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REMEDIAL INVESTIGATION/FEASIBILITY STUDY ADDENDUM

Property:
Plastics Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington
Agreed Order No. DE7084

Prepared for:
The Lutheran Retirement Home of Greater Seattle
(d/b/a The Hearthstone)
6720 East Green Lake Way North
Seattle, Washington

Report Date:
March 9, 2016

Remedial Investigation/Feasibility Study Addendum

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Project No.: 0651-002

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March 9, 2016

SoundEarth
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ACRONYMS AND ABBREVIATIONS

2013 RI/FS Report	Draft Final Remedial Investigation and Feasibility Study Report, prepared by Farallon Consulting, LLC in 2013
µg/L	micrograms per liter
AO	Agreed Order
AST	aboveground storage tank
bgs	below ground surface
^{o}C	degree centigrade
cis-1,2-DCE	cis-1,2-dichloroethene
cm/sec	centimeters per second
COC	chemical of concern
CSM	conceptual site model
CVOC	chlorinated volatile organic compound
DCE	dichloroethene
Dry Cleaner Building Property	6870 Woodlawn Avenue Northeast, Seattle, Washington
Dry Cleaner Building	the building on the Dry Cleaner Building Property
DW	Dangerous Waste
Ecology	Washington State Department of Ecology
EOH	edible oil substrate
EPA	U.S. Environmental Protection Agency
ERD	enhanced reductive dechlorination
ERH	Electrical Resistance Heating
Farallon	Farallon Consulting, LLC
feet/day	feet per day

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Former Laundry Property	the former parcel located within the Hearthstone Property, located at 6860 Woodlawn Avenue Northeast
Former Yasuko Property	the former parcel located within the Hearthstone Property, located at 6560 Latona Avenue Northeast
ft/ft	feet per foot
GeoEngineers	GeoEngineers, Inc.
Hearthstone Property	the property adjoining the Dry Cleaner Building to the west, located at 6850 Woodlawn Avenue Northeast
Hearthstone	The Hearthstone Retirement Living
IRACR	Interim Remedial Action Completion Report, prepared by SoundEarth in 2014
Karkrie	Karkrie LLC
mg/kg	milligrams per kilogram
MTCA	Washington State Model Toxics Control Act
PCE	tetrachloroethene
PLP	potentially liable person
PSS	Plastic Sales and Service
RCRA	Resource Conservation and Recovery Act
RI/FS Addendum	Remedial Investigation/Feasibility Study Addendum
RI/FS	remedial investigation/feasibility study
ROW	right-of-way
SM	Standard Method
SoundEarth	SoundEarth Strategies, Inc.
the Site	the extent of contamination caused by the releases of hazardous substances at the Dry Cleaner Building Property
TCE	trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure

ACRONYMS AND ABBREVIATIONS (CONTINUED)

trans-1,2-DCE	trans-1,2-dichloroethene
UST	underground storage tank
WAC	Washington Administrative Code

1.0 INTRODUCTION

SoundEarth Strategies, Inc. (SoundEarth) has prepared this Draft Final Revised Remedial Investigation/Feasibility Study (RI/FS) Addendum on behalf of the Lutheran Retirement Home of Greater Seattle (d/b/a The Hearthstone [Hearthstone]) to provide the Washington State Department of Ecology (Ecology) with a summary of the 2014 groundwater monitoring data recently collected to support the remedial investigation conceptual site model (CSM). In addition, this RI/FS Addendum provides a focused feasibility study cleanup action alternative evaluation to present the basis of the selection of the preferred modified cleanup action alternative for the Plastic Sales and Service Site (Site) and provides additional supporting information requested by Ecology in an email dated April 28, 2015.

The general location of the Site is depicted on Figure 1. The Site is defined in Ecology Agreed Order No. DE 7084 (AO), dated September 14, 2009, as the extent of contamination caused by the releases of hazardous substances at the property located at 6870 Woodlawn Avenue Northeast in Seattle, Washington (the Dry Cleaner Building Property). The Site includes the Dry Cleaner Building Property; the property adjoining it to the west, located at 6850 Woodlawn Avenue Northeast (the Hearthstone Property); the property adjoining it to the north, located at 6869 Woodlawn Avenue Northeast (north-adjoining property); and portions of the western alley (the alley), Woodlawn Avenue Northeast, and 4th Avenue Northeast rights-of-way (ROWs); and is collectively referred to as “the Site” (Figures 2A and 2B).

This document was prepared as an addendum to the Draft Final Remedial Investigation and Feasibility Study Report, prepared by Farallon Consulting, LLC (Farallon), and dated July 3, 2013 (2013 RI/FS Report). This addendum was developed to complete the requirements of a feasibility study as defined by the Washington State Model Toxics Control Act (MTCA) Regulation in Parts 350 through 357 and 370 of Chapter 340 of Title 173 of the Washington Administrative Code (WAC 173-340-350 through 173-340-157, and 173-340-370) and to satisfy the terms and conditions of the AO. The potentially liable persons (PLPs) for the Site are defined in the AO. Hearthstone purchased the Dry Cleaner Building Property from Karkrie LLC, a PLP, on June 19, 2014. Hearthstone will maintain lead responsibility for the completion of a proposed cleanup action plan that will be the basis of the work to be performed under a Consent Decree for the Site. This addendum was completed in accord with discussions between Hearthstone and Ecology that defined tasks necessary for eventual Consent Decree approval. The Hearthstone plans on redeveloping the Dry Cleaner Building Property as a mixed-use building that includes commercial and residential uses.

1.1 PURPOSE

The objective of the 2014 groundwater monitoring event was to collect additional groundwater monitoring data to assess the present Site groundwater conditions and confirm the CSM for the purpose of developing the preferred cleanup action alternative selected for the Site in the 2013 RI/FS Report.

The purpose of the focused feasibility study cleanup action alternative evaluation presented in this report is to develop and evaluate modified versions of the preferred cleanup action alternative presented in the 2013 RI/FS Report, to enable a cleanup action to be selected for the Site, and for the cleanup action alternative to be incorporated as part of the Site development.

This RI/FS Addendum has been prepared to provide Ecology with supplemental RI/FS information and to select the most appropriate cleanup action alternative based on future land use and in comparison with

Ecology evaluation criteria listed below. According to MTCA, a selected cleanup action alternative must satisfy all of the following threshold criteria as specified in WAC 173-340-360(2):

- Protect human health and the environment.
- Comply with applicable state and federal laws.
- Comply with cleanup standards.
- Provide for compliance monitoring.

While these criteria represent the minimum standards for an acceptable cleanup action, WAC 173-340-360(2)(b) also recommends that the selected cleanup action satisfy the following criteria:

- Use permanent solutions to the maximum extent practicable.
- Provide for a reasonable restoration time frame.
- Consider public concerns on the proposed cleanup action alternative.

1.2 PRELIMINARY CLEANUP LEVELS

Preliminary cleanup levels were established for individual hazardous substances in each medium during the scoping of the Farallon remedial investigation based on various phases of investigation performed by others. The preliminary cleanup levels were refined in the 2013 RI/FS Report. The current land use of the Dry Cleaner Building Property is commercial and the proposed future land use is a mix of commercial and residential.

The preliminary cleanup levels for chemicals of concern (COCs) confirmed or suspected in environmental media of concern are provided in the 2013 RI/FS Report. These cleanup levels for individual hazardous substances are based on established MTCA Method A cleanup levels in accordance with WAC 173-340-720 through WAC 173-340-760. MTCA Method B cleanup levels are used for hazardous substances where MTCA Method A cleanup levels were not established. For example, a MTCA Method A cleanup level has not been established for cis-1,2-dichloroethene (cis-1,2-DCE); therefore, the MTCA Method B cleanup level will be used for cis-1,2-DCE.

The final cleanup standards will be determined based on the Ecology approved-selected cleanup action(s) and the current and potential future land and resource uses. The final cleanup standards for the Site, including cleanup levels and points of compliance, will be defined in the Cleanup Action Plan presented under separate cover, in accordance with WAC 173-340-700.

1.3 REPORT ORGANIZATION

This RI/FS Addendum is organized into the following sections:

- **Section 2.0, Background.** This section provides a description of the Site features and location; a summary of the current and historical uses of the Site and adjoining properties; a description of the Site's environmental setting, a description of the sampling conducted at the Site between 2002 and 2014, and a summary of the CSM derived primarily from the results of the historical research, previous investigations, and interim actions performed at the Site. Included is a summary of the confirmed and suspected source areas, the chemicals and media of concern, the fate and transport characteristics of the release of hazardous substances, and the potential exposure pathways.

- **Section 3.0, Focused Feasibility Study Cleanup Action Alternative Evaluation.** This section provides a summary of Farallon's selected preferred cleanup action alternative, a detailed comparison of enhanced modified versions of the previously selected preferred cleanup action alternative, and a disproportionate cost analysis of each of the modified cleanup action alternatives.
- **Section 4.0, Selected Modified Cleanup Action Alternative.** This section also presents the selected modified cleanup action alternative preferred for the Site.
- **Section 5.0, References.** This section lists sources used to create this RI/FS Addendum.
- **Section 6.0, Limitations.** This section presents SoundEarth's standard limitations associated with conducting the work reported herein and preparing this RI/FS Addendum.

2.0 BACKGROUND

This section provides a summary of the Site features and location, historical Site use, environmental setting, previous investigations, interim remedial actions, results from the 2014 groundwater monitoring event, and the CSM. Detailed descriptions of the background information for the Site prior to 2014 are provided in the reports listed in Section 5.0.

2.1 SITE DESCRIPTION AND HISTORY

The Site is defined by the extent of contamination caused by the releases of hazardous substances at the Dry Cleaner Building Property, as described above in Section 1.0. The Site is located in Section 5, Township 25 South, Range 4 West, in the Green Lake neighborhood of Seattle, Washington (Figure 1). A description of the properties located within the Site is provided in the following subsections.

2.1.1 Dry Cleaner Building Property

The Dry Cleaner Building Property includes two tax parcels (King County tax parcels #952810-4725, and #952810-4735) that cover approximately 8,800 square feet (0.20 acres) of land. The Dry Cleaner Building Property is located at 6870 Woodlawn Avenue Northeast and 6560 4^{th} Avenue Northeast. The Dry Cleaner Building Property is currently improved with a 1947-vintage, 2-story, masonry warehouse and office (Dry Cleaner Building; Figures 2A and 2B).

The Dry Cleaner Building Property was occupied by residences as early as 1904. Sunshine Cleaners acquired the Dry Cleaning Building Property in 1947, demolished the residence, and constructed the Dry Cleaner Building. The building utilized steam heat fueled by a heating oil underground storage tank (UST) of unknown capacity, located in the western portion of the building. The heating oil UST remains beneath the Dry Cleaner Building Property. Sunshine Cleaners operated a dry cleaner on the Dry Cleaner Building Property from 1948 to 1977 (Ecology 2009). Sunshine Cleaners used Stoddard solvent, the primary dry cleaning solvent in use from the late 1920s to late 1950s. Stoddard solvent was stored in two USTs with capacities of 1,500 and 2,000 gallons. The USTs are located in Woodlawn Avenue Northeast ROW adjacent to the north side of the Dry Cleaning Building and were reportedly abandoned in-place in 1958 when the Sunshine Cleaners began using tetrachloroethene (PCE) for dry cleaning operations. The Stoddard solvent USTs are still present beneath the Woodlawn Avenue Northeast ROW.

Sunshine Cleaners reportedly stored PCE in an aboveground storage tank (AST) with a capacity of 200 gallons. The former location of the AST is unknown. Sunshine Cleaners installed dry cleaning equipment on the western portion of the former Dry Cleaner Building, as shown on Figures 2A and 2B, and used the equipment for both Stoddard solvent and PCE operations.

Plastic Sales and Service (PSS) began operating in the Dry Cleaner Building in 1978. PSS does not operate as a dry cleaner; however, small quantities of solvent have been used during its tenure (Ecology 2009). PSS currently operates a plastic fabrication facility in the Dry Cleaner Building. No plastics are manufactured on the Dry Cleaner Building Property, but plastic stock materials are stored and are finished and transformed into final products. Hearthstone purchased the Dry Cleaner Building Property from Karkrie LLC (Karkrie) in June 2014.

2.1.2 Hearthstone Property

The Hearthstone Property is composed of three former parcels: the first parcel located at 6860 Woodlawn Avenue Northeast (Former Laundry Property), the second located at 6850 Woodlawn Avenue Northeast (the Former Yasuko Property), and the third located at 6560 Latona Avenue Northeast (Single Family Lot). The Hearthstone Property is located to the west of the Dry Cleaner Building Property, across the alley (Figures 2A and 2B). The three parcels were purchased by Hearthstone in 2005 and Former Laundry and Yasuko Properties were replatted into a single tax parcel (King County tax parcel #952810-4695). The Hearthstone Property currently includes two tax parcels (King County tax parcel #952810-4695 and -4696) that cover approximately 18,203 square feet (0.42 acres) of land. The Hearthstone Property is listed at 6850 Woodlawn Avenue Northeast. The northern portion of the Hearthstone Property (King County tax parcel #952810-4695) is considered part of the Site based on the historical extent of PCE contamination formerly present at this parcel. Additionally, the northern portion of the Hearthstone Property has been redeveloped as a 4-story building with one level of underground parking to be used as retirement residences, with commercial shops occupying the first floor. The Single Family Lot (King County tax parcel #952810-4696) is undeveloped and is not considered part of the Site.

Sunshine Cleaners owned and occupied the Former Laundry Property as early as 1931. According to the former owner of Sunshine Cleaners, only laundry, pressing, and packaging operations were conducted on the Former Laundry Property. Former tenants on the Former Yasuko Property included Scott's Trophies, a restaurant, a dance studio, an antique shop, and a cabinetmaker.

In 1977, Mr. Robert Bell, the former owner and operator of Sunshine Cleaners, transferred interest in the Former Laundry Property. Ruben and Patricia Rael acquired the Former Laundry Property in 1995 and transferred the property to Karkrie in 2000. Karkrie sold the Former Laundry Property to Hearthstone in 2005. PSS operated at the Former Laundry Property at various times between 1977 and 2006 (Ecology 2009).

All aboveground structures within the Hearthstone Property were demolished between 2008 and 2009 as part of the Hearthstone Property's redevelopment.

2.1.3 North-Adjoining Property

The north-adjoining property, located at 6869 Woodlawn Avenue Northeast, includes two tax parcels (King County tax parcels #952810-0525 and #952810-0535) that cover approximately 8,500 square feet (0.20 acres) of land. The north-adjoining property is improved with a 1926-

vintage, wood-framed, office building on the eastern portion and an asphalt-paved parking lot on the western portion. The north-adjoining property was occupied by residences as early as 1904, a machine shop in the 1950s, and a film development facility in 1966 (GeoEngineers 2004b).

2.1.4 City of Seattle Rights-of-Way

The existing PCE groundwater plume extends from the Dry Cleaner Building Property into the adjoining City of Seattle ROWs. The adjoining ROWs include the alley located between the Dry Cleaner Building Property and the Hearthstone Property; Woodlawn Avenue Northwest located between the Dry Cleaner Building Property and the north-adjoining property; and 4th Avenue Northwest located directly east-northeast of the Dry Cleaner Building Property.

2.2 ENVIRONMENTAL SETTING

Topographically, the Site is relatively flat with a slight slope to the northeast toward the former Ravenna Creek. The Site is situated approximately 150 feet above mean sea level. The nearest surface water body is Green Lake, located approximately 900 feet to the northwest. Properties within the Site are zoned Neighborhood Commercial 3 (King County 2015). Immediately south, properties are zoned for single- and multifamily residential use.

Based on field observations from SoundEarth and others, the upper 20 feet of soil beneath the Dry Cleaner Building Property and the Hearthstone Property generally range from stiff to very stiff silt and medium dense to very dense silty sand. Trace amounts of gravel were also observed in borings advanced in the vicinity of the Hearthstone Building Property in the upper 15 feet below ground surface [bgs]). The observed soil from borings located north and downgradient of the Dry Cleaner Building Property indicates that the soil profile transition laterally from silt and silty sand layers to a silt with minimal coarse-grained soil present in Woodlawn Avenue Northeast. Underlying the upper silt and silty sand unit is a dense to very dense, poorly graded sand and gravel to well-graded sand and silty sand unit that ranges in depth from approximately 20 to 70 feet bgs. The silty sand layers encountered in the upper 20 feet contained a higher percentage of silt (30 to 40 percent) versus the silty sand layers encountered in soil deeper than approximately 20 feet bgs. A silt unit has been encountered beneath the sand and gravel unit to the maximum depths explored beneath the Site, approximately 80 feet bgs.

A shallow, unconfined water-bearing zone is present beneath the Site from approximately 6 to 20 feet bgs and is designated as the Shallow Zone based on the observed soil profile and potentiometric surface in the existing well network. The depth to groundwater in the Shallow Zone generally ranges from 4 to 8 feet below the top of well casings; seasonal fluctuations in groundwater elevations range from approximately 2 to 5 feet (Table 1). Based on groundwater elevations measured in September 2014 at monitoring wells located at the Site, the groundwater flow direction in the Shallow Zone was to the north and northwest, with gradients ranging between 0.01 and 0.06 feet per foot (ft/ft; Figure 3). The Shallow Zone is underlain by a semiconfined to confined groundwater-bearing zone designated as the Deep Zone. The Deep Zone ranges in depth from 5 to 9 feet below the top of well casings. Based on depth-to-groundwater measurements collected in September 2014, the direction of groundwater flow in the Deep Zone was to the northeast with gradients ranging between 0.01 and 0.03 ft/ft (Figure 4). The Shallow Zone appears to act as a semiconfining to confining unit based on observed potentiometric surface measurements from the existing well network that generally indicate a positive hydraulic head in wells installed in the Deep Zone.

2.3 PREVIOUS INVESTIGATIONS

Between 2002 and 2012, 12 subsurface investigations were conducted at the Site. The objectives of the subsurface investigations were to collect data necessary to adequately define the nature and extent of contamination at the Site and to complete the remedial investigation. This report section presents a summary of the investigation activities conducted at the Site by SoundEarth and others. Groundwater elevations and analytical results are presented in Table 1 and 2, respectively. Figure 2B of this report depicts locations, including borings and monitoring wells, sampled during previous investigations on the Site. Potentiometric surface contour maps for the Shallow Zone and Deep Zone are depicted on Figures 3 and 4, respectively. The groundwater analytical results and PCE isoconcentration contours for the Shallow Zone and Deep Zone are depicted on Figures 5 and 6, respectively. Figure 7 presents a plan view of the Site, a concentration contour map for PCE, and PCE concentrations in soil beneath the Site after the completion of the interim remedial action conducted on the Hearthstone Property between 2011 and 2012. Cross sections presenting the soil and groundwater analytical results for the Site subsequent to the completion of the interim remedial action are presented on Figures 8, 9, and 10. As requested by Ecology, SoundEarth prepared a new cross section E–E' (Figure 10) to present the soil and groundwater conditions along a cross section line following the groundwater flow direction that includes MW-14, MW-4, MW-6, and MW-21. SoundEarth Figures 7, 8, and 9 in this RI/FS Addendum are supplemental to Farallon Figures 6, 10, and 11 in the 2013 RI/FS Report. Cross sections C–C' and D–D' are included in Figures 12 and 13 of the 2013 RI/FS Report and are focused on the soil and groundwater conditions associated with the former Laundry Building Property.

A release of PCE was discovered in soil and shallow groundwater at the Dry Cleaner Building Property in 2002 during a subsurface investigation being conducted as part of due diligence for a prospective purchaser of the Laundry Property. GeoEngineers, Inc. (GeoEngineers) advanced direct-push borings GP-6 and GP-7 at the former Dry Cleaner Building Property (Figure 2B) and collected soil from the borings, as well as a reconnaissance groundwater sample from boring GP-6. The samples were submitted for analysis of chlorinated volatile organic compounds (CVOCs), and the analytical results confirmed a release of CVOCs, including PCE and trichloroethene (TCE), to soil and shallow groundwater beneath the Dry Cleaner Building Property. PCE and TCE in soil were detected at concentrations exceeding the applicable MTCA Method A cleanup levels (Figure 7). The source(s) and extent of the release were not defined during the investigation. The following investigation activities were performed at the Site between 2002 and 2011 in order to define the nature and extent of contamination, including the initial discovery subsurface investigation:

- Drilling and sampling of 86 borings within and adjacent to the Site.
- Collecting 196 soil samples from the borings and submitting the samples for laboratory analysis of CVOCs, including PCE, TCE, cis-1,2-DCE and trans-1,2-dichloroethene (trans-1,2-DCE), and vinyl chloride. A select subset of these samples was also analyzed for select physical parameters.
- Collecting 9 soil samples from beneath drain lines, concrete slabs, and sumps on the Hearthstone Property to evaluate preferential pathways and submitting the samples for laboratory analysis of CVOCs.
- Collecting 52 reconnaissance groundwater samples from the borings and submitting the samples for laboratory analysis of CVOCs.
- Installing and developing 30 permanent monitoring wells within the Shallow Zone and Deep Zone.

- Collecting and analyzing 91 groundwater samples from the monitoring wells and submitting the samples for analysis of CVOCs. A subset of the samples was also analyzed for select geochemical parameters to evaluate natural attenuation.
- Conducting aquifer tests, including slug tests, in multiple wells and a constant-rate aquifer pump test.

The results of the investigations are summarized in the following subsections.

2.3.1 Soil Analytical Results

Soil samples were collected from borings using direct-push and hollow-stem auger drilling methods. The laboratory analytical results of the soil samples indicate the following:

- Concentrations of PCE exceeding the MTCA Method A cleanup level were detected in 73 of 196 soil samples collected during the subsurface investigations, which included 42 of the 86 sample locations. These sample locations included borings GP-6, GP-11, SB-1 through SB-5, SB-7 through SB-10, SB-15, SB-16, P01 through P06, P11, P12, P14, P17, SB-22, SB-23, SB-26, SB-27, SB-29, SB-30 through SB-39, MW-7, MW-8, MW-9, MW-15, MW-20, MW-22, and TMW-3.
- Concentrations of TCE exceeding the MTCA Method A cleanup level were detected in 13 of the 196 soil samples collected during the subsurface investigations, which included 8 of the 86 sample locations. These sample locations included borings SB-2, SB-4, SB-10, P11, SB-27, SB-34, MW-7, and MW-15.
- Concentrations of cis-1,2-DCE and trans-1,2-DCE were below applicable MTCA Method B cleanup levels and vinyl chloride was below applicable MTCA Method A cleanup levels in all of the soil samples analyzed.
- Soil samples collected to assess preferential pathways on the Hearthstone Property did not contain concentrations of CVOCs above laboratory reporting limits.

Soil with elevated concentrations of CVOCs is located beneath the northwest portion of the Dry Cleaner Building Property in the vicinity of the dry cleaning equipment and laterally extends a short distance to the north beneath the Woodlawn Avenue Northeast ROW, to the southwest beneath the alley and Hearthstone Property, and to the northeast beneath the 4th Avenue Northeast ROW. Soil analytical results subsequent to the interim remedial action at the Hearthstone Property are depicted in plan view on Figure 7 and presented in cross sections on Figures 8 through 10 of this RI/FS Addendum. A complete summary of historical soil analytical results for soil samples collected from borings prior to the completion of the interim remedial action at the Hearthstone Property is provided in Table 2 of the 2013 RI/FS Report, and plan and cross-sectional view on Figures 10 through 13 of the 2013 RI/FS Report. The Interim Remedial Action Completion Report (IRACR), prepared by SoundEarth and dated December 18, 2014, provides tabulated soil analytical results for samples collected beneath drain lines and sumps as Table 1 and a plan view depiction as Figure 5. CVOCs exceeding the applicable MTCA Method A cleanup levels in the soil samples were primarily encountered at depths from 2 to 18 feet bgs, within in the Shallow Zone. CVOCs exceeding the applicable MTCA Method A cleanup levels were also detected in two samples located within the Deep Zone at depths between 25 and 25.5 and 45 to 46.5 feet bgs: borings MW-15 and MW-9, respectively.

2.3.2 Reconnaissance Groundwater Analytical Results

Reconnaissance groundwater samples were collected from historical borings using temporary well screens. The laboratory analytical results of the reconnaissance groundwater samples indicate the following:

- Concentrations of PCE exceeding the MTCA Method A cleanup level were detected in 26 of 56 reconnaissance groundwater samples collected during the investigations. Boring locations with exceedances included GP-6, GP-10, GP-11, SB-1 through SB-4, SB-9, SB-15, SB-18, P11 through P15, P17, SB-22, SB-23, SB-26, SB-27, SB-29, SB-30, SB-32, and SB-35. In addition, concentrations of PCE were also detected in deep boring SB-11 at depths of 55 and 66.5 feet bgs, but below the applicable MTCA Method A cleanup level.
- Concentrations of TCE exceeding the MTCA Method A cleanup level were detected in 8 of the 56 reconnaissance groundwater samples collected during the investigations, which included borings GP-6, SB-2, SB-4, SB-9, SB-15, P11, SB-26, and SB-27.
- Concentrations of cis-1,2-DCE exceeding the MTCA Method B cleanup level were detected in 3 of the 56 reconnaissance groundwater samples collected during the investigations, which included borings GP-6, SB-15, and P11.
- A concentration of vinyl chloride exceeding the MTCA Method A cleanup level was detected in boring P11.

Historical reconnaissance groundwater sample analytical results from previous investigations are summarized in Table 3 of the 2013 RI/FS Report. Plan views of historical PCE concentrations in groundwater are provided in Figures 7 and 8 of the 2013 RI/FS Report. The distribution of contaminants observed in the reconnaissance groundwater samples is described in the next subsection.

2.3.3 Groundwater Analytical Results

Groundwater samples were collected from monitoring wells using low-flow purging methods between 2006 and 2010. Laboratory analytical results of the groundwater samples indicate the following:

- Concentrations of PCE exceeding the MTCA Method A cleanup level have been detected in groundwater samples collected from Shallow Zone monitoring wells MW02 through MW06, MW24, and MW25, and temporary monitoring wells TMW01, TMW02, and TMW03.
- Concentrations of TCE, cis-1,2,-DCE, and vinyl chloride exceeding the applicable MTCA Method A or B cleanup level have been detected in groundwater samples collected Shallow Zone monitoring wells MW04, MW05, and MW06.
- Concentrations of PCE exceeding the MTCA Method A cleanup level have been detected in groundwater samples collected from Deep Zone monitoring wells MW07 and MW09.
- Concentrations of TCE exceeding the MTCA Method A cleanup level have been detected in groundwater samples collected from Deep Zone monitoring well MW07.

Groundwater in the Shallow Zone with concentrations of CVOCs exceeding the MTCA cleanup levels was present beneath the Dry Cleaner Building Property, beneath the north-central portion of the Hearthstone Property, beneath the alley between these properties, and in the ROWs of Woodlawn Avenue Northeast to the north, and 4th Avenue Northeast to the east.

The historical release(s) of PCE to the subsurface in the vicinity of the dry cleaning equipment appears to have migrated vertically from the Shallow Zone down to the Deep Zone. The upper 1 to 30 feet (21 to 50 feet bgs) of the Deep Zone has elevated concentrations of CVOCs directly downgradient of the suspected source area (Figures 8, 9, and 10). Groundwater in the Deep Zone with concentrations of CVOCs exceeding the MTCA cleanup levels was likely present beneath the dry cleaning equipment and was directly north-northwest beneath the Woodlawn Avenue Northeast ROW and a portion of the north-adjoining property. Groundwater elevations and sample analytical results from previous investigations are summarized in Tables 1 and 2 of this RI/FS Addendum.

2.3.4 Aquifer Test Results

In January 2007, Farallon performed an aquifer slug test at Shallow Zone monitoring wells MW-4, MW-5, and MW-15 and a constant-rate pump test at Deep Zone monitoring well MW-11. The objective of the slug test was to evaluate the hydrologic characteristics of the Shallow Zone. Farallon calculated a geometric mean value for horizontal hydraulic conductivity from MW-4, MW-5, and MW-15 of 1.33×10^{-5} centimeters per second ([cm/sec]; 0.038 feet per day [feet/day] or 0.284 gallons per day per square foot) for Shallow Zone.

The objective of the pump test was to collect measurements to estimate the ability of the Deep Zone to transmit groundwater and other hydraulic characteristics. Farallon calculated a geometric mean value for horizontal hydraulic conductivity of 4.21×10^{-3} cm/sec (11.9 feet/day) for wells screened in the Shallow Zone and the upper portion of the Deep Zone and of 2.85×10^{-3} cm/sec (8.1 feet/day) for wells screened in Deep Zone.

Storativity was estimated to range between 0.007 and 0.17 in the Shallow Zone and upper portions of the Deep Zone, indicating unconfined or semiconfined conditions, and in the lower portion of the Deep Zone between 0.004 and 0.0003, indicating semiconfined to confined conditions.

The results of the aquifer tests indicated that hydraulic communication of the Shallow Zone and Deep Zone is present beneath the Site. The aquifer test results also indicated that a preferential flow pathway was present between MW-11 and MW-12 and a limited pathway was present between MW-11 and MW18, likely due to channelized flow or other geologic conditions increasing hydraulic conductivity in a northwesterly direction.

2.4 2011 AND 2012 INTERIM REMEDIAL ACTION

SoundEarth conducted the interim remedial action on the Hearthstone Property in two phases. The first phase of work was performed between July and September 2011, and the second phase of work was completed between May and July 2012. The objectives of the interim remedial action were to remove PCE-contaminated soil, prevent vapor intrusion, and control potentially contaminated groundwater beneath the Hearthstone Property. The field activities associated with the interim remedial action included the following:

- Excavating soil with concentrations of PCE above the laboratory reporting limit (0.025 milligrams per kilogram [mg/kg]) within the Hearthstone Property, specifically within the northeast corner of the Hearthstone Property, to the maximum extent practical of 15 feet bgs.

- Disposing of approximately 4,106 tons of PCE-contaminated soil from the Hearthstone Property to a regulated treatment, storage, and disposal facility.
- Excavating approximately 541 tons of clean soil, defined as soil exhibiting no PCE concentrations above the laboratory reporting limit, and disposing of it at a regulated landfill.
- Collecting groundwater samples from dewatering wells and submitting the samples for analysis of CVOCs.
- Collecting a total of 118 performance and confirmation samples within a surveyed grid, including 64 sidewall samples and 54 bottom samples.
- Collecting wastewater discharge samples and submitting the samples for laboratory analysis of CVOCs and other chemicals based on the criteria specified in the King County discharge authorization permit.

A detailed description of the field activities and analytical results is provided in the IRACR. The results of the interim remedial action are summarized below.

2.4.1 Soil Analytical Results

Upon completion of the interim remedial action, 23 sidewall confirmation samples and 37 bottom confirmation samples were collected to document the results of the interim remedial action.. The sidewall confirmation soil samples were collected at depths of 5 to 12 feet bgs and the bottom confirmation soil samples ranged in depth from 15 to 17 feet bgs. Concentrations of PCE in performance and confirmation soil samples ranged from less than 0.025 mg/kg to 1.8 mg/kg. A concentration of TCE exceeding the Method A cleanup level was detected in the soil sample collected beneath a footing at 17 feet bgs in grid cell GC02. Soil at depths of 15 to 17 feet bgs in the central and northern portions of the interim remedial excavation had concentrations of PCE exceeding the preliminary cleanup level of 0.05 mg/kg. Concentrations of PCE and other COCs in soil remaining in the sidewalls at the completion of interim remedial action do not exceed the laboratory reporting limits. An updated cross section of A–A' is presented on Figure 8 and shows the extent of the excavation which completed the interim remedial action. Concentrations of PCE in confirmation soil samples are in Table 3 and on Figure 8 of the IRACR.

A total of 27 stockpile soil samples were collected during the interim remedial action to confirm that soil designated for disposal as clean soil did not contain concentrations of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, or vinyl chloride at concentrations above applicable laboratory detection limits. Analytical results for stockpile soil samples showed that soil samples contained concentrations of PCE ranging from less than 0.025 mg/kg to 0.51 mg/kg. TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride were not detected in stockpile soil samples at concentrations exceeding applicable laboratory detection limits. Stockpile soil with concentrations of PCE above the laboratory practical quantitation limit was disposed of at the Republic Services solid waste landfill in Roosevelt, Washington (Roosevelt Landfill). Analytical results for stockpile soil samples are presented in Table 4 of the IRACR.

2.4.2 Groundwater Analytical Results

Groundwater samples were collected from the dewatering well in September and November 2011 and April 2014. The concentrations of PCE in groundwater in September and November

2011 were 12 micrograms per liter (µg/L) and 5.3 µg/L, respectively. PCE was not detected above the laboratory reporting limit in the April 2014 sample. Concentrations of TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride did not exceed the laboratory reporting limits in the analyzed samples. Analytical results are presented in Tables 5 and 7 of the IRACR.

2.4.3 Wastewater Analytical Results

Wastewater samples were collected from the dewatering system prior to discharging the water to the sanitary sewer system. At a minimum, samples were collected monthly, and results were reported monthly to King County Metro in accordance with the King County wastewater discharge authorization permit for the Hearthstone Property. Concentrations of PCE in the wastewater discharged ranged from 2.2 µg/L to 77 µg/L. Concentrations of PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride in the discharge water were less than the King County Water Discharge Limits authorized under King County Major Discharge Authorization Permit No. 4164-02 (King County 2011). Discharge limits are presented in Table 6 of the IRACR.

2.5 2014 GROUNDWATER MONITORING

SoundEarth conducted a groundwater monitoring event at the Site in September and October 2014. The purpose of the monitoring event was to evaluate the present groundwater conditions and to confirm the CSM for the purpose of developing and evaluating focused cleanup action alternatives based on the preferred cleanup action alternative selected for the Site in the 2013 RI/FS Report. A detailed description of the field activities and results is provided below.

2.5.1 Field Activities

In September 2014, SoundEarth collected groundwater measurements from existing Shallow Zone monitoring wells MW01 through MW06, MW15, MW16, MW19, MW21, MW24 through MW27, and Deep Zone monitoring wells MW07 through MW14 and MW22. Groundwater measurements were collected from the existing monitoring wells on September 9, 2014, relative to the top of well casings to an accuracy of 0.01 feet using an electronic water meter.

SoundEarth collected groundwater samples from each monitoring well in September and October 2014 in accordance with the U.S. Environmental Protection Agency's (EPA) *Low Flow (Minimal Drawdown) Ground-Water Sampling Procedures* (1996). Purging and sampling of each well were performed using a peristaltic pump for Shallow Zone wells and a bladder pump for Deep Zone monitoring wells. During purging, water quality parameters were monitored and recorded, including temperature, pH, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential. Each well was purged until the six water quality parameters stabilized.

Following purging, groundwater samples were collected from the pump outlet tubing located upstream of the flow-through cell and placed directly into clean, laboratory-prepared sample containers. A duplicate groundwater sample was collected from monitoring well MW04 for quality assurance/quality control purposes. The groundwater samples were submitted for analysis of CVOCs by EPA Method 8260C. Samples collected from wells MW01, MW07 through MW11, and MW22 were also submitted for the following natural attenuation and geochemical parameters:

- Nitrate by EPA Method 353.2
- Dissolved manganese and iron by EPA Method 6010C

- Ferrous iron by Standard Method (SM) 3500
- Sulfate by American Society for Testing and Materials Method D516-07
- Methane, ethane, and ethene by Method RSK 175
- Total alkalinity by SM 2320B
- Total organic carbon by SM 5310B

Total manganese and iron were analyzed in the field using HACH field kits. Groundwater samples were submitted to Onsite Environmental Inc., of Redmond, Washington, and subcontracted for laboratory analysis to Aquatic Research Incorporated, of Seattle, Washington, under standard chain-of-custody protocols. Purge water and decontamination water were temporarily stored on the Dry Cleaning Building Property pending analytical results.

2.5.2 Groundwater Measurement and Analytical Results

The groundwater elevations measured in Shallow Zone monitoring wells within and adjacent to the Site ranged from 164.69 feet (MW21) to 169.95 above mean sea level and groundwater elevations measured in the Deep Zone monitoring wells at the Site ranged from 164.75 feet to 168.01 feet above mean sea level. Deep Zone groundwater measurements demonstrate semiconfined to confined aquifer conditions. Depth-to-groundwater measurements and corresponding groundwater elevations for Site monitoring wells are presented in Table 1.

The potentiometric surface contours for the Shallow Zone and Deep Zone from the monitoring event are shown on Figures 3 and 4, respectively. Groundwater flow direction for the Shallow Zone is generally in a northeast to north direction toward Green Lake with an average gradient ranging between 0.01 and 0.06 ft/ft. The measurements for the Shallow Zone observed at monitoring well MW03 indicate that localized mounding is occurring. Potential sources of recharge for the mounding may be the existing sanitary sewer or water lines leaving the Dry Cleaner Building Property or potential irrigation lines located in the planter strip or potential surface infiltration. Groundwater for the Deep Zone flows in a general northeast direction toward Green Lake with an average gradient ranging between 0.01 and 0.03 ft/ft. The contours for both water-bearing zones are consistent with previous groundwater monitoring events. Historical groundwater elevation measurements are presented in Table 1.

Laboratory analytical results of the groundwater samples collected during the 2014 groundwater monitoring event indicate the following:

- Concentrations of PCE exceeding the MTCA Method A cleanup level were detected in groundwater samples collected from Shallow Zone monitoring wells MW03 through MW06, MW24, and MW25.
- Concentrations of TCE exceeding the MTCA Method A cleanup level were detected in groundwater samples collected from Shallow Zone monitoring wells MW04, MW05, and MW06.
- Concentrations of cis-1,2-DCE exceeding the MTCA Method B cleanup level were detected in groundwater samples collected from Shallow Zone monitoring wells MW04 and MW06.

- Concentrations of vinyl chloride exceeding the MTCA Method A cleanup level were detected in groundwater samples collected from Shallow Zone monitoring wells MW04, MW06, and MW21.
- Concentrations of PCE exceeding the MTCA Method A cleanup level have been detected in groundwater samples collected from wells screened within the Deep Zone, including monitoring wells MW09 and MW10.

An assessment of the natural attenuation and geochemical parameters in groundwater was performed as part of the feasibility study for the Site. The continued assessment of monitored natural attenuation is proposed as part of the monitoring program for modified cleanup action alternative. Groundwater analytical results for CVOCs are presented in Table 2 and on Figures 5 and 6 for the Shallow and Deep Zones, respectively. Groundwater analytical results for natural attenuation parameters are presented in Table 3 and for geochemical parameters in Table 4. Laboratory reports for the groundwater samples are provided in Appendix A.

2.6 CONCEPTUAL SITE MODEL SUMMARY

The findings of investigations conducted at the Site were used to develop a CSM. This section summarizes the source areas, COCs, media of concern, contaminant fate and transport, and potential exposure pathways identified for the Site. Updated soil and groundwater PCE concentrations are presented on Figures 5, 6, and 7 in plan view. Cross sections for A–A' and B–B' with updated soil and groundwater analytical results are presented on Figures and 8 and 9. Cross section E–E' presented on Figure 10 is a new cross section line that runs southwest to northeast along a path in close proximity to monitoring wells MW-14, MW-4, MW-6, and MW-21 and includes updated soil and groundwater analytical results.

2.6.1 Source Areas

The primary source of contamination beneath the Site is the former dry cleaning equipment and/or the floor drain system in the northwest corner of the Dry Cleaner Building on the Dry Cleaner Building Property, as supported by the distribution of high concentrations of PCE in Shallow Zone soil and groundwater, and the possible presence of PCE as dense nonaqueous-phase liquids at borings SB-1 and SB-37 (Figures 8, 9, and 10).

2.6.2 Chemicals and Media of Concern

The primary COC identified for the Site is PCE. Other COCs include the degradation products of PCE: TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride.

The media of concern for the Site are soil, groundwater, and air as soil vapor. The interim remedial action has addressed contaminated soil and vapor within the boundary of the Hearthstone Property; the vapor pathway is no longer a medium of concern for the Hearthstone Property.

2.6.3 Contaminant Fate and Transport

Soil analytical data for the Site indicates that PCE in soil within the Shallow Zone has migrated from the primary source area, beneath the former dry cleaning machines located on the Dry Cleaner Building Property, to a portion of the northeast corner of the Hearthstone Property and a portion of the Woodlawn Avenue Northeast ROW (Figure 7). This migration has occurred by vapor-phase transport via diffusion within the vadose zone and/or dissolved-phase advective transport. The interim remedial action conducted in 2011 and 2012 has effectively removed the majority of Shallow Zone PCE contamination at the Hearthstone Property; however, residual concentrations of PCE in soil are present below the maximum excavation depth of 15 feet bgs.

The lateral extent of the Shallow Zone dissolved-phase PCE plume (where concentrations exceed the MTCA Method A cleanup level) is bounded by monitoring wells MW-15, MW-16, MW-17, MW-19, MW-23, MW-26, and MW-27 and borings SB-6, SB-7, SB-20, and SB-21 in the cross- and downgradient directions to the west, north, and east of the Site, and by monitoring well MW-1 in the upgradient direction, located on the south-adjoining property (Figure 5). Figure 5 also shows the PCE isoconcentration contours for the groundwater in the Shallow Zone based on the results from historical reconnaissance groundwater and groundwater samples and from the 2014 groundwater monitoring event.

Based on the groundwater analytical results from previous investigations, concentrations of PCE and its degradation compounds in the Shallow Zone are highest near the former dry cleaning equipment and attenuate rapidly with distance downgradient of the former dry cleaning equipment. The rapid attenuation of concentrations of PCE in groundwater is attributed to the lateral gradation in the Shallow Zone from silt and silty sand layers located in the source area to a more uniform silt layer observed in areas downgradient of the source and south of the north-adjoining property. The groundwater analytical results from the previous investigations also identified other minor source areas present in the southern portion of the Dry Cleaner Building Property associated with suspected releases of PCE to the existing floor drain and sanitary sewer lines.

Shallow soil and groundwater analytical data indicate that PCE concentrations in the Shallow Zone decrease rapidly with distance from source areas both laterally (Figure 5 of this RI/FS Addendum) and vertically. PCE concentrations generally decrease to below 1 mg/kg at depths below approximately 20 feet bgs, corresponding to the depth of contact between the Shallow and Deep Zones (Figures 8, 9, and 10). The dissolved-phase PCE plume extent appears to be limited by the low transmissivity of saturated silt and silty sand within the Shallow Zone beneath the source areas and the decreased sand content downgradient of the source areas. The lateral and vertical extent of the dissolved-phase PCE plume in Shallow Zone groundwater has been sufficiently characterized with the existing Shallow Zone monitoring well network and shallow borings.

Soil and groundwater analytical results indicate the presence of TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride beneath the Site. The presence of these compounds indicates that the reductive dechlorination of PCE is occurring within the Shallow Zone by either biological or chemical attenuation processes.

The presence of concentrations of PCE exceeding the MTCA Method A cleanup level in Deep Zone soil in samples collected from borings MW-9 and MW-15 is likely due to partitioning from contaminated groundwater onto soil downgradient of the source of contamination to Deep Zone groundwater (Figure 9).

PCE from the source area beneath the former dry cleaning equipment and/or nearby floor drain system has migrated vertically into the upper portions of the Deep Zone. The Deep Zone dissolved-phase PCE groundwater plume is delineated by the well network. The lateral extent of the Deep Zone dissolved-phase PCE plume (where concentrations exceed the MTCA Method A cleanup level) is bounded down- to crossgradient by monitoring wells MW-8, MW-12, MW-13, MW14, MW-18, and MW-22 and borings SB-11 through SB-13 to the north, east, and west of the Site, and by monitoring wells MW-11 and MW-20 located upgradient to the south (Figure 6 of this RI/FS Addendum and Figures 6 and 8 of the 2013 RI/FS Report). The upper Deep Zone groundwater from 20 to 45 feet bgs is impacted with CVOCs that extend from beneath the former dry cleaning machines toward the north–northwest, beneath the Woodlawn Avenue Northeast ROW, and beneath a portion of the north-adjoining property (Figure 6 of this RI/FS Addendum). Figure 6 shows the PCE isoconcentration contours for the groundwater in the Deep Zone based on the results from historical reconnaissance groundwater and groundwater samples and from the 2014 groundwater monitoring event.

The dissolved-phase PCE plume extends farther downgradient in the Deep Zone than in the Shallow Zone. The limited dissolved-phase PCE plume extent is a result of the higher transmissivity of sand and gravel soils within the Deep Zone and the absence of a Shallow Zone groundwater downgradient of the Site (Figures 8, 9, and 10). The lateral and vertical extent of Deep Zone dissolved-phase CVOC plume has been sufficiently characterized with the existing Deep Zone monitoring well network and deep borings.

PCE in soil and groundwater may volatilize into vapor phase. At portions of the Site where no impermeable caps are present, some vapor-phase PCE may escape from the subsurface into the atmosphere and where photodegradation of the vapor will occur.

The estimated distribution of PCE mass in soil and groundwater for the Site was calculated in the 2013 RI/FS Report using the available data for the Dry Cleaner Building Property and the downgradient ROWs. The calculated percentages of mass are summarized below.

Area	% Mass in Soil	% Mass in Groundwater	% Mass in Shallow Zone	% Mass in Deep Zone
Dry Cleaner Building Property	92%	0.69%	74%	19%
Rights-of-way	6.9%	0.19%	4.3%	2.8%
Total:	~100%		~100%	

The data above indicate that the majority of PCE mass at the Site (i.e., greater than 90 percent) is contained in soil on the Dry Cleaner Building Property, less than 7 percent is present in soil in the ROWs, and less than 1 percent is contained in groundwater.

