (PAHs) or total lead was detected in soil samples collected in any of the borings. With the exception of BTEX, total napthalenes were the only volatile organic compound (VOC) detected in any of the boreholes. Elevated napthalenes were detected in MW-4.

1.3 Site Geology and Hydrogeology

According to the *Geologic Map of Washington, Northwest Quadrant*, the Site and vicinity area is underlain by Quaternary age glacial till deposits (Dragovich, J.D., Logan, R.L., et al, 2002). The

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till deposits typically consist of "*unsorted unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders deposited by glacial ice; may contain interbedded stratified sand, silt, and gravel. Includes part of Vashon Drift undivided" (Dragovich;, J.D., Logan, R.L., et al, 2002).* Geologic cross sections of this area of Island County indicated that glacial till is underlain by Esperance Sand and the Whidbey Formation. The Whidbey Formation consists of "*sand, silt, and clay interbedded with peat and lenses of gravel. Crossbedding is common in the sand. … An unconformity is almost always present at the top of the Whidbey Formation. … Where the Esperance Sand Member lies directly on the Whidbey Formation, it is sometimes difficult to distinguish them. … The Esperance is usually somewhat coarser than the typical Whidbey, consisting mostly of pebbly crossbedded sand with scattered lenses of gravel"* (Easterbrook, D. J., 1968).

In addition, according to the Washington Department of Natural Resources (DNR), known active faults traverse Whidbey Island. DNR is currently performing geologic mapping in the Oak Harbor and Coupeville areas. Several strike –slip, reverse, and thrust displacement faults have been mapped in the northern area of Whidbey Island. Seismic reflection profiles, outcrops, boreholes, and potential field surveys have provided evidence of Quaternary movements on these faults (Johnson, S.Y., Potter, C.J., et. al., 1996). Devils Mountain fault is one of the active faults mapped to the north of the subject site (within the northern section of Whidbey Island). The presence of active faults on Whidbey Island poses geological hazards to the Site and vicinity area.

The subsurface conditions at the Site, at locations of previous investigation, generally consist of glacial till which was comprised of very dense to hard silt with local sand and/or sandy silt with gravel within an indurated silt matrix. Glacial till was logged to approximately 19 feet bgs. This glacial till was underlain by very dense poorly graded sand. Sand was logged to approximately 30 feet bgs, the maximum depth explored. Artificial fill was encountered at areas adjacent to the east and west of the convenience store which included the footprints of the excavation pits for former USTs located in these areas (refer to Figure 2, *Site Plan*). The fill encountered on the east side of the Site at MW-1 consisted of poorly graded sand to approximately 14 1/2 feet bgs; on the west side at MW-2, fill was comprised of sand with gravel and was logged to approximately 9 1/2 feet bgs.

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2.0 CONCEPTUAL SITE MODEL

Based on field observations and soil laboratory analytical results from the various remedial investigations, the subsurface of the Site (soil media) at locations of investigation is impacted by gasoline petroleum hydrocarbons and associated volatile compounds. It appears that contamination is present between four feet bgs to at least 17 feet bgs. Laterally, it appears the impacted area encompasses approximately 100 feet in width by 100 feet in length, from the former UST areas adjacent east and west of the convenience store to the northern section of the property around the fuel tanks and the product line system.

However, it appears that due to the lithologic density and low permeability of the subsurface at the Site (i.e., glacial till and well indurated/compacted silt) the petroleum hydrocarbon impact may be localized. The likelihood is high that shallow soil contamination is retarded laterally and vertically due to the lithologic characteristics present at the Site. The greatest concentrations of soil contamination are located to the northwest at approximately 4 feet bgs and 10 feet bgs between VES wells EW-4 and EW-5, to the west of the West View Mart building between the Tattoo Shop and the Mart building at approximately 10 feet bgs, and immediately to the east of the Mart building at approximately 10 feet bgs to 15 feet bgs. There also appears to be residual contamination remaining to the northeast between VES wells EW-6 and EW-7 at approximately 6.5 feet bgs and 10 feet bgs. Groundwater has been determined to be at least 45 feet bgs at the Site and was not encountered in any of the boreholes constructed onSite.