2.6.4 Potential Exposure Pathways

The following potential exposure pathways have been identified for future human health exposure at the Site:

- Vapor Pathway. Short-term inhalation of volatilized contaminants by construction workers during future construction activities on the Site and indoor air inhalation of vapors emanating from contaminated soil and/or groundwater intruding into existing and/or future structures at the Site.
- Soil Pathway. Direct dermal contact and/or ingestion of contaminated soil by construction workers during future construction activities on the Site.
- Groundwater Pathway. Direct dermal contact and/or ingestion of contaminated groundwater by construction workers during future construction activities on the Site.

Human health exposure via ingestion of groundwater as a potable drinking water supply is not considered to be a complete exposure pathway.

3.0 FOCUSED FEASIBILITY STUDY CLEANUP ACTION ALTERNATIVE EVALUATION

This section provides a summary of Farallon's selected preferred cleanup action alternative, a detailed comparison of enhanced modified versions of the previously selected preferred cleanup action alternative, and a disproportionate cost analysis of each of the modified cleanup action alternatives. A detailed description of the previous cleanup action alternatives and Farallon's complete feasibility study is presented in the 2013 RI/FS Report.

3.1 2013 RI/FS SELECTED PREFERRED CLEANUP ACTION ALTERNATIVE

Farallon developed and evaluated six cleanup action alternatives for the Site, as detailed in the 2013 RI/FS Report. Upon completion of their evaluation, Farallon selected Cleanup Alternative 3 as the preferred alternative for the Site. Cleanup Alternative 3 included the following cleanup action elements:

- Removing the Stoddard solvent USTs in the Woodlawn Avenue ROW.
- Demolishing the existing Dry Cleaner Building.
- Removing the decommissioned USTs and the heating oil UST beneath the Dry Cleaner building.
- Conducting thermal treatment of Shallow Zone soil and groundwater.
- Applying a chemical oxidant reagent to the Shallow Zone to assess the practicability to treat residual PCE downgradient of the dry cleaning equipment source area within the Woodlawn Avenue Northeast ROW.
- Treating Deep Zone groundwater using chemical oxidation or bioremediation.
- Implementing institutional and engineering controls to prevent future exposure of residual contamination.
- Conducting long-term monitoring.

Farallon concluded that Cleanup Alternative 3 would require a total restoration time frame of 25 to 35 years, but provided a high degree of protectiveness, permanence, long-term effectiveness, and had the highest degree of practicability to implement when compared to the five other alternatives.

3.2 MODIFICATION TO PREFERRED CLEANUP ACTION ALTERNATIVE 3

In general, SoundEarth agrees with Farallon's selected Cleanup Action Alternative 3 of the 2013 RI/FS Report. Farallon gave two different treatment alternatives for the Deep Zone including enhanced reductive dechlorination (ERD) and chemical oxidation. However, Farallon did not provide a detailed description of their method for treating Deep Zone groundwater and did not adequately address remediation of Deep Zone soil and groundwater contamination.

SoundEarth has evaluated four modified cleanup action alternative versions (alternatives 3.1, 3.2, 3.3, and 3.4) of Farallon's selected cleanup action alternative (alternative 3) in order to select a more complete preferred alternative to implement for the Site. SoundEarth divided the Site into 5 remediation areas based on the lateral and vertical extents of soil contamination and associated waste designation when excavated, soil accessibility, and planned redevelopment excavation footprint. The 5 areas are shown on Figure 11. These remediation areas include the following:

- Area 1 is generally located within the former dry cleaning machinery source area, beneath the Dry Cleaning Building Property, and contains PCE-contaminated soil and groundwater. The extent of Area 1 is defined by concentrations of PCE in soil exceeding the MTCA Method A Cleanup level and Resource Conservation and Recovery Act (RCRA) Land Ban criteria (60 mg/kg). (40 Code of Federal Regulations Part 268, Subpart D, 268.40 and 268.49 [c][1][C]).
- Area 2 is generally located around the perimeter of Area 1 beneath the Dry Cleaning Building Property and contains PCE-contaminated soil and groundwater. The extent of Area 2 is defined by concentrations of PCE in soil exceeding the MTCA Method A Cleanup level and Washington State's Dangerous Waste (DW) Toxicity Characteristic List for PCE of a Toxicity Characteristic Leaching Procedure (TCLP) of 0.7 milligrams per liter (mg/l), which is equivalent to 14 mg/kg), but not exceeding RCRA Land Ban criteria (WAC173-303-090[8][c]).
- Area 3 is generally located directly downgradient of the former dry cleaning machinery source area, beneath the Woodlawn Avenue Northeast ROW, and contains PCE-contaminated soil and groundwater. The extent of Area 3 is defined by concentrations of PCE in soil exceeding the MTCA Method A Cleanup level and DW criteria for listed wastes, but not exceeding RCRA Land Ban criteria.
- Area 4 is generally located in remaining areas beneath the Dry Cleaning Building Property and contains PCE-contaminated soil and groundwater. The extent of Area 4 is defined by concentrations of PCE soil exceeding the MTCA Method A Cleanup level, but not exceeding DW criteria for listed wastes.
- Area 5 is generally located on the 6565 4th Avenue Northwest Property. Concentrations of PCE have not been detected in the soil or groundwater on this property, and this property is not part of the Site, but is part of the redevelopment. However, concentrations of PCE in soil and groundwater have been detected in exceedance of the MTCA Method A cleanup level at boring and well locations directly north on the Dry Cleaner Building Property.

Figures 4 through 10 of this RI/FS Addendum present concentrations of PCE in soil and groundwater at the Site. Updated cross sections for A–A' and B–B' are presented on Figures 8 and 9 and a new cross section E–E' is presented on Figure 10. The remediation areas are presented on Figure 11. Areas 1, 2, and 3 are designated remediation areas for thermal treatment by electrical resistance heating based on the presence of concentrations of PCE in soil exceeding RCRA Land Ban criteria of 60 mg/kg or Washington State's DW Toxicity Characteristic List for PCE of a TCLP of 0.7 milligrams per liter, which is equivalent to 14 mg/kg for soil. Figure 11 shows PCE concentration contour lines for soil of 60 and 14 mg/kg in relationship to remediation Areas 1, 2, and 3.

All of the four alternatives include demolition of the Dry Cleaner Building, the removal of two USTs beneath the Woodlawn Avenue Northeast ROW and a heating oil UST beneath the Dry Cleaner Building Property, Electrical Resistance Heating (ERH), soldier pile shoring installation, construction dewatering, soil excavation, under-slab drainage system installation, and foundation slab vapor barrier installation as common components of the remediation and engineering control measures. Figures 11 through 22 show the proposed ERH electrode layout and associated depths in relationship to proposed thermal treatment remediation areas and excavation limits for the four modified cleanup action alternatives.

Three of the alternatives use ERD to treat residual contaminated groundwater, and the fourth alternative uses chemical oxidation using potassium permanganate. Figures 23 through 26 present the proposed injection well layout for the four modified cleanup action alternatives and provide PCE isoconcentration contours for groundwater in the Shallow Zone and Deep Zone. Figures 27 through 32 show the proposed injection well screen intervals and depths for the three cleanup action alternatives that would use ERD to treat residual contaminated groundwater, and Figures 33 through 35 depict the proposed injection well screen intervals and depths for the fourth alternative that would use chemical oxidation. Design details for the selected modified cleanup action alternative for each of the common remediation and engineering control measures will be specified in the cleanup action plan.

In the email prepared by Ecology dated April 28, 2015, Ecology requested additional information regarding how the under-slab drainage system may impact the groundwater flow direction in the Shallow Zone. A conceptual flow net diagram was constructed to show the estimated groundwater flow direction in relationship to the under-slab drainage system. The layout of the drainage pipe for the under-slab drainage system is shown on Figure 36. SoundEarth calculated the equivalent radius (r_s) for a rectangular system (under-slab drainage system) that acts as a single large well and equivalent radius of influence (R_0) for the under-slab drainage system. The estimated r_s is approximately 57.71 feet and the estimated R_0 is approximately 69.13 feet from the center point of the proposed drainage piping system (Figure 36). The calculations and associated assumptions are tabulated in Table 5. These radii were incorporated into the flow net diagram.

The highest historical potentiometric surface measurements from 2007 for the groundwater in the Shallow Zone were used in the development of the conceptual flow net diagram to be conservative by representing the largest possible drawdown between the historical seasonal high potentiometric surface at approximately 170 to 171 feet mean sea level and the under-slab drainage system at approximately 165 feet mean sea level. The conceptual flow net diagram also incorporates the preliminary construction design components and proposed permanent features located within the groundwater in the Shallow Zone (Figure 37). The conceptual flow net diagram did not incorporate the reduced flow caused by the planned soldier pile shoring to be installed around the redevelopment excavation perimeter. One level of underground parking garage will be constructed to a depth of approximately 13.5 to 14.5 feet bgs. The parking garage foundation will be approximately 4 inches thick. Underlying the foundation will be a layer of drainage rock approximately 1 foot thick. The under-slab drainage piping will be installed with the drainage rock. A 4-inch-thick rat-slab will be installed beneath the drainage rock. The rat-slab will act as a relatively impervious surface, and upward groundwater flow and infiltration into the under-slab drainage system will be limited to the edges of the rat-slab where there are no walls connecting the rat-slab to the foundation slab.

Based on the conceptual flow net diagram, the under-slab drainage system will have localized drawdown of groundwater in the Shallow Zone adjacent to the base building foundation. The overall groundwater flow direction in Shallow Zone will continue to flow towards the north–northwest (Figure 37). Most of the groundwater will be drawn to the upgradient portion of the drainage system, which is at an approximate elevation of 165 feet mean sea level. During seasonally high groundwater conditions, there may be no groundwater flow in the upper 5 feet of the Shallow Zone in an area approximately 5 to 7 feet north of the proposed parking garage. However, the groundwater in this area will flow to the north–northwest when the potentiometric surface begins to fall. Downgradient of the under-slab drainage system, it is not anticipated that there would be a significant amount of permanently reversed groundwater flow.

The selected cleanup action alternative will also include the following additional components as a response to Ecology comments:

- Utilizing the injection wells located in the south sidewalk of Woodlawn Avenue Northeast (Transect D on Figure 23A) as dewatering wells during construction to remove or reduce the concentrations of PCE in groundwater in the Shallow Zone. The estimated radius of influence resulting from the use of Transect D injection as dewatering wells is shown on Figure 23B.
- Constructing and utilizing the injection wells located on the north sidewalk of Woodlawn Avenue Northeast as dual injection wells (Transect E on Figure 24). In addition, groundwater samples will be taken at Shallow Zone screen interval of the dual injection wells. If the concentrations of COCs in the shallow groundwater exceed applicable MTCA cleanup levels, ERD treatment will be implemented in the Shallow Zone and Deep Zone groundwater.
- Utilizing monitoring well MW-4 and MW-6 will be utilized as an injection wells. Both monitoring wells MW-4 and MW-6 will monitored for COCs after ERD treatment. Monitoring well MW-21 will be used as a monitoring well. If the under-slab drainage system does reverse the groundwater flow direction for the Shallow Zone in south Woodlawn Avenue Northeast near monitoring wells MW-4 and MW-6, then monitoring well MW-6 may be used as an injection well and monitoring well MW-4 will be used as a compliance monitoring well. If reversal groundwater conditions occur due to the under-slab drainage system, SoundEarth will confer with Ecology on uses of monitoring wells MW-4 and MW-6 as compliance wells or injection wells.

A description of each of the modified cleanup action alternatives is presented in the subsections below. The costs for each alternative have been normalized to the present value of 2015. Tables 6 through 9 present the feasibility level cost estimates for each of the four modified cleanup action alternatives evaluated in this RI/FS Addendum.

3.2.1 Modified Cleanup Action Alternative 3.1

The initial steps of modified Cleanup Action Alternative 3.1 are to remove the existing Dry Cleaner Building and decommission and remove the two Stoddard solvent USTs beneath the Woodlawn Avenue Northeast ROW. Following completion of the UST removal, ERH remediation would be implemented in Areas 1, 2, and 3 (Figure 11) to an approximate depth of 16 feet bgs (Figures 12, 13, and 14). ERH treatment applies heat to the subsurface in order to degrade or volatilize contaminants. Electrodes are installed into the treatment areas. Heat is applied by passing an electrical current through the electrode network, thereby heating the subsurface to approximately 100 degrees Celsius. In this temperature range groundwater boils and steam is produced, which in combination with the heat volatilizes contaminants in the groundwater and flushes them from the soil. Mobilized and/or volatilized contaminants are then collected by a soil vapor extraction system component at each electrode and captured on activated carbon. The activated carbon can be processed off site for recycled use or disposed of in an appropriate subtitle D landfill.

SoundEarth estimates that ERH treatment will take approximately 6 to 8 weeks once heating starts and will volatize the majority of the chlorinated contamination from the soil in the treatment areas. The remediation goal of ERH treatment is to lower contaminant concentrations in the treated soil below 14 mg/kg. If the goal is met, the soil treated will be excavated to approximately 16 feet bgs and disposed of offsite in a subtitle D land fill under a contained out determination after the thermally treated soil has reached a temperature of 30°C. As a contingency, if post ERH confirmation soil sampling indicates a portion of the soil contains greater than TCLP of 0.7 mg/l, which is equivalent to 14 mg/kg, that soil will be disposed at a subtitle C landfill.

Following completion of ERH treatment, Area 1, the lower Shallow Zone of Area 1 below the ERH treatment, and the on- and off-Property Deep Zone will be remediated with ERD technology (Figures 23, 24, 27, 28, and 29). ERD utilizes bioremediation to degrade the remaining contaminants present in groundwater. To implement ERD, injection wells will be installed in the treatment areas and/or existing wells will be converted into injection wells (e.g., well MW-4) (Figures 23, 24, 27, 28, and 29). The Ecology Underground Injection Control Program requires that all injection wells are registered and a permit procured for all injectates prior to commencement of injection.

To initiate ERD bioremediation, an edible oil substrate (EOS) will be injected into the saturated subsurface. EOS consists predominantly of emulsified food-grade soybean oil, with lesser amounts of sodium lactate, food additives, emulsifiers, and preservatives. Initial introduction of EOS will sequester much of the dissolved-phase PCE and TCE present, resulting in a sharp decrease in groundwater concentrations. The EOS injection creates an anaerobic condition in groundwater and provides nutrition that stimulates indigenous microorganisms. The resulting increased organic metabolism then degrades the contaminants by using them as a food source. The consumed contaminants are converted to nonhazardous compounds.

The contaminant degradation following EOS injection will provide long-term remediation of both the soil and groundwater in the treated areas. In addition, dewatering activities associated with the planned redevelopment will flush the local groundwater in the areas with the highest observed contaminant concentrations. Groundwater removed for development dewatering will be treated, if necessary, and disposed of off site. Groundwater performance monitoring results will be used to evaluate the stability of the contaminated groundwater plume, estimate the restoration time from for the groundwater at the Site, and if additional EDR injections are necessary to reach the estimated restoration time frame for the Site as proposed in the draft CAP.

The overall remediation cost normalized to 2015 dollars is $3,234,000.

The total cost, including development related components, normalized to 2015 dollars is $4,953,000.

3.2.2 <u>Modified Cleanup Action Alternative 3.2</u>

Modified Cleanup Action Alternative 3.2 is similar to modified Cleanup Action Alternative 3.1, but would incorporate ERH treatment for Area 1 (Figure 15) down to a depth of approximately 21 feet bgs (Figures 15, 16, 17, and 18) in addition to ERD remediation (Figures 23, 24, 27, 28, and 29). This treatment depth will require electrodes for the ERH to be extended deeper into the subsurface to access Area 1 (Figures 15, 16, 17, and 18). Because Area 1 is completely saturated, the heating time to reach the remediation levels will be increased. The extended heating time, deeper electrode installation, and required waterproofing of electrodes makes the overall cost of modified Cleanup Action Alternative 3.2 significantly higher than modified

Cleanup Action Alternative 3.1. The expanded ERH treatment will potentially decrease the overall remediation time frame of the lower Shallow Zone on the Dry Cleaner Building Property.

The overall remediation cost normalized to 2015 dollars is $3,935,000.

The total cost, including development related components, normalized to 2015 dollars is $5,613,000.

3.2.3 Modified Cleanup Action Alternative 3.3

Modified Cleanup Action Alternative 3.3 is similar to modified Cleanup Action Alternative 3.2, where the ERH treatment includes Area 1 (Figure 19) down to a depth of approximately 40 feet bgs (Figures 20, 21, and 22) in addition to ERD remediation (Figures 25, 26, 30, 31, and 32), but shifts the ERH treatment from a remediation level goal for soil concentrations below 14 mg/kg to a cleanup level goal for groundwater concentrations below MTCA Method A cleanup levels. This treatment focus causes the ERH costs to increase significantly but causes a decrease in the on-Property groundwater remediation time frame. Although this alternative appears to be cost competitive with alternative 3.2, a careful comparison, including the development-related costs, shows that modified Cleanup Action Alternative 3.3 is clearly not as cost effective. This is due to RCRA regulations requiring soil that contains any detectable amount of Listed Waste, even if it is below the state cleanup level, be disposed of as a Listed Waste. The true cost of alternative 3.3 is increased, shifting the bulk of expenses from the remediation costs to the development costs.

The overall remediation cost normalized to 2015 dollars is $3,560,000.

The total cost, including development related components, normalized to 2015 dollars is $5,702,000.

3.2.4 Modified Cleanup Action Alternative 3.4

Modified Cleanup Action Alternative 3.4 operates similarly to modified Cleanup Alternative 3.1, where ERH remediation would be implemented in Areas 1, 2, and 3 (Figure 11) to an approximate depth of 16 feet bgs (Figures 12, 13, and 14), but replaces ERD treatment with chemical oxidation. Chemical oxidation involves the injection of potassium permanganate to chemically oxidize residual soil and groundwater. The oxidizer chemically reacts with and destroys the contaminants present in the subsurface, converting them to nonhazardous compounds. For simplicity, the planned injection grid for ERD treatment was assumed adequate for potassium permanganate injections (Figures 23, 24, 33, 34, and 35). In fact, that assumption is optimistic since emulsified oil normally moves through the soil column more readily than permanganate, as the permanganate reacts with naturally occurring organics in the soil. The risk for both failure and liability of chemical oxidation is higher due to natural degradation processes, such as soil oxidant demand, that consume the permanganate. In addition, the propensity for the dissolved permanganate solution to enter sewers or storm drains is slightly greater.

The overall remediation cost normalized to 2015 dollars is $3,481,000.

The total cost, including development related components, normalized to 2015 dollars is $5,199,000.

3.3 COMPARISON OF MODIFIED ALTERNATIVES

A summary of the comparative evaluation of the modified cleanup action alternatives using the MTCA evaluation criteria (WAC 173-340-360[3][f]) is presented in Table 10. All four of focused modified cleanup action alternatives evaluated fall under the Farallon's selected Cleanup Action Alternative 3, which had a total ranking score of 7.8 out of a possible 10. Farallon used weighting factors for the six criteria evaluated below. A description of the weighting factors and an example is provided in section 7.4.3 of the 2013 RI/FS Report.

Below we compare the same MTCA evaluation criteria for each of our modified alternatives relative to each other:

- **Protectiveness.** All four modified cleanup action alternatives end at the same level of cleanup, MTCA Method A. In fact, the estimated time to meet this goal for the four alternatives is not discernable. To estimate the time for ERD to achieve the cleanup for vinyl chloride, the last compound in the reductive dechlorination process, SoundEarth used the data from another PCE-contaminated site located on Capitol Hill in Seattle, Washington. The average degradation rates across 4 monitoring wells at the site were, 1 percent, 1.5 percent, 0.40 percent and 0.30 percent per day for PCE, TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride, respectively. A spreadsheet was used to estimate the overall remediation time accounting for the durations of time needed to complete the reductive dechlorination steps. PCE first degrades at 1 percent per day, adding to the TCE concentration that already exists. The TCE degrades at 1.5 percent, supplying the DCE for the system. The DCE degrades to vinyl chloride, and vinyl chloride to ethene. Vinyl chloride remains the driving time factor for the remediation due to its low cleanup level of 0.2 µg/L in groundwater. The projected time for 160,000 µg/L of PCE to degrade to 0.2 µg/L of vinyl chloride, using the above degradation rates, is approximately 13 to 20 years (Figure 38). Although modified Cleanup Action Alternative 3.4 proposes the use of chemical oxidation, which is generally faster than ERD processes, for this site the degradation rate is controlled by the time that it takes for the PCE to move from immobile pore spaces and dissolve into the groundwater. For chemical oxidation applications, this creates timing issues as the oxidant dissolves into the groundwater and moves away from the contamination, before the contamination can dissolve into the groundwater. This is seen in the field as a rebound effect. To counter this issue, the chemical oxidation alternative evaluated includes 4 injection programs over a 15 year period. Based on the long re-injection program the overall remediation for modified Cleanup Action Alternative 3.4 is on par with the other three alternatives. All alternatives receive the same value, 8.
- **Permanence.** All modified cleanup action alternatives provide a permanent solution to the reduction of toxicity, mobility, and volume of COCs through either biological, chemical, or physical means. Due to design even modified Cleanup Action Alternative 3.4 ends up with the same permanent solution. All modified alternatives end with the contamination destroyed, or removed from the site, and are equal in permanence. All modified alternatives receive the same value, 8.
- **Effectiveness over the Long Term.** All modified cleanup action alternatives are permanent and, therefore, equal in the long-term effectiveness. All modified alternatives receive the same value, 8.

- **Management of Short-Term Risks.** All four modified cleanup action alternatives have the short-term risks associated with ERH. Modified Cleanup Action Alternatives 3.2 and 3.3 require a longer period of short-term risk associated with the high voltage electricity associated with ERH, but modified Cleanup Action Alternatives 3.1 and 3.4 have short-term risk associated with higher starting concentrations of PCE because the ERH does not extend to the bottom of the hot spot area. All modified alternatives receive the same value, 7.
- **Technical and Administrative Implementability.** Modified Cleanup Action Alternatives 3.2, 3.3, and 3.4 have slightly more difficult implementations than modified Cleanup Action Alternative 1 due to the electrode depth in modified Cleanup Action Alternatives 3.2 and 3.3, and the rebound effects associated with potassium permanganate in modified Cleanup Action Alternative 3.4. The number of electrodes and injection wells do not change for the modified alternatives. Based on this assessment of technical and administrative implementability, modified Cleanup Action Alternative 3.1 receives a score of 9 while the modified Cleanup Action Alternatives 3.2 and 3.3 receive a score of 8 each. Modified Cleanup Action Alternative 3.4 receives a slightly lower score of 7 based on the formation diffusion limitations and the rebound effects associated with the use of chemical oxidation.
- **Public Concerns.** As stated in the 2013 RI/FS Report, community concerns are considered by Ecology in the selection of cleanup actions and are formally obtained during the required Public Notice and Participation periods, which will occur with submittal of the Draft Cleanup Action Plan. Public concerns will be considered in the selection and implementation of the modified cleanup action alternative for the Site. Therefore, all modified alternatives receive the same value, 7.

SoundEarth used the same weighting of the scores as presented in the 2013 RI/FS Report. Farallon's preferred Cleanup Action Alternative 3.1 had a total ranking score of 7.8. Results of the comparative evaluation indicate modified Cleanup Action Alternative 3.1 ranks slightly higher, with a total ranking score of 7.9, versus modified Cleanup Action Alternatives 3.2 and 3.3, with total ranking score of 7.8. Modified Cleanup Action Alternative 3.4 ranks last with respect to the SoundEarth preferred modified cleanup action alternative with a total ranking score of 7.7, the four modified versions of the preferred cleanup action alternative are within 0.2 of each other. Based on the comparative evaluation, modified Cleanup Action Alternative 3.1 meets or exceeds all of the other alternatives evaluated by Farallon in the 2013 RI/FS Report and by SoundEarth in this addendum.

3.4 DISPROPORTIONATE COST ANALYSIS

Detailed engineering cost estimates have been completed for each modified alternative. Table 6 presents modified Cleanup Action Alternative 3.1: ERH of Upper Shallow Zone Source Area to Soil Remediation Level ERD of Lower Shallow Zone and Deep Zone on Property, and ERD of Shallow Zone and Deep off Property. Table 7 presents modified Cleanup Action Alternative 3.2: ERH of Upper and Lower Shallow Zone Source Area to Soil Remediation Level, ERD of Lower Shallow Zone and Deep Zone on Property, and ERD of Shallow Zone and Deep Zone off Property. Table 8 presents modified Cleanup Action Alternative 3.3: ERH of Shallow Zone and Deep Zone Source Area to Groundwater Cleanup Level and ERD of Shallow Zone and Deep Zone off Property. Table 9 presents modified Cleanup Action Alternative 3.4: ERH of Upper Shallow Zone Source Area to Soil Remediation Level, Chemical Oxidation of Lower Shallow Zone and Deep Zone on Property, and Chemical Oxidation of Shallow Zone and Deep off Property.

The cost estimates are valued in 2015 dollars, and then normalized to present value to take in account the effect of long-term monitoring and injections. Costs for development-related components are also broken out, as requested by Ecology. Chart 1 presents the total present value costs, including and excluding development costs, and the MTCA composite benefit score for modified Cleanup Action Alternatives 3.1 through 3.4. The higher the benefit score, the better the alternative is for human health and the environment. The lower the cost, the more cost effective the alternative is to implement. Chart 1 shows that the modified Cleanup Action Alternative 3.1 has the lowest cost to implement, including and excluding development costs. In addition, modified Cleanup Action Alternative 3.1 also has a slightly higher benefit score, making it the most favorable modified alternative. Chart 2 plots the cost-to-benefit ratios for the four modified alternatives to illustrate the relative cost and environmental benefits afforded by each modified alternative. The charts demonstrate that modified Cleanup Action Alternative 3.1 exhibits the lowest cost-to-benefit ratio.

4.0 SELECTED MODIFIED CLEANUP ACTION ALTERNATIVE

After performing the comparative analysis and ranking of modified alternatives in accordance with the MTCA evaluation criteria and the disproportionate cost analysis, modified Cleanup Action Alternative 3.1 is the recommended alternative for the Site. ERH and ERD are proven technologies for the effective remediation of COCs. Modified Cleanup Action Alternative 3.1 meets the threshold requirements for cleanup actions set forth in WAC 173-340-360(3) and WAC 173-340-370. Modified Cleanup Action Alternative 3.1 is protective of human health and the environment, is more easily implemented than competing alternatives, and provides a permanent solution for reducing concentrations of COCs at the Site within a reasonable restoration time frame. The cost to implement modified Cleanup Action Alternative 3.1 is the lowest and exhibits the lowest cost-to-benefit ratio when compared to competing alternatives.

The disproportionate cost analysis was completed both including and excluding development costs, as requested by Ecology. The disproportionate cost analysis is based on two components: the cost of remediation and the MTCA Composite Benefit Score. The basis for the MTCA Composite Benefit Score for modified Cleanup Action Alternative 3.1 is presented below:

- Protectiveness was favorable, with a score of 8 out of 10. All modified cleanup action alternatives were scored the same because the end result for all alternatives meets the preliminary cleanup level for the Site. Modified Cleanup Action Alternative 3.1 has a slightly longer monitoring program, suggesting that the cleanup was longer. This was based on a conservative approach that ignored the construction dewatering benefits and used the worst-case known concentration of 160,000 µg/L as a starting condition. Based on degradation rates from another site in Washington using ERD, the time for the site to reach the MTCA cleanup level for vinyl chloride could be 5 years longer. The protectiveness score was left same as the other alternatives because the starting concentration will be much lower due to the construction dewatering efforts required by the development. Extending the monitoring time did lead to a worst-case scenario for the cost.
- Permanence was favorable, with a score of 8 out of 10. Again, all modified cleanup action alternatives received the same score because they all have the same MTCA cleanup goal.
- Long-term effectiveness was favorable, with a score of 8 out of 10. Again, all modified cleanup action alternatives received the same score because they all have the same MTCA cleanup goal.

Due to the slow migration of contamination in the Shallow Zone, it is unlikely that the groundwater will clean up in the ROW in fewer than 5 years. An estimated remediation time frame between 13 and 20 years is more likely based on the hydraulic characteristics observed at the Site.

- Short-term risks management was favorable, with a score of 7 out to 10. All modified cleanup action alternatives received the same score because they all have a long-term in situ remediation component. The groundwater movement in the Shallow Zone will be a long-term process, making the two technologies, ERD and chemical oxidation, end at close to the same time.
- Implementability was very favorable, with a score of 9 out of 10. This was the only MTCA Composite Benefit Score criterion that received a higher score than the other modified cleanup action alternatives and Farallon's original selected Cleanup Action Alternative 3 in the 2013 RI/FS Report. Modified Cleanup Action Alternatives 3.2 and 3.3 include heating wells that extend through the Shallow Zone, which acts as a semiconfining to confining unit. Each time the Shallow Zone is penetrated, a significant effort is required to ensure the penetration does not leak, as the Deep Zone is under artesian conditions at the design depth of the proposed building basement floor. Based on the last site where SoundEarth used ERH, the electrode wells will require over-drilling to abandon. This again will impact the integrity of the Shallow Zone that is acting as a confining unit for modified Cleanup Action Alternatives 3.2 and 3.3. Modified Cleanup Action Alternative 3.4 has to use a strong oxidizer that presents additional health and safety issues in comparison with ERD included in modified Cleanup Action Alternatives 3.1, 3.2, and 3.3.
- Public concerns were favorable, with a score of 7 out of 10. All modified cleanup action alternatives scored the same because they all had largely the same risks associated with remediation timing and the length of time until the Site meets the MTCA cleanup level.

The cost for modified Cleanup Action Alternative 3.1 was the lowest of the four modified cleanup action alternatives, with or without including development costs. The disproportionate cost was more significant when the development costs were included. Although the results are the same for the analysis, with or without development costs, SoundEarth recommends that the development costs be left in the analysis, as the development of the Dry Cleaner Property is the driving component for remediating the Site. In addition, for this selected alternative, the primary PCE source area will be removed early in the remediation process and the majority of impacted soil will be removed from the Property solely due to the development.

5.0 REFERENCES

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6.0 LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed 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.

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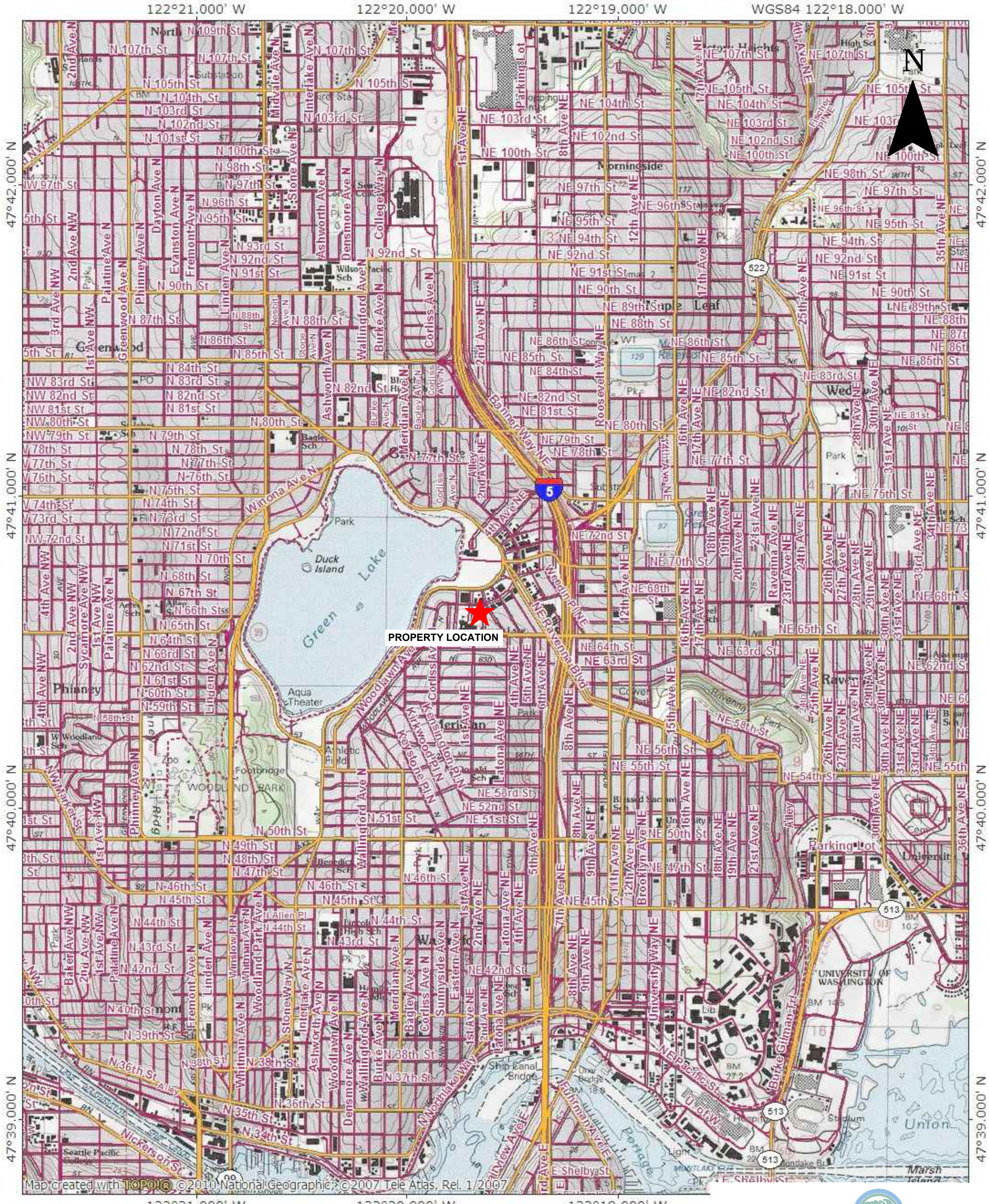
FIGURES

TOPO! map printed on 03/20/15 from "Untitled.tpo"



NATIONAL GEOGRAPHIC

0 .5 1 MILES

1000 0 1000 2000 3000 4000 5000 FEET

1 .5 0 KILOMETERS 1

1000 0 METERS 1000

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FIGURE 1

SITE VICINITY MAP

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED_RIFS ADDENDUM\0651-002_FIG 1_F.DWG

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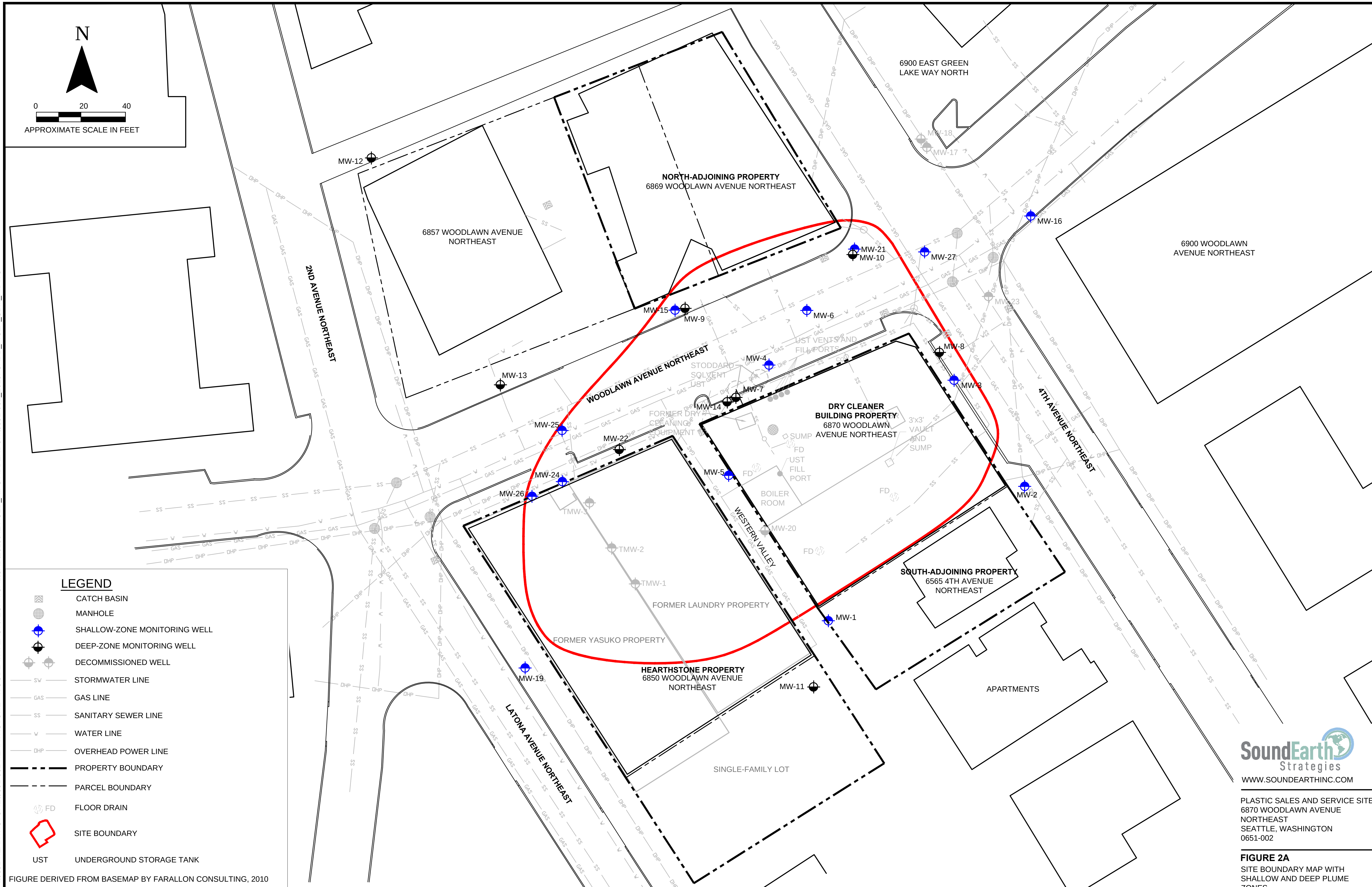

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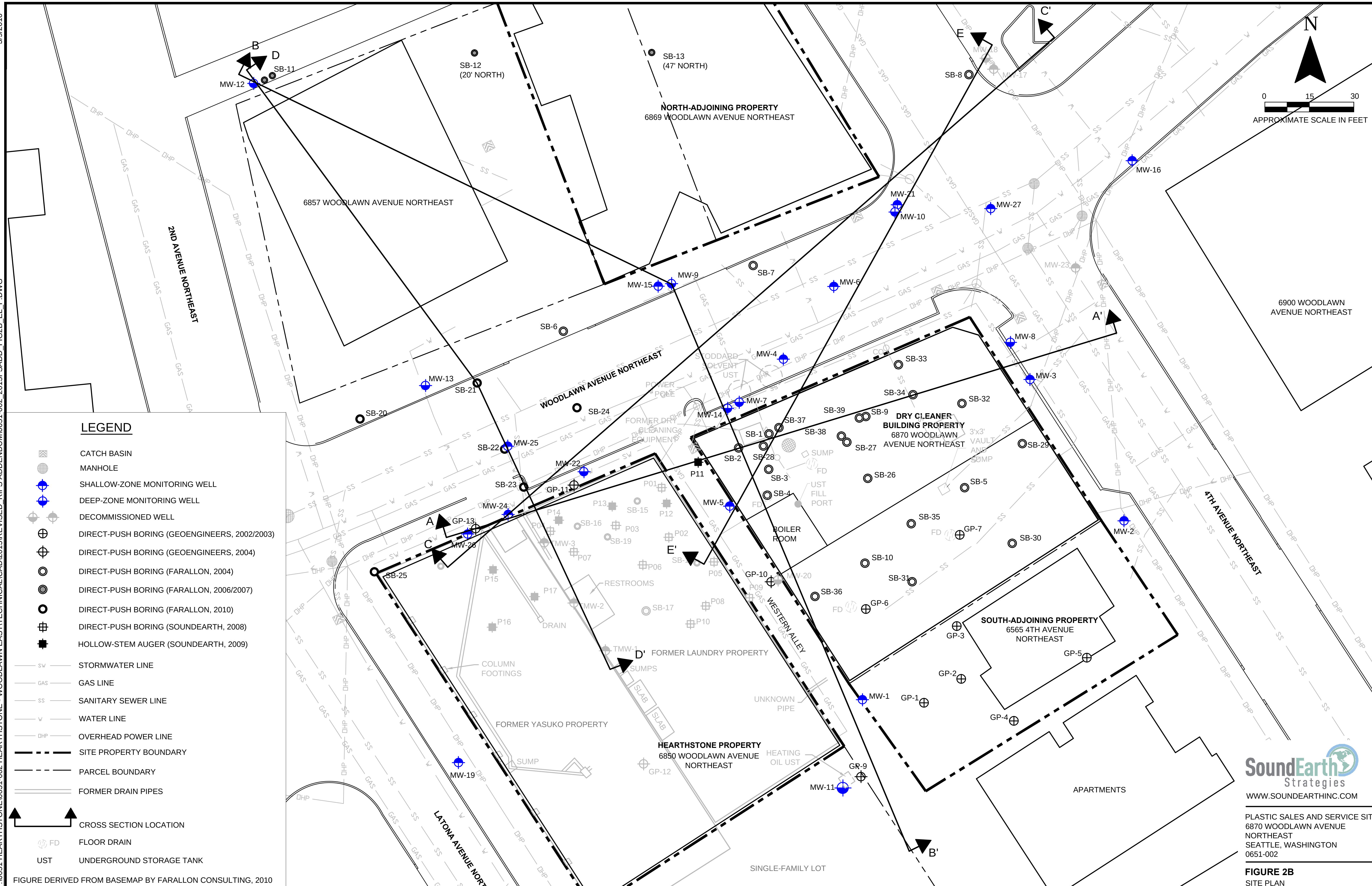

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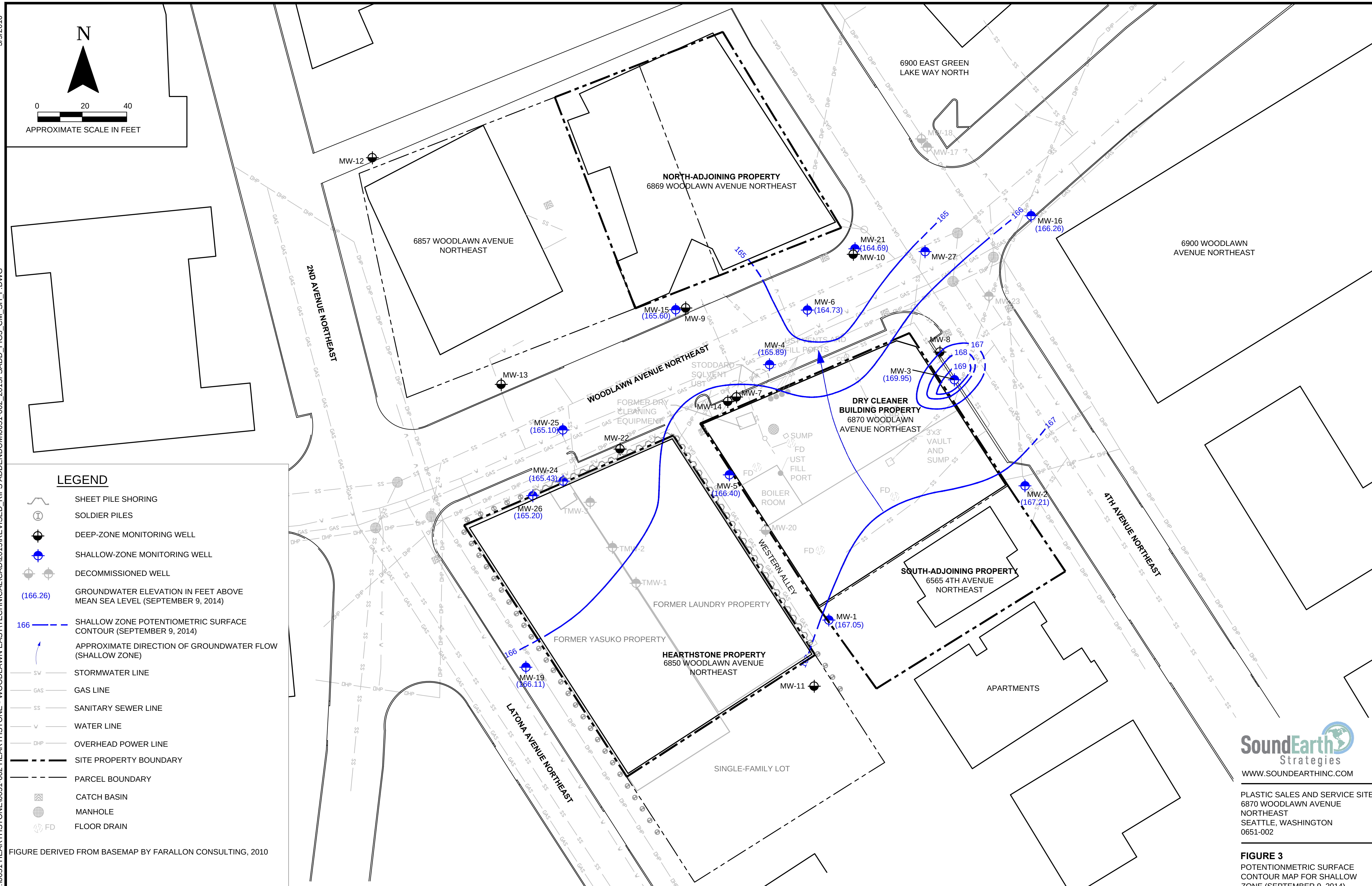