AEG recommends conducting a Supplemental RI Investigation at this Site to address the Further Action comments from Ecology and to develop Method B soil cleanup levels to provide additional documentation that will provide for a no further action (NFA) determination. Soil contamination is believed to be localized and may be below Method B soil cleanup levels.

End points for Soil Cleanup Levels are considered to be:

- Direct human contact
  - Ingestion
  - Dermal contact
- Terrestrial ecological evaluation
- Protection of groundwater
  - Leaching (not applicable at this Site)
  - Residual saturation
- Conditional endpoints:
  - Vapors

The potential receptors to humans are limited to several narrow potential exposure routes. Routes to human receptors include:

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- Ingestion of or dermal contact with petroleum contaminated soil during subsurface Site maintenance and/or excavation projects to a depth of 15 feet bgs.
- Inhalation of vapor from source material through the soil to receptors on the surface.

Routes to terrestrial ecological receptors include:

- Exposure of terrestrial plants and animals to petroleum contaminated soil from the surface to a depth of 15 feet bgs.

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3.0 OBJECTIVES AND SCOPE OF WORK

The primary objective of this Supplemental RI is to address comments from Ecology in the Further Action letter dated April 29, 2011. Ecology determined:

1. That the characterization that had been conducted was not sufficient to establish cleanup standards and select a cleanup action. Ecology considers that the soil contamination is limited within the upper 15 to 20 feet bgs. However, the lateral extent of the contamination in the soil, including off-Property contamination to the west and east of the convenience store, has not been fully determined. Further Site characterization is required.
2. To establish cleanup standards, at least a simplified terrestrial ecological evaluation should be conducted to determine whether soil cleanup levels protective of terrestrial species should also be applicable to this Site.
3. The soil cleanup levels were originally established based on protection of groundwater and direct contact. Therefore, the point of compliance was determined to be in soil throughout the Site.
4. A variety of cleanup actions have taken place at this Site over years (see above). Despite these actions, soil contamination still remains on the Site. A feasibility study should be conducted to develop and evaluate other cleanup action alternatives, and determine the preferred alternative to complete the Site cleanup.

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4.0 PROPOSED SUPPLEMENTAL REMEDIAL INVESTIGATION

Ecology MTCA Method A cleanup levels are designed for facilities undergoing routine cleanup actions that involve relatively few hazardous substances. The conditions for using MTCA Method A cleanup levels are met at this Site and were originally applied in evaluating the phases of cleanup and remedial investigations that have been conducted to date. The constituents of concern (COC) include gasoline range TPH, gasoline fuel associated VOC including benzene, toluene, ethylbenzene, and total xylenes (BTEX) constituents, and napthalenes. The MTCA Method A soil cleanup levels for all of these constituents, including gasoline range TPH, is based on protection of groundwater for drinking water uses. Since the soil to groundwater pathway is incomplete at this Site, it would not be accurate to use the MTCA Method A soil cleanup levels for developing cleanup standards for this Site. MTCA Method B can be used at any Site and should be used to develop soil cleanup levels that will be applied at the standard points of compliance (POC). However, all pathways should be analyzed and the most stringent selected as the cleanup levels at the Site.

Method B cleanup levels for TPH are determined using the fractionated analytical VPH approach as described in *Analytical Methods for Petroleum Hydrocarbons*, Publication No. ECY 97-602, June 1997, and MTCA WAC 173-340-700(8)(b)(ii)(C). This approach divides the TPH mixture into equivalent carbon numbers. Cleanup levels are calculated using reference doses that have been determined by Ecology for each fraction. Cleanup levels also need to consider the measured or predicted ability of the fractions to migrate from one medium to other media. Product composition may be determined by analyzing each sample in accordance with the VPH/EPH method described in Publication No. ECY 97-602. Alternatively, product composition may be determined by one of the following methods: 1) Correlation – Where NWTPH methods described in the Publication No. ECY 97-602 are used to collect and analyze the presence, location, and concentration of TPH, knowledge of the fraction-specific composition of the petroleum released at the Site may be based on analysis and correlation of a portion of the Site samples with both the VPH/EPH and NWTPH methods. 2) Retrofitting – Where NWTPH methods were used to collect and analyze the presence, location, and concentration of TPH before the effective date of the MTCA provision, knowledge of the fraction-specific composition of the petroleum released at the Site may be based on the fraction-specific composition assumptions used by Ecology to calculate Method A cleanup levels, which Ecology shall publish in guidance. If the identity of the petroleum product released at the Site is not known, or is a mixture of products, retrofitting under this provision shall be based on the composition that yields the lowest TPH cleanup level. [WAC 173-340-700(8)(b)(ii)(D)]