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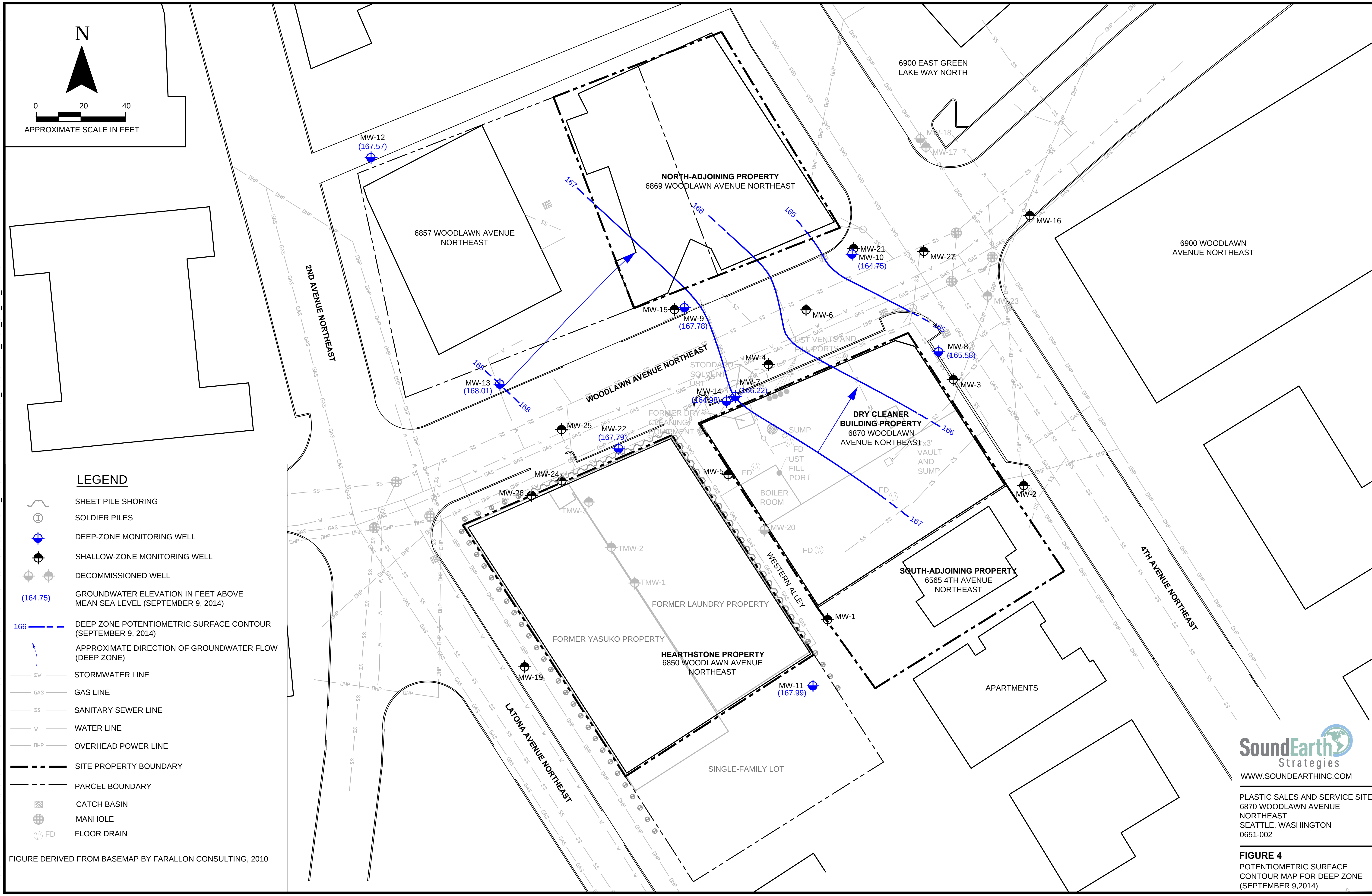

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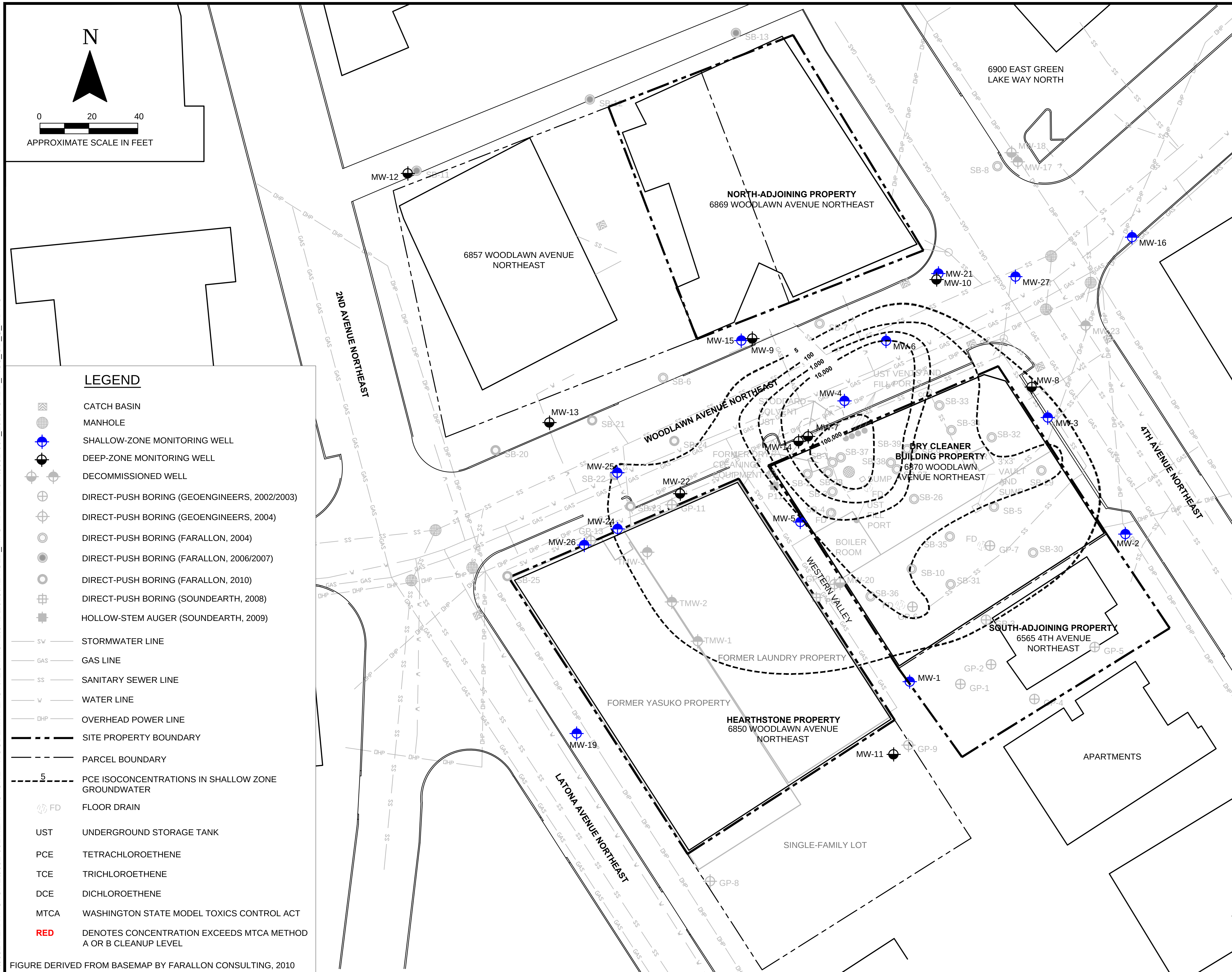

Well ID	Sample Date	Analytical Results				
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride
MW-1	10/30/03	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	06/02/06	1.1	< 0.2	< 0.2	< 0.2	< 0.2
	11/20/08	1.5	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	1.8	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	1.6	< 0.2	< 0.2	< 0.2	< 0.2
MW-2	10/30/03	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	06/01/06	< 0.2	5.5	< 0.2	< 0.2	< 0.2
	11/19/08	6.80	4.6	< 0.2	< 0.2	< 0.2
	05/04/10	9.50	3.5	< 0.2	< 0.2	< 0.2
	09/10/14	4.00	0.49	< 0.2	< 0.2	< 0.2
MW-3	10/30/03	170	< 2.0	< 2.0	< 2.0	< 2.0
	06/01/06	150	1.1	< 1.0	< 1.0	< 1.0
	11/19/08	230	1.6	2.0	< 1.0	< 1.0
	05/04/10	150	< 1.0	< 1.0	< 1.0	< 1.0
	09/10/14	64	0.58	0.79	< 0.2	< 0.2
MW-4	10/30/03	2,100	220	92	< 2.0	20
	08/05/04	860	1200	250	< 10	68
	06/02/06	1,100	730	590	< 10	170
	04/20/07	3,100	720	940	< 20	160
	11/20/08	10,000	640	1,100	< 50	130
	05/05/10	10,000	1,000	1,600	< 50	370
	09/10/14	28,000	3,400	3,800	< 200	920
MW-5	10/30/03	270	46	< 2.0	< 2.0	< 2.0
	06/01/06	54	9.6	3.3	< 0.4	< 0.4
	03/28/08	19	110	40	< 1	2.8
	11/20/08	86	67	37	1.4	5.5
	05/04/10	82	34	27	0.44	0.88
	09/11/14	71	22	5.6	0.27	< 0.2
MW-6	11/08/04	29	18	11	< 2.0	6
	05/04/10	4,100	330	440	< 20	110
	10/07/14	10,000	450	320	< 50	72
MW-15	06/01/06	0.22	< 0.2	< 0.2	< 0.2	< 0.2
	11/20/08	0.26	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-16	06/01/06	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	11/19/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/05/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/09/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-17	06/01/06	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-19	03/28/08	< 1	< 1	< 1	< 1	< 0.2
	03/11/09	< 1	< 1	< 1	< 1	< 0.2
	05/03/10	< 1	< 0.2	< 0.2	< 0.2	< 0.2
	09/09/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-21	11/20/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/09/14	< 0.2	< 0.2	< 0.2	< 0.2	0.73
MW-23	11/20/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
MW-24	03/28/08	650	< 10	< 10	< 10	< 2.0
	11/20/08	360	3.4	< 2.0	< 2.0	< 2.0
	03/04/09	290	< 10	< 10	< 10	< 2.0
	05/05/10	40	0.42	< 0.2	< 0.2	< 0.2
	09/10/14	17	0.27	< 0.2	< 0.2	< 0.2
MW-25	05/04/10	14	0.31	1.1	< 0.2	< 0.2
	10/07/14	12	0.36	0.37	< 0.2	< 0.2
MW-26	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-27	07/01/11	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	10/07/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
TMW-1	04/05/10	15	0.29	< 0.2	< 0.2	< 0.2
	04/05/10	16	< 1	< 1	< 1	< 0.2
TMW-2	04/05/10	110	1.5	< 1.0	< 1.0	< 1.0
	04/05/10	150	1.5	< 1	< 1	< 0.2
TMW-3	04/05/10	310	3.6	< 2.0	< 2.0	< 2.0
	04/05/10	350	3.7	< 1	< 1	< 0.2
MTCA Cleanup Levels		5	5	16	160	0.2

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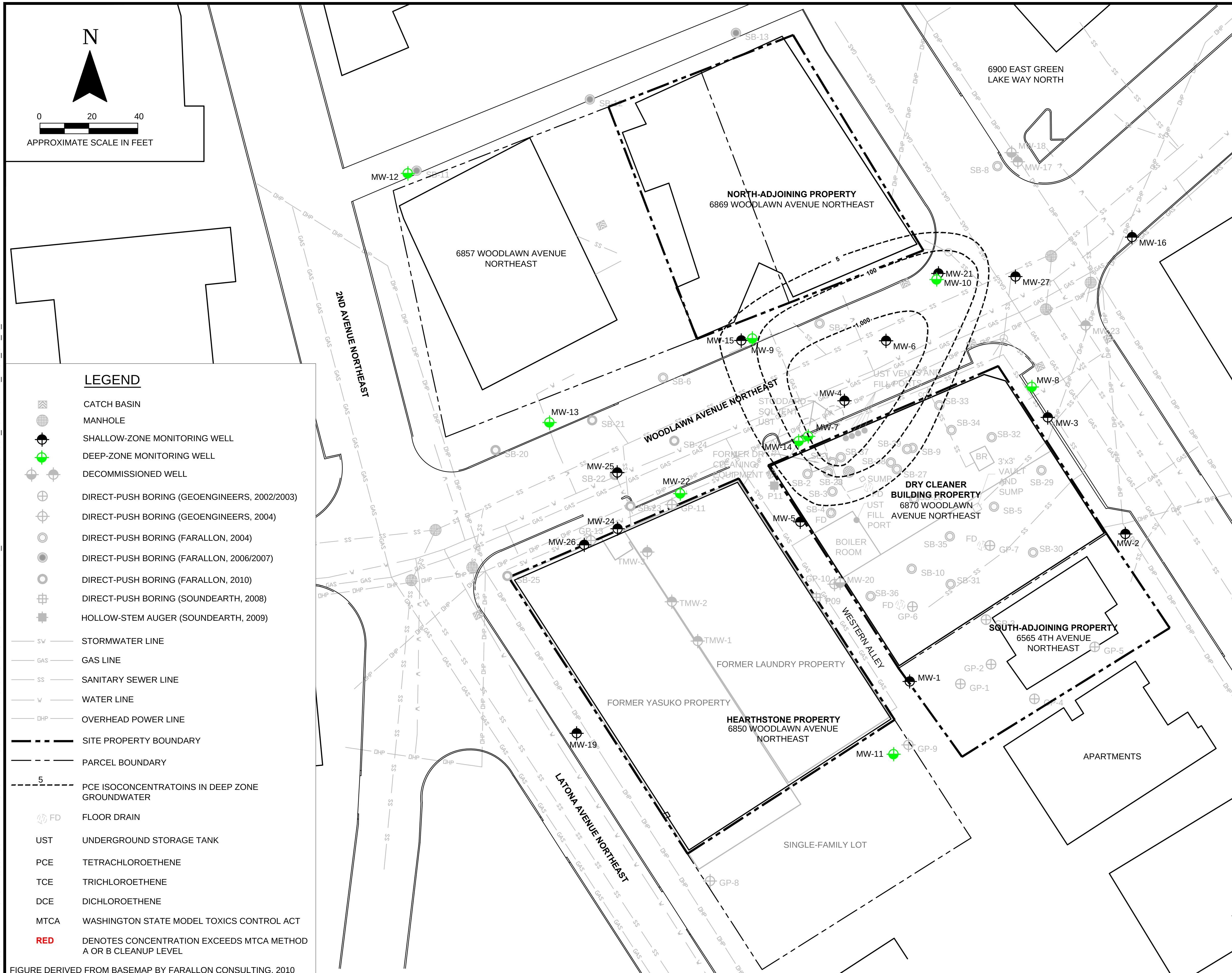
FIGURE 5
GROUNDWATER ANALYTICAL RESULTS FOR SHALLOW ZONE MONITORING WELLS



LEGEND

	CATCH BASIN
	MANHOLE
	SHALLOW-ZONE MONITORING WELL
	DEEP-ZONE MONITORING WELL
	DECOMMISSIONED WELL
	DIRECT-PUSH BORING (GEOENGINEERS, 2002/2003)
	DIRECT-PUSH BORING (GEOENGINEERS, 2004)
	DIRECT-PUSH BORING (FARALLON, 2004)
	DIRECT-PUSH BORING (FARALLON, 2006/2007)
	DIRECT-PUSH BORING (FARALLON, 2010)
	DIRECT-PUSH BORING (SOUNDEARTH, 2008)
	HOLLOW-STEM AUGER (SOUNDEARTH, 2009)
SW	STORMWATER LINE
GAS	GAS LINE
SS	SANITARY SEWER LINE
W	WATER LINE
DHP	OVERHEAD POWER LINE
	SITE PROPERTY BOUNDARY
	PARCEL BOUNDARY
5	PCE ISOCONCENTRATOINS IN DEEP ZONE GROUNDWATER
FD	FLOOR DRAIN
UST	UNDERGROUND STORAGE TANK
PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE
DCE	DICHLOROETHENE
MTCA	WASHINGTON STATE MODEL TOXICS CONTROL ACT
RED	DENOTES CONCENTRATION EXCEEDS MTCA METHOD A OR B CLEANUP LEVEL

FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010

Well ID	Sample Date	Analytical Results PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride
MW-7	11/19/04	7,000	47	< 20	< 20	< 20
	06/02/06	530	16	< 4.0	< 4.0	< 4.0
	04/20/07	2.5	< 2.0	< 2.0	< 2.0	< 2.0
	11/20/08	18.0	0.69	< 2.0	< 2.0	< 2.0
	05/04/10	12.0	0.49	< 0.2	< 0.2	< 0.2
	09/10/14	4.5	0.26	< 0.2	< 0.2	< 0.2
MW-8	11/19/04	0.36	< 0.2	< 0.2	< 0.2	< 0.2
	06/01/06	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	11/19/08	0.70	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/09/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-9	11/19/04	210	< 1.0	< 1.0	< 1.0	< 1.0
	06/01/06	390	< 2.0	< 2.0	< 2.0	< 2.0
	04/20/07	410	< 2.0	< 2.0	< 2.0	< 2.0
	11/20/08	220	< 2.0	< 2.0	< 2.0	< 2.0
	05/04/10	190	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	89	< 0.2	< 0.2	< 0.2	< 0.2
MW-10	11/19/04	2.50	< 0.2	< 0.2	< 0.2	< 0.2
	06/01/06	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	04/20/07	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	11/20/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	3.30	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	600	< 0.2	< 0.2	< 0.2	< 0.2
MW-11	06/02/06	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	11/20/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/03/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	10/07/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-12	06/02/06	0.76	< 0.2	< 0.2	< 0.2	< 0.2
	11/19/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/03/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/09/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-13	06/02/06	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	04/20/07	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	11/19/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/03/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/09/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-14	06/02/06	0.99	< 0.2	< 0.2	< 0.2	< 0.2
	03/25/07	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	04/20/07	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	11/20/08	1.10	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-18	06/01/06	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW-20	11/20/08	0.28	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
MW-22	11/20/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MTCA Cleanup Levels		5	5	16	160	0.2

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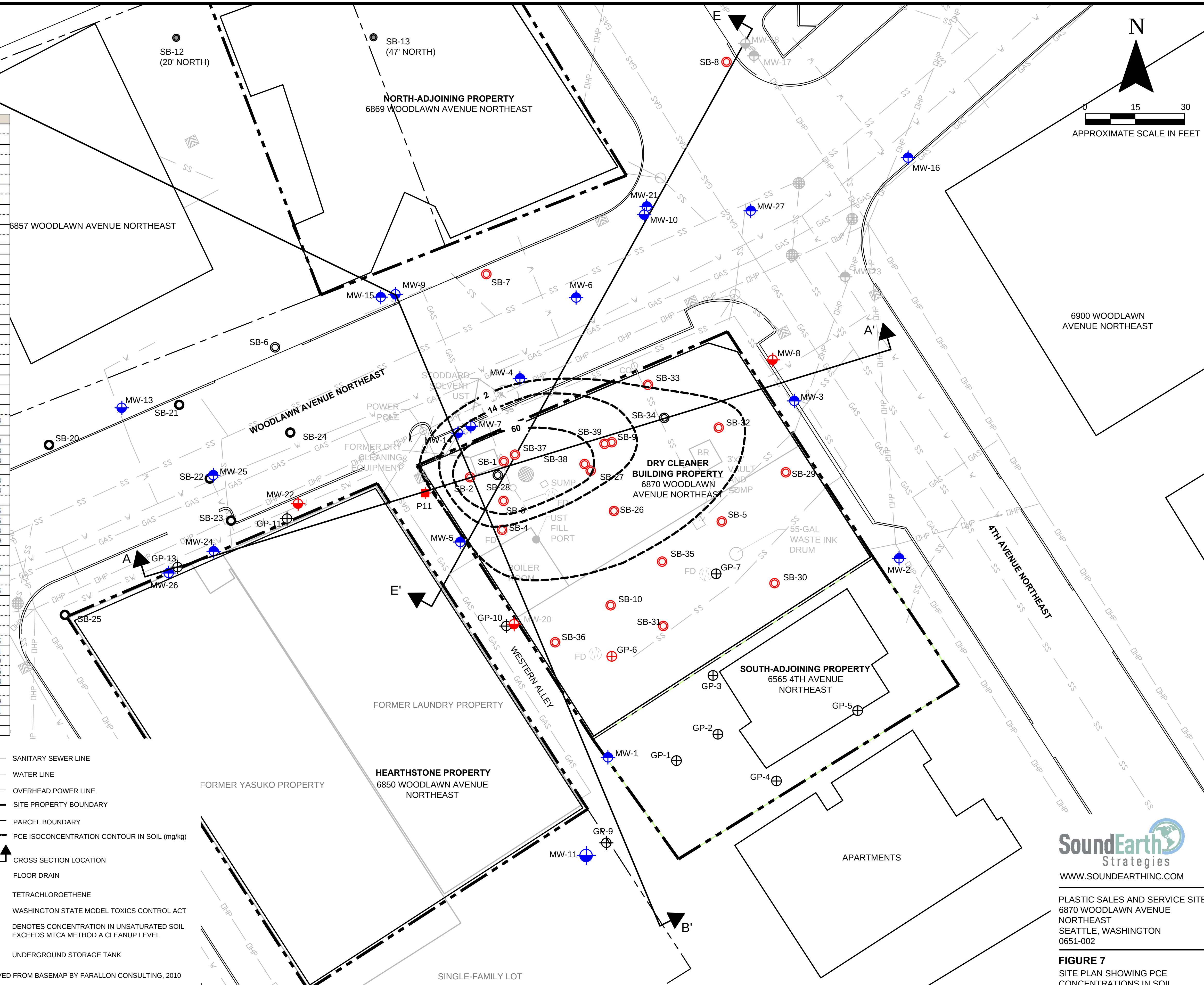
FIGURE 6
GROUNDWATER ANALYTICAL RESULTS FOR DEEP ZONE MONITORING WELLS

Sample ID	Depth	PCE
GP-6-6	6	0.266
GP-7-8	8	<0.005
GP-9-9	9.0	<0.010
GP-10-12	12.0	<0.010
GP-11-6	6.0	1.50
GP-11-8	8.0	0.22
GP-13-4	4.0	<0.010
GP-13-14	14.0	<0.010
SB1-5-7	5 to 7	230
SB1-13-16	13 to 16	58
SB2-4-6	4 to 6	190
SB2-14-16	14 to 16	64
SB3-6-8	6 to 8	240
SB3-14-15.5	14 to 15.5	570
SB4-6-8	6 to 8	7.0
SB4-10-12	10 to 12	4.2
SB5-6-8	6 to 8	1.2
SB5-14-16	14 to 16	0.076
SB7-2-4	2 to 4	0.17
SB7-15-18	15 to 18	0.38
SB8-2-4	2 to 4	0.46
SB9-4-6	4 to 6	29
SB9-8-10	8 to 10	1.3
SB10-4-6	4 to 6	0.64
SB10-10-12	10 to 12	0.23
SB11-66.5-67	66.5 to 67	<0.00084
SB12-66-67	66 to 67	<0.00096
SB13-70-71	70 to 71	<0.00087
P07-05	5	<0.05
P07-07	7	<0.05
P07-10	10	<0.05
P09-08	8	<0.05
P09-13	13	<0.05
P11-07.5	7.5	0.77
P11-09	9	<0.025
P11-12	12	0.48
SB-20-2.5	2.5	<0.00091
SB-20-7	7	<0.00078
SB-20-13.5	13.5	<0.00080
SB-21-2.5	2.5	<0.00096
SB-21-10	10	<0.00090
SB-21-14.5	14.5	<0.00068
SB-22-2.5	2.5	0.0028
SB-22-11	11	0.13
SB-22-14	14	0.19
SB-23-2.5	2.5	0.051
SB-23-10	10	0.0087
SB-23-13.5	13.5	0.052
SB-24-2.5	2.5	0.0035
SB-24-11	11	0.013
SB-24-14	14	0.013
SB-25-2.5	2.5	<0.0011
SB-25-9	9	<0.00067
SB-25-17	17	<0.0011
SB26-1.3	1.3	2.5
SB26-8.0	8	0.16
SB27-2.5	2.5	48
SB27-7.5	7.5	40
SB27-12.0	12	170
SB29-4.0	4.0	1.0
SB29-9.0	9.0	<0.0077
SB30-3.0	3.0	0.071
SB30-10.0	10.0	0.020
SB31-2.0	2.0	0.67
SB31-8.5	8.5	0.013
SB32-3.0	3.0	1.9
SB32-7.5	7.5	2.9
MTCA Cleanup Level		0.05

Sample ID	Depth	PCE
SB33-3.0	3.0	0.46
SB33-8.5	8.5	<0.0075
SB34-3.0	3.0	0.12
SB34-8.0	8.0	7.3
SB35-5.0	5.0	0.12
SB35-10.5	10.5	<0.0077
SB36-3.0	3.0	0.075
SB36-10.5	10.5	<0.0061
SB37-5.5	5.5	54
SB37-9.5	9.5	79,000
SB38-5.5	5.5	4.3
SB38-9.0	9.0	17
SB39-5.5	5.5	1.5
SB39-10.0	10.0	11
MW-1-8.0	8	<0.010
MW-2-10.5	10.5	<0.010
MW-3-8.0	8	<0.010
MW-4-8.0	8	<0.010
MW-4-11.0	11	<0.010
MW-5-7.5	7.5	<0.010
MW-6-15	15.0	<0.010
MW7-6.5-8.0	6.5 to 8.0	6.30
MW7-14-15.5	14 to 15.5	17.0
MW7-21.5-23	21.5 to 23	0.042
MW7-35-36	35 to 36	0.034
MW8-5-6.5	5 to 6.5	0.18
MW8-45-46.5	45 to 46.5	0.0012
MW9-45-46.5	45 to 46.5	0.13
MW10-111204-5-6.5	5 to 6.5	<0.0010
MW10-111204-22.5-24	22.5 to 24	<0.00083
MW10-111204-45-46.5	45 to 46.5	<0.045
MW11-67-67.5	67 to 67.5	<0.00079
MW12-65.5-67	65.5 to 67	<0.00078
MW13-64-65.5	64-65.5	<0.00078
MW14-67.5-70	67.5 to 70	<0.0010
MW15-5-6.5	5 to 6.5	<0.00093
MW15-15-16.5	15 to 16.5	<0.00083
MW15-25-25.5	25 to 25.5	9.5
MW16-7.5-9	7.5 to 9	<0.00075
MW17-2.5-3.5	2.5 to 3.5	<0.00076
MW18-27.5-28.5	27.5 to 28.5	<0.00073
MW18-77-80	77 to 80	<0.00089
MW-20-6-111008	6	0.69
MW-20-26-111008	26	0.0013
MW-20-45-111008	45	<0.00087
MW-21-6-111008	6.0	0.01
MW-21-16-111008	16.0	<0.00095
MW-22-6-111108	6	0.12
MW-22-10.5-111108	10.5	0.025
MW-22-15-111108	15	0.013
MW-22-25-111108	25	0.002
MW-22-45-111108	45	<0.00095
MW-23-5-111208	5.0	<0.00081
MW-23-11-111208	11.0	<0.00089
MW-23-16-111208	16.0	<0.00086
MW-23-11-111210	20.5	<0.00088
MW26-5.0	5.0	0.0047
MW26-10.0	10.0	<0.00069
MW26-20.0	20.0	<0.00081
MW27-13.5	13.5	<0.0012
MTCA Cleanup Level		0.05



LEGEND

CATCH BASIN
MANHOLE
SHALLOW-ZONE MONITORING WELL
DEEP-ZONE MONITORING WELL
DECOMMISSIONED WELL
DIRECT-PUSH BORING (GEOENGINEERS, 2002/2003)
DIRECT-PUSH BORING (GEOENGINEERS, 2004)
DIRECT-PUSH BORING (FARALLON, 2004)
DIRECT-PUSH BORING (FARALLON, 2006/2007)
DIRECT-PUSH BORING (FARALLON, 2010)
DIRECT-PUSH BORING (SOUNDEARTH, 2008)
HOLLOW-STEM AUGER (SOUNDEARTH, 2009)
STORMWATER LINE
GAS LINE

SANITARY SEWER LINE
WATER LINE
OVERHEAD POWER LINE
SITE PROPERTY BOUNDARY
PARCEL BOUNDARY
PCE ISOCONCENTRATION CONTOUR IN SOIL (mg/kg)
CROSS SECTION LOCATION
FLOOR DRAIN
PCE TETRACHLOROETHENE
MTCA WASHINGTON STATE MODEL TOXICS CONTROL ACT
RED DENOTES CONCENTRATION IN UNSATURATED SOIL EXCEEDS MTCA METHOD A CLEANUP LEVEL
UST UNDERGROUND STORAGE TANK

FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010

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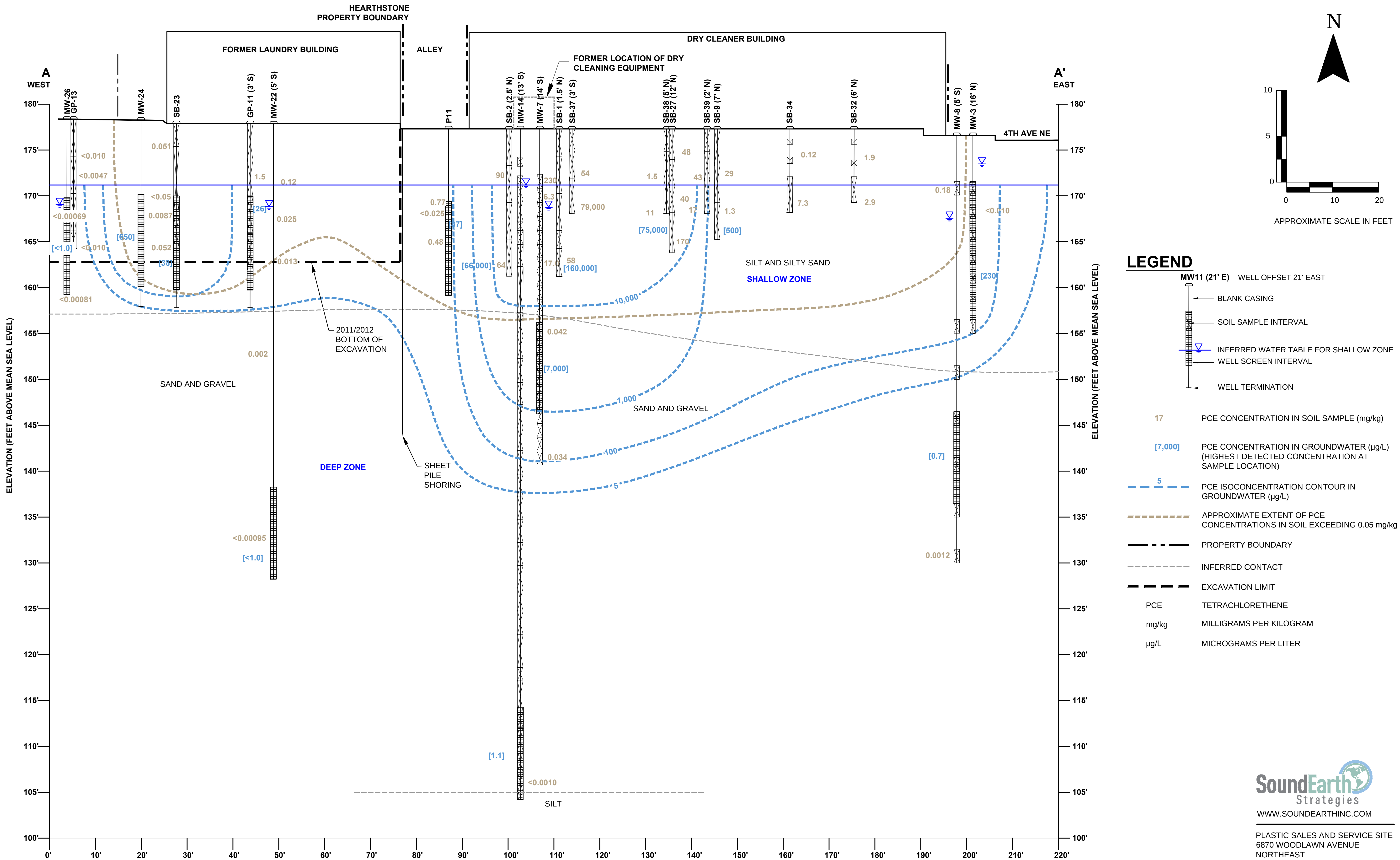
FIGURE 7
SITE PLAN SHOWING PCE CONCENTRATIONS IN SOIL

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED_RIFS ADDENDUM\0651-002_2015FSADD_FIG7_PCE_SD_F.DWG
3/9/2016

3/9/2016

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG8_XAA_SD_F.DWG



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SEATTLE, WASHINGTON
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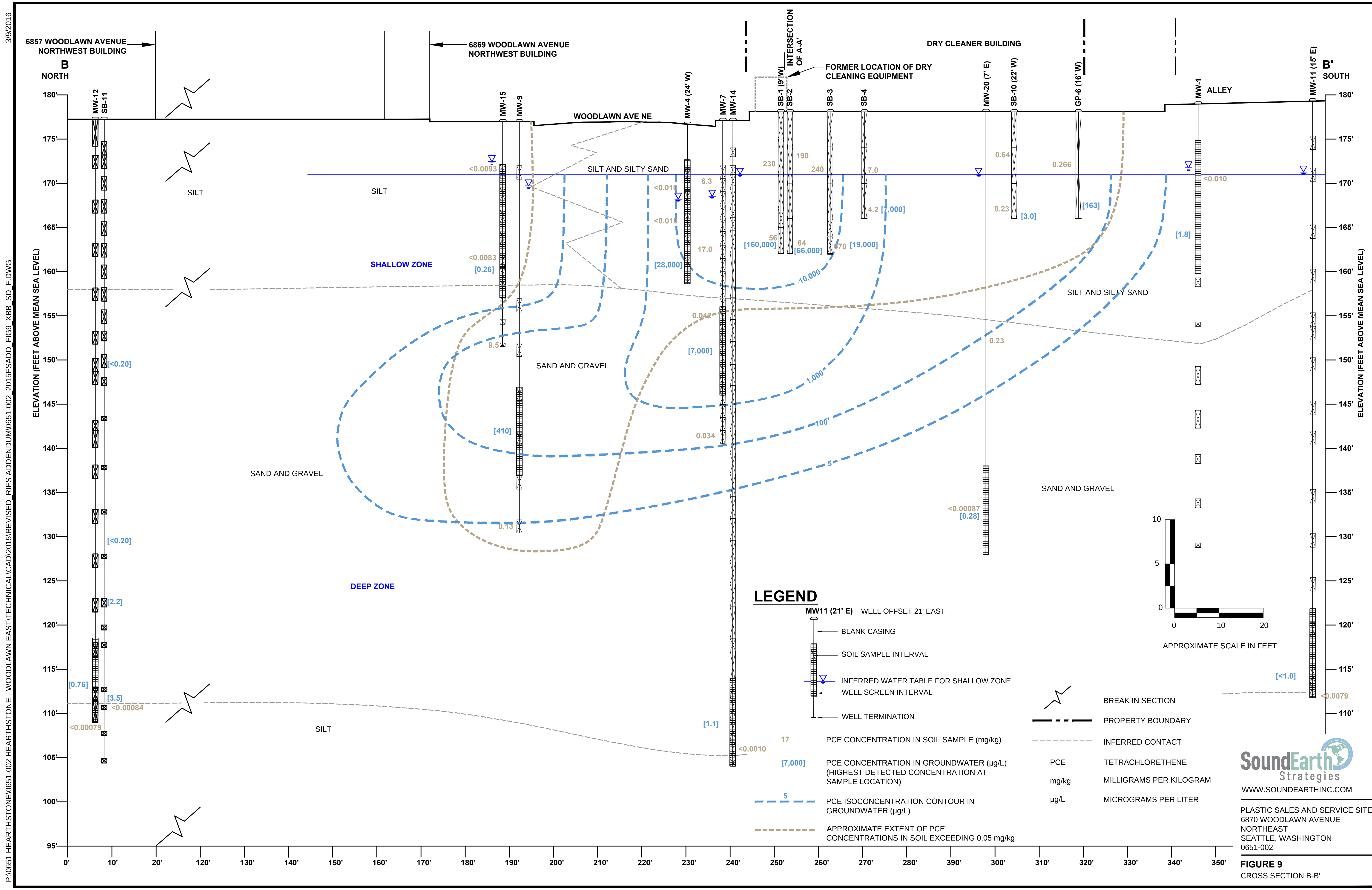
FIGURE 8
CROSS SECTION A-A'



3/9/2016
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG9_XBB_SD_F.DWG
6857 WOODLAWN AVENUE NORTHWEST BUILDING
6869 WOODLAWN AVENUE NORTHWEST BUILDING
B
NORTH
B'
SOUTH
DRY CLEANER BUILDING
INTERSECTION OF A-A'
FORMER LOCATION OF DRY CLEANING EQUIPMENT
ALLEY
WOODLAWN AVE NE
MW-12
SB-11
MW-15
MW-9
MW-4 (24' W)
MW-7
MW-14
SB-1 (9' W)
SB-2
SB-3
SB-4
MW-20 (7' E)
SB-10 (22' W)
GP-6 (16' W)
MW-1
MW-11 (15' E)
ELEVATION (FEET ABOVE MEAN SEA LEVEL)
SILT
SILT AND SILTY SAND
SHALLOW ZONE
SAND AND GRAVEL
DEEP ZONE
10,000
1,000
100
5
LEGEND
MW11 (21' E) WELL OFFSET 21' EAST
BLANK CASING
SOIL SAMPLE INTERVAL
INFERRED WATER TABLE FOR SHALLOW ZONE
WELL SCREEN INTERVAL
WELL TERMINATION
17 PCE CONCENTRATION IN SOIL SAMPLE (mg/kg)
[7,000] PCE CONCENTRATION IN GROUNDWATER (µg/L) (HIGHEST DETECTED CONCENTRATION AT SAMPLE LOCATION)
5 PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)
APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg
BREAK IN SECTION
PROPERTY BOUNDARY
INFERRED CONTACT
PCE TETRACHLOROETHENE
mg/kg MILLIGRAMS PER KILOGRAM
µg/L MICROGRAMS PER LITER
APPROXIMATE SCALE IN FEET
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FIGURE 9
CROSS SECTION B-B'

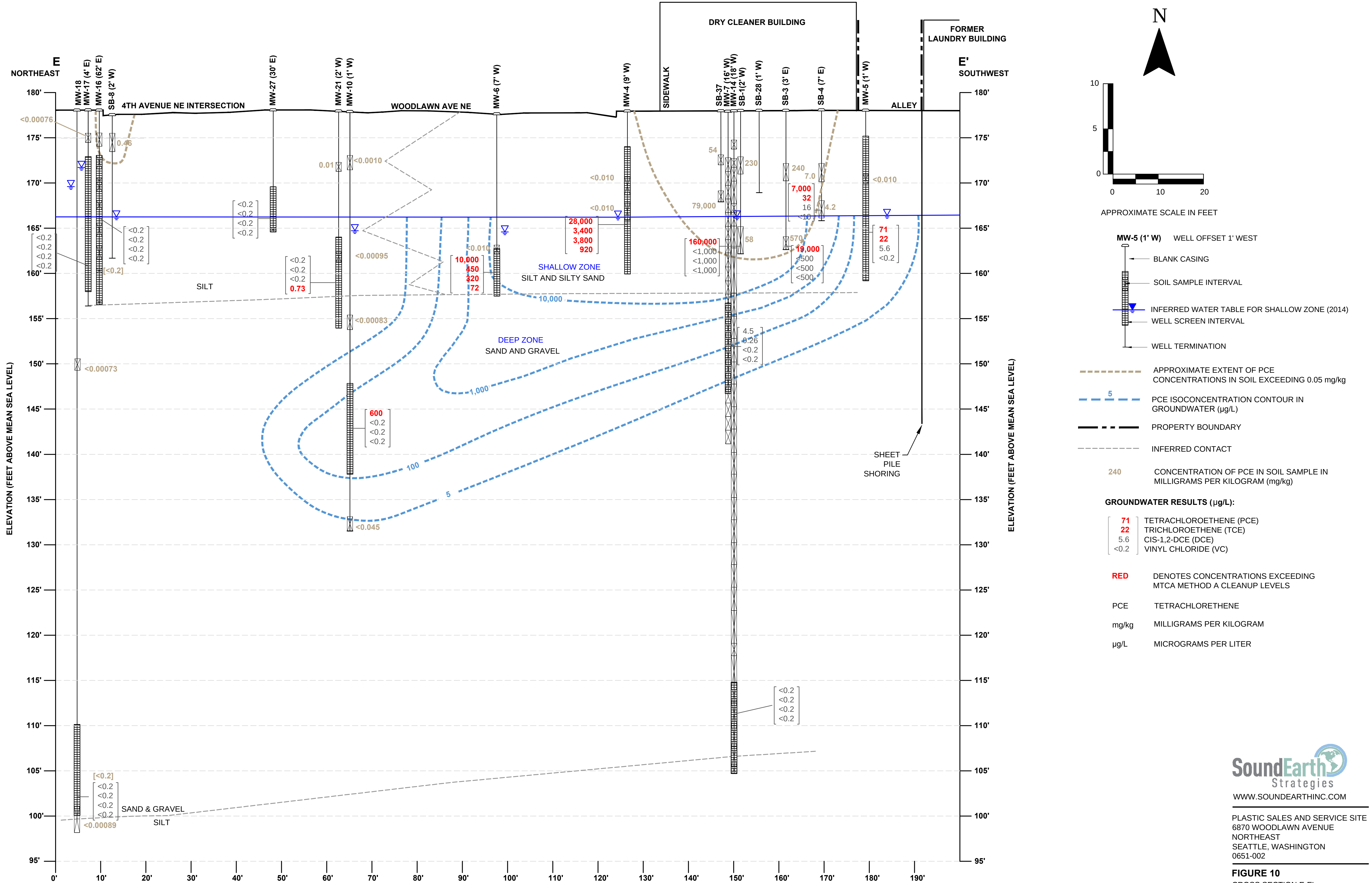

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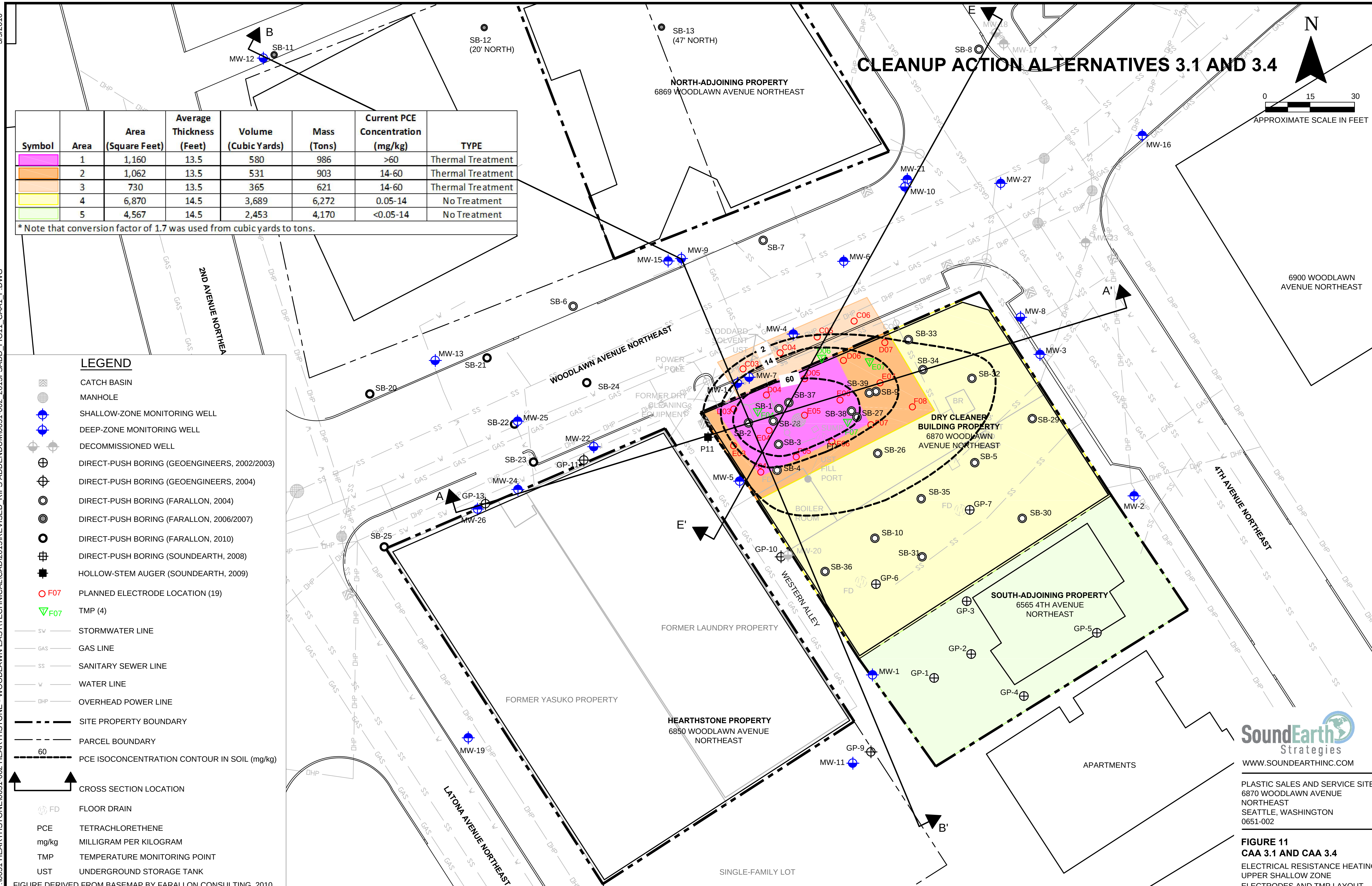
FIGURE 10
CROSS SECTION E-E'

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED_RIFS ADDENDUM\0651-002_2015FSADD_FIG10_XEE_SD_F.DWG

CLEANUP ACTION ALTERNATIVES 3.1 AND 3.4

Symbol	Area	Area (Square Feet)	Average Thickness (Feet)	Volume (Cubic Yards)	Mass (Tons)	Current PCE Concentration (mg/kg)	TYPE
	1	1,160	13.5	580	986	>60	Thermal Treatment
	2	1,062	13.5	531	903	14-60	Thermal Treatment
	3	730	13.5	365	621	14-60	Thermal Treatment
	4	6,870	14.5	3,689	6,272	0.05-14	No Treatment
	5	4,567	14.5	2,453	4,170	<0.05-14	No Treatment

* Note that conversion factor of 1.7 was used from cubic yards to tons.