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The following table will demonstrate the application of MTCA Method B to develop soil cleanup levels:

Table 1. MTCA Cleanup Level for West View Mart – Supplemental Remedial Investigation

Media	Contaminants	Cleanup Levels	Reference
Soil (Protection of gw)	Gasoline range TPH	10,000 mg/Kg	Residual Saturation *
Soil (Direct contact)	Gasoline range TPH	TBD	Drilling, VPH analysis
Soil (Direct contact)	Benzene	TBD	Drilling, VPH analysis
Air	Benzene	0.32 ug/m^3	MTCA Method B, carcinogen
Air	Benzene	14 ug/m^3	MTCA Method B, noncarcinogen
Air	Toluene	2,300 ug/m^3	MTCA Method B, nonC
Air	Ethylbenzene	460 ug/m^3	MTCA Method B, nonC
Air	Total Xylenes	46 ug/m^3	MTCA Method B, nonC

*from Concise Explanatory Statement for the Amendments to The Model Toxics Control Act Cleanup Regulation Chapter 173-340 WAC, February 12, 2001, Table 15-14, gasoline in silt to fine sand, Residual Saturation equivalent soil concentration

AEG's scope of work for the Supplemental RI includes subsurface explorations utilizing a hollow stem auger drilling rig to obtain soil samples at selected depths and install four boreholes, analytical laboratory testing of soil samples, data analysis, and preparation of a final report. Tasks to be performed include the following:

- Conduct both public and private utilities locate for the Site. The locates to be performed by Underground Utilities Locate Center include only areas in the public right-of-ways. Applied Professional Services (APS) will provide private utility locates at the Site.

- Advance four soil borings (SB-1 through SB-4) via a hollow stem auger drilling rig to a maximum depth of 25 feet bgs at specific locales at the Site. The borings will be placed at these selected areas to further assess areas of known petroleum hydrocarbons impact and develop MTCA Method B cleanup levels from samples collected at the three most contaminated areas representing the residual petroleum hydrocarbons onSite (refer to Figure 3, *Site Plan*).

- Continuously log soil borings documenting soil lithologies encountered, lithologic contacts, moisture, density, sample depths, photoionization detection readings, and information regarding sheens and odors, as applicable. Field screen each sample utilizing a Photoionization Detector (PID) to facilitate the selection of appropriate soil samples to be submitted to the analytical laboratory. The soil samples will be handled and transported in accordance with industry standard chain-of-custody protocols to a certified laboratory capable of analyzing using NWTPH-Gx, VPH, and BTEX analytical methods.

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- Unless the PID indicates other sample locations, NWTPH-Gx and BTEX samples will be collected at five-foot intervals from five feet bgs to 25 feet bgs in each borehole. VPH samples will be collected at those locations identified as having the greatest concentrations of gasoline range TPH, BTEX, and napthalenes. The greatest concentrations are located to the northwest at approximately 4 feet bgs and 10 feet bgs between VES wells EW-4 and EW-5, to the west of the West View Mart building between the Tattoo Shop and the Mart building at approximately 10 feet bgs, and immediately to the east of the Mart building at approximately 10 feet bgs to 15 feet bgs. There also appears to be residual contamination remaining to the northeast between VES wells EW-6 and EW-7 at approximately 6.5 feet bgs and 10 feet bgs. At four of these locations soil samples will be split at a specific depth, one sample to be analyzed using the NWTPH-Gx method, and the other sample to be analyzed using the VPH analytical method. A total of 20 samples will be analyzed using NWTPH-Gx, BTEX, and napthalenes. A total four samples will be analyzed using the VPH methodology.