LEGEND

- CATCH BASIN
- MANHOLE
- SHALLOW-ZONE MONITORING WELL
- DEEP-ZONE MONITORING WELL
- DECOMMISSIONED WELL
- DIRECT-PUSH BORING (GEOENGINEERS, 2002/2003)
- DIRECT-PUSH BORING (GEOENGINEERS, 2004)
- DIRECT-PUSH BORING (FARALLON, 2004)
- DIRECT-PUSH BORING (FARALLON, 2006/2007)
- DIRECT-PUSH BORING (FARALLON, 2010)
- DIRECT-PUSH BORING (SOUNDEARTH, 2008)
- HOLLOW-STEM AUGER (SOUNDEARTH, 2009)
- F07 PLANNED ELECTRODE LOCATION (19)
- F07 TMP (4)
- SW STORMWATER LINE
- GAS GAS LINE
- SS SANITARY SEWER LINE
- W WATER LINE
- DHP OVERHEAD POWER LINE
- SITE PROPERTY BOUNDARY
- PARCEL BOUNDARY
- 60 PCE ISOCONCENTRATION CONTOUR IN SOIL (mg/kg)
- CROSS SECTION LOCATION
- FD FLOOR DRAIN
- PCE TETRACHLORETHENE
- mg/kg MILLIGRAM PER KILOGRAM
- TMP TEMPERATURE MONITORING POINT
- UST UNDERGROUND STORAGE TANK

FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010

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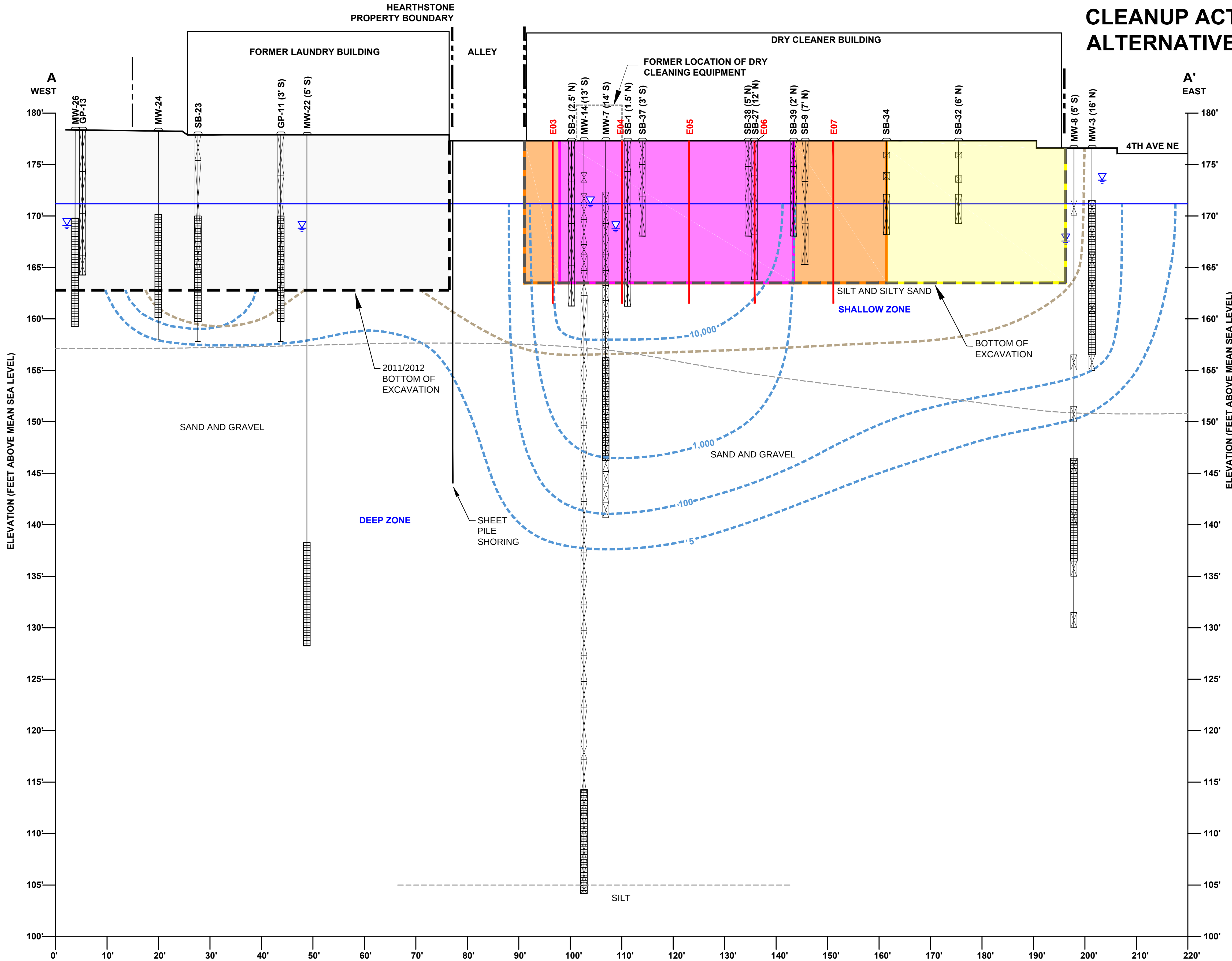
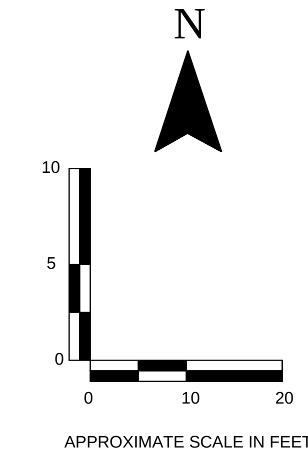
FIGURE 11
CAA 3.1 AND CAA 3.4
ELECTRICAL RESISTANCE HEATING UPPER SHALLOW ZONE ELECTRODES AND TMP LAYOUT

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG11_CAA1_F.DWG

3/9/2016

CLEANUP ACTION ALTERNATIVES 3.1 AND 3.4





LEGEND

MW11 (21' E) WELL OFFSET 21' EAST

BLANK CASING

SOIL SAMPLE INTERVAL

INFERRED WATER TABLE FOR SHALLOW ZONE

WELL SCREEN INTERVAL

WELL TERMINATION

5 PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)

APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg

PROPERTY BOUNDARY

INFERRED CONTACT

EXCAVATION LIMIT

E07 ELECTRODE

PCE TETRACHLOROETHENE

mg/kg MILLIGRAMS PER KILOGRAM

µg/L MICROGRAMS PER LITER

Symbol	Current PCE Concentration (mg/kg)
(magenta)	>60
(orange)	14-60
(yellow)	0.05-14

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NORTHEAST
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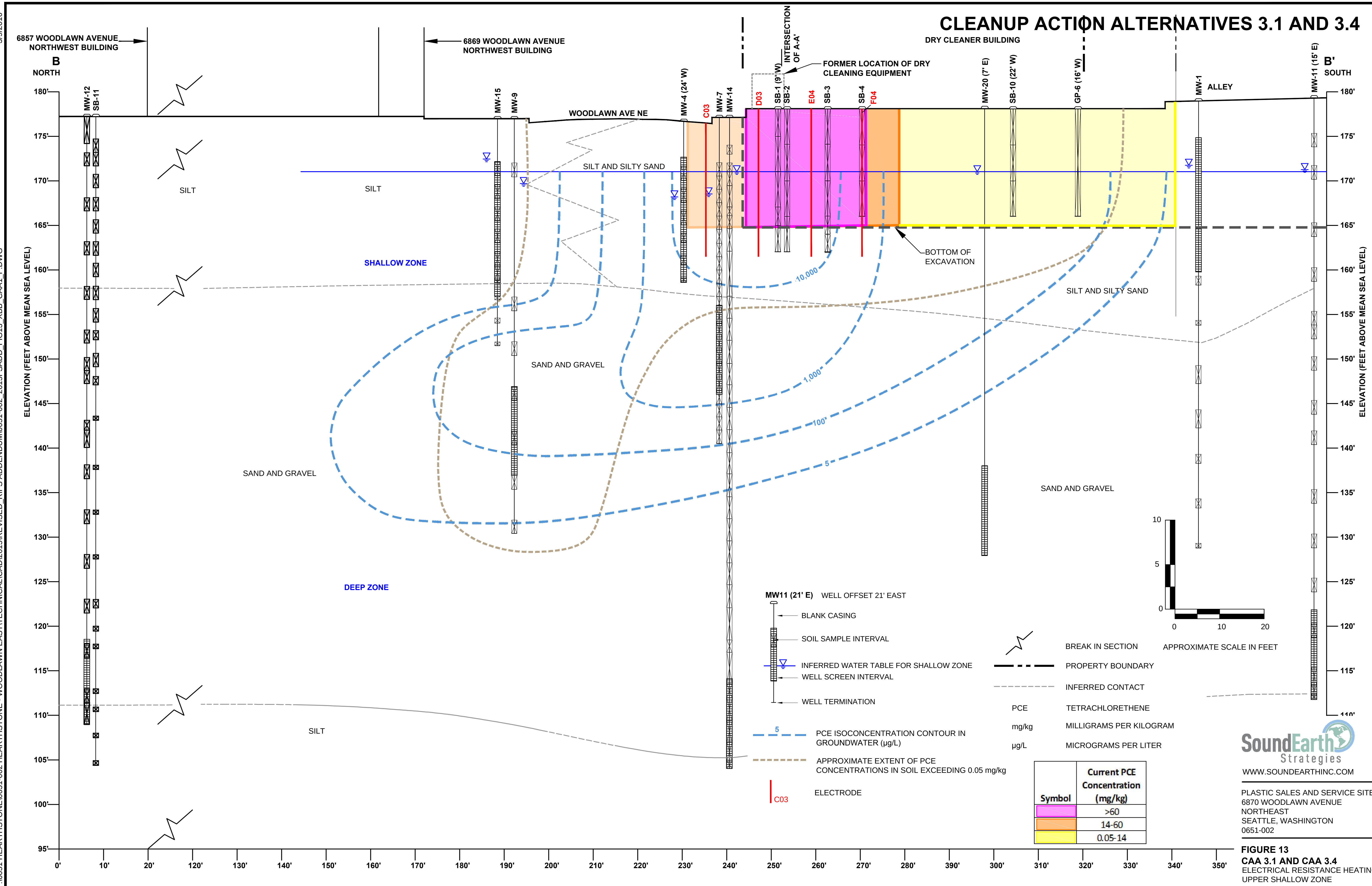
FIGURE 12
CAA 3.1 AND CAA 3.4
ELECTRICAL RESISTANCE HEATING
UPPER SHALLOW ZONE
CROSS SECTION A-A'



CLEANUP ACTION ALTERNATIVES 3.1 AND 3.4
3/9/2016
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG13_XBB_CAA1_F.DWG
6857 WOODLAWN AVENUE NORTHWEST BUILDING
6869 WOODLAWN AVENUE NORTHWEST BUILDING
DRY CLEANER BUILDING
INTERSECTION OF A-A'
FORMER LOCATION OF DRY CLEANING EQUIPMENT
B
NORTH
B'
SOUTH
ALLEY
WOODLAWN AVE NE
MW-12
SB-11
MW-15
MW-9
MW-4 (24' W)
C03
MW-7
MW-14
D03
SB-1 (9' W)
SB-2
E04
SB-3
SB-4
F04
MW-20 (7' E)
SB-10 (22' W)
GP-6 (16' W)
MW-1
MW-11 (15' E)
ELEVATION (FEET ABOVE MEAN SEA LEVEL)
SILT
SILT AND SILTY SAND
SHALLOW ZONE
SAND AND GRAVEL
DEEP ZONE
BOTTOM OF EXCAVATION
10,000
1,000
100
5
MW11 (21' E) WELL OFFSET 21' EAST
BLANK CASING
SOIL SAMPLE INTERVAL
INFERRED WATER TABLE FOR SHALLOW ZONE
WELL SCREEN INTERVAL
WELL TERMINATION
PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)
APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg
C03 ELECTRODE
BREAK IN SECTION
PROPERTY BOUNDARY
INFERRED CONTACT
PCE TETRACHLOROETHENE
mg/kg MILLIGRAMS PER KILOGRAM
µg/L MICROGRAMS PER LITER
Symbol | Current PCE Concentration (mg/kg)
>60
14-60
0.05-14
APPROXIMATE SCALE IN FEET
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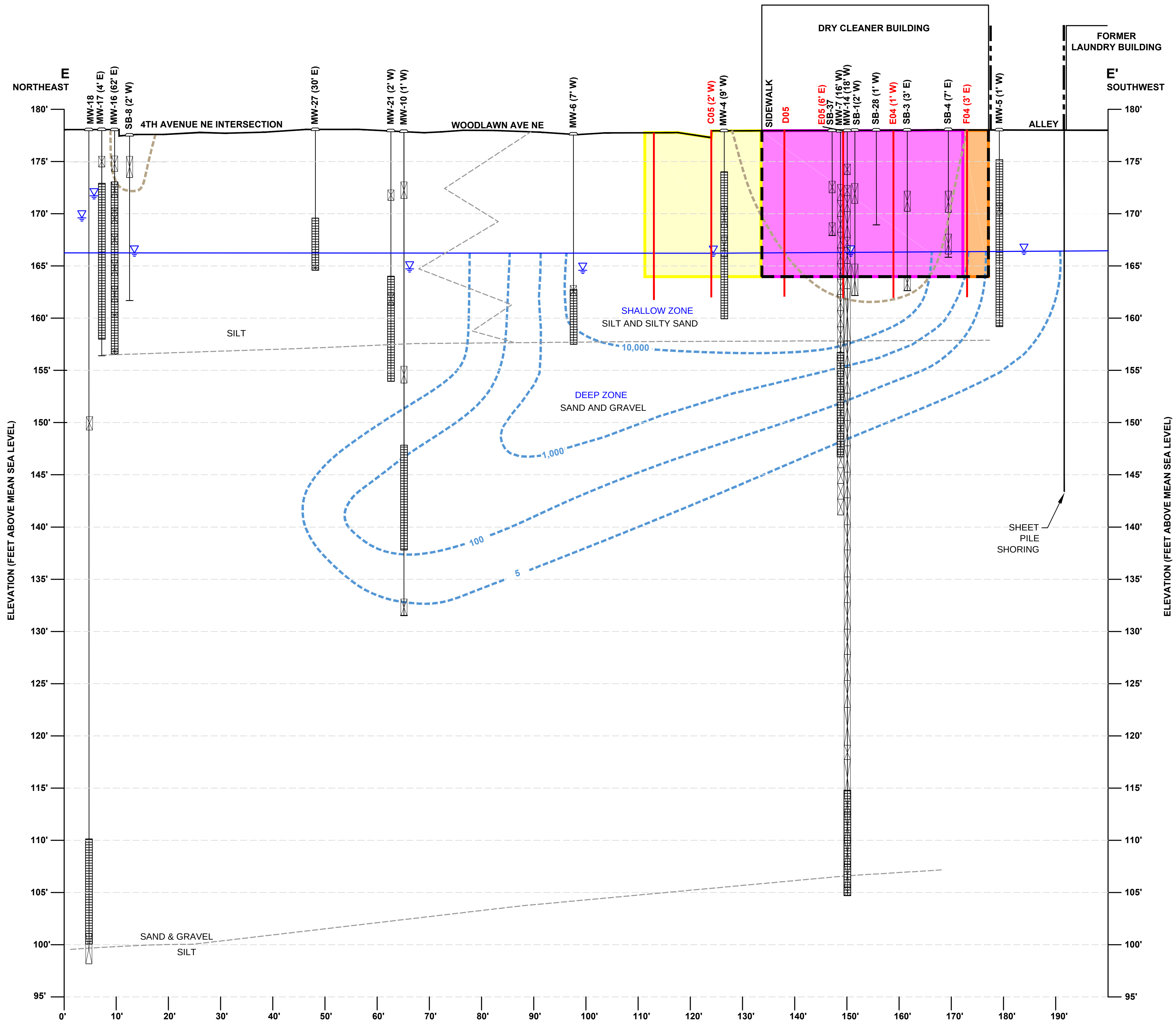
FIGURE 13
CAA 3.1 AND CAA 3.4
ELECTRICAL RESISTANCE HEATING
UPPER SHALLOW ZONE
CROSS SECTION B-B'

3/9/2016

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG14_XEE_CAA1_F.DWG

CLEANUP ACTION ALTERNATIVES 3.1 AND 3.4



N

APPROXIMATE SCALE IN FEET (0, 5, 10; 0, 10, 20)

MW-5 (1' W) WELL OFFSET 1' WEST

BLANK CASING

SOIL SAMPLE INTERVAL

INFERRED WATER TABLE FOR SHALLOW ZONE (2014)

WELL SCREEN INTERVAL

WELL TERMINATION

APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg

5 PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)

PROPERTY BOUNDARY

INFERRED CONTACT

EXCAVATION LIMIT

D05 ELECTRODE

PCE TETRACHLOROETHENE

mg/kg MILLIGRAMS PER KILOGRAM

Symbol	Current PCE Concentration (mg/kg)
(magenta)	>60
(orange)	14-60
(yellow)	0.05-14

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6870 WOODLAWN AVENUE
NORTHEAST
SEATTLE, WASHINGTON
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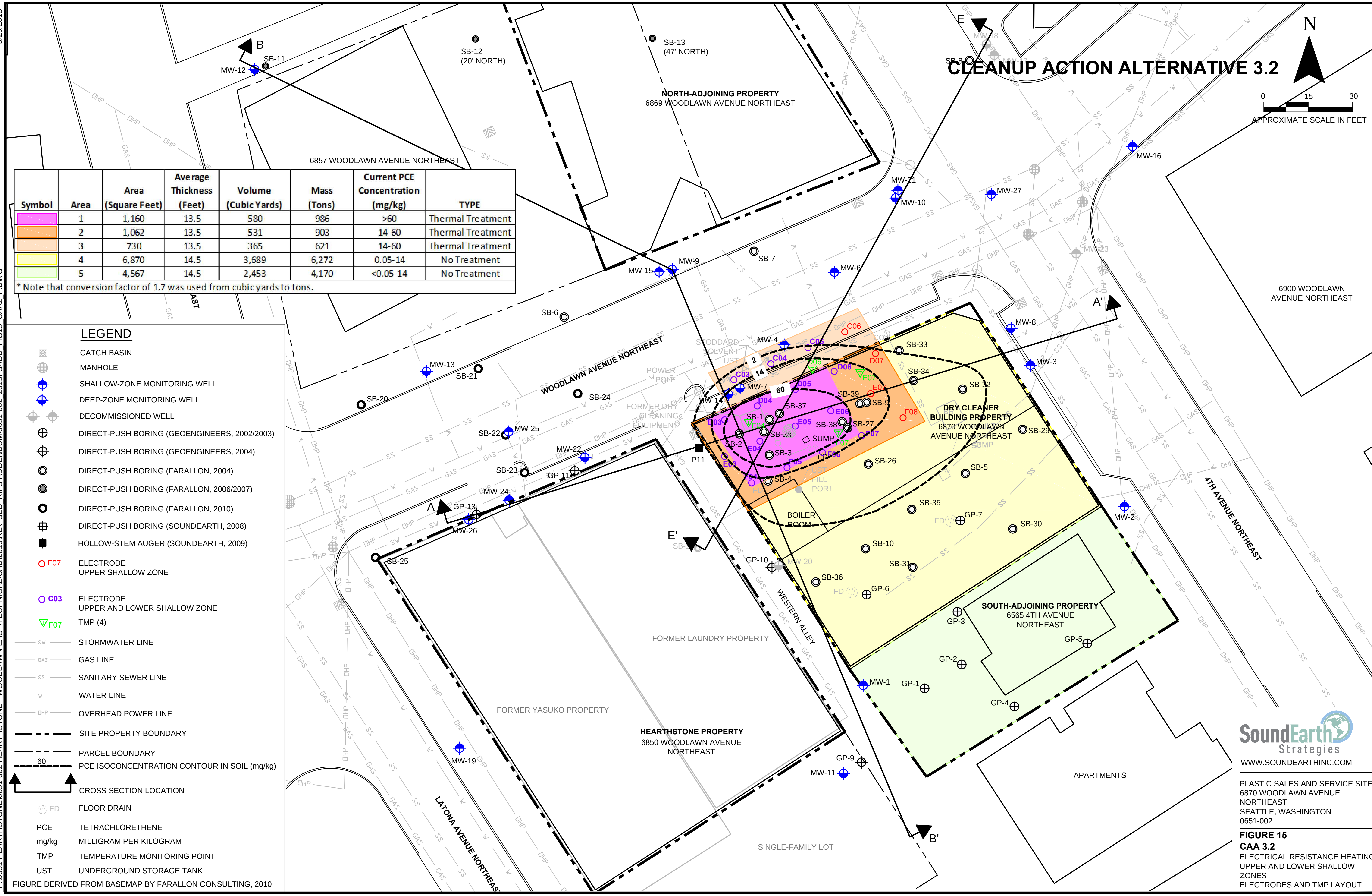
FIGURE 14
CAA 3.1 AND CAA 3.4
ELECTRICAL RESISTANCE HEATING
UPPER SHALLOW ZONE
CROSS SECTION E-E'



Symbol	Area	Area (Square Feet)	Average Thickness (Feet)	Volume (Cubic Yards)	Mass (Tons)	Current PCE Concentration (mg/kg)	TYPE
	1	1,160	13.5	580	986	>60	Thermal Treatment
	2	1,062	13.5	531	903	14-60	Thermal Treatment
	3	730	13.5	365	621	14-60	Thermal Treatment
	4	6,870	14.5	3,689	6,272	0.05-14	No Treatment
	5	4,567	14.5	2,453	4,170	<0.05-14	No Treatment

* Note that conversion factor of 1.7 was used from cubic yards to tons.

LEGEND

- CATCH BASIN
- MANHOLE
- SHALLOW-ZONE MONITORING WELL
- DEEP-ZONE MONITORING WELL
- DECOMMISSIONED WELL
- DIRECT-PUSH BORING (GEOENGINEERS, 2002/2003)
- DIRECT-PUSH BORING (GEOENGINEERS, 2004)
- DIRECT-PUSH BORING (FARALLON, 2004)
- DIRECT-PUSH BORING (FARALLON, 2006/2007)
- DIRECT-PUSH BORING (FARALLON, 2010)
- DIRECT-PUSH BORING (SOUNDEARTH, 2008)
- HOLLOW-STEM AUGER (SOUNDEARTH, 2009)
- F07 ELECTRODE UPPER SHALLOW ZONE
- C03 ELECTRODE UPPER AND LOWER SHALLOW ZONE
- F07 TMP (4)
- SW STORMWATER LINE
- GAS GAS LINE
- SS SANITARY SEWER LINE
- W WATER LINE
- DHP OVERHEAD POWER LINE
- SITE PROPERTY BOUNDARY
- PARCEL BOUNDARY
- 60 PCE ISOCONCENTRATION CONTOUR IN SOIL (mg/kg)
- CROSS SECTION LOCATION
- FD FLOOR DRAIN
- PCE TETRACHLORETHENE
- mg/kg MILLIGRAM PER KILOGRAM
- TMP TEMPERATURE MONITORING POINT
- UST UNDERGROUND STORAGE TANK

FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010

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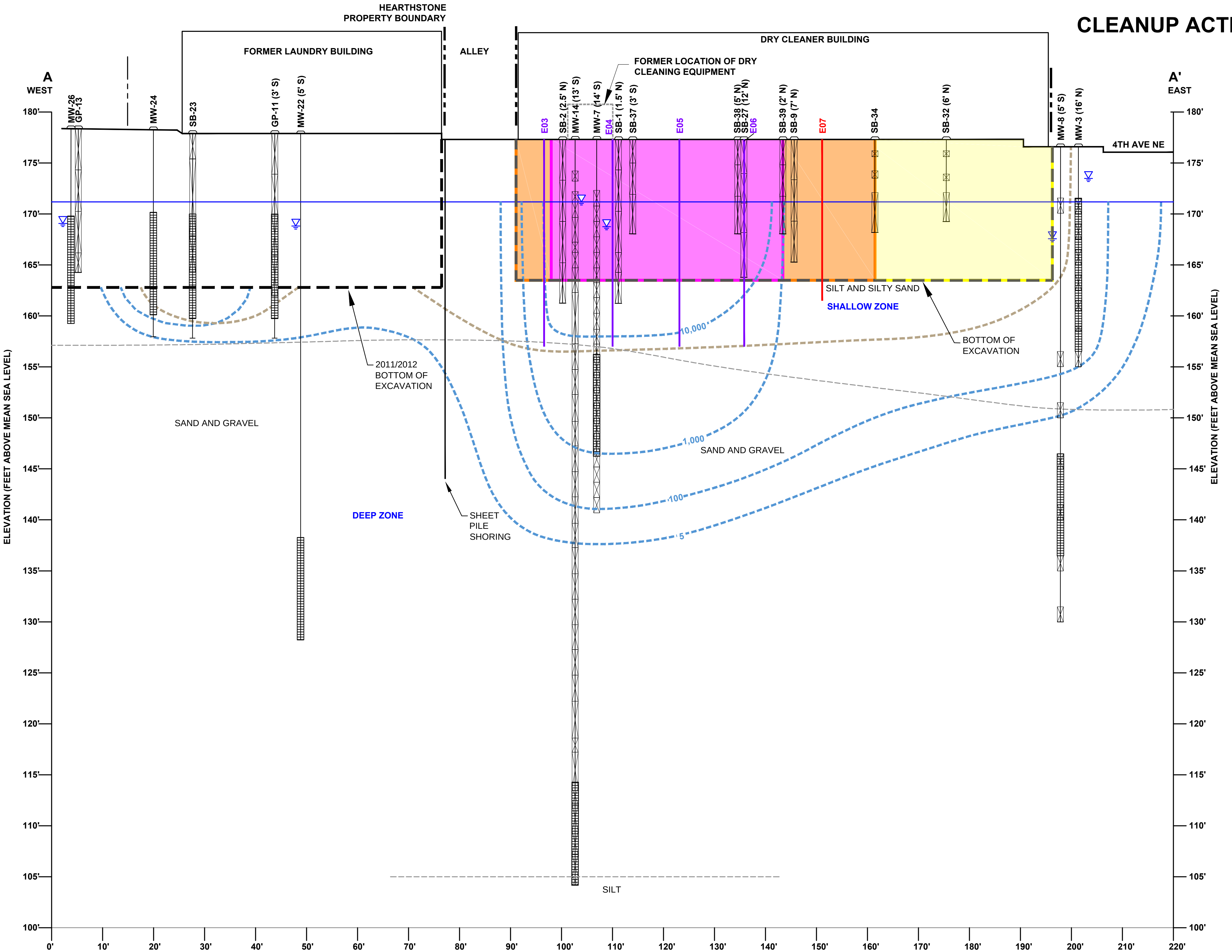
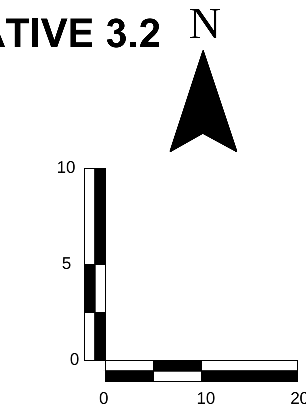
FIGURE 15
CAA 3.2
ELECTRICAL RESISTANCE HEATING UPPER AND LOWER SHALLOW ZONES ELECTRODES AND TMP LAYOUT

5/29/2015
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG15_CAA2_F.DWG

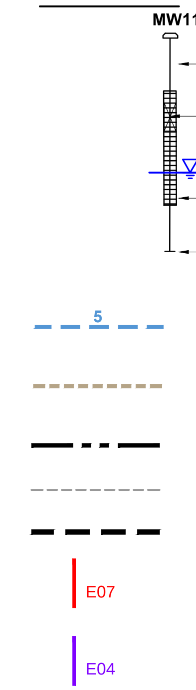
CLEANUP ACTION ALTERNATIVE 3.2





APPROXIMATE SCALE IN FEET

LEGEND



MW11 (21' E) WELL OFFSET 21' EAST

BLANK CASING

SOIL SAMPLE INTERVAL

INFERRED WATER TABLE FOR SHALLOW ZONE

WELL SCREEN INTERVAL

WELL TERMINATION

PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)

APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg

PROPERTY BOUNDARY

INFERRED CONTACT

EXCAVATION LIMIT

E07 ELECTRODE UPPER SHALLOW ZONE

E04 ELECTRODE LOWER SHALLOW ZONE

PCE TETRACHLORETHENE

mg/kg MILLIGRAMS PER KILOGRAM

µg/L MICROGRAMS PER LITER

Symbol	Current PCE Concentration (mg/kg)
	>60
	14-60
	0.05-14

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FIGURE 16
CAA 3.2
ELECTRICAL RESISTANCE HEATING
UPPER AND LOWER SHALLOW ZONES
CROSS SECTION A-A'

3/9/2016

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED_RIFS ADDENDUM\0651-002_2015FSADD_FIG16_XAA_CAA2_F.DWG

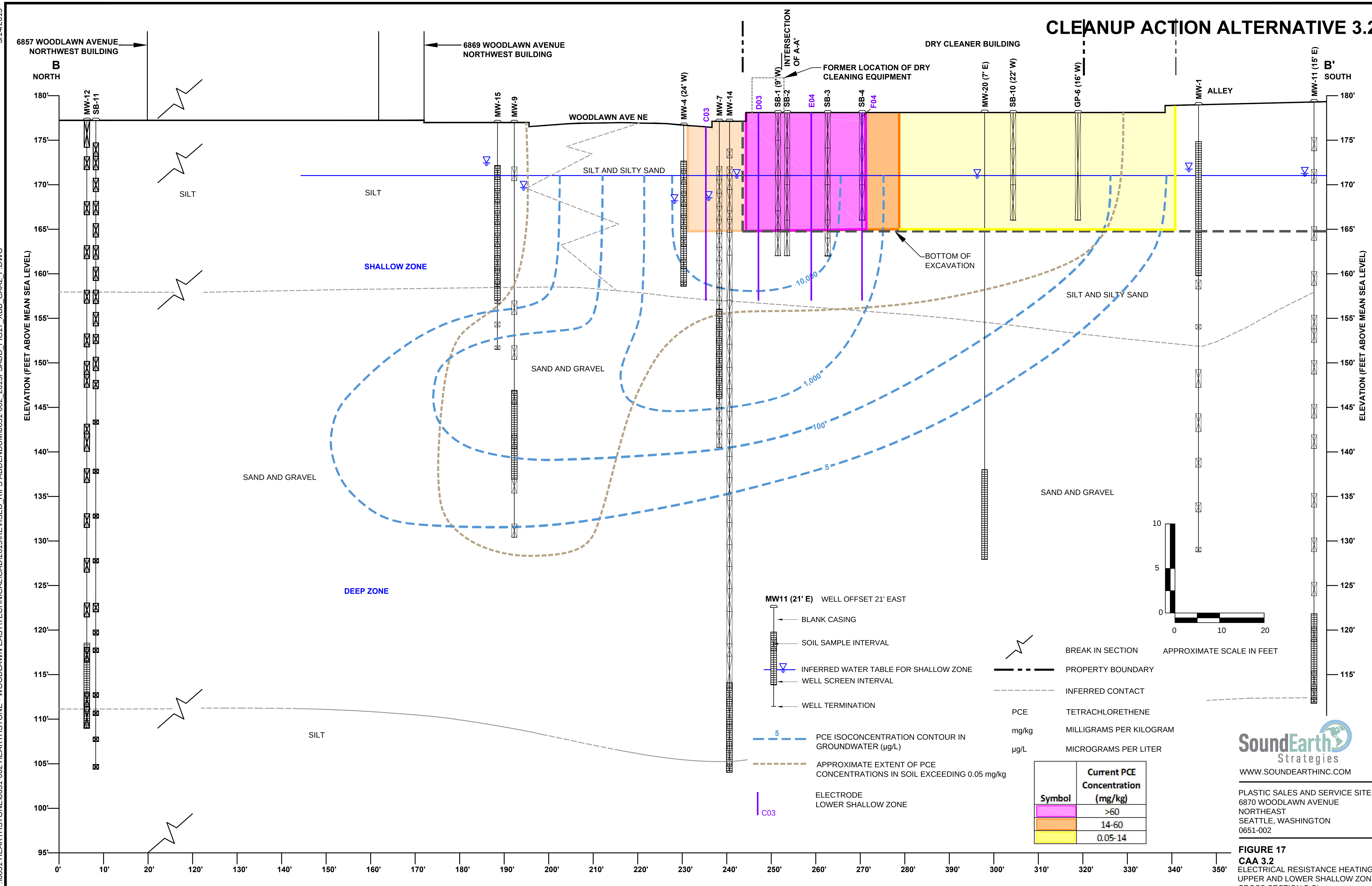

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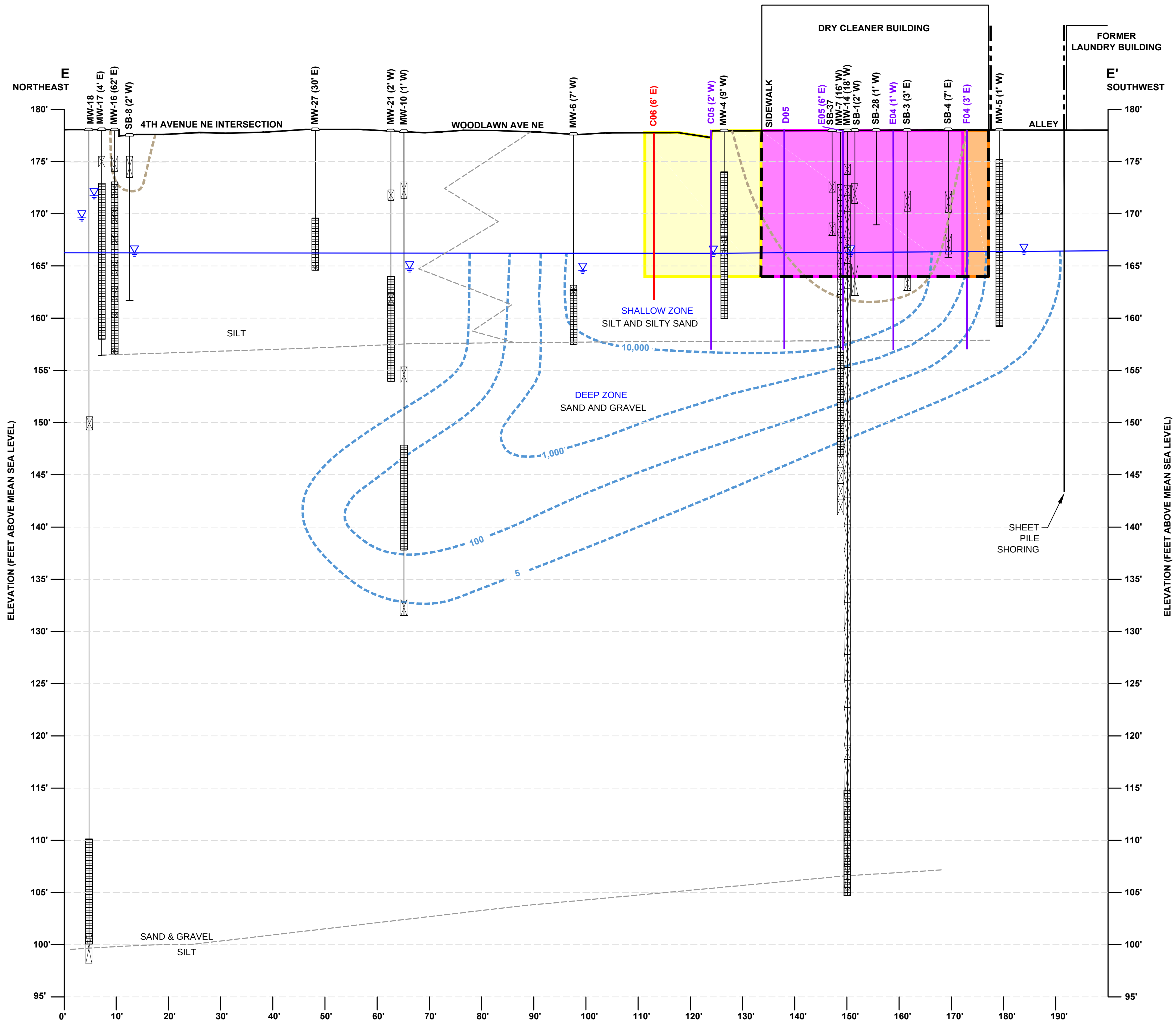
FIGURE 17
CAA 3.2
ELECTRICAL RESISTANCE HEATING UPPER AND LOWER SHALLOW ZONES
CROSS SECTION B-B'



CLEANUP ACTION ALTERNATIVE 3.2

N

APPROXIMATE SCALE IN FEET

MW-5 (1' W) WELL OFFSET 1' WEST

BLANK CASING

SOIL SAMPLE INTERVAL

INFERRED WATER TABLE FOR SHALLOW ZONE (2014)

WELL SCREEN INTERVAL

WELL TERMINATION

APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg

5 PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)

PROPERTY BOUNDARY

INFERRED CONTACT

EXCAVATION LIMIT

C06 ELECTRODE UPPER SHALLOW ZONE

F04 ELECTRODE LOWER SHALLOW ZONE

PCE TETRACHLORETHENE

mg/kg MILLIGRAMS PER KILOGRAM

Symbol	Current PCE Concentration (mg/kg)
	>60
	14-60
	0.05-14

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FIGURE 18
CAA 3.2
ELECTRICAL RESISTANCE HEATING
UPPER AND LOWER SHALLOW ZONES
CROSS SECTION E-E'

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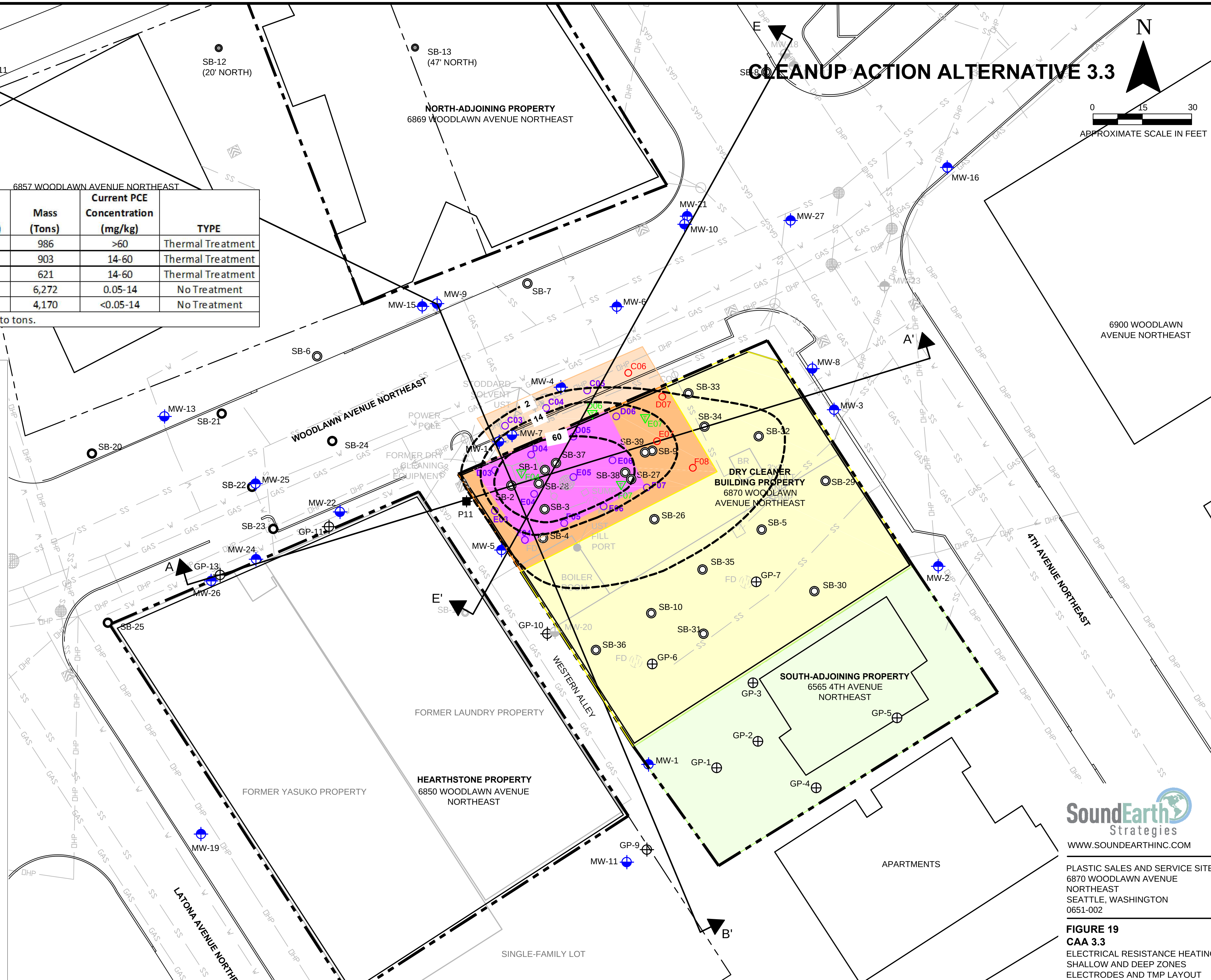
CLEANUP ACTION ALTERNATIVE 3.3

Symbol	Area	Area (Square Feet)	Average Thickness (Feet)	Volume (Cubic Yards)	Mass (Tons)	Current PCE Concentration (mg/kg)	TYPE
	1	1,160	13.5	580	986	>60	Thermal Treatment
	2	1,062	13.5	531	903	14-60	Thermal Treatment
	3	730	13.5	365	621	14-60	Thermal Treatment
	4	6,870	14.5	3,689	6,272	0.05-14	No Treatment
	5	4,567	14.5	2,453	4,170	<0.05-14	No Treatment

* Note that conversion factor of 1.7 was used from cubic yards to tons.