- Analyze selected soil samples for the following constituents of concern on a standard laboratory turn-around-time:
    - ❖ Gasoline range TPH by Northwest Method NWTPH-Gx;
    - ❖ Gasoline range TPH, BTEX, and napthalenes using VPH Method; and
    - ❖ Volatile organic compounds (VOC) including benzene, toluene, ethylbenzene, and total xylenes (BTEX) and naphthalenes by EPA Method 8021B;

- Retain a Professional Licensed Surveyor, Pacific Geomatic Services, Inc., to survey the elevations of the four newly installed monitoring wells at the Site. Ground surface and casing elevations at each well were surveyed to the nearest 0.01 foot relative to an assigned benchmark. The locations of the extraction wells onsite were also located and surveyed for its locations.

- Address conditional vapor phase issues by monitoring air in buildings and on the surface. Summa canisters will be used to monitor air over a 24 to 48-hour period or longer, if necessary. Samples will be submitted to a certified laboratory capable of analyzing air samples for the COCs.

- Prepare a report to contain a summary of the subsurface conditions encountered, a discussion of Site soil, analytical laboratory results, and interpretation, including a comparison of VPH and NWTPH-Gx results and Method B evaluation.

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4.1 Quality Controls

All soil samples will be collected in general accordance with industry protocols for the collection, documentation, and handling of samples. Descriptions of soil and sampling depths will be carefully logged in the field, and the drillers and geologist will confirm sample depths as soil samples are collected. Boring location maps will be completed prior to leaving the site to document sampling locations.

Soil samples will be tightly packed into jars to eliminate sample headspace. Upon sampling, all samples will be placed immediately into chilled ice chests.

All samples will be transported and submitted under standard chain-of-custody protocols and remain refrigerated until delivery to the Laboratory. The laboratory will provide standard quality assurance/quality control (QA/QC) which includes the following: surrogate recoveries for each sample, method blank results, duplicate analyses, matrix or blank spiked analyses, and duplicate spiked analyses.

4.2 Investigation Derived Waste

Investigation derived waste for this project will consist of soil cuttings from the subsurface exploration activities, decontamination water from decontamination of the augers and associated equipment, and purge water. These wastes will be separated and placed in Washington State Department of Transportation (DOT) approved 55 gallon drums. The drums will be stored onsite for subsequent characterization and disposal.

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5.0 DISCUSSION

The end points for Soil Cleanup Levels are considered to be:

- Direct human contact
  - Ingestion
  - Dermal contact
- Terrestrial ecological evaluation
- Protection of groundwater
  - Leaching (not applicable at this Site)
  - Residual saturation
- Conditional endpoints:
  - Vapors

This work plan will address developing cleanup standards for the direct contact and protection of groundwater (residual saturation) pathways, and conditional air monitoring will be conducted in nearby buildings to address the potential vapor intrusion pathway. A simplified terrestrial ecological evaluation is included within this work plan to address terrestrial ecological risk. The Terrestrial Ecological Evaluation is shown as attachment #1in this document. The simplified terrestrial ecological evaluation has determined that the West View Mart Site does not pose a threat to terrestrial ecological receptors, and thus may be removed from further ecological consideration during this Supplemental RI and cleanup process.[WAC 173-340-7492]

AEG will develop an average cleanup level based on the four VPH analytical results collected at the most contaminated areas of the Site. The Method B cleanup level will be compared against the 25 NWTPH-Gx, BTEX, and naphthalene results. Should it be determined that residual concentrations do not exceed the Method B cleanup levels, AEG will request an NFA letter from Ecology for this Site.

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6.0 LIMITATIONS

This report summarizes the findings of the services authorized under our agreement. It has been prepared using generally accepted professional practices, related to the nature of the work accomplished. This report was prepared for the exclusive use of Mr. Jin Shin or his designated representatives for the specific application to the project purpose.

Recommendations, opinions, site history and proposed actions contained in this report apply to conditions and information available at the time this report was completed. Since conditions and regulations beyond our control can change at any time after completion of this report, or our proposed work, we are not responsible for any impacts of any changes in conditions, standards, practices and/or regulations subsequent to our performance of services. We cannot warrant or validate the accuracy of information supplied by others, in whole or part.