LEGEND

CATCH BASIN
MANHOLE
SHALLOW-ZONE MONITORING WELL
DEEP-ZONE MONITORING WELL
DECOMMISSIONED WELL
DIRECT-PUSH BORING (GEOENGINEERS, 2002/2003)
DIRECT-PUSH BORING (GEOENGINEERS, 2004)
DIRECT-PUSH BORING (FARALLON, 2004)
DIRECT-PUSH BORING (FARALLON, 2006/2007)
DIRECT-PUSH BORING (FARALLON, 2010)
DIRECT-PUSH BORING (SOUNDEARTH, 2008)
HOLLOW-STEM AUGER (SOUNDEARTH, 2009)
F07 ELECTRODE UPPER SHALLOW ZONE
C03 ELECTRODE SHALLOW AND DEEP ZONES
F07 TMP (4)
SW STORMWATER LINE
GAS GAS LINE
SS SANITARY SEWER LINE
W WATER LINE
DHP OVERHEAD POWER LINE
SITE PROPERTY BOUNDARY
PARCEL BOUNDARY
60 PCE ISOCONCENTRATION IN SOIL (mg/kg)
CROSS SECTION LOCATION
FD FLOOR DRAIN
PCE TETRACHLORETHENE
mg/kg MILLIGRAM PER KILOGRAM
TMP TEMPERATURE MONITORING POINT
UST UNDERGROUND STORAGE TANK

FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010

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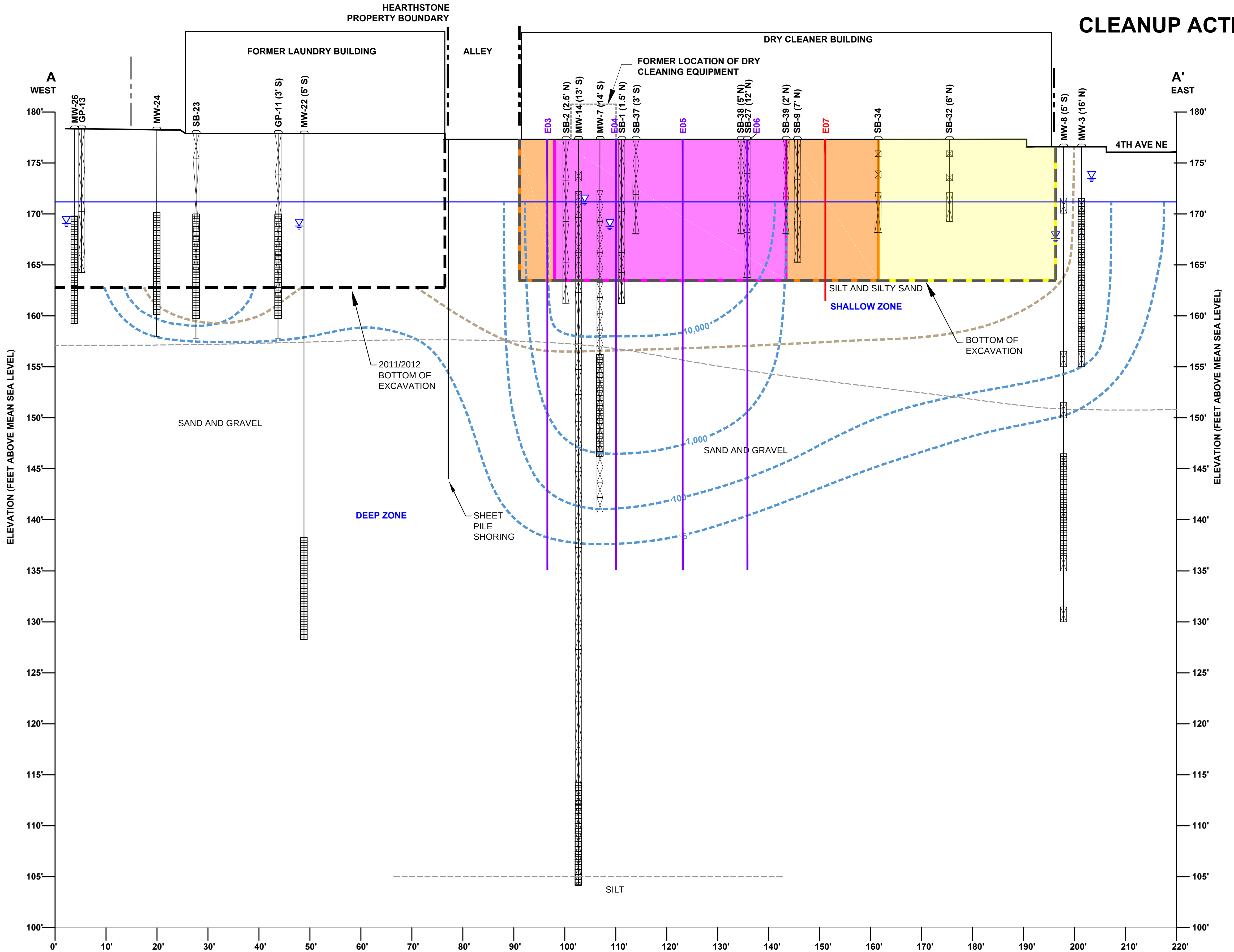
FIGURE 19
CAA 3.3
ELECTRICAL RESISTANCE HEATING SHALLOW AND DEEP ZONES ELECTRODES AND TMP LAYOUT

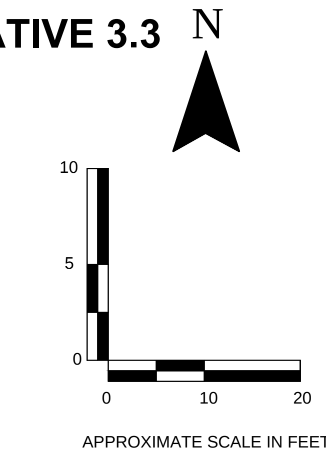
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG19_CAA3_F.DWG
5/29/2015

5/14/2015

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG20_XAA_CAA3_F.DWG

CLEANUP ACTION ALTERNATIVE 3.3





LEGEND

MW11 (21' E) WELL OFFSET 21' EAST

- BLANK CASING
- SOIL SAMPLE INTERVAL
- WELL SCREEN INTERVAL
- INFERRED WATER TABLE FOR SHALLOW ZONE
- WELL TERMINATION

5 — PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)

APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg

PROPERTY BOUNDARY

INFERRED CONTACT

EXCAVATION LIMIT

E07 — ELECTRODE UPPER SHALLOW ZONE

E03 — ELECTRODE SHALLOW AND DEEP ZONES

PCE — TETRACHLORETHENE

mg/kg — MILLIGRAMS PER KILOGRAM

µg/L — MICROGRAMS PER LITER

Symbol	Current PCE Concentration (mg/kg)
(magenta)	>60
(orange)	14-60
(yellow)	0.05-14

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FIGURE 20
CAA 3.3
ELECTRICAL RESISTANCE HEATING
SHALLOW AND DEEP ZONES
CROSS SECTION A-A'

5/14/2015

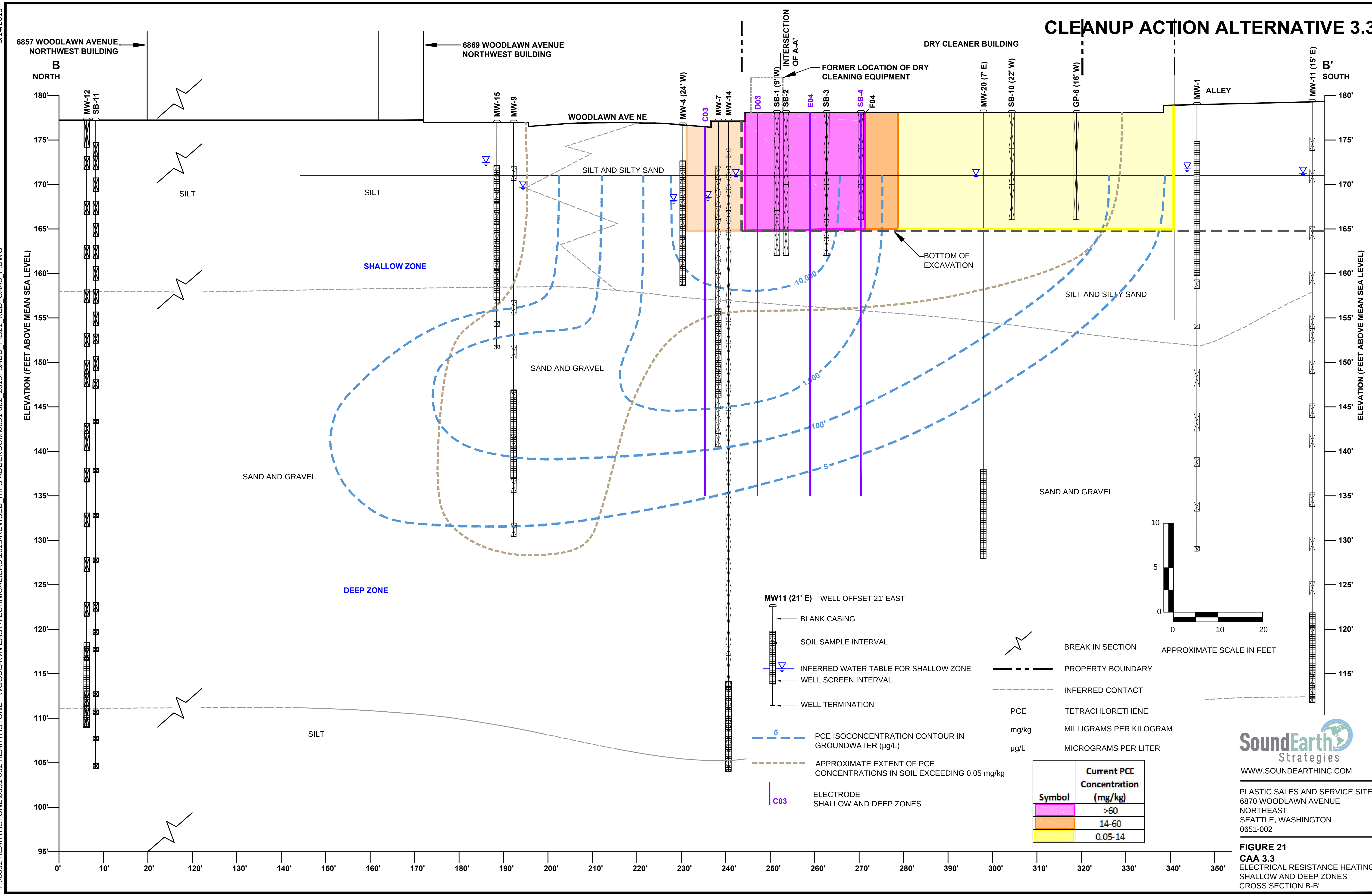
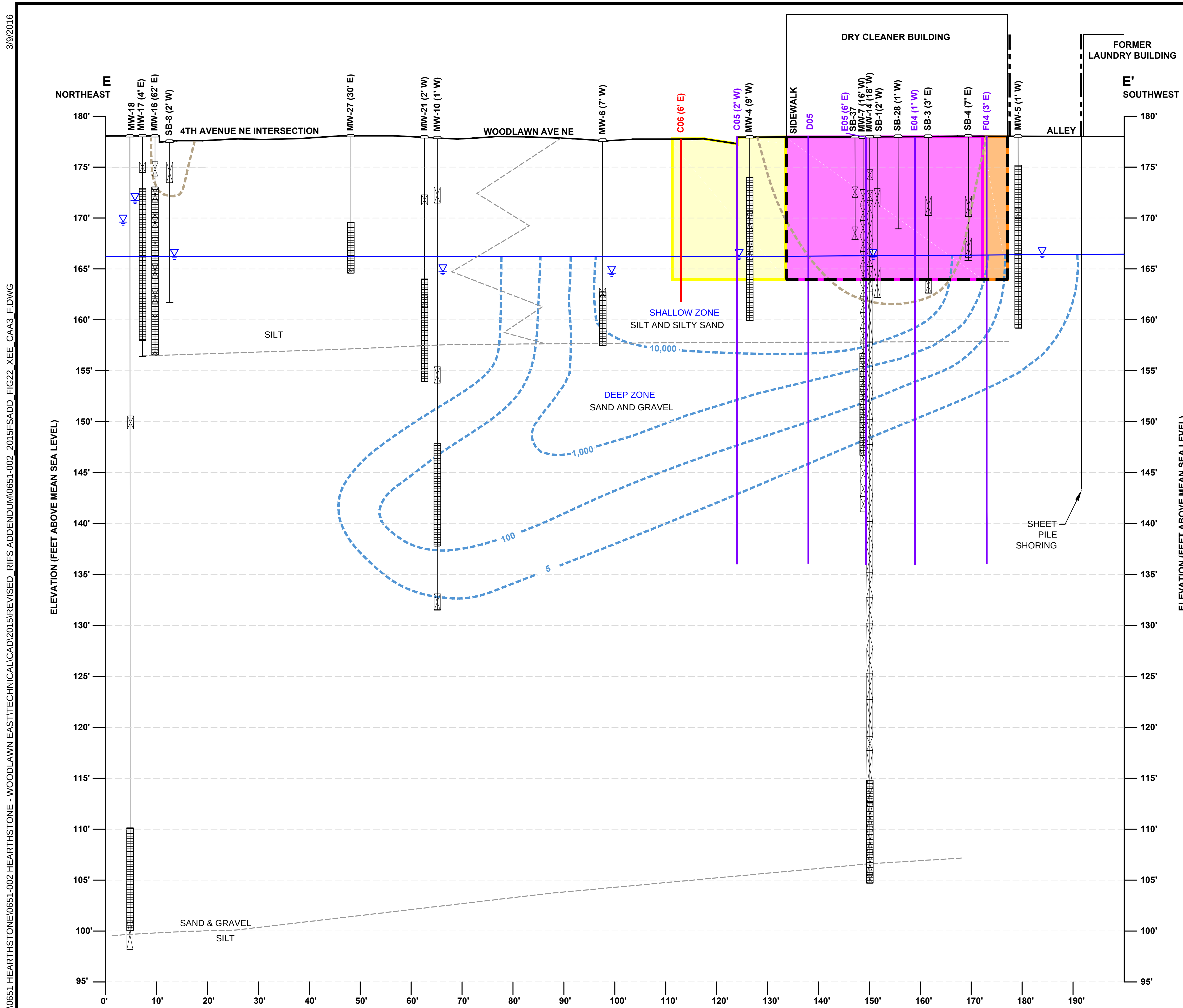


FIGURE 21
CAA 3.3
ELECTRICAL RESISTANCE HEATING
SHALLOW AND DEEP ZONES
CROSS SECTION B-B'

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG21_XBB_CAA3_F.DWG

CLEANUP ACTION ALTERNATIVE 3.3



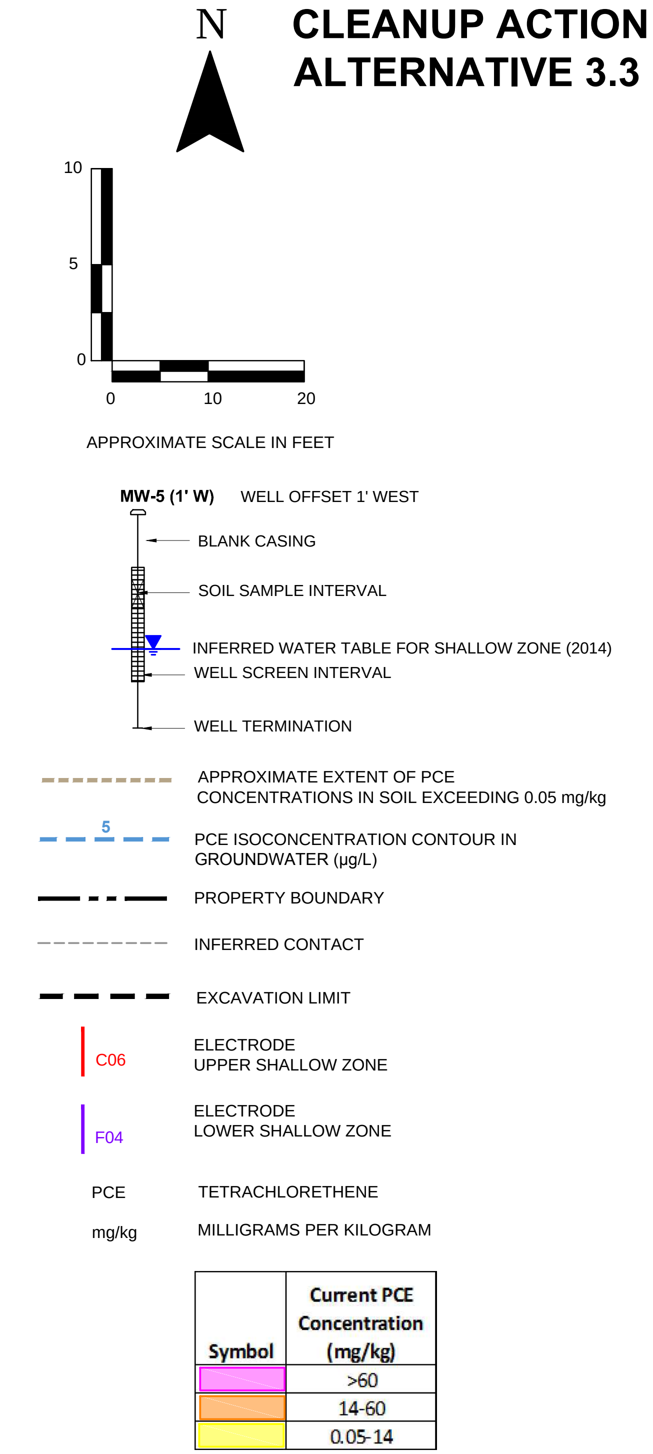


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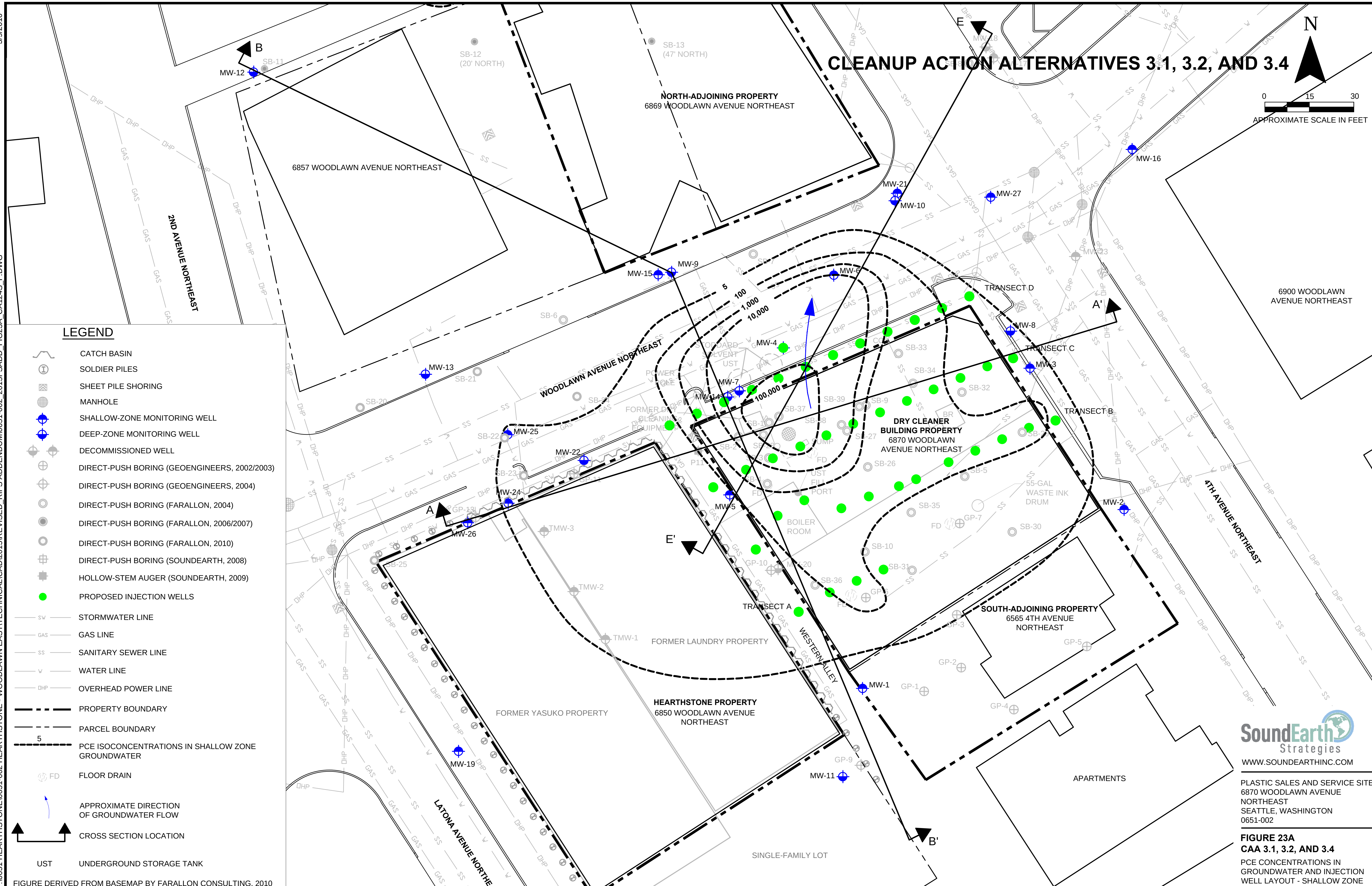
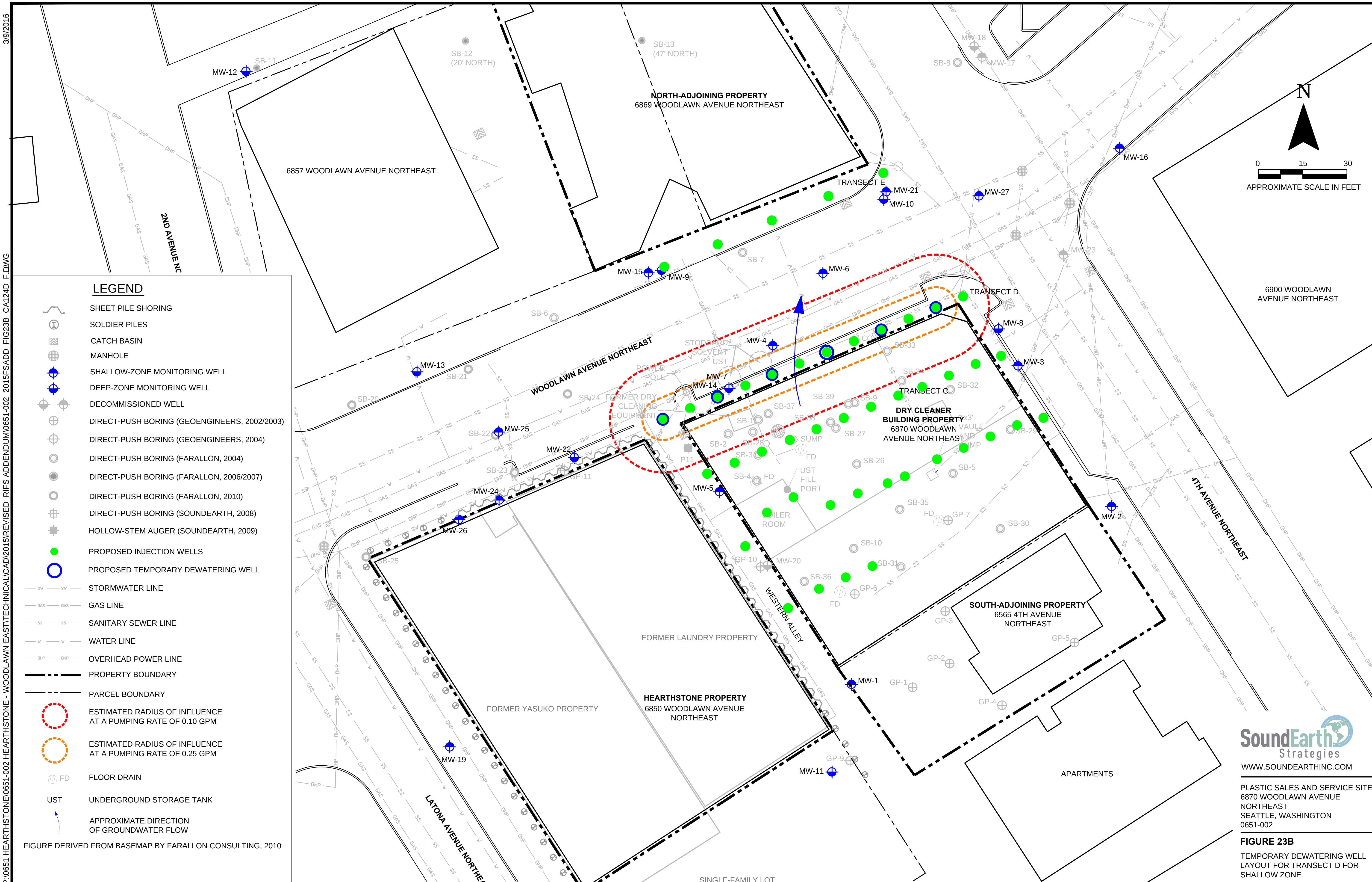
FIGURE 22
CAA 3.3
ELECTRICAL RESISTANCE HEATING
SHALLOW AND DEEP ZONES
CROSS SECTION E-E'

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG23A_CA124S_F.DWG 3/9/2016



3/9/2016

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG23B_CA124D_F.DWG



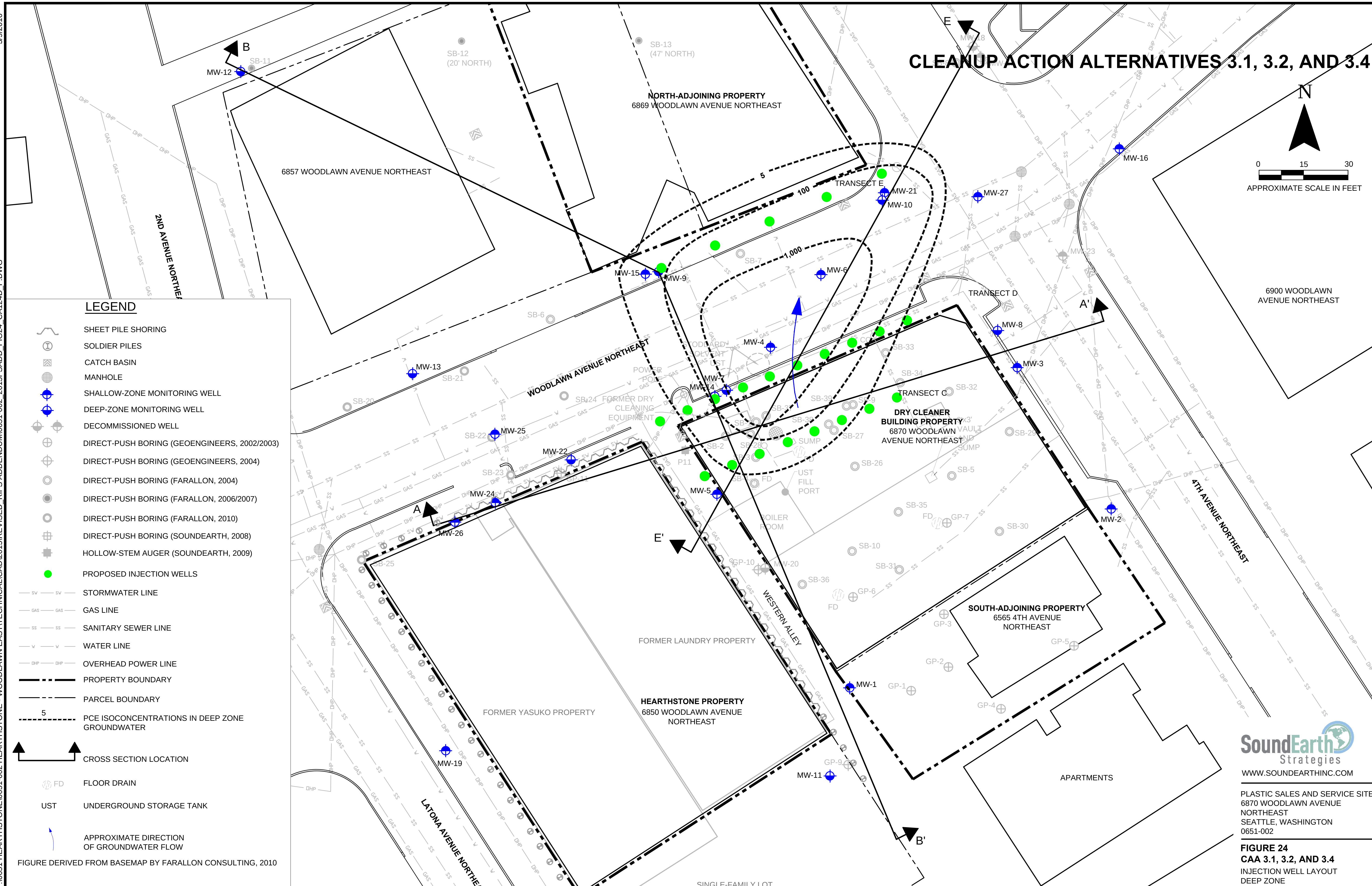

CLEANUP ACTION ALTERNATIVES 3.1, 3.2, AND 3.4
N
0 15 30
APPROXIMATE SCALE IN FEET
NORTH-ADJOINING PROPERTY
6869 WOODLAWN AVENUE NORTHEAST
6857 WOODLAWN AVENUE NORTHEAST
6900 WOODLAWN AVENUE NORTHEAST
WOODLAWN AVENUE NORTHEAST
2ND AVENUE NORTHEAST
4TH AVENUE NORTHEAST
LATONA AVENUE NORTHEAST
WESTERN ALLEY
DRY CLEANER BUILDING PROPERTY
6870 WOODLAWN AVENUE NORTHEAST
HEARTHSTONE PROPERTY
6850 WOODLAWN AVENUE NORTHEAST
FORMER YASUKO PROPERTY
FORMER LAUNDRY PROPERTY
SOUTH-ADJOINING PROPERTY
6565 4TH AVENUE NORTHEAST
APARTMENTS
SINGLE-FAMILY LOT
TRANSECT C
TRANSECT D
TRANSECT E
5
100
1,000
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11
MW-12
MW-13
MW-14
MW-15
MW-16
MW-19
MW-21
MW-22
MW-24
MW-25
MW-26
MW-27
A
A'
B
B'
E
E'
3/9/2016
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG24_CA124D_F.DWG
LEGEND
SHEET PILE SHORING
SOLDIER PILES
CATCH BASIN
MANHOLE
SHALLOW-ZONE MONITORING WELL
DEEP-ZONE MONITORING WELL
DECOMMISSIONED WELL
DIRECT-PUSH BORING (GEOENGINEERS, 2002/2003)
DIRECT-PUSH BORING (GEOENGINEERS, 2004)
DIRECT-PUSH BORING (FARALLON, 2004)
DIRECT-PUSH BORING (FARALLON, 2006/2007)
DIRECT-PUSH BORING (FARALLON, 2010)
DIRECT-PUSH BORING (SOUNDEARTH, 2008)
HOLLOW-STEM AUGER (SOUNDEARTH, 2009)
PROPOSED INJECTION WELLS
STORMWATER LINE
GAS LINE
SANITARY SEWER LINE
WATER LINE
OVERHEAD POWER LINE
PROPERTY BOUNDARY
PARCEL BOUNDARY
PCE ISOCONCENTRATIONS IN DEEP ZONE GROUNDWATER
CROSS SECTION LOCATION
FLOOR DRAIN
UST UNDERGROUND STORAGE TANK
APPROXIMATE DIRECTION OF GROUNDWATER FLOW
FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010
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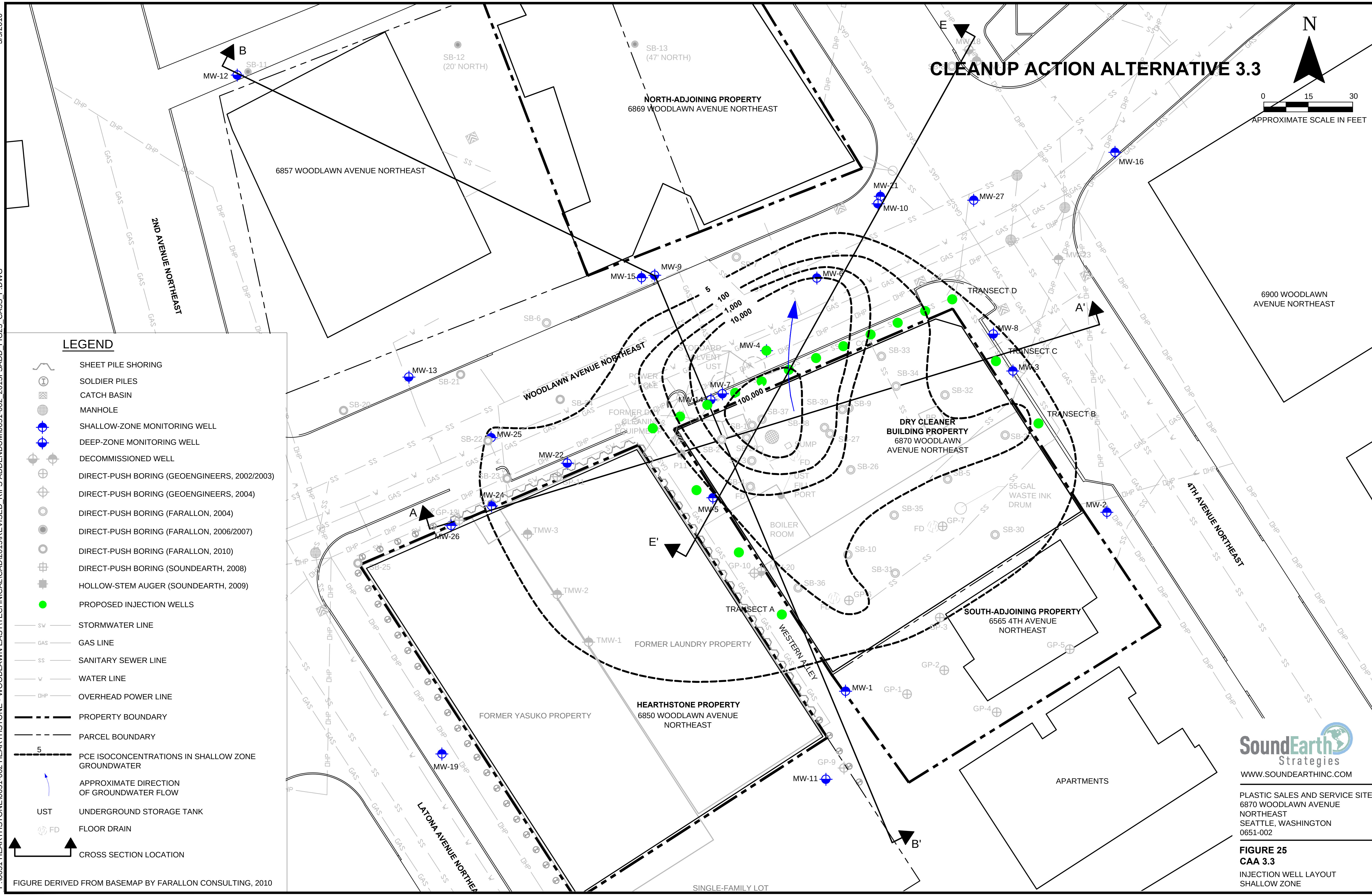
FIGURE 24
CAA 3.1, 3.2, AND 3.4
INJECTION WELL LAYOUT
DEEP ZONE

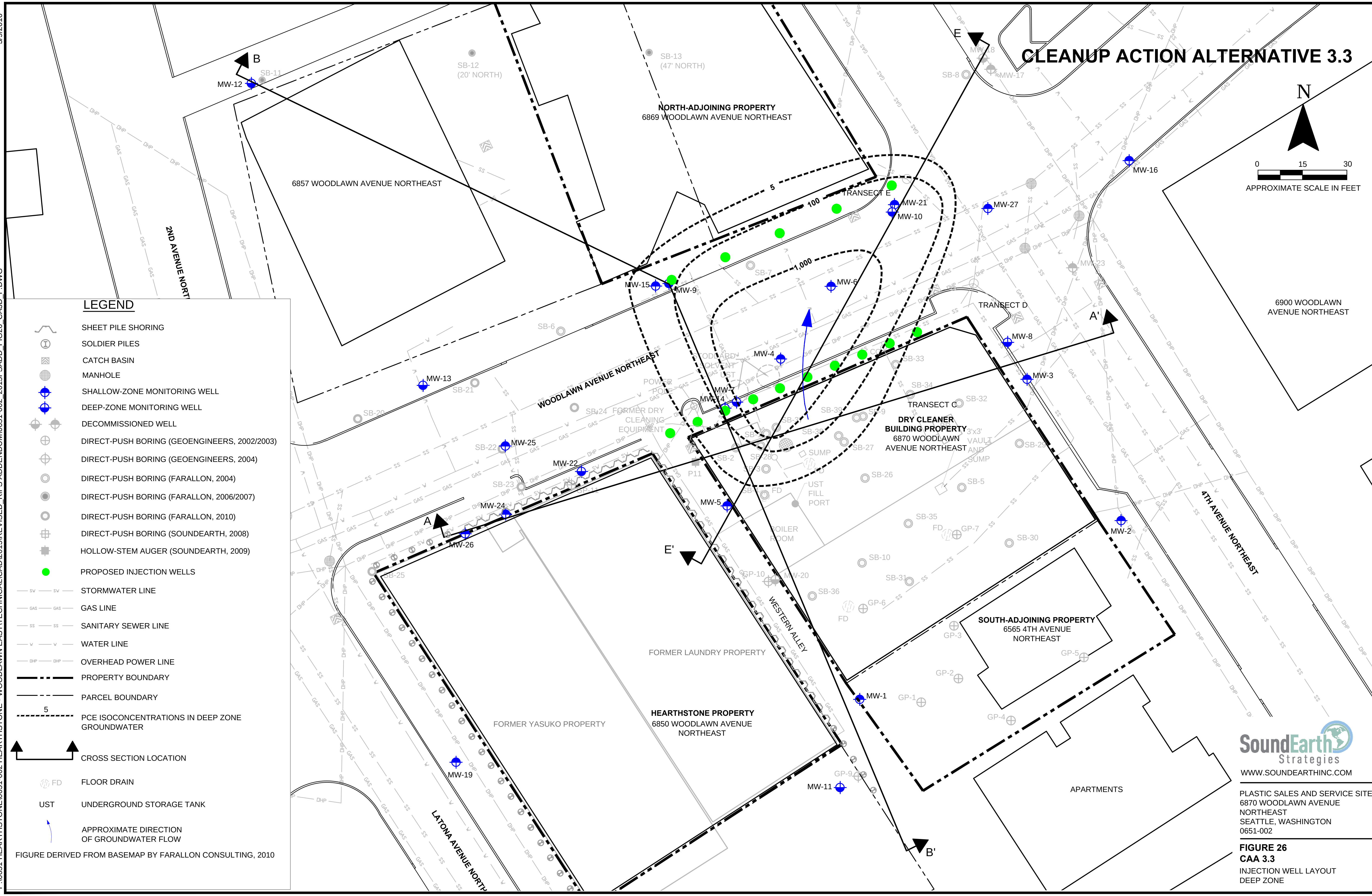


3/9/2016

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG25_CA3S_F.DWG

3/9/2016

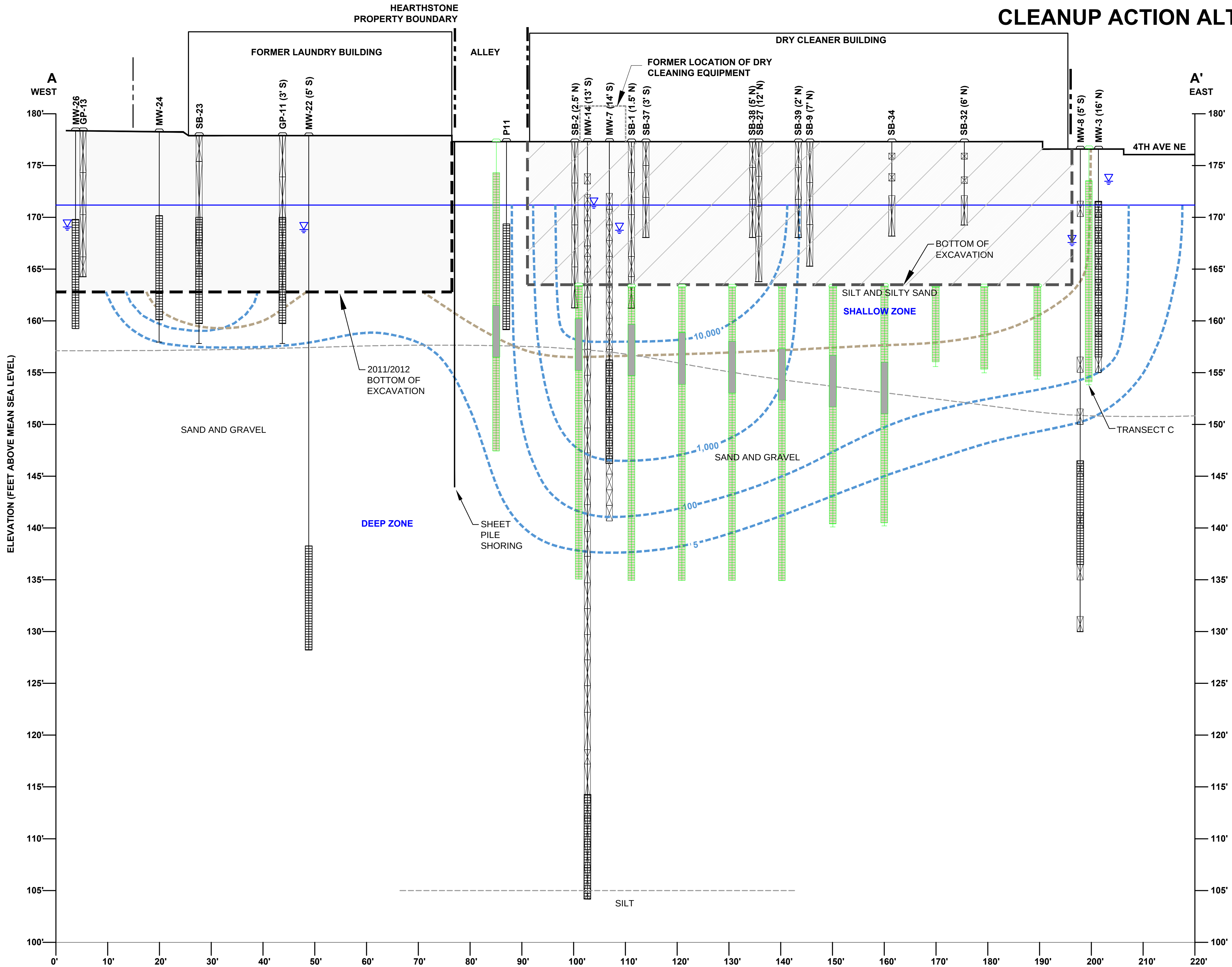
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002 2015FSADD FIG26 CA3D F.DWG



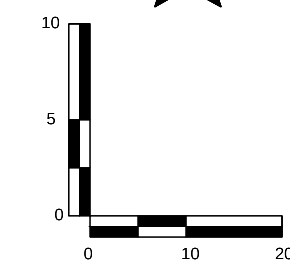
3/9/2016

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG27_XAA_ERD_F.DWG

CLEANUP ACTION ALTERNATIVES 3.1 AND 3.2



N



APPROXIMATE SCALE IN FEET

LEGEND

MW11 (21' E) WELL OFFSET 21' EAST

- BLANK CASING
- SOIL SAMPLE INTERVAL
- INFERRED WATER TABLE FOR SHALLOW ZONE
- WELL SCREEN INTERVAL
- WELL TERMINATION

5 — PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)

APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg

PROPERTY BOUNDARY

PARCEL BOUNDARY

INFERRED CONTACT

EXCAVATION LIMIT

PCE	TETRACHLORETHENE
mg/kg	MILLIGRAMS PER KILOGRAM
µg/L	MICROGRAMS PER LITER

PROPOSED SINGLE INJECTION WELL

PROPOSED DUAL INJECTION WELL
BENTONITE/GROUT SEAL AT ZONE CONTACT

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FIGURE 27
CAA 3.1 AND CAA 3.2
ENHANCED REDUCTIVE DECHLORINATION
CROSS SECTION A-A'