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7.0 REFERENCES

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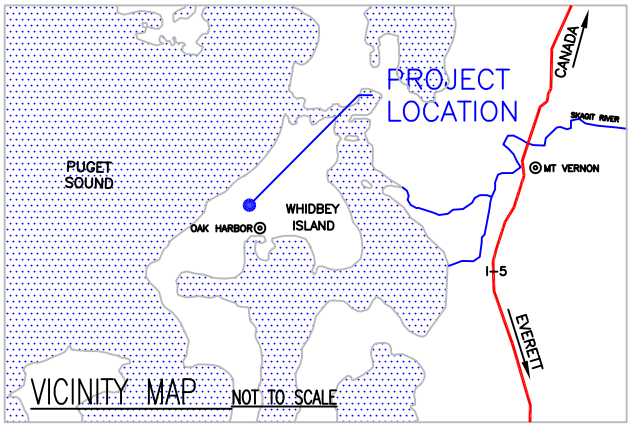
Notes: (a) The locations of all features shown are approximate.
(b) This drawing is for information purposes.
It is intended to assist in showing features discussed in an attached document.
Reference: Drawing created from sketch provided by AEGs' personnel.



ELECTRICAL ENCLOSURE

WOODED AREA

AULT FIELD ROAD

SHOPPINC CENTER

TATTOO

WEST VIEW MART

PAINT SHOP

TAXI

COMMERCIAL

COMMERCIAL

RESIDENCE

PAINT SHOP

DIRT ROAD

RESIDENCE

WOODED AREA

WOODED AREA

SUMMIT BLVD

SCALE: 1"=80 FEET

0 40 80 160

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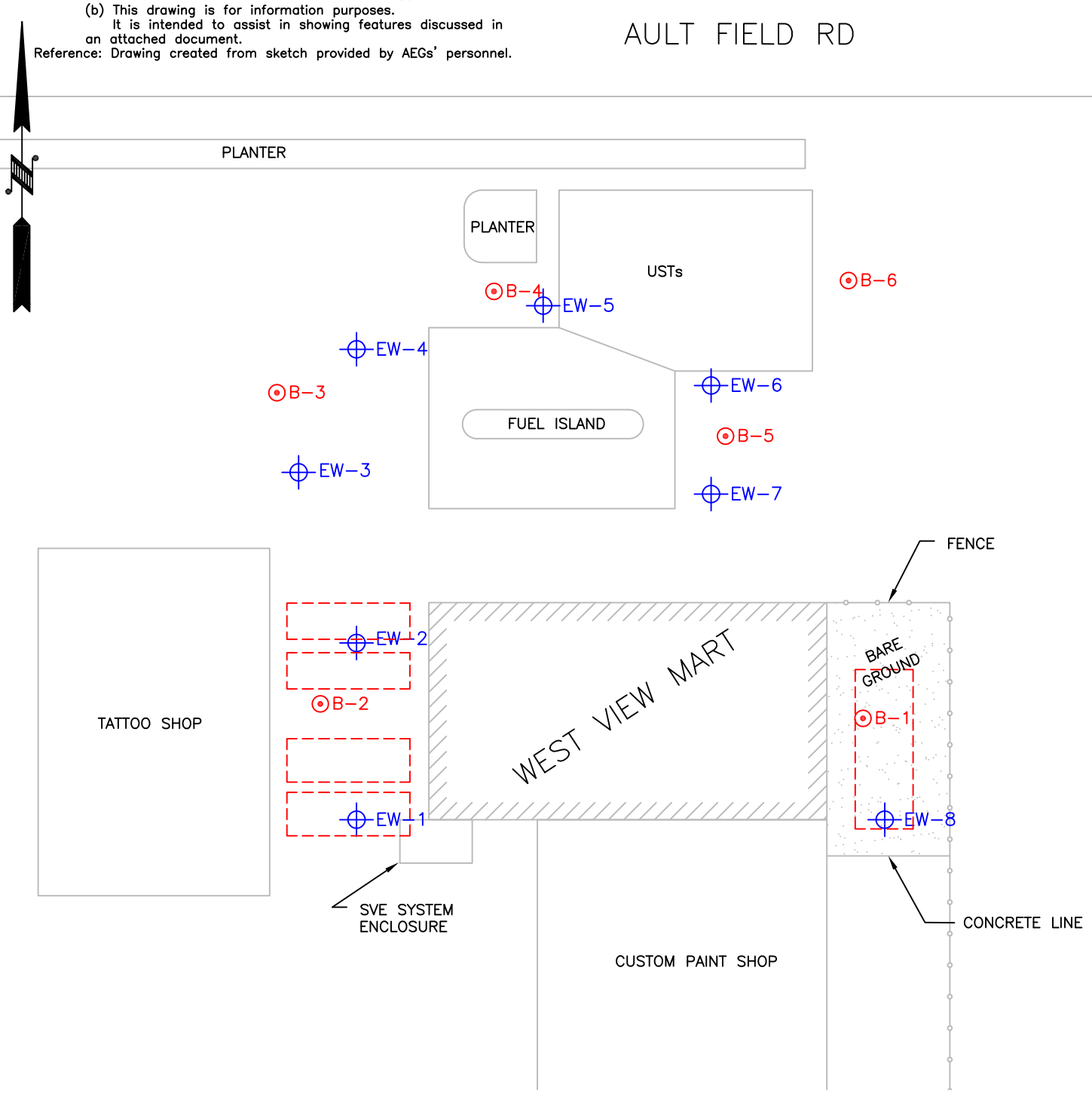
FIGURE 1