5/14/2015

CLEANUP ACTION ALTERNATIVES 3.1 AND 3.2

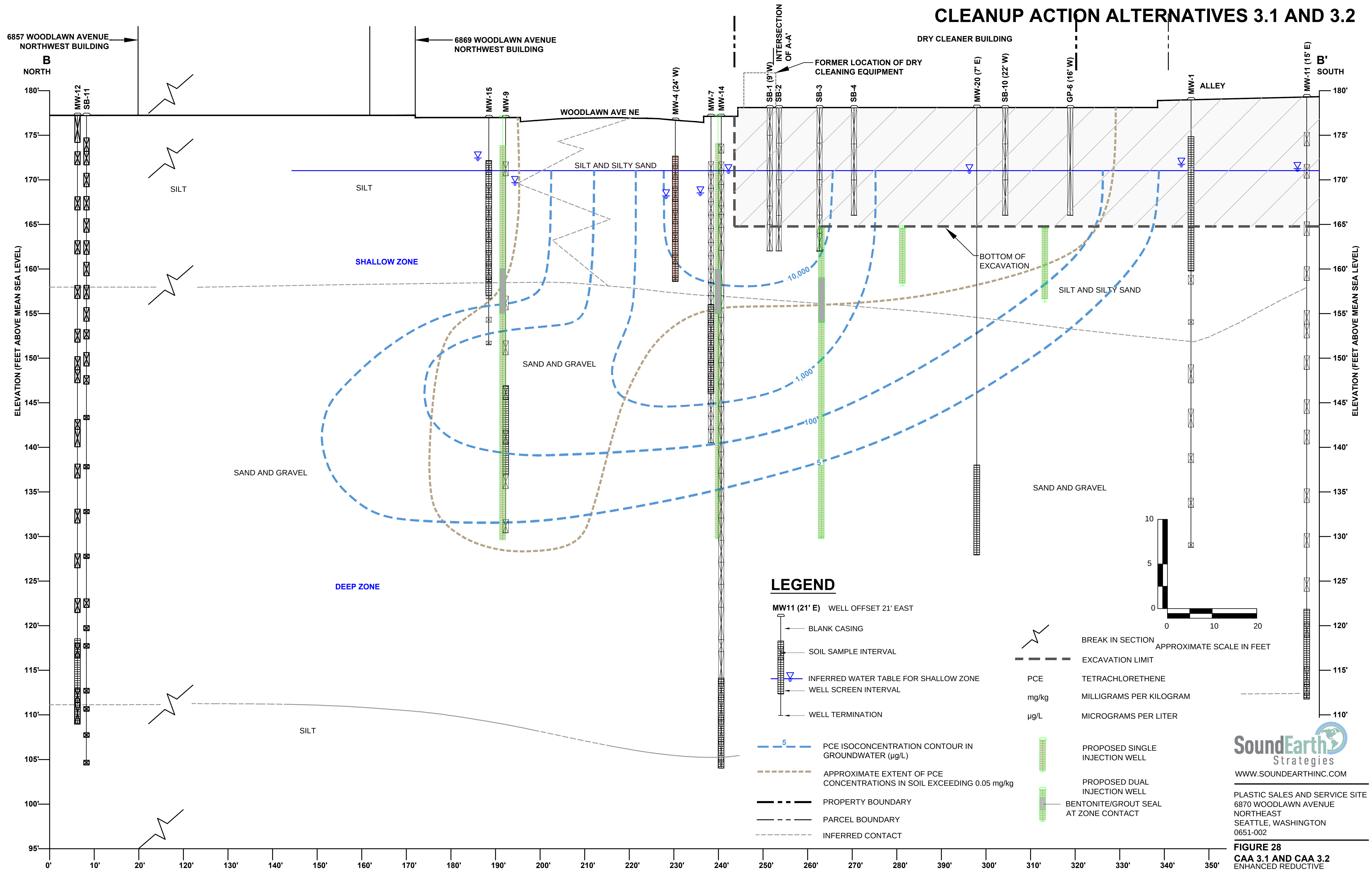

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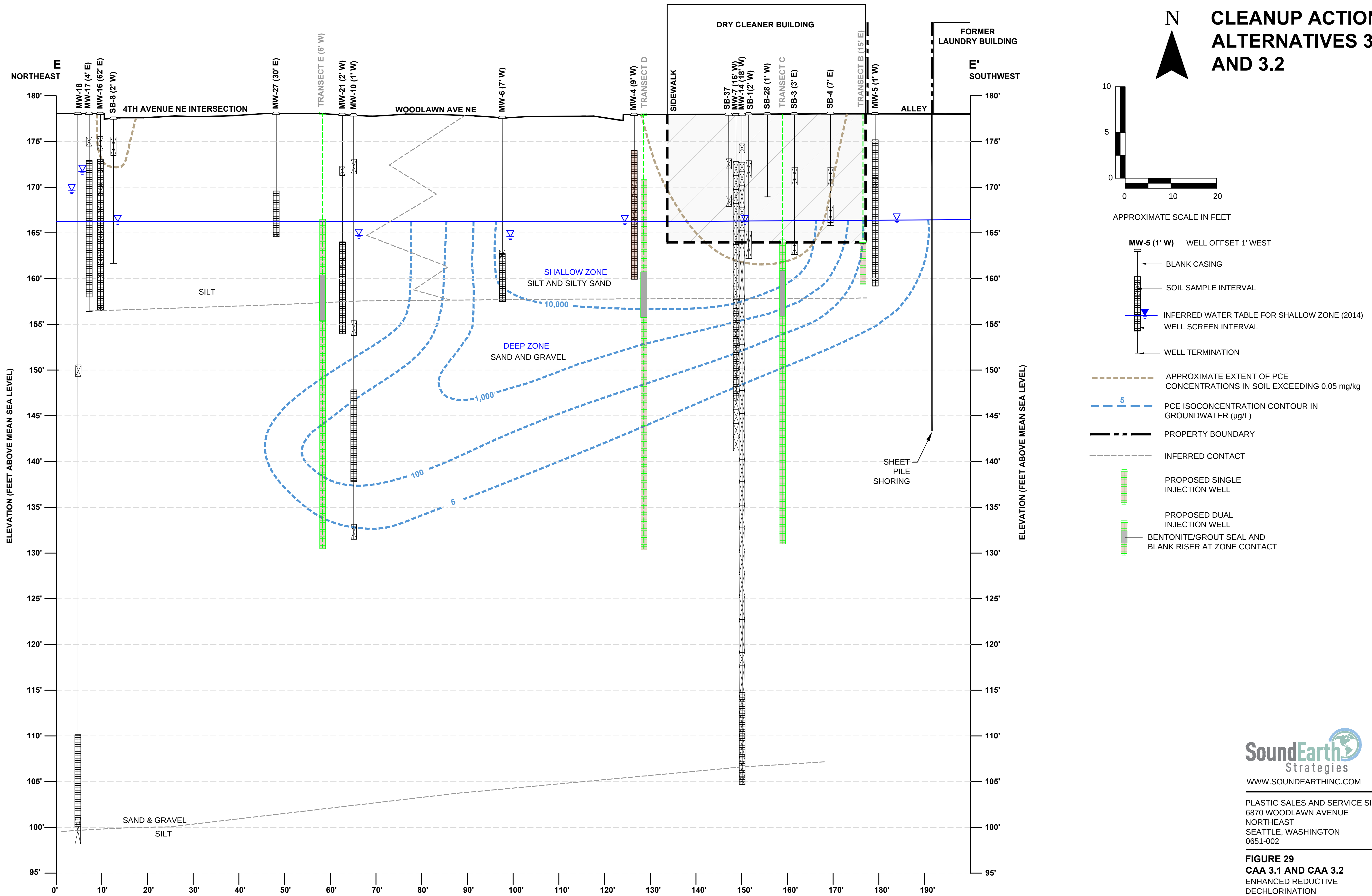
FIGURE 28
CAA 3.1 AND CAA 3.2
ENHANCED REDUCTIVE DECHLORINATION
CROSS SECTION B-B'

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG28_XBB_ERD_F.DWG



CLEANUP ACTION ALTERNATIVES 3.1 AND 3.2

5/29/2015

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG29_XEE_ERD_F.DWG

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NORTHEAST
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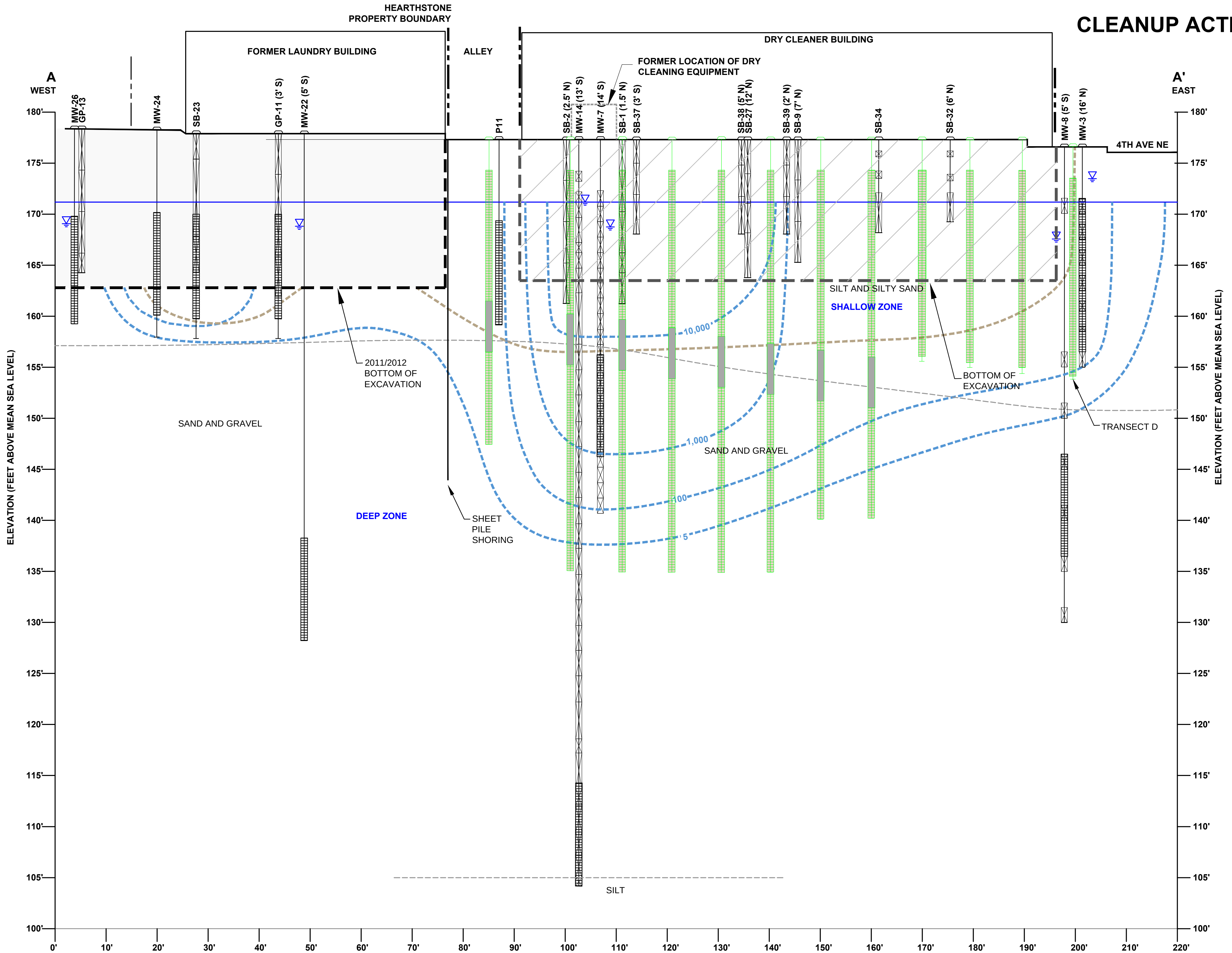
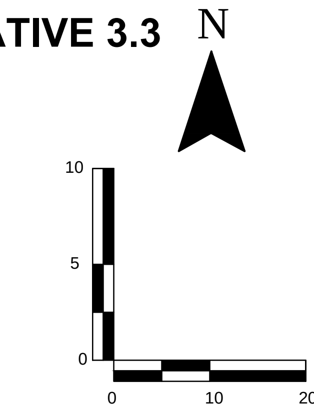
FIGURE 29
CAA 3.1 AND CAA 3.2
ENHANCED REDUCTIVE DECHLORINATION
CROSS SECTION E-E'

CLEANUP ACTION ALTERNATIVE 3.3





LEGEND

MW11 (21' E) WELL OFFSET 21' EAST

- BLANK CASING
- SOIL SAMPLE INTERVAL
- INFERRED WATER TABLE FOR SHALLOW ZONE
- WELL SCREEN INTERVAL
- WELL TERMINATION

5	PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)
	APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg
	PROPERTY BOUNDARY
	PARCEL BOUNDARY
	INFERRED CONTACT
	EXCAVATION LIMIT
PCE	TETRACHLORETHENE
mg/kg	MILLIGRAMS PER KILOGRAM
µg/L	MICROGRAMS PER LITER
	PROPOSED SINGLE INJECTION WELL
	PROPOSED DUAL INJECTION WELL
	BENTONITE/GROUT SEAL AT ZONE CONTACT

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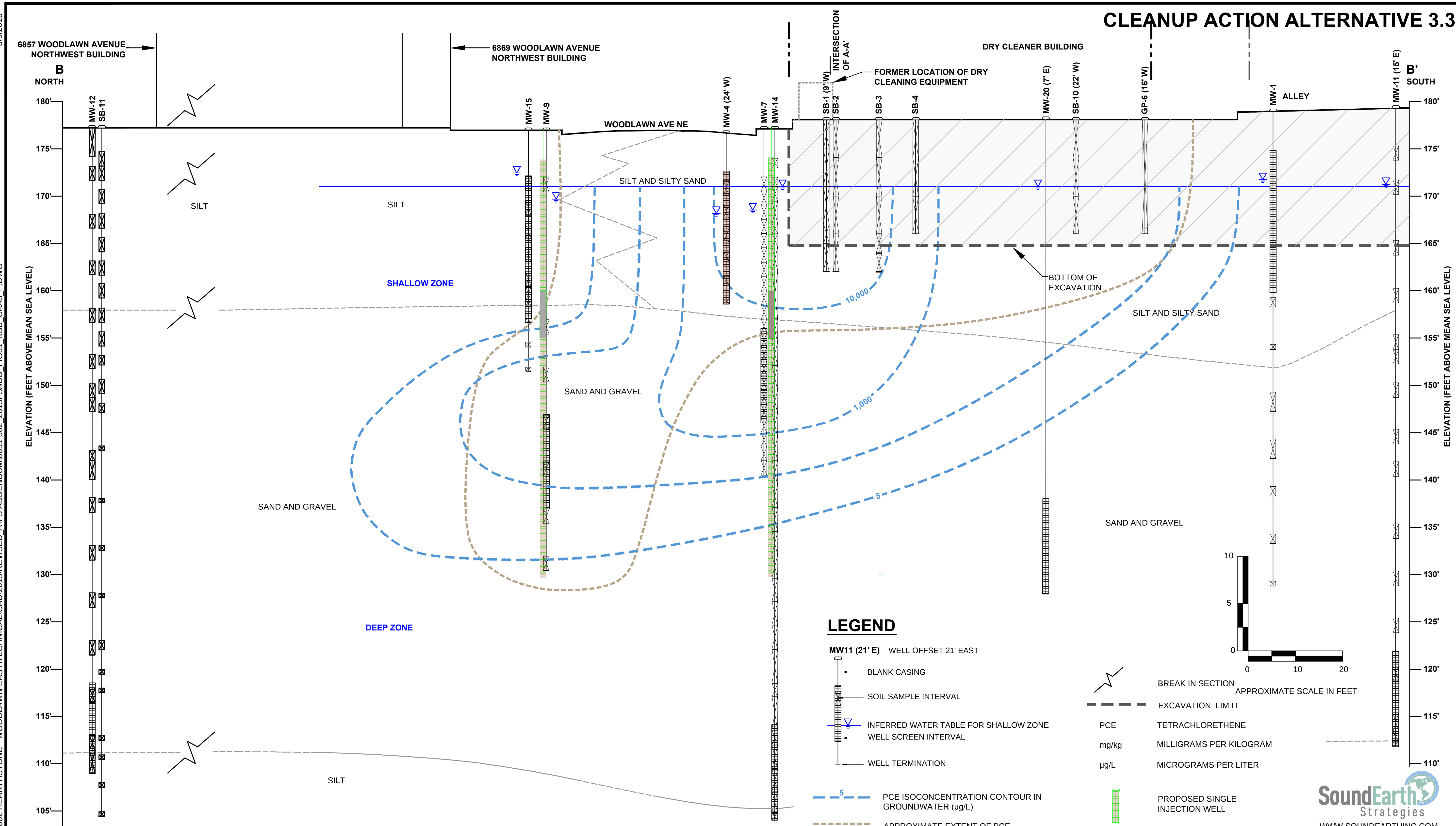
FIGURE 30
CAA 3.3
ENHANCED REDUCTIVE
DECHLORINATION
CROSS SECTION A-A'

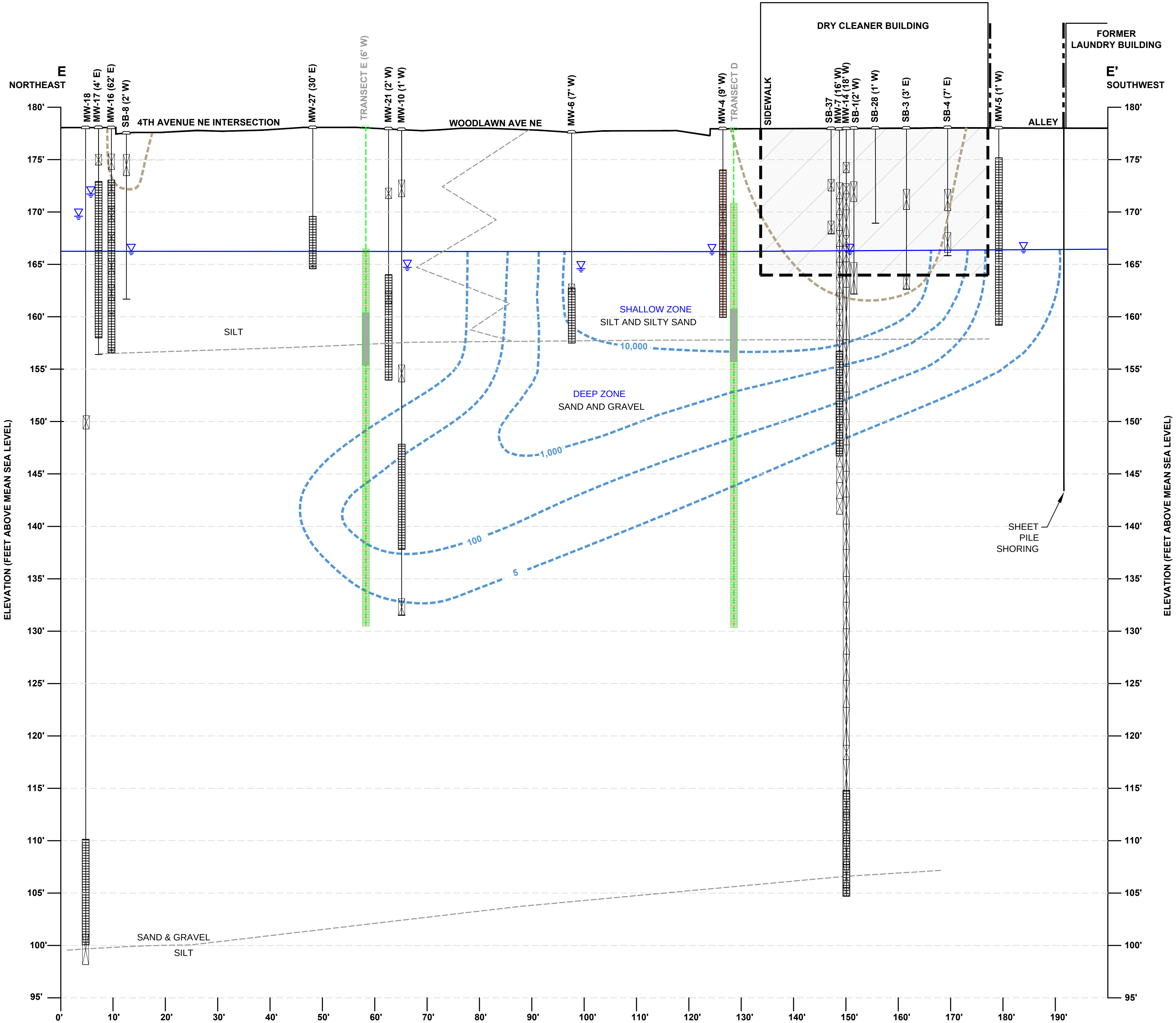
3/9/2016
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED_RIFS ADDENDUM\0651-002_2015FSADD_FIG30_XAA_CAA3_F.DWG



PLASTIC SALES AND SERVICE SITE
6870 WOODLAWN AVENUE NORTHEAST
SEATTLE, WASHINGTON
0651-002

FIGURE 31
CAA 3.3
ENHANCED REDUCTIVE DECHLORINATION
CROSS SECTION B-B'

CLEANUP ACTION ALTERNATIVE 3.3



N

APPROXIMATE SCALE IN FEET (0, 5, 10 vertical; 0, 10, 20 horizontal)

MW-5 (1' W) WELL OFFSET 1' WEST

BLANK CASING

SOIL SAMPLE INTERVAL

INFERRED WATER TABLE FOR SHALLOW ZONE (2014)

WELL SCREEN INTERVAL

WELL TERMINATION

APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg

5 PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)

PROPERTY BOUNDARY

INFERRED CONTACT

PROPOSED SINGLE INJECTION WELL

PROPOSED DUAL INJECTION WELL

BENTONITE/GROUT SEAL AND BLANK RISER AT ZONE CONTACT

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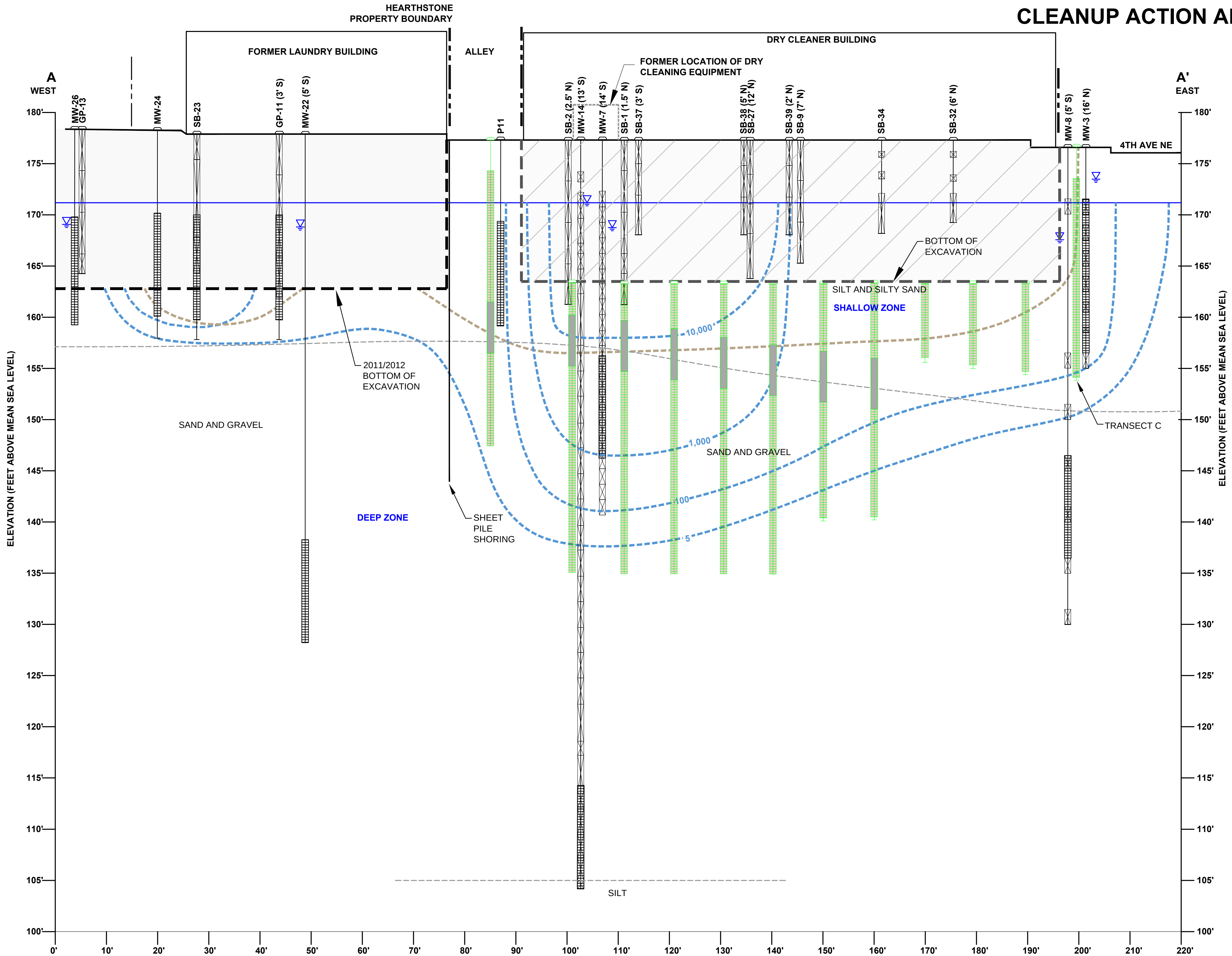
6870 WOODLAWN AVENUE
NORTHEAST
SEATTLE, WASHINGTON
0651-002

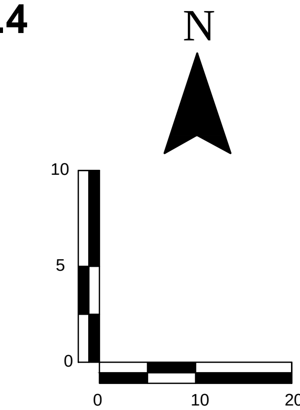
FIGURE 32
CAA 3.3
ENHANCED REDUCTIVE DECHLORINATION CROSS SECTION E-E'

3/9/2016

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED_RIFS ADDENDUM\0651-002_2015FSADD_FIG32_XEE_CAA3_F.DWG

CLEANUP ACTION ALTERNATIVE 3.4





APPROXIMATE SCALE IN FEET

LEGEND

MW11 (21' E) WELL OFFSET 21' EAST

- BLANK CASING
- SOIL SAMPLE INTERVAL
- INFERRED WATER TABLE FOR SHALLOW ZONE
- WELL SCREEN INTERVAL
- WELL TERMINATION

5	PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)
	APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg
	PROPERTY BOUNDARY
	PARCEL BOUNDARY
	INFERRED CONTACT
	EXCAVATION LIMIT
PCE	TETRACHLORETHENE
mg/kg	MILLIGRAMS PER KILOGRAM
µg/L	MICROGRAMS PER LITER
	PROPOSED SINGLE INJECTION WELL
	PROPOSED DUAL INJECTION WELL
	BENTONITE/GROUT SEAL AT ZONE CONTACT

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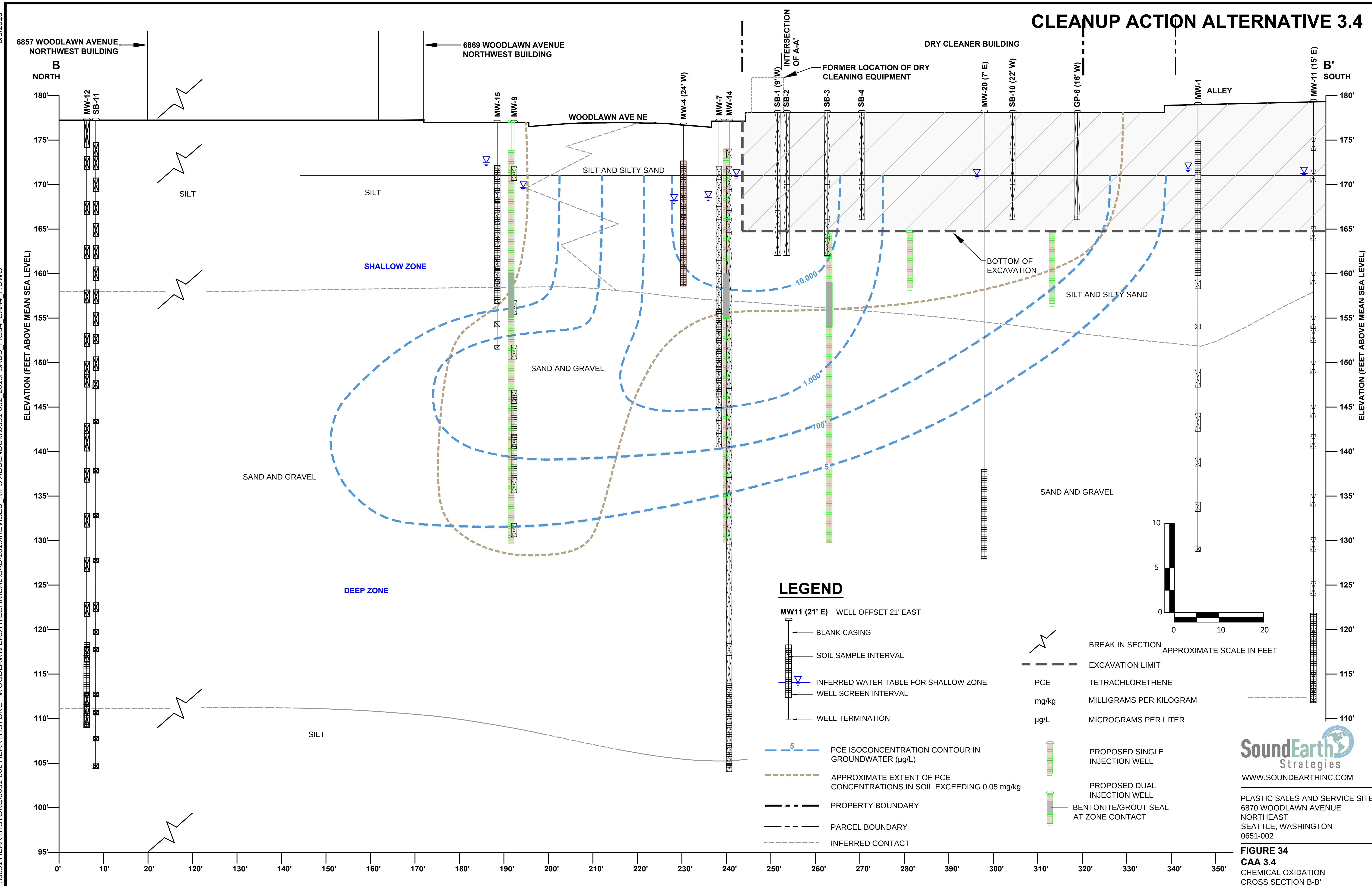
PLASTIC SALES AND SERVICE SITE
6870 WOODLAWN AVENUE
NORTHEAST
SEATTLE, WASHINGTON
0651-002

FIGURE 33
CAA 3.4
CHEMICAL OXIDATION
CROSS SECTION A-A'



CLEANUP ACTION ALTERNATIVE 3.4
3/9/2016
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED RIFS ADDENDUM\0651-002_2015FSADD_FIG34_CAA4_F.DWG
6857 WOODLAWN AVENUE NORTHWEST BUILDING
6869 WOODLAWN AVENUE NORTHWEST BUILDING
B
NORTH
B'
SOUTH
INTERSECTION OF A-A'
FORMER LOCATION OF DRY CLEANING EQUIPMENT
DRY CLEANER BUILDING
ALLEY
WOODLAWN AVE NE
MW-12
SB-11
MW-15
MW-9
MW-4 (24' W)
MW-7
MW-14
SB-1 (9' W)
SB-2
SB-3
SB-4
MW-20 (7' E)
SB-10 (22' W)
GP-6 (16' W)
MW-1
MW-11 (15' E)
SILT
SILT AND SILTY SAND
SHALLOW ZONE
SAND AND GRAVEL
DEEP ZONE
BOTTOM OF EXCAVATION
10,000
1,000
100
5
ELEVATION (FEET ABOVE MEAN SEA LEVEL)
LEGEND
MW11 (21' E) WELL OFFSET 21' EAST
BLANK CASING
SOIL SAMPLE INTERVAL
INFERRED WATER TABLE FOR SHALLOW ZONE
WELL SCREEN INTERVAL
WELL TERMINATION
PCE ISOCONCENTRATION CONTOUR IN GROUNDWATER (µg/L)
APPROXIMATE EXTENT OF PCE CONCENTRATIONS IN SOIL EXCEEDING 0.05 mg/kg
PROPERTY BOUNDARY
PARCEL BOUNDARY
INFERRED CONTACT
BREAK IN SECTION
EXCAVATION LIMIT
PCE TETRACHLORETHENE
mg/kg MILLIGRAMS PER KILOGRAM
µg/L MICROGRAMS PER LITER
PROPOSED SINGLE INJECTION WELL
PROPOSED DUAL INJECTION WELL
BENTONITE/GROUT SEAL AT ZONE CONTACT
APPROXIMATE SCALE IN FEET
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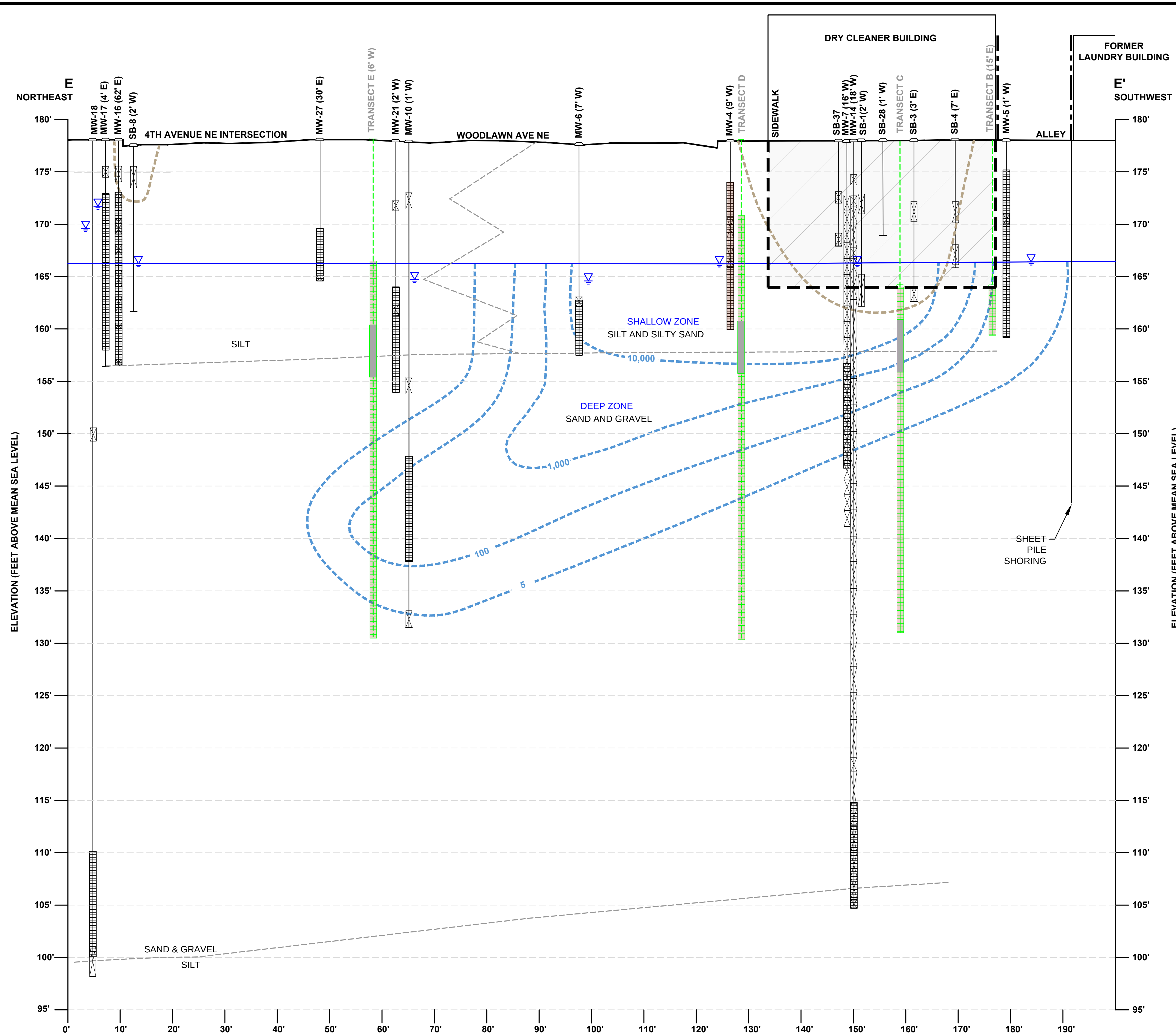
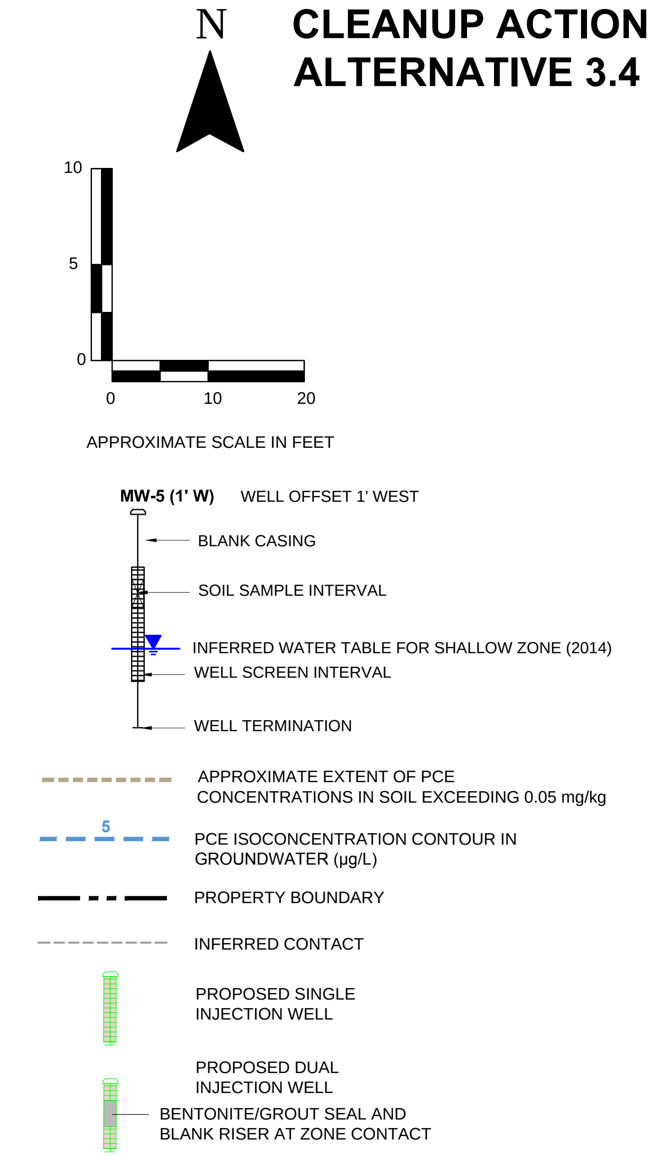
PLASTIC SALES AND SERVICE SITE
6870 WOODLAWN AVENUE NORTHEAST
SEATTLE, WASHINGTON
0651-002
FIGURE 34
CAA 3.4
CHEMICAL OXIDATION CROSS SECTION B-B'

CLEANUP ACTION ALTERNATIVE 3.4





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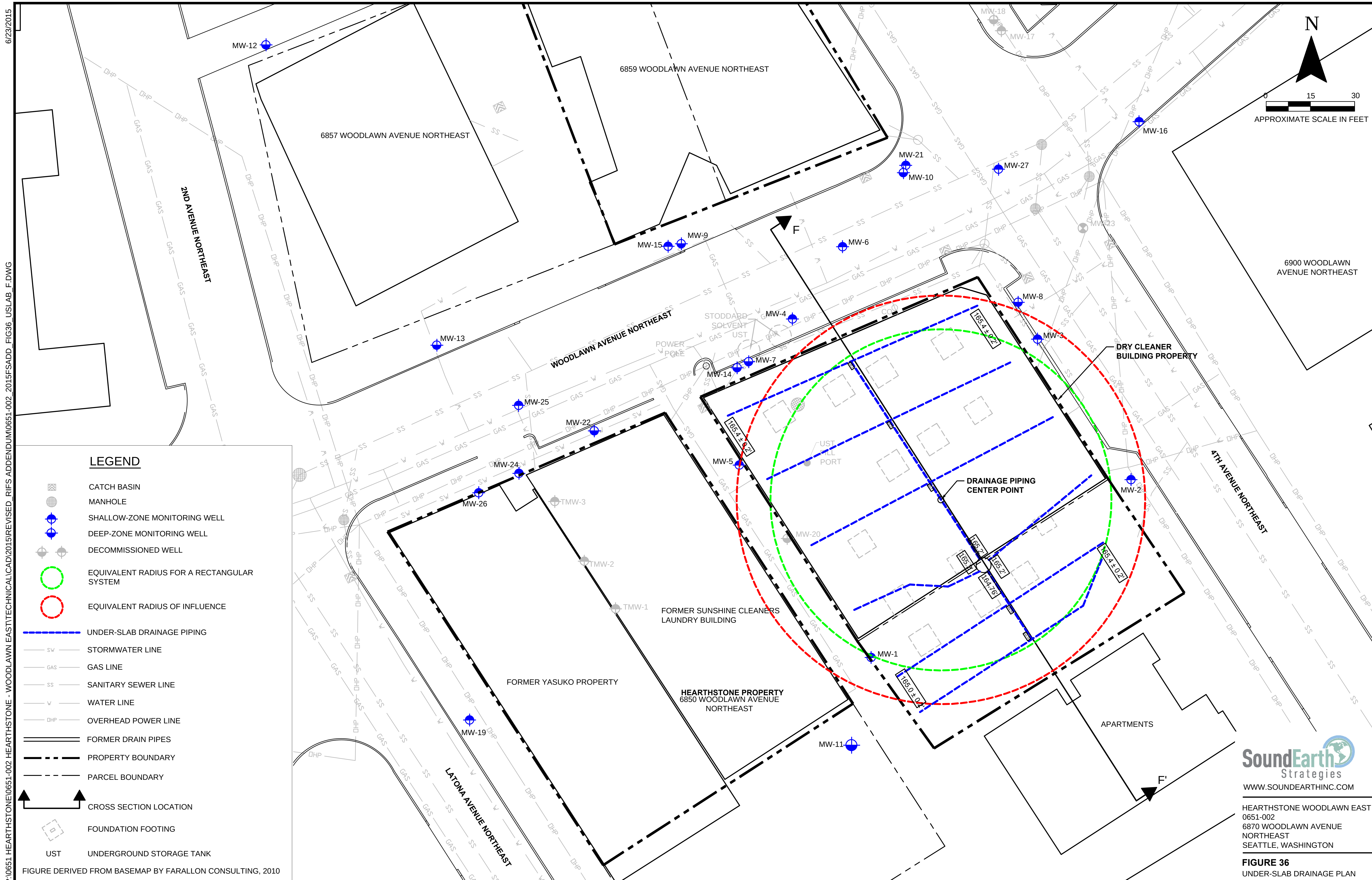
PLASTIC SALES AND SERVICE SITE
6870 WOODLAWN AVENUE
NORTHEAST
SEATTLE, WASHINGTON
0651-002

FIGURE 35
CAA 3.4
CHEMICAL OXIDATION
CROSS SECTION E-E'

3/9/2016
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED_RIFS ADDENDUM\0651-002_2015FSADD_FIG35_XEE_CAA4_F.DWG


6/23/2015
P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED_RIFS ADDENDUM\0651-002_2015FSADD_FIG36_USLAB_F.DWG
N
0
15
30
APPROXIMATE SCALE IN FEET
6857 WOODLAWN AVENUE NORTHEAST
6859 WOODLAWN AVENUE NORTHEAST
6900 WOODLAWN AVENUE NORTHEAST
2ND AVENUE NORTHEAST
WOODLAWN AVENUE NORTHEAST
4TH AVENUE NORTHEAST
LATONA AVENUE NORTHEAST
STODDARD SOLVENT UST
POWER POLE
UST FILL PORT
DRY CLEANER BUILDING PROPERTY
DRAINAGE PIPING CENTER POINT
FORMER SUNSHINE CLEANERS LAUNDRY BUILDING
FORMER YASUKO PROPERTY
HEARTHSTONE PROPERTY
6850 WOODLAWN AVENUE NORTHEAST
APARTMENTS
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11
MW-12
MW-13
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-23
MW-24
MW-25
MW-26
MW-27
TMW-1
TMW-2
TMW-3
F
F'
165.4 ± 0.2'
165.4 ± 0.2'
165.4 ± 0.2'
165.0 ± 0.2'
165.2'
165.2'
165.1'
164.76'
LEGEND
CATCH BASIN
MANHOLE
SHALLOW-ZONE MONITORING WELL
DEEP-ZONE MONITORING WELL
DECOMMISSIONED WELL
EQUIVALENT RADIUS FOR A RECTANGULAR SYSTEM
EQUIVALENT RADIUS OF INFLUENCE
UNDER-SLAB DRAINAGE PIPING
STORMWATER LINE
GAS LINE
SANITARY SEWER LINE
WATER LINE
OVERHEAD POWER LINE
FORMER DRAIN PIPES
PROPERTY BOUNDARY
PARCEL BOUNDARY
CROSS SECTION LOCATION
FOUNDATION FOOTING
UST
UNDERGROUND STORAGE TANK
FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010
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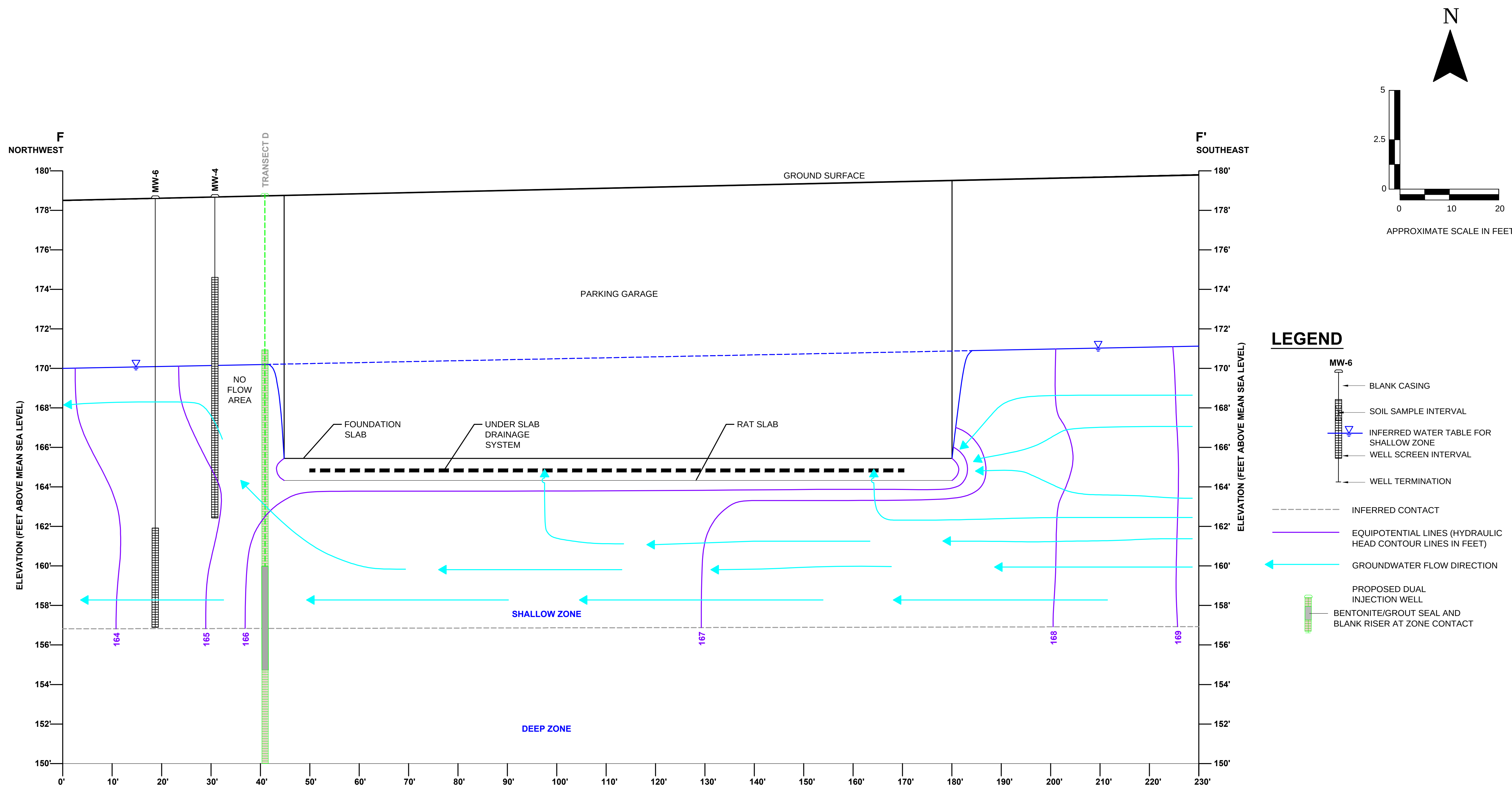
HEARTHSTONE WOODLAWN EAST
0651-002
6870 WOODLAWN AVENUE NORTHEAST
SEATTLE, WASHINGTON
FIGURE 36
UNDER-SLAB DRAINAGE PLAN



3/9/2016

P:\0651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED_RIFS ADDENDUM\0651-002_2015FSADD_FIG37_XFF_F.DWG

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PLASTIC SALES AND SERVICE SITE
6870 WOODLAWN AVENUE
NORTHEAST
SEATTLE, WASHINGTON
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FIGURE 37
CONCEPTUAL FLOW NET DIAGRAM
CROSS SECTION F-F'

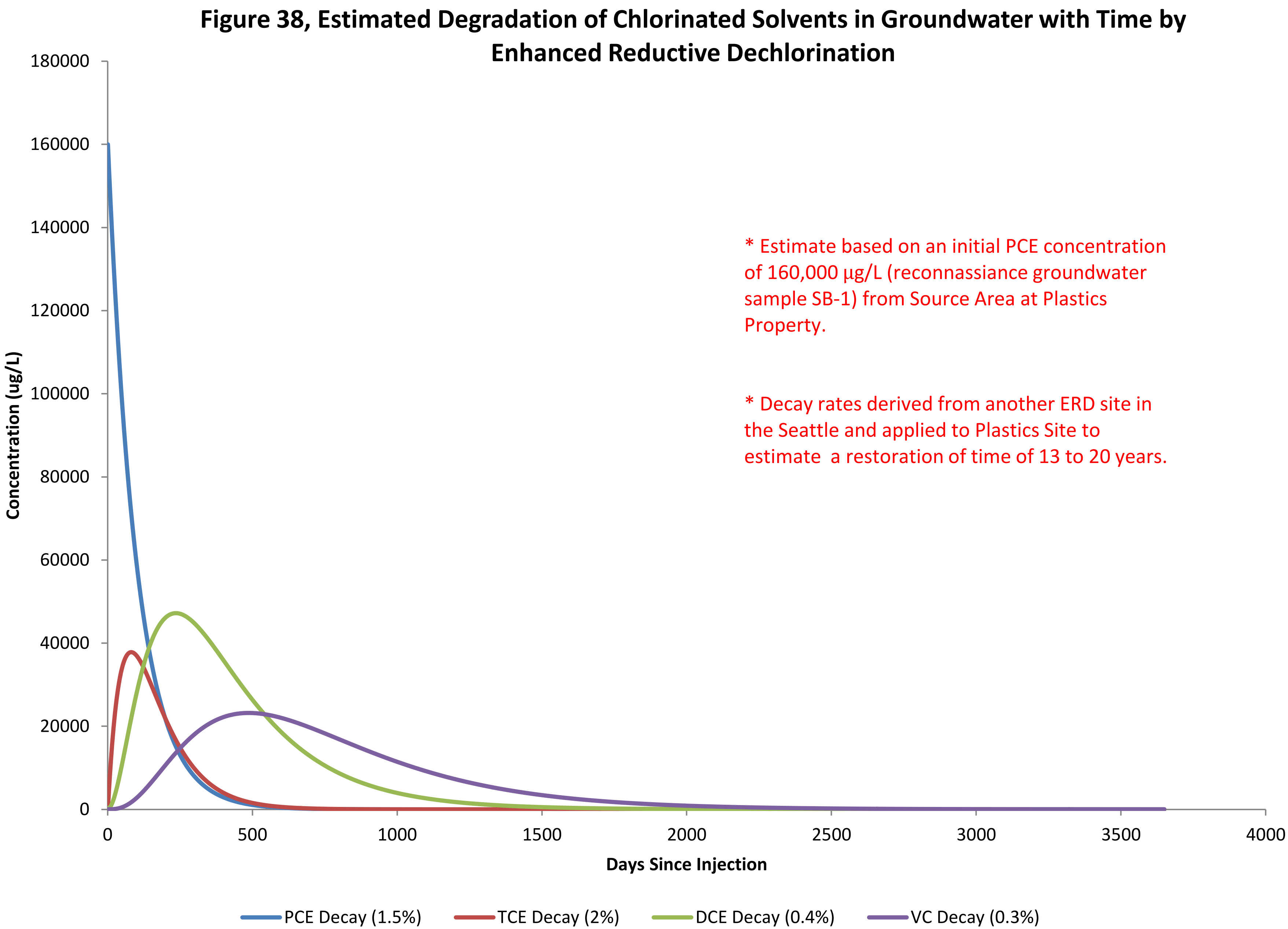


Figure 38, Estimated Degradation of Chlorinated Solvents in Groundwater with Time by Enhanced Reductive Dechlorination
Concentration (ug/L)
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
0
500
1000
1500
2000
2500
3000
3500
4000
Days Since Injection
* Estimate based on an initial PCE concentration of 160,000 μg/L (reconnassiance groundwater sample SB-1) from Source Area at Plastics Property.
* Decay rates derived from another ERD site in the Seattle and applied to Plastics Site to estimate a restoration of time of 13 to 20 years.
PCE Decay (1.5%)
TCE Decay (2%)
DCE Decay (0.4%)
VC Decay (0.3%)

TABLES

Table 1
Summary of Groundwater Elevation Data
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Well ID	Screened Interval (feet bgs)	TOC Elevation (feet msl)[1]	Total Well Depth (feet below TOC)[2]	Date Measured	Depth to Groundwater (feet below TOC)[2]	Groundwater Elevation (feet msl)[1]
Shallow Water Bearing Zone Wells						
MW01	4 to 19	178.24	18.42	08/05/04	7.91	170.33
			18.42	11/18/04	7.00	171.24
			--	01/07/05	5.91	172.33
			--	05/31/06	6.36	171.88
			--	06/22/06	8.22	170.02
			18.15	01/08/07	3.93	174.31
			18.15	04/20/07	5.38	172.86
			18.48	11/19/08	6.78	171.46
			18.37	05/03/10	6.33	171.91
			--	05/07/10	6.52	171.72
			--	09/09/14	11.19	167.05
MW02	5 to 20	176.22	19.48	08/05/04	6.39	169.83
			19.50	11/18/04	6.41	169.81
			--	01/07/05	5.88	170.34
			--	05/31/06	5.75	170.47
			--	06/22/06	7.01	169.21
			--	01/08/07	4.56	171.66
			--	04/20/07	4.90	171.32
			19.31	11/19/08	6.86	169.36
			19.45	05/03/10	6.50	169.72
			--	05/07/10	6.48	169.74
			--	09/09/14	9.01	167.21
MW03	5 to 20	175.87	19.55	08/05/04	6.56	169.31
			19.56	11/18/04	6.64	169.23
			--	01/07/05	5.86	170.01
			--	05/31/06	2.79	173.08
			--	06/22/06	3.69	172.18
			19.54	01/08/07	2.18	173.69
			19.54	04/20/07	1.96	173.91
			19.6	11/19/08	2.65	173.22
			19.45	05/03/10	2.54	173.33
			--	05/07/10	2.59	173.28
			--	09/09/14	5.92	169.95
MW04	4 to 18	176.15	18.08	08/05/04	7.66	168.49
			18.08	11/18/04	7.35	168.80
			--	01/07/05	6.82	169.33
			--	05/31/06	7.88	168.27
			--	06/22/06	8.19	167.96
			17.95	01/08/07	5.80	170.35
			17.95	04/20/07	6.49	169.66
			17.61	11/19/08	8.45	167.70
			17.54	05/03/10	8.02	168.13
			--	05/04/10	8.09	168.06
			--	05/07/10	7.98	168.17
			--	09/09/14	10.26	165.89
MW05	2.5 to 17.5	177.37	17.45	08/05/04	8.71	168.66
			17.45	11/18/04	7.86	169.51
			--	01/07/05	7.15	170.22
			--	05/31/06	7.50	169.87
			--	06/22/06	9.12	168.25
			17.44	01/08/07	2.90	174.47
			17.44	04/20/07	6.63	170.74
			17.47	11/19/08	8.30	169.07
			17.45	05/03/10	7.54	169.83
			--	05/04/10	7.87	169.50
			--	05/07/10	8.01	169.36
			--	09/09/14	10.97	166.40

Table 1
Summary of Groundwater Elevation Data
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Well ID	Screened Interval (feet bgs)	TOC Elevation (feet msl)(1)	Total Well Depth (feet below TOC)(2)	Date Measured	Depth to Groundwater (feet below TOC)(2)	Groundwater Elevation (feet msl)(1)
Shallow Water Bearing Zone Wells						
MW06	15 to 20	176.26	--	11/18/04	--	--
			--	01/07/05	--	--
			--	05/31/06	--	--
			--	06/22/06	--	--
			--	01/08/07	8.84	167.42
			--	04/20/07	--	--
			19.93	05/03/10	10.4	165.86
			--	05/07/10	10.52	165.74
			--	09/09/14	11.53	164.73
MW15	5 to 20	176.62	18.12	05/31/06	6.76	169.86
			--	06/22/06	7.36	169.26
			18.15	01/08/07	5.63	170.99
			18.15	04/20/07	6.68	169.94
			18.2	11/19/08	9.21	167.41
			18.18	05/03/10	4.23	172.39
			--	05/07/10	4.22	172.40
			--	09/09/14	11.02	165.60
MW16	5 to 20	175.60	19.45	05/31/06	4.56	171.04
			--	06/22/06	6.21	169.39
			--	01/08/07	3.91	171.69
			--	04/20/07	4.29	171.31
			19.6	11/19/08	5.03	170.57
			19.60	05/03/10	5.30	170.30
			--	05/07/10	5.44	170.16
			--	09/09/14	9.34	166.26
MW17	5 to 20	175.79	19.19	05/31/06	4.29	171.50
			--	06/22/06	5.82	169.97
			--	01/08/07	3.67	172.12
			--	04/20/07	4.03	171.76
	Monitoring Well Decommissioned					
MW19	10 to 20	180.68	19.8	11/20/08	9.68	171.00
			19.72	05/03/10	9.17	171.51
			--	05/04/10	9.54	171.14
			--	05/07/10	9.4	171.28
			--	09/09/14	14.57	166.11
MW21	14 to 24	175.93	23.74	11/19/08	10.21	165.72
			23.74	05/03/10	9.70	166.23
			--	05/07/10	9.73	166.20
			--	09/09/14	11.24	164.69
MW23	10 to 20	176.03	20.15	11/19/08	10.81	165.22
			20.15	05/03/10	10.17	165.86
			--	05/07/10	10.32	165.71
	Monitoring Well Decommissioned					
MW24	8 to 18	177.62	17.25	11/19/08	9.34	168.28
			17.34	05/03/10	8.89	168.73
			--	05/04/10	8.96	168.66
			--	05/07/10	8.95	168.67
			17.34	09/09/14	12.19	165.43
MW25	8 to 18	176.95	18.29	05/03/10	9.85	167.10
			--	05/04/10	10.02	166.93
			--	05/07/10	9.86	167.09
			--	09/09/14	11.85	165.10
MW26	8 to 18	177.83	18.18	05/03/10	8.71	169.12
			--	05/04/10	8.81	169.02
			--	05/07/10	8.75	169.08
			18.18	09/09/14	12.63	165.20
TMW01	8 to 18	176.98	18.75	04/05/10	5.12	171.86
			18.80	05/04/10	5.27	171.71
			--	05/07/10	5.31	171.67
TMW02	8 to 18	176.91	18.79	04/05/10	5.62	171.29
			18.83	05/04/10	6.31	170.60
			--	05/07/10	6.25	170.66
TMW03	8 to 18	177.14	18.22	04/05/10	6.96	170.18
			18.25	05/04/10	7.53	169.61
			--	05/07/10	7.52	169.62
MW27	8.5 to 13.5	--	13.5	06/28/11	--	--
			--	09/09/14	11.54	--

Table 1
Summary of Groundwater Elevation Data
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Well ID	Screened Interval (feet bgs)	TOC Elevation (feet msl)(1)	Total Well Depth (feet below TOC)(2)	Date Measured	Depth to Groundwater (feet below TOC)(2)	Groundwater Elevation (feet msl)(1)
Deep Water Bearing Zone Wells						
MW07	21 to 31	176.56	31.00	12/06/04	7.45	169.11
			--	01/07/05	7.30	169.26
			--	05/31/06	8.09	168.47
			--	06/22/06	8.42	168.14
			31.01	01/08/07	6.52	170.04
		176.59	--	04/20/07	7.00	169.59
			30.67	11/19/08	8.38	168.21
			30.84	05/03/10	7.99	168.60
			--	05/07/10	8.04	168.55
			--	09/09/14	10.37	166.22
MW08	30 to 40	175.90	40.09	12/06/04	6.55	169.35
			--	01/07/05	6.34	169.56
			--	05/31/06	6.35	169.55
			--	06/22/06	7.55	168.35
			40.09	01/08/07	5.54	170.36
			40.09	01/08/07	5.98	169.92
			40.15	11/19/08	9.00	166.90
			40.15	05/03/10	8.49	167.41
			--	05/07/10	8.51	167.39
			--	09/09/14	10.32	165.58
MW09	30 to 40	176.43	39.81	12/06/04	6.81	169.62
			--	01/07/05	6.49	169.94
			--	05/31/06	6.34	170.09
			--	06/22/06	7.48	168.95
			39.75	01/08/07	5.85	170.58
			39.75	04/20/07	6.01	170.42
			39.81	11/19/08	7.30	169.13
			39.80	05/03/10	6.74	169.69
			--	05/07/10	6.73	169.70
			--	09/09/14	9.25	167.18
MW10	30 to 40	176.01	39.98	12/06/04	7.12	168.89
			--	01/07/05	6.89	169.12
			--	05/31/06	6.99	169.02
			--	06/22/06	8.12	167.89
			--	01/08/07	6.05	169.96
			--	04/20/07	6.57	169.44
			40.01	11/19/08	10.21	165.80
			40.00	05/03/10	9.72	166.29
			--	05/07/10	9.75	166.26
			--	09/09/14	11.26	164.75
MW11	57.5 to 67.5	178.99	64.30	05/31/06	7.71	171.28
			--	06/22/06	8.78	170.21
			64.28	01/08/07	7.30	171.69
			64.28	04/20/07	7.38	171.61
			65.3	11/19/08	8.34	170.65
			65.24	05/03/10	7.73	171.26
			--	05/07/10	7.69	171.30
			64.91	09/09/14	11.00	167.99
MW12	57 to 67	176.95	62.51	05/31/06	7.31	169.64
			--	06/22/06	8.40	168.55
			66.55	01/08/07	7.04	169.91
			66.55	04/20/07	7.05	169.90
			66.1	11/19/08	7.92	169.03
			65.78	05/03/10	7.35	169.60
			--	05/07/10	7.32	169.63
			--	09/09/14	9.38	167.57
MW13	55.5 to 65.5	177.03	62.90	05/31/06	6.31	170.72
			--	06/22/06	7.40	169.63
			66.18	01/08/07	5.96	171.07
			66.18	04/20/07	6.01	171.02
			66.22	11/19/08	6.95	170.08
			66.21	05/03/10	6.35	170.68
			--	05/07/10	6.30	170.73
			--	09/09/14	9.02	168.01

Table 1
Summary of Groundwater Elevation Data
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Well ID	Screened Interval (feet bgs)	TOC Elevation (feet msl)[1]	Total Well Depth (feet below TOC)[2]	Date Measured	Depth to Groundwater (feet below TOC)[2]	Groundwater Elevation (feet msl)[1]
Deep Water Bearing Zone Wells						
MW14	63 to 73	176.50	72.81	05/31/06	6.55	169.95
			--	06/22/06	6.65	169.85
			71.8	01/08/07	5.18	171.32
		176.72	--	04/20/07	5.47	171.25
			72.16	11/19/08	6.45	170.27
			72.05	05/03/10	5.86	170.86
			--	05/07/10	5.81	170.91
			--	09/09/14	8.74	167.98
MW18	68 to 78	175.91	77.42	05/31/06	6.89	169.02
			--	06/22/06	7.84	168.07
			78.05	01/08/07	6.04	169.87
			78.05	04/20/07	6.26	169.65
	Monitoring Well Decommissioned					
MW20	40 to 50	177.62	49.19	11/19/08	7.16	170.46
			48.49	05/03/10	6.56	171.06
			--	05/07/10	6.50	171.12
	Monitoring Well Decommissioned					
MW22	39.5 to 49.5	177.23	49.2	11/19/08	7.18	170.05
			49.20	05/03/10	6.59	170.64
			--	05/07/10	6.53	170.70
			--	09/09/14	9.44	167.79

NOTES:

[1]Initial elevation data for wells obtained from the Draft Final Remedial Investigation/Feasibility Study Report prepared by Farallon and dated July 2013. Farallon survey based on North American Vertical Datum of 1988.

[2]As measured from a fixed spot on the well TOC.

-- = not measured
bgs = below ground surface
Farallon = Farallon Consulting LLC
msl = mean sea level
TOC = top of casing

Table 2
Groundwater Analytical Results for CVOCs
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Well ID	Sample ID	Sampled By	Sample Date	Sample Point Depth (feet bgs)	Analytical Results[1] (micrograms per liter) PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
Shallow Zone Wells										
MW01	MW-1	GeoEngineers	10/30/03	--	< 2.0	< 2.0	< 2.0	< 2.0	--	< 2.0
	MW1-060206	Farallon	06/02/06	16.42	1.1	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW1-112008	Farallon	11/20/08	16.48	1.5	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW1-050410	Farallon	05/04/10	11.50	1.8	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW01-20140910	SoundEarth	09/10/14	13.50	1.6	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW02	MW-2	GeoEngineers	10/30/03	--	< 2.0	< 2.0	< 2.0	< 2.0	--	< 2.0
	MW2-060106	Farallon	06/01/06	17.50	< 0.2	**5.5**	< 0.2	< 0.2	--	< 0.2
	MW2-111908	Farallon	11/19/08	17.31	**6.80**	4.6	< 0.2	< 0.2	--	< 0.2
	MW2-050410	Farallon	05/04/10	12.50	**9.50**	3.5	< 0.2	< 0.2	--	< 0.2
	MW02-20140910	SoundEarth	09/10/14	11.50	4.0	0.49	< 0.2	< 0.2	< 0.2	< 0.2
MW03	MW-3	GeoEngineers	10/30/03	--	**170**	< 2.0	< 2.0	< 2.0	--	< 2.0
	MW3-060106	Farallon	06/01/06	17.56	**150**	1.1	< 1.0	< 1.0	--	< 1.0
	MW3-111908	Farallon	11/19/08	17.60	**230**	1.6	2.0	< 1.0	--	< 1.0
	MW3-050410	Farallon	05/04/10	12.50	**150**	< 1.0	< 1.0	< 1.0	--	< 1.0
	MW03-20140910	SoundEarth	09/10/14	8.50	**64**	0.58	0.79	< 0.2	< 0.2	< 0.2
MW04	MW-4	GeoEngineers	10/30/03	--	**2,100**	**220**	**92**	< 2.0	--	**20**
	MW4-080504	Farallon	08/05/04	16.00	**860**	**1200**	**250**	< 10	--	**68**
	MW4-060206	Farallon	06/02/06	16.08	**1,100**	**730**	**590**	< 10	--	**170**
	MW4-042007	Farallon	04/20/07	14.95	**3,100**	**720**	**940**	< 20	--	**160**
	MW4-112008	Farallon	11/20/08	15.61	**10,000**	**640**	**1,100**	< 50	--	**130**
	MW4-050510	Farallon	05/05/10	11.00	**10,000**	**1,000**	**1,600**	< 50	--	**370**
	MW04-20140910	SoundEarth	09/10/14	12.50	**28,000**	**3,400**	**3,800**	< 200	< 200	**920**
MW05	MW-5	GeoEngineers	10/30/03	--	**270**	**46**	< 2.0	< 2.0	--	< 2.0
	MW5-060106	Farallon	06/01/06	15.45	**54**	**9.6**	3.3	< 0.4	--	< 0.4
	MW5-20080328	SoundEarth	03/28/08	--	**19**	**110**	**40**	< 1	--	**2.8**
	MW5-112008	Farallon	11/20/08	15.47	**86**	**67**	**37**	1.4	--	**5.5**
	MW5-050410	Farallon	05/04/10	10.00	**82**	**34**	**27**	0.44	--	**0.88**
	MW05-20140911	SoundEarth	09/11/14	13.50	**71**	**22**	5.6	0.27	< 0.2	< 0.2
MW06	MW-6	GeoEngineers	11/08/04	--	**29**	**18**	11	< 2.0	--	**6**
	MW6-050410	Farallon	05/04/10	14.50	**4,100**	**330**	**440**	< 20	--	**110**
	MW06-20141007	SoundEarth	10/07/14	17.50	**10,000**	**450**	**320**	< 50	< 0.050	**72**
MW15	MW15-060106	Farallon	06/01/06	16.12	0.22	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW15-112008	Farallon	11/20/08	13.20	0.26	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW15-050410	Farallon	05/04/10	12.50	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW15-20140910	SoundEarth	09/10/14	17.50	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW16	MW16-060106	Farallon	06/01/06	17.45	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW16-111908	Farallon	11/19/08	17.60	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW16-050510	Farallon	05/05/10	12.50	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW16-20140909	SoundEarth	09/09/14	12.00	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW17	MW17-060106	Farallon	06/01/06	17.19	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	Monitoring Well Decommissioned									
MW19	MW17-20080328	SoundEarth	03/28/08	--	< 1	< 1	< 1	< 1	--	< 0.2
	MW19-20090311	SoundEarth	03/11/09	--	< 1	< 1	< 1	< 1	--	< 0.2
	MW19-050310	Farallon	05/03/10	15.00	< 1	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW19-20140909	SoundEarth	09/09/14	17.00	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW21	MW21-112008	Farallon	11/20/08	21.74	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW21-050410	Farallon	05/04/10	19.00	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW21-20140909	SoundEarth	09/09/14	19.00	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**0.73**
MW23	MW23-112008	Farallon	11/20/08	18.15	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW23-050410	Farallon	05/04/10	15.00	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	Monitoring Well Decommissioned									
MTCA Cleanup Levels for Groundwater					**5[2]**	**5[2]**	**16[3]**	**160[3]**	**400[3]**	**0.2[2]**

Table 2
Groundwater Analytical Results for CVOCs
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Well ID	Sample ID	Sampled By	Sample Date	Sample Point Depth (feet bgs)	Analytical Results[1] (micrograms per liter)					
					PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
Shallow Zone Wells										
MW24	MW18-20080328	SoundEarth	03/28/08	--	**650**	< 10	< 10	< 10	--	< 2.0
	MW24-112008	Farallon	11/20/08	15.25	**360**	3.4	< 2.0	< 2.0	--	< 2.0
	MW24-20090304	Farallon	03/04/09	--	**290**	< 10	< 10	< 10	--	< 2.0
	MW24-050510	Farallon	05/05/10	13.00	**40**	0.42	< 0.2	< 0.2	--	< 0.2
	MW24-20140910	SoundEarth	09/10/14	15.00	**17**	0.27	< 0.2	< 0.2	< 0.2	< 0.2
MW25	MW25-050410	Farallon	05/04/10	13.00	**14**	0.31	1.1	< 0.2	--	< 0.2
	MW25-20141007	SoundEarth	10/07/14	14.00	**12**	0.36	0.37	< 0.2	--	< 0.2
MW26	MW26-050410	Farallon	05/04/10	13.00	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW26-20140910	SoundEarth	09/10/14	15.00	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW27	MW27-070111	Farallon	07/01/11	11.00	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW27-20141007	SoundEarth	10/07/14	12.00	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
TMW01	TMW-1-040510	Farallon	04/05/10	13.75	**15**	0.29	< 0.2	< 0.2	--	< 0.2
	TMW-1-20100405	SoundEarth	04/05/10	--	**16**	< 1	< 1	< 1	--	< 0.2
TMW02	TMW-2-040510	Farallon	04/05/10	13.79	**110**	1.5	< 1.0	< 1.0	--	< 1.0
	TMW-2-20100405	SoundEarth	04/05/10	--	**150**	1.5	< 1	< 1	--	< 0.2
TMW03	TMW-3-040510	Farallon	04/05/10	13.22	**310**	3.6	< 2.0	< 2.0	--	< 2.0
	TMW-3-20100405	SoundEarth	04/05/10		**350**	3.7	< 1	< 1	--	< 0.2
Deep Zone Wells										
MW07	MW7-111904-01	Farallon	11/19/04	26.00	**7,000**	**47**	< 20	< 20	--	< 20
	MW7-060206	Farallon	06/02/06	29.00	**530**	**16**	< 4.0	< 4.0	--	< 4.0
	MW7-042007	Farallon	04/20/07	28.00	2.5	< 2.0	< 2.0	< 2.0	--	< 2.0
	MW7-112008	Farallon	11/20/08	28.67	**18.0**	0.69	< 2.0	< 2.0	--	< 2.0
	MW7-050410	Farallon	05/04/10	26.00	**12.0**	0.49	< 0.2	< 0.2	--	< 0.2
	MW07-20140910	SoundEarth	09/10/14	26.00	4.5	0.26	< 0.2	< 0.2	< 0.2	< 0.2
MW08	MW8-111904-01	Farallon	11/19/04	35.00	0.36	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW8-060106	Farallon	06/01/06	38.09	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW8-111908	Farallon	11/19/08	38.15	0.70	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW8-050510	Farallon	05/04/10	35.00	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW08-20140909	SoundEarth	09/09/14	30.00	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW09	MW9-111904-01	Farallon	11/19/04	35.00	**210**	< 1.0	< 1.0	< 1.0	--	< 1.0
	MW9-060106	Farallon	06/01/06	37.81	**390**	< 2.0	< 2.0	< 2.0	--	< 2.0
	MW9-042007	Farallon	04/20/07	36.75	**410**	< 2.0	< 2.0	< 2.0	--	< 2.0
	MW9-112008	Farallon	11/20/08	37.81	**220**	< 2.0	< 2.0	< 2.0	--	< 2.0
	MW9-050410	Farallon	05/04/10	35.00	**190**	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW09-20140910	SoundEarth	09/10/14	35.00	**89**	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW10	MW10-111904-01	Farallon	11/19/04	34.98	2.50	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW10-060106	Farallon	06/01/06	37.98	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW10-042007	Farallon	04/20/07	37.00	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW10-112008	Farallon	11/20/08	38.01	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW10-050410	Farallon	05/04/10	35.00	3.30	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW10-20140910	SoundEarth	09/10/14	35.00	**600**	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW11	MW11-060206	Farallon	06/02/06	62.30	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW11-112008	Farallon	11/20/08	63.30	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW11-050310	Farallon	05/03/10	62.50	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW11-20141007	SoundEarth	10/07/14	62.50	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW12	MW12-060206	Farallon	06/02/06	60.51	0.76	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW12-111908	Farallon	11/19/08	64.10	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW12-050310	Farallon	05/03/10	62.00	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW12-20140909	SoundEarth	09/09/14	62.00	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW13	MW13-060206	Farallon	06/02/06	60.90	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW13-042007	Farallon	04/20/07	63.18	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW13-111908	Farallon	11/19/08	64.22	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW13-050310	Farallon	05/03/10	60.00	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW13-20140909	SoundEarth	09/09/14	60.00	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MTCA Cleanup Levels for Groundwater					**5[2]**	**5[2]**	**16[3]**	**160[3]**	**400[3]**	**0.2[2]**

Table 2
Groundwater Analytical Results for CVOCs
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Well ID	Sample ID	Sampled By	Sample Date	Sample Point Depth (feet bgs)	Analytical Results[1] (micrograms per liter)					
					PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
Deep Zone Wells										
MW14	MW14-060206	Farallon	06/02/06	71.31	0.99	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW14-032507	Farallon	03/25/07	70.08	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW14-042007	Farallon	04/20/07	68.80	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW14-112008	Farallon	11/20/08	70.16	1.10	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW14-050410	Farallon	05/04/10	68.00	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW14-20140910	SoundEarth	09/10/14	68.00	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW18	MW18-060106	Farallon	06/01/06	75.92	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	Monitoring Well Decommissioned									
MW20	MW20-112008	Farallon	11/20/08	47.19	0.28	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW20-050410	Farallon	05/04/10	45.00	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	Monitoring Well Decommissioned									
MW22	MW22-112008	Farallon	11/20/08	47.19	< 0.2	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW22-050410	Farallon	05/04/10	44.00	< 1.0	< 0.2	< 0.2	< 0.2	--	< 0.2
	MW22-20140910	SoundEarth	09/10/14	44.50	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MTCA Cleanup Levels for Groundwater					**5**[2]	**5**[2]	**16**[3]	**160**[3]	**400**[3]	**0.2**[2]

NOTES:

Red denotes concentration exceeds MTCA cleanup level for groundwater.

[1]Analyzed by U.S. Environmental Protection Agency Method 8260B or 8260C.

[2]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 720-1 Method A Cleanup Levels for Groundwater, revised November 2007.

[3]MTCA Cleanup Regulation, Chapter 173-340 of WAC, CLARC, Groundwater, Method B, Non-Carcinogen, Standard Formula Value, CLARC Website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

-- = not analyzed
< = not detected at a concentration above the laboratory reporting limit
bgs = below ground surface
CLARC = cleanup levels and risk calculations
CVOCs = chlorinated volatile organic compounds
DCE = dichloroethene
Farallon = Farallon Consulting, L.L.C.
GeoEngineers = GeoEngineers, Inc.
MTCA = Washington State Model Toxics Control Act
PCE = tetrachloroethene
SoundEarth = SoundEarth Strategies, Inc.
TCE = trichloroethene
WAC = Washington Administrative Code

Table 3
Natural Attenuation Parameters
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Well ID	Sample ID	Sample Date	Dissolved Oxygen[1]	Analytical Results (milligrams per liter) Nitrate[2]	Dissolved Manganese[3]	Total Iron[3]	Ferrous Iron[4]	Ferric Iron[5]	Sulfate[6]	Methane[7]	Ethane[7]	Ethene[7]
Shallow Zone Wells												
MW01	MW1-060206	06/02/06	4.16	16	0.02	1.30	0.00	1.30	16	<0.01	<0.01	<0.01
	MW1-20140910	09/10/14	1.24	4.1	<0.011	<0.06	0.041	0.00	26	<0.0005	<0.0005	<0.0005
Deep Zone Wells												
MW07	MW7-060206	06/02/06	0.11	<0.15	0.10	4.30	0.00	4.30	65	0.33	<0.01	<0.01
	MW07-20140910	09/10/14	0.34	2.7	<0.011	<0.06	0.173	0.00	32	<0.0005	<0.0005	<0.0005
MW08	MW08-20140909	09/09/14	0.22	<0.050	0.17	<0.06	0.059	0.00	43	<0.0005	<0.0005	<0.0005
MW09	MW09-20140910	09/10/14	2.90	4.7	<0.011	<0.06	<0.04	0.00	27	<0.0005	<0.0005	<0.0005
MW10	MW10-20140910	09/10/14	0.29	<0.050	0.1	<0.06	0.048	0.00	37	<0.0005	<0.0005	<0.0005
MW11	MW11-060206	06/02/06	0.32	2.8	0.25	2.80	0.00	2.80	35	<0.01	<0.01	<0.01
	MW11-20141007	10/07/14	0.22	<0.050	0.019	<0.06	0.889	0.00	50	0.042	<0.003	<0.003
MW12	MW12-060206	06/02/06	0.11	<0.15	0.11	4.20	0.00	4.20	39	<0.01	<0.01	<0.01
MW13	MW13-060206	06/02/06	0.11	<0.15	0.24	2.20	0.00	2.20	35	<0.01	<0.01	<0.01
MW14	MW14-060206	06/02/06	0.10	<0.15	0.32	1.90	0.00	1.90	34	<0.01	<0.01	<0.01
MW22	MW22-20140910	09/10/14	5.95	4.9	<0.011	<0.06	<0.04	0.00	24	<0.0005	<0.0005	<0.0005

NOTES:

[1]Analyzed by field instrument.
[2]Analyzed by EPA Method 353.2.
[3]Analyzed by EPA Method 6010C.
[4]Analyzed by EPA Method SM 3500-Fe B or Field Kit Instrument.
[5]Ferric Iron = Total Iron minus Ferrous Iron. If concentrations of Ferrous Iron are non-detect, Ferric Iron is assumed to be equal to Total Iron.
[6]Analyzed by ASTM D516-07.
[7]Analyzed by Method RSK 175.

-- = not analyzed/not measured
< = not detected at a concentration above the laboratory reporting limit
EPA = U.S. Environmental Protection Agency

Table 4
Geochemical and Water Quality Parameters
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Well ID	Sample ID	Sample Date	ORP[1] (mV)	Specific Conductivity[1] (mS/cm)	Turbidity[1] (NTU)	Temperature[1] (°C)	pH[1]	Alkalinity[2] (mg/L $CaCO_3$)	Total Organic Carbon[3] (mg/L)
Shallow Zone Wells									
MW01	MW1-060206	06/02/06	198.6	--	--	14.37	6.71	--	--
	MW01-20140910	09/10/14	120	0.371	367.0	19.74	6.61	150	1.5
Deep Zone Wells									
MW07	MW7-060206	06/02/06	20.6	--	--	15.30	7.62	--	--
	MW07-20140910	09/10/14	20.7	0.305	21.9	16.70	7.42	140	<1.0
MW08	MW08-20140909	09/09/14	21	0.302	40.5	15.98	8.00	130	<1.0
MW09	MW09-20140910	09/10/14	-87	0.241	0.98	17.90	7.46	96	<1.0
MW10	MW10-20140910	09/10/14	-49	0.331	36.3	16.65	7.89	120	<1.0
MW11	MW11-060206	06/02/06	149.2	--	--	13.65	7.15	--	--
	MW11-20141007	10/07/14	-124.5	0.252	40.0	15.00	9.15	110	2.6
MW12	MW12-060206	06/02/06	-91.2	--	--	15.34	7.14	--	--
MW13	MW13-060206	06/02/06	53.1	--	--	14.91	7.4	--	--
MW14	MW14-060206	06/02/06	-103.5	--	--	15.12	7.5	--	--
MW22	MW22-20140910	09/10/14	179.3	0.28	3.52	16.84	6.78	100	<1.0

NOTES:

Data prior to 2006 obtained by Farallon Consulting LLC of Issaquah, Washington.

[1]Analyzed by field instrument.

[2]Analyzed by Standard Method 2320B.

[3]Analyzed by Standard Method 5310B.

-- = not analyzed

< = not detected at a concentration above the laboratory reporting limit

°C = degrees Celsius

$CaCO_3$ = calcium carbonate

EPA = U.S. Environmental Protection Agency

mg/L = milligrams per liter

mS/cm = millisiemens per centimeter

mV = millivolts

NTU = nephelometric turbidity units

ORP = oxidation-reduction potential

Table 5
Estimated Equivalent Radius of Influence for Under-Slab Drainage System
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Q_w (gpd)	Q_w (gpm)	K (gpd/ft^2)	H (ft)	h_w (ft)	r_s (ft)	$ln(R_0)$ [1] (ft)	R_0 [2] (ft)
720	0.50	2.88E-01	14	7.25	57.71	4.24	**69.13**
1,440	1.00	2.88E-01	14	7.25	57.71	4.15	63.16
2,880	2.00	2.88E-01	14	7.25	57.71	4.10	60.37

NOTES:

Q_w = assumes constant water flow rate under steady state conditions and estimated ranges based on observed soil profile of shallow zone

K = hydraulic conductivity (estimated geometric mean from Farallon 2013 RI/FS Report)

H = saturated thickness; assumes a confining layer at 157.75 ft msl and seasonally high potentiometric surface at 171.75 ft msl (Farallon 2013 RI/FS Report)

h_w = drawdown saturated thickness; assumes a confining layer at 157.75 ft msl and under-slab drainage piping at 165.00 ft msl

$r_s = (ab/\pi)^{1/2}$ = equilivalent radius for a rectangular system that acts as a single large well

a = 93 feet (Figure 36, Under-Slab Drainage Plan from SoundEarth Strategies)

b = 112.5 feet (Figure 36, Under-Slab Drainage Plan from SoundEarth Strategies)

R_0 = equivalent radius of influence for the under-slab drainage system

(1) = calculated using the equation $\boxed{\ln(R_0) = \left(\frac{K(H^2 - h_w^{\,2})}{Q_w * 458}\right) + \ln(r_s)}$; equation assumes steady state conditions

(2) = calculating using $e^{\ln(R)}$

69.13 = selected equivalent radius of influence for the under-slab drainage system

Farallon = Farallon Consulting, LLC
ft = feet
ft^2 = feet squared
gpd = gallons per day

gpm = gallons per minute
msl = mean sea level
RI/FS = Remedial Investigation/Feasbility Study

Table 6
Cleanup Action Alternative 3.1
Feasibility Level Cost Estimate
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Cleanup Action Alternative 3.1 - ERH of Upper Shallow Zone Source Area to Soil Remediation Level, ERD of Lower Shallow Zone and Deep Zone on Property, and ERD of Shallow Zone and Deep Zone off Property						Present Value Cost Per Year (2% Present Value Discount Rate, Assuming 5% Cost of Future Money and 3% Inflation Rate)							Present Value Costs		
	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	2015	2016	2017	2018	2019-2020	2021-2024	2025	Total	Development-Related	Remediation-Related
Direct Capital															
Remedial Excavation															
PSS Building and 6565 4th House Demolition	1	ls	$ 177,000	$ 177,000			$ 173,460						$ 173,460	$ 173,460	
PSS Building and 6565 4th House ACM Survey	1	ls	$ 7,000	$ 7,000			$ 6,860						$ 6,860	$ 6,860	
PSS Building and 6565 4th House ACM Abatement	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500	$ 24,500	
Shoring Installation for Excavation	1	ls	$ 450,000	$ 450,000			$ 441,000						$ 441,000	$ 441,000	
Excavation, Handling, and Soil Segregation - Shoring Cuttings for Areas 1, 2, & 4	472	tons	$ 8	$ 3,776			$ 3,700						$ 3,700	$ 3,700	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Shoring Cuttings for Areas 1, 2, & 4	472	tons	$ 70	$ 33,040			$ 32,379						$ 32,379	$ 13,877	
Excavation, Handling, and Soil Segregation - Shoring Cuttings for Area 5	214	tons	$ 8	$ 1,712			$ 1,678						$ 1,678	$ 1,678	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Shoring Cuttings for Area 5 (Subjected to Results from Line Item #10)	214	tons	$ 70	$ 14,980			$ 14,680						$ 14,680	$ 6,292	
Contained Out Soil Profile	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
ERH In Situ Soil Treatment	2,222	sf	$ 250	$ 555,500			$ 544,390						$ 544,390		
ERH Confirmation Soil Sampling for Contained Out	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
Excavation, Handling, and Soil Segregation - Areas 1, 2, & 4	8,161	tons	$ 8	$ 65,288			$ 63,982						$ 63,982	$ 63,982	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Areas 1, 2, & 4	8,161	tons	$ 70	$ 571,270			$ 559,845						$ 559,845	$ 239,933	
Excavation, Handling, and Soil Segregation - Area 5	4,170	tons	$ 8	$ 33,360			$ 32,693						$ 32,693	$ 32,693	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Area 5 (Subjected to Results from Line Item No. 10)	4,170	tons	$ 70	$ 291,900			$ 286,062						$ 286,062	$ 122,598	
Dewatering System Installation - Shallow Zone	1	ls	$ 78,700	$ 78,700			$ 77,126						$ 77,126	$ 77,126	
Dewatering System Installation - Deep Zone	1	ls	$ 71,250	$ 71,250			$ 69,825						$ 69,825	$ 69,825	
Contingency Deep Dewatering Well Installation	8	each	$ 5,000	$ 40,000			$ 39,200						$ 39,200	$ 39,200	
Water Treatment System using Granular Activated Carbon (3 months)	1	ls	$ 12,000	$ 12,000			$ 11,760						$ 11,760		
Discharge Fees and Lab Analysis	3	mo	$ 8,000	$ 24,000			$ 23,520						$ 23,520		
Excavation of Tanks in Sidewalk (Trench Box Ex)	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
Well Abandonment - MW-7 and MW-14	2	each	$ 800	$ 1,600			$ 1,568						$ 1,568		
ERH In Situ Soil Treatment - Sidewalk Area	730	sf	$ 250	$ 182,500			$ 178,850						$ 178,850		
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Sidewalk Tank Excavation	40	ton	$ 70	$ 2,800			$ 2,744						$ 2,744		
Sidewalk UST Decommissioning	1	ls	$ 5,000	$ 5,000			$ 4,900						$ 4,900		
Backfill of Sidewalk with CDF	20	cy	$ 135	$ 2,700			$ 2,646						$ 2,646		
Heating Oil UST Decommissioning	4	ls	$ 5,000	$ 20,000			$ 19,600						$ 19,600		
Excavation, Handling, and Soil Segregation - Heating Oil UST Area (Subject to Results from Line Item No. 10)	160	tons	$ 8	$ 1,280			$ 1,254						$ 1,254	$ 1,254	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Heating Oil UST Area (Subjected to Results from Line Item No. 10)	160	tons	$ 70	$ 11,200			$ 10,976						$ 10,976	$ 4,704	
Footing Drain Iron Filter Treatment System	1	ls	$ 84,100	$ 84,100			$ 82,418						$ 82,418		
Sub-slab Vapor Barrier	13,592	sf	$ 7	$ 95,144			$ 93,241						$ 93,241		
Subtotal Remedial Excavation					$ 2,937,100		$ 2,878,358						$ 2,878,358	$ 1,322,682	$ 1,555,676
Groundwater Treatment - Enhanced Reductive Dechlorination															
Drilling Contractor - Installation of 23 Onsite Shallow Wells	23	each	$ 2,000	$ 46,000			$ 45,080						$ 45,080		
Drilling Contractor - Installation of 8 Onsite Deep Wells	8	each	$ 4,000	$ 32,000			$ 31,360						$ 31,360		
Drilling Contractor - Installation of 18 Offsite Shallow Wells	18	each	$ 2,000	$ 36,000			$ 35,280						$ 35,280		
Drilling Contractor - Installation of 10 Offsite Deep Wells	10	each	$ 4,000	$ 40,000			$ 39,200						$ 39,200		
Drilling Contractor - Installation of 5 Offsite Deep Wells across Woodlawn Ave NE	5	each	$ 4,000	$ 20,000				$ 19,208					$ 19,208		
Disposal of Soil Cuttings - Assumed 50% as Dangerous Waste, Subtitle C	0	ton	$ 250	$ -			$ -						$ -		
Disposal of Soil Cuttings - Assumed 50% as Dangerous Waste, Subtitle D	20	ton	$ 70	$ 1,400			$ 1,372						$ 1,372		
Disposal of Soil Cuttings - Contingency wells/probes (Subtitle D)	10	ton	$ 70	$ 700				$ 672					$ 672		
Edible Oil Injection Event	1	ls	$ 51,205	$ 51,205			$ 50,181						$ 50,181		
Contingency Injection Edible Oil Injection Event and Bioaugmentation	2	event	$ 69,605	$ 139,210				$ 66,849	$ 65,512				$ 132,360		
Subtotal Groundwater Treatment					$ 366,515		$ 202,473	$ 86,729	$ 65,512				$ 354,713		$ 354,713
Compliance Monitoring															
Well Installation - Building Footprint (1 shallow, 1 deep)	2	each	$ 6,000	$ 12,000			$ 11,760						$ 11,760		
Groundwater Monitoring Event Post Excavation, 20 wells with MNA Parameters	1	event	$ 22,675	$ 22,675			$ 22,222						$ 22,222		
Compliance Monitoring Subtotal					$ 34,675		$ -						$ -		$ -
Subtotal Direct Capital					$ 3,338,290		$ 3,080,800	$ 86,700	$ 65,500				$ 3,233,100	$ 1,322,682	$ 1,910,389

Table 6
Cleanup Action Alternative 3.1
Feasibility Level Cost Estimate
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Cleanup Action Alternative 3.1 - ERH of Upper Shallow Zone Source Area to Soil Remediation Level, ERD of Lower Shallow Zone and Deep Zone on Property, and ERD of Shallow Zone and Deep Zone off Property

	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	Present Value Cost Per Year (2% Present Value Discount Rate, Assuming 5% Cost of Future Money and 3% Inflation Rate) 2015	2016	2017	2018	2019-2020	2021-2024	2025	Present Value Costs Total	Development-Related	Remediation-Related
Indirect Capital (as percentages of Direct Capital)															
Design, Permitting, and Work Plans (6%)				$ 200,300		$ 150,225	$ 25,518	$ 15,389	$ 7,541				$ 198,673	$ 79,400	
Mobilization (1%)				$ 33,400			$ 32,732						$ 32,732	$ 13,300	
Professional Labor for Construction Oversight (12%)				$ 400,600			$ 392,588						$ 392,588	$ 158,800	
Field Equipment and Supplies (2%)				$ 66,800			$ 65,464						$ 65,464		
Laboratory Testing (field verification and waste profiling) (3%)				$ 100,200			$ 98,196						$ 98,196		
Site Restoration and Demobilization (1%)				$ 33,400			$ 32,732						$ 32,732	$ 13,300	
Regulatory Reporting and Meetings (6%)				$ 200,300		$ 150,225	$ 25,518	$ 15,389	$ 7,541				$ 198,673	$ 79,400	
Subtotal Indirect Capital					$ 1,035,000	$ 300,450	$ 672,748	$ 30,779	$ 15,082	$ -	$ -	$ -	$ 1,019,059	$ 344,200	$ 674,859
Project Management (15% of Subtotal Indirect Capital)					$ 155,250	$ 45,068	$ 100,912	$ 4,617	$ 2,262	$ -	$ -	$ -	$ 152,859	$ 51,630	$ 101,229
Total Present Capital					$ 4,528,500	$ 345,500	$ 3,854,500	$ 122,100	$ 82,800	$ -	$ -	$ -	$ 4,405,000	$ 1,718,500	$ 2,686,500

Long-Term Future Monitoring, O&M, And Other Direct Cost Items[1]	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	Present Value Cost Per Year (2% Present Value Discount Rate, Assuming 5% Cost of Future Money and 3% Inflation Rate) 2015	2016	2017	2018	2019-2020	2021-2024	2025-2035	Present Value Costs Total	Development-Related	Remediation-Related
Annual Monitoring and Reporting, 20 wells (Years 1) - With MNA Parameters	1	event	$ 22,670	$ 22,670				$ 21,772					$ 21,772		
Quarterly Monitoring and Reporting, 13 wells (Year 1) - With Geochemical Parameters	3	event	$ 16,450	$ 49,350				$ 47,396					$ 47,396		
Annual Monitoring and Reporting, 20 wells (Years 2) - With MNA Parameters	1	event	$ 23,560	$ 23,560					$ 22,174				$ 22,174		
Quarterly Monitoring and Reporting, 13 wells (Year 2) - With Geochemical Parameters	3	event	$ 17,100	$ 51,300					$ 48,283				$ 48,283		
Semi-annual Monitoring and Reporting, Annual event - 20 wells, Semi-Annual 13 wells (Years 3 and 4) - With MNA Parameters	2	event	$ 21,725	$ 43,450						$ 39,676			$ 39,676		
Annual Monitoring and Reporting, 20 wells (Years 5 - 8) - No MNA Parameters	4	event	$ 26,105	$ 104,420							$ 89,761		$ 89,761		
Annual Monitoring Event 20 wells (Year 9) - With MNA Parameters	1	event	$ 31,025	$ 31,025								$ 25,350	$ 25,350		
Annual Monitoring Event 20 wells Years 10-20 - No MNA Parameters	10	event	$ 22,670	$ 226,700								$ 166,030			
Injection Well Decommissioning - 41 Shallow Wells	41	ea	$ 500	$ 20,500								$ 13,686	$ 13,686		
Injection Well Decommissioning - 23 Deep Wells	23	ea	$ 1,000	$ 23,000								$ 15,355	$ 15,355		
Decommissioning of Monitoring Wells, 25 wells	25	ea	$ 500									$ 8,345	$ 8,345		
Subtotal Future Worth Cost of Annual and Other Direct Capital Costs					$ 608,475	$ -	$ -	$ 69,168	$ 70,458	$ 39,676	$ 89,761	$ 228,766	$ 497,829	$ -	$ 497,829
Project Management (10% of Future Worth Cost of Annual and Other Direct Capital)					$ 60,848	$ -	$ -	$ 6,917	$ 7,046	$ 3,968	$ 8,976	$ 22,877	$ 49,783	$ -	$ 49,783
Future Worth Cost of Annual and Capital Costs					$ 669,300	$ -	$ -	$ 76,100	$ 77,500	$ 43,600	$ 98,700	$ 251,600	$ 547,600	$ -	$ 547,600
TOTAL PRESENT WORTH COST (Sum of Total Capital and Present Worth of Annual and Future Capital Cost)[2][3][4]					$ 5,198,000	$ 346,000	$ 3,855,000	$ 198,000	$ 160,000	$ 44,000	$ 99,000	$ 252,000	$ 4,953,000	$ 1,719,000	$ 3,234,000

NOTES:

[1]Additional direct costs such as project management, regulatory communications and reporting, and other technical support services not specifically listed are not included in any future annual costs.
[2]This feasibility level cost should not be considered a design cost estimate or guaranteed cost.
[3]Excludes electrical costs for all systems.
[4]Cost rounded up to nearest $1,000.
Annual groundwater monitoring costs reflect a 4% annual increase.