SITE & VICINITY MAP

WEST VIEW MART
971 AULT FIELD RD
OAK HARBOR, WA

Project# 07-199	Date: 04/16/13
File: WEST VIEW MART	Sheet 1 OF 3

Notes: (a) The locations of all features shown are approximate.
(b) This drawing is for information purposes.
It is intended to assist in showing features discussed in an attached document.
Reference: Drawing created from sketch provided by AEGs' personnel.



LEGEND

B-1 SOIL BORING (AEG 2009)

EW EXTRACTION WELL

FORMER UST (LOCATION APPROXIMATE)

SCALE: 1"=20 FEET

0 10 20 40

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FIGURE 2

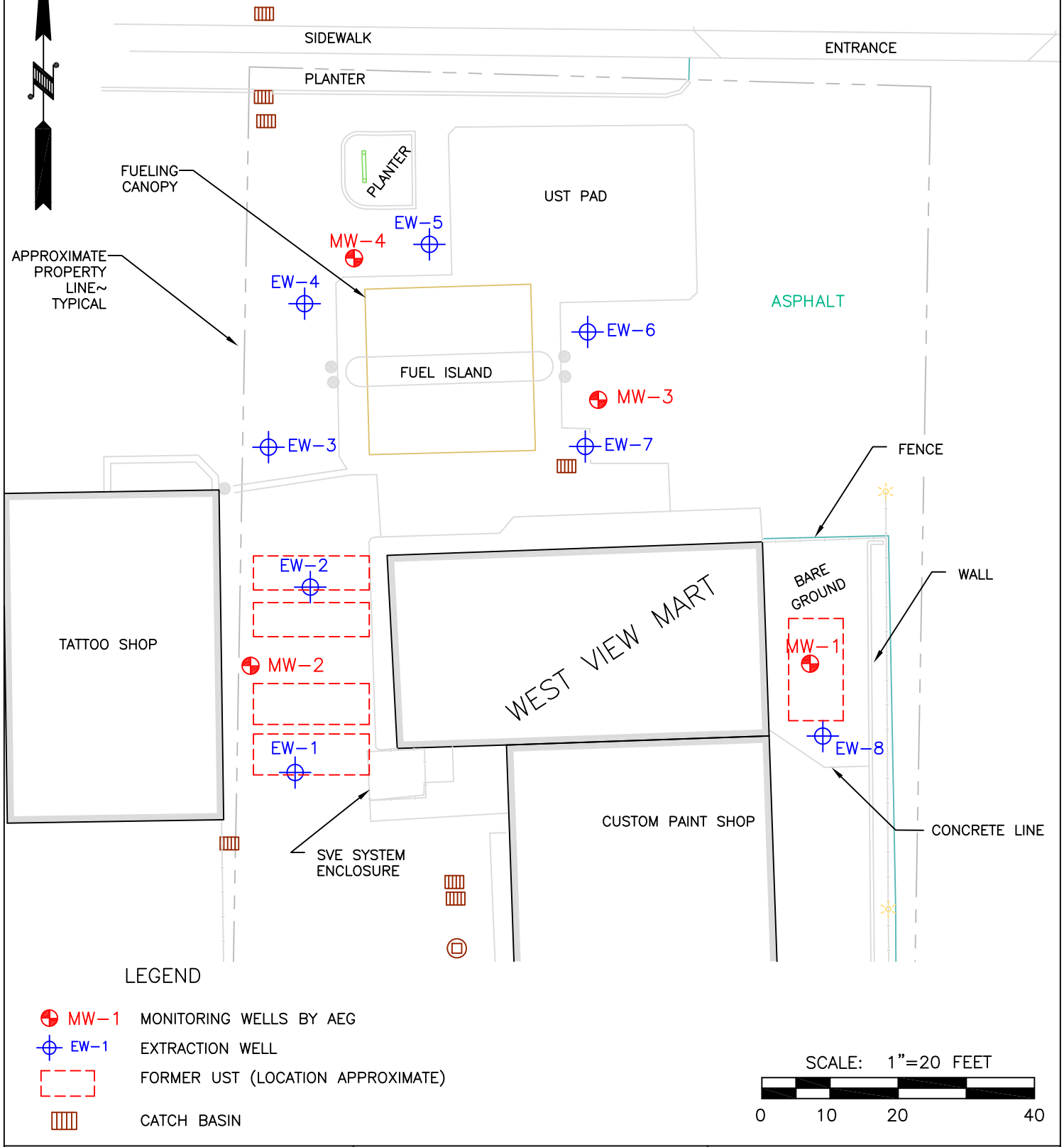
SITE PLAN

WEST VIEW MART
971 AULT FIELD RD
OAK HARBOR, WA

Project# 07-282	Date: 04/16/13
File: WEST VIEW MART	Sheet 2 OF 3

Notes:
(1) The locations of all features shown are approximate.
(2) This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.

Reference: Drawing created from surveyor's drawing by PACIFIC GEOMATIC SERVICES and notes provided by AEG, LLC.



LEGEND

MW-1 MONITORING WELLS BY AEG

EW-1 EXTRACTION WELL

FORMER UST (LOCATION APPROXIMATE)

CATCH BASIN

SCALE: 1"=20 FEET

0 10 20 40

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FIGURE 3

SITE PLAN – RI

WEST VIEW MART
971 AULT FIELD RD
OAK HARBOR, WA 98277

Project# 07-199	Date: 2/28/2011
File: WEST VIEW MART	Sheet 3 OF 3

Table 2 Summary of Soil Analytical Results - Supplemental Remedial Investigation
West View Mart
Oak Harbor, WA

Sample Number[1]	Date Sampled	Depth Sampled (feet)	**Gasoline TPH[2] (mg/Kg)**	GRO Table 830-1 - Select Volatile Organic Compounds[3] (mg/Kg)								Total Lead[5] (mg/Kg)	Diesel Extended TPH[4] (mg/Kg)		
				Benzene	Toluene	**Ethylbenzene**	**Total Xylenes**	1,2-Dichloroethane (EDC)	1,2-Dibromoethane (EDB)	**Total Naphthalenes**	MTBE		Diesel	Heavy Oil	Mineral Oil
MW1-S3-10.0	6/14/2010	10.0	**319**	<0.02	<0.10	0.085	0.48	<0.02	<0.005	<0.20	<0.05	<5.0	--	--	--
MW1-S6-25.0	6/14/2010	25.0	<10	<0.02	<0.10	<0.05	<0.15	--	--	--	--	--	--	--	--
MW2-S2-10.0	6/14/2010	10.0	**351**	**0.067**	0.052	0.46	2.74	<0.02	<0.005	0.63	<0.05	<5.0	<25	<40	<40
MW2-S4-20.0	6/14/2010	20.0	<10	<0.02	<0.10	<0.05	<0.15	--	--	--	--	--	<25	<40	<40
MW3-S1-5.0	6/15/2010	5.0	<10	**0.06**	<0.10	0.16	<0.15	--	--	--	--	--	--	--	--
MW3-S5-25.0	6/15/2010	25.0	<10	<0.02	<0.10	<0.05	<0.15	--	--	--	--	--	--	--	--
MW4-S2-10.0	6/15/2010	10.0	**5,680**	**0.38**	3.71	**21.8**	**128**	<0.02	<0.005	**82.9**	<0.05	<5.0>	<25	<40	<40
MW4-S5-25.0	6/15/2010	25.0	<10	<0.02	<0.10	<0.05	<0.15	--	--	--	--	--	<25	<40	<40
PQL			10	0.02	0.10	0.05	0.15	0.02	0.005	0.20	0.05	5.0	25	40	40
Ecology MTCA Method A Clean Up Levels			30 [6]	0.03	7	6	9	*	0.005	5	0.1	250	2,000	2,000	4,000

Notes:
[1]Approximate sample locations are shown in figure 2
[2]Gasoline range total petroleum hydrocarbons (TPH). Analyzed by NWTPH-Gx
[3]Select Volatile Organic Compounds. Analyzed by EPA Method 8260B.
[4] Diesel extended range TPH. Analyzed by Northwest Method NWTPH-D/Dx
[5] Analyzed by Northwest Method 7421
[6]Cleanup level with presence of benzene
mg/Kg = milligrams per kilograms
MTBE = methyl tertiary-butyl ether
GRO = Gasoline range organics, Table 830-1, *Required Testing for Petroleum Releases*
-- = not analyzed for this constituent
< = not detected above laboratory limits
* Ecology has not designated a cleanup level for this constituent
Bold indicates the detected concentration exceeds Ecology MTCA Method A cleanup level

Table 1 Summary of Soil Analytical Results
West View Mart
Oak Harbor, WA

Sample Number[1]	Date Sampled	Depth Sampled (feet)	**Gasoline TPH[2] (mg/Kg)**	Select Volatile Organic Compounds[3] (mg/Kg)			
				Benzene	Toluene	**Ethylbenzene**	**Total Xylenes**
B1-S4-14.0	11/5/2009	14.0	**1,420**	0.023	0.70	5.95	**36.3**
B2-S3-9.0	11/5/2009	9.0	**4,190**	**0.23**	4.74	**7.22**	**83.1**
B3-S2-6.0	11/5/2009	6.0	**68**	<0.02	0.16	0.23	2.22
B4-S1-4.0	11/5/2009	4.0	**7,720**	**2.80**	0.52	**45.6**	**487**
B5-S2-6.5	11/5/2009	6.5	**674**	**0.096**	0.046	3.53	3.16
B6-S1-4.0	11/5/2009	4.0	16	<0.02	<0.02	0.074	0.14
PQL			10	0.02	0.02	0.03	0.03
Ecology MTCA Method A Cleanup Levels			30 [4]	0.03	7	6	9

Notes:
[1]Approximate sample locations are shown in figure 2
[2]Gasoline range total petroleum hydrocarbons (TPH). Analyzed by NWTPH-Gx
[3]Select Volatile Organic Compounds. Analyzed by EPA Method 8260B.
[4]Cleanup level with presence of benzene
mg/Kg = milligrams per kilograms
-- = not analyzed for this constituent
< = not detected above laboratory limits
* Ecology has not designated a cleanup level for this constituent
Bold indicates the detected concentration exceeds Ecology MTCA Method A cleanup level

Attachment

Simplified Terrestrial Ecological Evaluation-Exposure Analysis Procedure

Estimate the area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site to the nearest 1/2 acre (1/4 acre if the area is less than 0.5 acre).	
1) From the table below, find the number of points corresponding to the area and enter this number in the field to the right.	
Area (acres) / Points: 0.25 or less – 4; 0.5 – 5; 1.0 – 6; 1.5 – 7; 2.0 – 8; 2.5 – 9; 3.0 – 10; 3.5 – 11; 4.0 or more – 12	4
2) Is this an industrial or commercial property? If yes, enter a score of 3. If no, enter a score of 1	3
3)[a] Enter a score in the box to the right for the habitat quality of the site, using the following rating system[b]. High=1, Intermediate=2, Low=3	2
4) Is the undeveloped land likely to attract wildlife? If yes, enter a score of 1 in the box to the right. If no, enter a score of 2.[c]	2
5) Are there any of the following soil contaminants present: Chlorinated dioxins/furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene? If yes, enter a score of 1 in the box to the right. If no, enter a score of 4.	4
6) Add the numbers in the boxes on lines 2-5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified evaluation may be ended.	11

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