ERD = enhanced reductive dechlorination
ERH = electric resistive heating
lf = linear feet
ls = lump sum
n = number of years
O&M = operation and maintenance
PCE = tetrachloroethene
sf = square feet
ton = number of bank cubic yards x 1.7 ton/bank cubic yard

SoundEarth Strategies

Table 7
Cleanup Action Alternative 3.2
Feasibility Level Cost Estimate
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Cleanup Action Alternative 3.2 - ERH of Upper and Lower Shallow Zone Soured Area to Soil Remediation Level, ERD of Lower Shallow Zone and Deep Zone on Property, and ERD of Shallow Zone and Deep Zone off Property

Present Capitol Cost Item	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	Present Value Cost Per Year (2% Present Value Discount Rate, Assuming 5% Cost of Future Money and 3% Inflation Rate) 2015	2016	2017	2018	2019-2020	2021-2024	2025	Present Value Costs Total	Development-Related	Remediation-Related
Direct Capital															
Remedial Excavation															
PSS Building and 6565 4th House Demolition	1	ls	$ 177,000	$ 177,000			$ 173,460						$ 173,460	$ 173,460	
PSS Building and 6565 4th House ACM Survey	1	ls	$ 7,000	$ 7,000			$ 6,860						$ 6,860		
PSS Building and 6565 4th House ACM Abatement	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
Shoring Installation for Excavation	1	ls	$ 450,000	$ 450,000			$ 441,000						$ 441,000	$ 441,000	
Excavation, Handling, and Soil Segregation - Shoring Cuttings for Areas 1, 2, & 4	472	tons	$ 8	$ 3,776			$ 3,700						$ 3,700	$ 3,700	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Shoring Cuttings for Areas 1, 2, & 4	472	tons	$ 70	$ 33,040			$ 32,379						$ 32,379	$ 13,877	
Excavation, Handling, and Soil Segregation - Shoring Cuttings for Area 5	214	tons	$ 8	$ 1,712			$ 1,678						$ 1,678	$ 1,678	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Shoring Cuttings for Area 5 (Subjected to Results from Line Item #10)	214	tons	$ 70	$ 14,980			$ 14,680						$ 14,680	$ 6,292	
Contained Out Soil Profile	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
ERH In Situ Soil Treatment	2,222	sf	$ 450	$ 999,900			$ 979,902						$ 979,902		
ERH Confirmation Soil Sampling for Contained Out	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
Excavation, Handling, and Soil Segregation - Areas 1, 2, & 4	8,161	tons	$ 8	$ 65,288			$ 63,982						$ 63,982	$ 63,982	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Areas 1, 2, & 4	8,161	tons	$ 70	$ 571,270			$ 559,845						$ 559,845	$ 239,933	
Excavation, Handling, and Soil Segregation - Area 5	4,170	tons	$ 8	$ 33,360			$ 32,693						$ 32,693	$ 32,693	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Area 5 (Subjected to Results from Line Item No. 10)	4,170	tons	$ 70	$ 291,900			$ 286,062						$ 286,062	$ 122,598	
Dewatering System Installation - Shallow Zone	1	ls	$ 78,700	$ 78,700			$ 77,126						$ 77,126	$ 77,126	
Dewatering System Installation - Deep Zone	1	ls	$ 71,250	$ 71,250			$ 69,825						$ 69,825	$ 69,825	
Contingency Deep Dewatering Well Installation	8	each	$ 5,000	$ 40,000			$ 39,200						$ 39,200	$ 39,200	
Water Treatment System using Granular Activated Carbon (3 months)	1	ls	$ 12,000	$ 12,000			$ 11,760						$ 11,760		
Discharge Fees and Lab Analysis	3	mo	$ 8,000	$ 24,000			$ 23,520						$ 23,520		
Excavation of Tanks in Sidewalk (Trench Box Ex)	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
Well Abandonment - MW-7 and MW-14	2	each	$ 800	$ 1,600			$ 1,568						$ 1,568		
ERH In Situ Soil Treatment - Sidewalk Area	730	sf	$ 450	$ 328,500			$ 321,930						$ 321,930		
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Sidewalk Tank Excavation	40	ton	$ 70	$ 2,800			$ 2,744						$ 2,744		
Sidewalk UST Decommissioning	1	ls	$ 5,000	$ 5,000			$ 4,900						$ 4,900		
Backfill of Sidewalk with CDF	20	cy	$ 135	$ 2,700			$ 2,646						$ 2,646		
Heating Oil UST Decommissioning	4	ls	$ 5,000	$ 20,000			$ 19,600						$ 19,600		
Excavation, Handling, and Soil Segregation - Heating Oil UST Area (Subject to Results from Line Item No. 10)	160	tons	$ 8	$ 1,280			$ 1,254						$ 1,254	$ 1,254	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Heating Oil UST Area (Subjected to Results from Line Item No. 10)	160	tons	$ 70	$ 11,200			$ 10,976						$ 10,976	$ 4,704	
Footing Drain Iron Filter Treatment System	1	ls	$ 84,100	$ 84,100			$ 82,418						$ 82,418		
Sub-slab Vapor Barrier	13,592	sf	$ 7	$ 95,144			$ 93,241						$ 93,241		
Subtotal Remedial Excavation					$ 3,527,500		$ 3,456,950						$ 3,456,950	$ 1,291,322	$ 2,165,628
Groundwater Treatment - Enhanced Reductive Dechlorination															
Drilling Contractor - Installation of 23 Onsite Shallow Wells	23	each	$ 2,000	$ 46,000			$ 45,080						$ 45,080		
Drilling Contractor - Installation of 8 Onsite Deep Wells	8	each	$ 4,000	$ 32,000			$ 31,360						$ 31,360		
Drilling Contractor - Installation of 18 Offsite Shallow Wells	18	each	$ 2,000	$ 36,000			$ 35,280						$ 35,280		
Drilling Contractor - Installation of 10 Offsite Deep Wells	10	each	$ 4,000	$ 40,000			$ 39,200						$ 39,200		
Drilling Contractor - Installation of 5 Deep Wells across Woodlawn Ave NE	5	each	$ 4,000	$ 20,000				$ 19,208					$ 19,208		
Disposal of Soil Cuttings - Assumed 50% as Dangerous Waste, Subtitle C	0	ton	$ 250	$ -			$ -						$ -		
Disposal of Soil Cuttings - Assumed 50% as Dangerous Waste, Subtitle D	20	ton	$ 70	$ 1,400			$ 1,372						$ 1,372		
Disposal of Soil Cuttings - Contingency wells/probes (Subtitle D)	10	ton	$ 70	$ 700				$ 672					$ 672		
Edible Oil Injection Event	1	ls	$ 51,205	$ 51,205			$ 50,181						$ 50,181		
Contingency Injection Edible Oil Injection Event and Bioaugmentation	2	event	$ 69,605	$ 139,210				$ 66,849	$ 65,512				$ 132,360		
Subtotal Groundwater Treatment					$ 366,515		$ 202,473	$ 86,729	$ 65,512				$ 354,713		$ 354,713

SoundEarth Strategies

Table 7
Cleanup Action Alternative 3.2
Feasibility Level Cost Estimate
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Cleanup Action Alternative 3.2 - ERH of Upper and Lower Shallow Zone Soured Area to Soil Remediation Level, ERD of Lower Shallow Zone and Deep Zone on Property, and ERD of Shallow Zone and Deep Zone off Property															
						Present Value Cost Per Year (2% Present Value Discount Rate, Assuming 5% Cost of Future Money and 3% Inflation Rate)							Present Value Costs		
Present Capitol Cost Item	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	2015	2016	2017	2018	2019-2020	2021-2024	2025	Total	Development-Related	Remediation-Related
Compliance Monitoring															
Well Installation - Building Footprint (1 shallow, 1 deep)	2	each	$ 6,000	$ 12,000			$ 11,760						$ 11,760		
Groundwater Monitoring Event Post Excavation, 20 wells with MNA Parameters	1	event	$ 22,675	$ 22,675			$ 22,222						$ 22,222		
Compliance Monitoring Subtotal					$ 34,675		$ -						$ -		$ -
Subtotal Direct Capital					$ 3,928,690		$ 3,659,400	$ 86,700	$ 65,500				$ 3,811,700	$ 1,291,322	$ 2,520,341
Indirect Capital (as percentages of Direct Capital)															
Design, Permitting, and Work Plans (6%)				$ 235,800		$ 176,850	$ 30,041	$ 18,117	$ 8,877				$ 233,885	$ 77,500	
Mobilization (1%)				$ 39,300			$ 38,514						$ 38,514	$ 13,000	
Professional Labor for Construction Oversight (12%)				$ 471,500			$ 462,070						$ 462,070	$ 155,000	
Field Equipment and Supplies (2%)				$ 78,600			$ 77,028						$ 77,028		
Laboratory Testing (field verification and waste profiling) (3%)				$ 117,900			$ 115,542						$ 115,542		
Site Restoration and Demobilization (1%)				$ 39,300			$ 38,514						$ 38,514	$ 13,000	
Regulatory Reporting and Meetings (6%)				$ 235,800		$ 176,850	$ 30,041	$ 18,117	$ 8,877				$ 233,885	$ 77,500	
Subtotal Indirect Capital					$ 1,218,200	$ 353,700	$ 791,750	$ 36,234	$ 17,755	$ -	$ -	$ -	$ 1,199,438	$ 336,000	$ 863,438
Project Management (15% of Subtotal Indirect Capital)					$ 182,730	$ 53,055	$ 118,762	$ 5,435	$ 2,663	$ -	$ -	$ -	$ 179,916	$ 50,400	$ 129,516
Total Present Capital					$ 5,329,600	$ 406,800	$ 4,569,900	$ 128,400	$ 85,900	$ -	$ -	$ -	$ 5,191,100	$ 1,677,700	$ 3,513,300

						Present Value Cost Per Year (2% Present Value Discount Rate, Assuming 5% Cost of Future Money and 3% Inflation Rate)							Present Value Costs		
Long-Term Future Monitoring, O&M, And Other Direct Cost Items[1]	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	2015	2016	2017	2018	2019-2020	2021-2024	2025-2035	Total	Development-Related	Remediation
Annual Monitoring and Reporting, 20 wells (Years 1) - With MNA Parameters	1	event	$ 22,670	$ 22,670				$ 21,772					$ 21,772		
Quarterly Monitoring and Reporting, 13 wells (Year 1) - With Geochemical Parameters	3	event	$ 16,450	$ 49,350				$ 47,396					$ 47,396		
Annual Monitoring and Reporting, 20 wells (Years 2) - With MNA Parameters	1	event	$ 22,670	$ 22,670					$ 21,337				$ 21,337		
Quarterly Monitoring and Reporting, 13 wells (Year 2) - With Geochemical Parameters	3	event	$ 16,450	$ 49,350					$ 46,448				$ 46,448		
Semi-annual Monitoring and Reporting, Annual event - 20 wells, Semi-Annual 13 wells (Years 3 and 4) - With MNA Parameters	2	event	$ 21,725	$ 43,450						$ 39,676			$ 39,676		
Annual Monitoring and Reporting, 20 wells (Years 5 - 8) - No MNA Parameters	4	event	$ 21,670	$ 86,680							$ 74,512		$ 74,512		
Annual Monitoring Event 20 wells (Year 9) - With MNA Parameters	1	event	$ 22,670	$ 22,670								$ 18,523	$ 18,523		
Annual Monitoring Event 20 wells (Year 10) - With MNA Parameters	1	event	$ 22,670									$ 18,153	$ 18,153		
Annual Monitoring Event 10 wells Years 11-15 - No MNA Parameters	5	event	$ 15,670	$ 78,350								$ 54,486	$ 54,486		
Injection Well Decommissioning - 41 Shallow Wells	41	ea	$ 500	$ 20,500								$ 15,141	$ 15,141		
Injection Well Decommissioning - 23 Deep Wells	23	ea	$ 1,000	$ 23,000								$ 16,987	$ 16,987		
Decommissioning of Monitoring Wells, 25 wells	25	ea	$ 500	$ 12,500								$ 9,232	$ 9,232		
Subtotal Future Worth Cost of Annual and Other Direct Capital Costs					$ 431,190	$ -	$ -	$ 69,168	$ 67,785	$ 39,676	$ 74,512	$ 132,522	$ 383,662	$ -	$ 383,662
Project Management (10% of Future Worth Cost of Annual and Other Direct Capital)					$ 43,119	$ -	$ -	$ 6,917	$ 6,778	$ 3,968	$ 7,451	$ 13,252	$ 38,366	$ -	$ 38,366
Future Worth Cost of Annual and Capital Costs					$ 474,300	$ -	$ -	$ 76,100	$ 74,600	$ 43,600	$ 82,000	$ 145,800	$ 422,000	$ -	$ 422,000
TOTAL PRESENT WORTH COST (Sum of Total Capital and Present Worth of Annual and Future Capital Cost)[3][4][5]					$ 5,804,000	$ 407,000	$ 4,570,000	$ 205,000	$ 161,000	$ 44,000	$ 82,000	$ 146,000	$ 5,613,000	$ 1,678,000	$ 3,935,000

NOTES:

[1]Additional direct costs such as project management, regulatory communications and reporting, and other technical support services not specifically listed are not included in any future annual costs.
[2]Annual cost is year 2014 cost.
[3]This feasibility level cost should not be considered a design cost estimate or guaranteed cost.
[4]Excludes electrical costs for all systems.
[5]Cost rounded up to nearest $1,000.
Annual groundwater monitoring costs reflect a 4% annual increase.
DFCR = Preliminary Draft for Client Review

ERD = enhanced reductive dechlorination
ERH = electric resistive heating
lf = linear feet
ls = lump sum
n = number of years
O&M = operation and maintenance
PCE = tetrachloroethene
sf = square feet
ton = number of bank cubic yards x 1.7 ton/bank cubic yard

Table 8
Cleanup Action Alternative 3.3
Feasibility Level Cost Estimate
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Cleanup Action Alternative 3.3 - ERH of Shallow Zone and Deep Zone Source Area to Groundwater Cleanup Level and ERD of Shallow Zone and Deep Zone off Property															
						Discounted Rate for Future Money (Assumes 5% Cost of Money and 3% Inflation Rate for a 2% Present Value Discount Rate)									
Present Capitol Cost Item	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	2015	2016	2017	2018	2019-2020	2021-2024	2025	Total Costs (2015 Present Value)	Development Related Costs (2015 Present Value)	Remediation Costs (2015 Present Value)
Direct Capital															
Remedial Excavation															
PSS Building and 6565 4th House Demolition	1	ls	$ 177,000	$ 177,000			$ 173,460						$ 173,460	$ 173,460	
PSS Building and 6565 4th House ACM Survey	1	ls	$ 7,000	$ 7,000			$ 6,860						$ 6,860	$ 6,860	
PSS Building and 6565 4th House ACM Abatement	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500	$ 24,500	
Shoring Installation for Excavation	1	ls	$ 450,000	$ 450,000			$ 441,000						$ 441,000	$ 441,000	
Excavation, Handling, and Soil Segregation - Shoring Cuttings for Areas 1, 2, & 4	472	tons	$ 8	$ 3,776			$ 3,700						$ 3,700	$ 3,700	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Shoring Cuttings for Areas 1, 2, & 4	472	tons	$ 70	$ 33,040			$ 32,379						$ 32,379	$ 13,877	
Excavation, Handling, and Soil Segregation - Shoring Cuttings for Area 5	214	tons	$ 8	$ 1,712			$ 1,678						$ 1,678	$ 1,678	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Shoring Cuttings for Area 5 (Subjected to Results from Line Item #10)	214	tons	$ 70	$ 14,980			$ 14,680						$ 14,680	$ 6,292	
Contained Out Soil Profile	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
ERH In Situ Soil Treatment	2,222	sf	$ 500	$ 1,111,000			$ 1,088,780						$ 1,088,780		
ERH Confirmation Soil Sampling for Contained Out	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
Excavation, Handling, and Soil Segregation - Areas 1, 2, & 4	8,161	tons	$ 8	$ 65,288			$ 63,982						$ 63,982	$ 63,982	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Areas 1, 2, & 4	8,161	tons	$ 70	$ 571,270			$ 559,845						$ 559,845	$ 559,845	
Excavation, Handling, and Soil Segregation - Area 5	4,170	tons	$ 8	$ 33,360			$ 32,693						$ 32,693	$ 32,693	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Area 5 (Subjected to Results from Line Item No. 10)	4,170	tons	$ 70	$ 291,900			$ 286,062						$ 286,062	$ 122,598	
Dewatering System Installation - Shallow Zone	1	ls	$ 78,700	$ 78,700			$ 77,126						$ 77,126	$ 77,126	
Dewatering System Installation - Deep Zone	1	ls	$ 71,250	$ 71,250			$ 69,825						$ 69,825	$ 69,825	
Contingency Deep Dewatering Well Installation	8	each	$ 5,000	$ 40,000			$ 39,200						$ 39,200	$ 39,200	
Water Treatment System using Granular Activated Carbon (3 months)	1	ls	$ 12,000	$ 12,000			$ 11,760						$ 11,760		
Discharge Fees and Lab Analysis	3	mo	$ 8,000	$ 24,000			$ 23,520						$ 23,520		
Excavation of Tanks in Sidewalk (Trench Box Ex)	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
Well Abandonment - MW-7 and MW-14	2	each	$ 800	$ 1,600			$ 1,568						$ 1,568		
ERH In Situ Soil Treatment - Sidewalk Area	730	sf	$ 500	$ 365,000			$ 357,700						$ 357,700		
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Sidewalk Tank Excavation	40	ton	$ 70	$ 2,800			$ 2,744						$ 2,744		
Sidewalk UST Decommissioning	1	ls	$ 5,000	$ 5,000			$ 4,900						$ 4,900		
Backfill of Sidewalk with CDF	20	cy	$ 135	$ 2,700			$ 2,646						$ 2,646		
Heating Oil UST Decommissioning	4	ls	$ 5,000	$ 20,000			$ 19,600						$ 19,600		
Excavation, Handling, and Soil Segregation - Heating Oil UST Area (Subject to Results from Line Item No. 10)	160	tons	$ 8	$ 1,280			$ 1,254						$ 1,254	$ 1,254	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Heating Oil UST Area (Subjected to Results from Line Item No. 10)	160	tons	$ 70	$ 11,200			$ 10,976						$ 10,976	$ 10,976	
Footing Drain Iron Filter Treatment System	1	ls	$ 84,100	$ 84,100			$ 82,418						$ 82,418		
Sub-slab Vapor Barrier	13,592	sf	$ 7	$ 95,144			$ 93,241						$ 93,241		
Subtotal Remedial Excavation					$ 3,675,100		$ 3,601,598						$ 3,601,598	$ 1,648,866	$ 1,952,732
Groundwater Treatment - Enhanced Reductive Dechlorination															
Drilling Contractor - Installation of 23 Onsite Shallow Wells	0	each	$ 2,000	$ -			$ -						$ -		
Drilling Contractor - Installation of 8 Onsite Deep Wells	0	each	$ 4,000	$ -			$ -								
Drilling Contractor - Installation of 18 Offsite Shallow Wells	18	each	$ 2,000	$ 36,000			$ 35,280						$ 35,280		
Drilling Contractor - Installation of 10 Offsite Deep Wells	10	each	$ 4,000	$ 40,000			$ 39,200						$ 39,200		
Drilling Contractor - Installation of 5 Deep Wells across Woodlawn Ave NE	5	each	$ 4,000	$ 20,000				$ 19,208					$ 19,208		
Disposal of Soil Cuttings - Assumed 50% as Dangerous Waste, Subtitle C	0	ton	$ 250	$ -			$ -						$ -		
Disposal of Soil Cuttings - Assumed 50% as Dangerous Waste, Subtitle D	20	ton	$ 70	$ 1,400			$ 1,372						$ 1,372		
Disposal of Soil Cuttings - Contingency wells/probes (Subtitle D)	10	ton	$ 70	$ 700				$ 672					$ 672		
Edible Oil Injection Event	1	ls	$ 51,205	$ 51,205			$ 50,181						$ 50,181		
Contingency Injection Edible Oil Injection Event and Bioaugmentation	2	event	$ 69,605	$ 139,210				$ 66,849	$ 65,512				$ 132,360		
Subtotal Groundwater Treatment					$ 288,515		$ 126,033	$ 86,729	$ 65,512				$ 278,273		$ 278,273
Compliance Monitoring															
Well Installation - Building Footprint (1 shallow, 1 deep)	2	each	$ 6,000	$ 12,000			$ 11,760						$ 11,760		
Groundwater Monitoring Event Post Excavation, 20 wells with MNA Parameters	1	event	$ 22,675	$ 22,675			$ 22,222						$ 22,222		
Compliance Monitoring Subtotal					$ 34,675		$ -						$ -		$ -
Subtotal Direct Capital					$ 3,998,290		$ 3,727,600	$ 86,700	$ 65,500				$ 3,879,900	$ 1,648,866	$ 2,231,006
Indirect Capital (as percentages of Direct Capital)															
Design, Permitting, and Work Plans (6%)				$ 239,900		$ 179,925	$ 30,563	$ 18,432	$ 9,032				$ 237,952	$ 99,000	
Mobilization (1%)				$ 40,000			$ 39,200						$ 39,200	$ 16,500	
Professional Labor for Construction Oversight (12%)				$ 479,800			$ 470,204						$ 470,204	$ 197,900	
Field Equipment and Supplies (2%)				$ 80,000			$ 78,400						$ 78,400		
Laboratory Testing (field verification and waste profiling) (3%)				$ 120,000			$ 117,600						$ 117,600		
Site Restoration and Demobilization (1%)				$ 40,000			$ 39,200						$ 39,200	$ 16,500	
Regulatory Reporting and Meetings (6%)				$ 239,900		$ 179,925	$ 30,563	$ 18,432	$ 9,032				$ 237,952	$ 99,000	
Subtotal Indirect Capital					$ 1,239,600	$ 359,850	$ 805,731	$ 36,864	$ 18,063	$ -	$ -	$ -	$ 1,220,508	$ 428,900	$ 791,608
Project Management (15% of Subtotal Indirect Capital)					$ 185,940	$ 53,978	$ 120,860	$ 5,530	$ 2,710	$ -	$ -	$ -	$ 183,076	$ 64,335	$ 118,741
Total Present Capital					$ 5,423,800	$ 413,800	$ 4,654,200	$ 129,100	$ 86,300	$ -	$ -	$ -	$ 5,283,500	$ 2,142,100	$ 3,141,400

Table 8
Cleanup Action Alternative 3.3
Feasibility Level Cost Estimate
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Cleanup Action Alternative 3.3 - ERH of Shallow Zone and Deep Zone Source Area to Groundwater Cleanup Level and ERD of Shallow Zone and Deep Zone off Property

Present Capitol Cost Item	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	Discounted Rate for Future Money (Assumes 5% Cost of Money and 3% Inflation Rate for a 2% Present Value Discount Rate) 2015	2016	2017	2018	2019-2020	2021-2024	2025	Total Costs (2015 Present Value)	Development Related Costs (2015 Present Value)	Remediation Costs (2015 Present Value)
Long-Term Future Monitoring, O&M, And Other Direct Cost Items[1]	**Quantity**	**Unit**	**Unit Cost**	**Item Cost**	**Total Costs (in 2015)**	**Discounted Rate for Future Money (Assumes 5% Cost of Money and 3% Inflation Rate for a 2% Present Value Discount Rate) 2015**	**2016**	**2017**	**2018**	**2019-2020**	**2021-2024**	**2025-2035**	**Total Costs (2015 Present Value)**	**Development Related Costs (2015 Present Value)**	**Remediation Costs (2015 Present Value)**
Annual Monitoring and Reporting, 20 wells (Years 1) - With MNA Parameters	1	event	$ 22,670					$ 21,772					$ 21,772		
Quarterly Monitoring and Reporting, 13 wells (Year 1) - With Geochemical Parameters	3	event	$ 16,450					$ 47,396					$ 47,396		
Annual Monitoring and Reporting, 20 wells (Years 2) - With MNA Parameters	1	event	$ 22,670						$ 21,337				$ 21,337		
Quarterly Monitoring and Reporting, 13 wells (Year 2) - With Geochemical Parameters	3	event	$ 16,450						$ 46,448				$ 46,448		
Semi-annual Monitoring and Reporting, Annual event - 20 wells, Semi-Annual 13 wells (Years 3 and 4) - With MNA Parameters	2	event	$ 21,725							$ 39,676			$ 39,676		
Annual Monitoring and Reporting, 20 wells (Years 5 - 8) - No MNA Parameters	4	event	$ 21,670								$ 74,512		$ 74,512		
Annual Monitoring Event 20 wells (Year 9) - With MNA Parameters	1	event	$ 22,670								$ 18,901		$ 18,901		
Annual Monitoring Event 20 wells (Year10) - With MNA Parameters	1	event	$ 22,670									$ 18,153	$ 18,153		
Annual Monitoring Event 10 wells Years 11-15 - No MNA Parameters	4	event	$ 15,670									$ 54,486	$ 54,486		
Injection Well Decommissioning - 41 Shallow Wells	41	ea	$ 500									$ 13,686	$ 13,686		
Injection Well Decommissioning - 23 Deep Wells	23	ea	$ 1,000									$ 15,355	$ 15,355		
Decommissioning of Monitoring Wells, 25 wells	25	ea	$ 500									$ 8,345	$ 8,345		
Subtotal Future Worth Cost of Annual and Other Direct Capital Costs					$ 415,520	$ -	$ -	$ 69,168	$ 67,785	$ 39,676	$ 93,413	$ 110,025	$ 380,066	$ -	$ 380,066
Project Management (10% of Future Worth Cost of Annual and Other Direct Capital)					$ 41,552	$ -	$ -	$ 6,917	$ 6,778	$ 3,968	$ 9,341	$ 11,002	$ 38,007	$ -	$ 38,007
Future Worth Cost of Annual and Capital Costs					$ 457,100	$ -	$ -	$ 76,100	$ 74,600	$ 43,600	$ 102,800	$ 121,000	$ 418,100	$ -	$ 418,100
TOTAL PRESENT WORTH COST (Sum of Total Capital and Present Worth of Annual and Future Capital Cost)[3][4][5]					$ 5,881,000	$ 414,000	$ 4,654,000	$ 205,000	$ 161,000	$ 44,000	$ 103,000	$ 121,000	$ 5,702,000	$ 2,142,000	$ 3,560,000

NOTES:

[1]Additional direct costs such as project management, regulatory communications and reporting, and other technical support services not specifically listed are not included in any future annual costs.

[2]Annual cost is year 2014 cost.

[3]This feasibility level cost should not be considered a design cost estimate or guaranteed cost.

[4]Excludes electrical costs for all systems.

[5]Cost rounded up to nearest $1,000.

Annual groundwater monitoring costs reflect a 4% annual increase.

DFCR = Preliminary Draft for Client Review

ERD = enhanced reductive dechlorination
ERH = electric resistive heating
lf = linear feet
ls = lump sum
n = number of years
O&M = operation and maintenance
PCE = tetrachloroethene
sf = square feet
ton = number of bank cubic yards x 1.7 ton/bank cubic yard

SoundEarth Strategies

Table 9
Cleanup Action Alternative 3.4
Feasibility Level Cost Estimate
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Cleanup Action Alternative 3.4 - ERH of Upper Shallow Zone Source Area to Soil Remediation Level, Chemical Oxidation of Lower Shallow Zone and Deep Zone on Property, and Chemical Oxidation of Shallow Zone and Deep Zone off Property															
						Discounted Rate for Future Money (Assumes 5% Cost of Money and 3% Inflation Rate for a 2% Present Value Discount Rate)									
Present Capitol Cost Item	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	2015	2016	2017	2018	2019-2020	2021-2024	2025	Total Costs (2015 Present Value)	Development Related Costs (2015 Present Value)	Remediation Costs (2015 Present Value)
Direct Capital															
Remedial Excavation															
PSS Building and 6565 4th House Demolition	1	ls	$ 177,000	$ 177,000			$ 173,460						$ 173,460	$ 173,460	
PSS Building and 6565 4th House ACM Survey	1	ls	$ 7,000	$ 7,000			$ 6,860						$ 6,860	$ 6,860	
PSS Building and 6565 4th House ACM Abatement	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500	$ 24,500	
Shoring Installation for Excavation	1	ls	$ 450,000	$ 450,000			$ 441,000						$ 441,000	$ 441,000	
Excavation, Handling, and Soil Segregation - Shoring Cuttings for Areas 1, 2, & 4	472	tons	$ 8	$ 3,776			$ 3,700						$ 3,700	$ 3,700	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Shoring Cuttings for Areas 1, 2, & 4	472	tons	$ 70	$ 33,040			$ 32,379						$ 32,379	$ 13,877	
Excavation, Handling, and Soil Segregation - Shoring Cuttings for Area 5	214	tons	$ 8	$ 1,712			$ 1,678						$ 1,678	$ 1,678	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Shoring Cuttings for Area 5 (Subjected to Results from Line Item #10)	214	tons	$ 70	$ 14,980			$ 14,680						$ 14,680	$ 6,292	
Contained Out Soil Profile	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
ERH In Situ Soil Treatment	2,222	sf	$ 250	$ 555,500			$ 544,390						$ 544,390		
ERH Confirmation Soil Sampling for Contained Out	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
Excavation, Handling, and Soil Segregation - Areas 1, 2, & 4	8,161	tons	$ 8	$ 65,288			$ 63,982						$ 63,982	$ 63,982	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Areas 1, 2, & 4	8,161	tons	$ 70	$ 571,270			$ 559,845						$ 559,845	$ 239,933	
Excavation, Handling, and Soil Segregation - Area 5	4,170	tons	$ 8	$ 33,360			$ 32,693						$ 32,693	$ 32,693	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Area 5 (Subjected to Results from Line Item No. 10)	4,170	tons	$ 70	$ 291,900			$ 286,062						$ 286,062	$ 122,598	
Dewatering System Installation - Shallow Zone	1	ls	$ 78,700	$ 78,700			$ 77,126						$ 77,126	$ 77,126	
Dewatering System Installation - Deep Zone	1	ls	$ 71,250	$ 71,250			$ 69,825						$ 69,825	$ 69,825	
Contingency Deep Dewatering Well Installation	8	each	$ 5,000	$ 40,000			$ 39,200						$ 39,200	$ 39,200	
Water Treatment System using Granular Activated Carbon (3 months)	1	ls	$ 12,000	$ 12,000			$ 11,760						$ 11,760		
Discharge Fees and Lab Analysis	3	mo	$ 8,000	$ 24,000			$ 23,520						$ 23,520		
Excavation of Tanks in Sidewalk (Trench Box Ex)	1	ls	$ 25,000	$ 25,000			$ 24,500						$ 24,500		
Well Abandonment - MW-7 and MW-14	2	each	$ 800	$ 1,600			$ 1,568						$ 1,568		
ERH In Situ Soil Treatment - Sidewalk Area	730	sf	$ 250	$ 182,500			$ 178,850						$ 178,850		
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Sidewalk Tank Excavation	40	ton	$ 70	$ 2,800			$ 2,744						$ 2,744		
Sidewalk UST Decommissioning	1	ls	$ 5,000	$ 5,000			$ 4,900						$ 4,900		
Backfill of Sidewalk with CDF	20	cy	$ 135	$ 2,700			$ 2,646						$ 2,646		
Heating Oil UST Decommissioning	4	ls	$ 5,000	$ 20,000			$ 19,600						$ 19,600		
Excavation, Handling, and Soil Segregation - Heating Oil UST Area (Subject to Results from Line Item No. 10)	160	tons	$ 8	$ 1,280			$ 1,254						$ 1,254	$ 1,254	
Transportation and Disposal as Contained Out, Subtitle D Facility (PCE < 14 mg/kg) - Heating Oil UST Area (Subjected to Results from Line Item No. 10)	160	tons	$ 70	$ 11,200			$ 10,976						$ 10,976	$ 4,704	
Footing Drain Iron Filter Treatment System	1	ls	$ 84,100	$ 84,100			$ 82,418						$ 82,418		
Sub-slab Vapor Barrier	13,592	sf	$ 7	$ 95,144			$ 93,241						$ 93,241		
Subtotal Remedial Excavation					$ 2,937,100		$ 2,878,358						$ 2,878,358	$ 1,322,682	$ 1,555,676
Groundwater Treatment - Chemical Oxidation															
Drilling Contractor - Installation of 23 Onsite Shallow Wells	23	each	$ 2,000	$ 46,000			$ 45,080						$ 45,080		
Drilling Contractor - Installation of 8 Onsite Deep Wells	8	each	$ 4,000	$ 32,000			$ 31,360								
Drilling Contractor - Installation of 18 Offsite Shallow Wells	18	each	$ 2,000	$ 36,000			$ 35,280						$ 35,280		
Drilling Contractor - Installation of 10 Offsite Deep Wells	10	each	$ 4,000	$ 40,000			$ 39,200						$ 39,200		
Drilling Contractor - Installation of 5 Deep Wells across Woodlawn Ave NE	5	each	$ 4,000	$ 20,000				$ 19,208					$ 19,208		
Disposal of Soil Cuttings - Assumed 50% as Dangerous Waste, Subtitle D	20	ton	$ 70	$ 1,400			$ 1,372						$ 1,372		
Disposal of Soil Cuttings - Contingency wells/probes (Subtitle D)	10	ton	$ 70	$ 700				$ 672					$ 672		
Chemox Injection Event	1	ls	$ 125,000	$ 125,000			$ 122,500						$ 122,500		
Contingency Injection Events	4	event	$ 125,000	$ 500,000				$ 120,050	$ 117,649	$ 102,134	$ 92,321		$ 432,154		
Subtotal Groundwater Treatment					$ 801,100		$ 274,792	$ 139,930	$ 117,649				$ 532,371		$ 532,371
Compliance Monitoring															
Well Installation - Building Footprint (1 shallow, 1 deep)	2	each	$ 6,000	$ 12,000			$ 11,760						$ 11,760		
Groundwater Monitoring Event Post Excavation, 20 wells with MNA Parameters	1	event	$ 22,675	$ 22,675			$ 22,222						$ 22,222		
Compliance Monitoring Subtotal					$ 34,675		$ -						$ -		$ -
Subtotal Direct Capital					$ 3,772,875		$ 3,153,200	$ 139,900	$ 117,600				$ 3,410,700	$ 1,322,682	$ 2,088,047
Indirect Capital (as percentages of Direct Capital)															
Design, Permitting, and Work Plans (6%)				$ 226,400		$ 169,800	$ 28,843	$ 17,395	$ 8,523				$ 224,562	$ 79,400	
Mobilization (1%)				$ 37,800			$ 37,044						$ 37,044	$ 13,300	
Professional Labor for Construction Oversight (12%)				$ 452,800			$ 443,744						$ 443,744	$ 158,800	
Field Equipment and Supplies (2%)				$ 75,500			$ 73,990						$ 73,990		
Laboratory Testing (field verification and waste profiling) (3%)				$ 113,200			$ 110,936						$ 110,936		
Site Restoration and Demobilization (1%)				$ 37,800			$ 37,044						$ 37,044	$ 13,300	
Regulatory Reporting and Meetings (6%)				$ 226,400		$ 169,800	$ 28,843	$ 17,395	$ 8,523				$ 224,562	$ 79,400	
Subtotal Indirect Capital					$ 1,169,900	$ 339,600	$ 760,445	$ 34,790	$ 17,047	$ -	$ -	$ -	$ 1,151,881	$ 344,200	$ 807,681
Project Management (15% of Subtotal Indirect Capital)					$ 175,485	$ 50,940	$ 114,067	$ 5,218	$ 2,557	$ -	$ -	$ -	$ 172,782	$ 51,630	$ 121,152
Total Present Capital					$ 5,118,300	$ 390,500	$ 4,027,700	$ 179,900	$ 137,200	$ -	$ -	$ -	$ 4,735,400	$ 1,718,500	$ 3,016,900

SoundEarth Strategies

Table 9
Cleanup Action Alternative 3.4
Feasibility Level Cost Estimate
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

Cleanup Action Alternative 3.4 - ERH of Upper Shallow Zone Source Area to Soil Remediation Level, Chemical Oxidation of Lower Shallow Zone and Deep Zone on Property, and Chemical Oxidation of Shallow Zone and Deep Zone off Property															
						Discounted Rate for Future Money (Assumes 5% Cost of Money and 3% Inflation Rate for a 2% Present Value Discount Rate)									
Present Capitol Cost Item	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	2015	2016	2017	2018	2019-2020	2021-2024	2025	Total Costs (2015 Present Value)	Development Related Costs (2015 Present Value)	Remediation Costs (2015 Present Value)
						Discounted Rate for Future Money (Assumes 5% Cost of Money and 3% Inflation Rate for a 2% Present Value Discount Rate)									
Long-Term Future Monitoring, O&M, And Other Direct Cost Items[1]	Quantity	Unit	Unit Cost	Item Cost	Total Costs (in 2015)	2015	2016	2017	2018	2019-2020	2021-2024	2025-2035	Total Costs (2015 Present Value)	Development Related Costs (2015 Present Value)	Remediation Costs (2015 Present Value)
Annual Monitoring and Reporting, 20 wells (Years 1) - With MNA Parameters	1	event	$ 22,670	$ 22,670				$ 21,772					$ 21,772		
Quarterly Monitoring and Reporting, 13 wells (Year 1) - With Geochemical Parameters	3	event	$ 16,450	$ 49,350				$ 47,396					$ 47,396		
Annual Monitoring and Reporting, 20 wells (Years 2) - With MNA Parameters	1	event	$ 22,670	$ 22,670					$ 21,337				$ 21,337		
Quarterly Monitoring and Reporting, 13 wells (Year 2) - With Geochemical Parameters	3	event	$ 16,450	$ 49,350					$ 46,448				$ 46,448		
Semi-annual Monitoring and Reporting, Annual event - 20 wells, Semi-Annual 13 wells (Years 3 and 4) - With MNA Parameters	2	event	$ 21,725	$ 43,450						$ 39,676			$ 39,676		
Annual Monitoring and Reporting, 20 wells (Years 5 - 8) - No MNA Parameters	4	event	$ 21,670	$ 86,680							$ 74,512		$ 74,512		
Annual Monitoring Event 20 wells (Year 9) - With MNA Parameters	1	event	$ 22,670	$ 22,670								$ 18,523	$ 18,523		
Annual Monitoring Event 20 wells Years 10-20 - No MNA Parameters	10	event	$ 15,670	$ 156,700								$ 114,764			
Injection Well Decommissioning - 41 Shallow Wells	41	ea	$ 500	$ 20,500								$ 13,686	$ 13,686		
Injection Well Decommissioning - 23 Deep Wells	23	ea	$ 1,000	$ 23,000								$ 15,355	$ 15,355		
Decommissioning of Monitoring Wells, 25 wells	25	ea	$ 500	$ 12,500								$ 8,345	$ 8,345		
Subtotal Future Worth Cost of Annual and Other Direct Capital Costs					$ 509,540	$ -	$ -	$ 69,168	$ 67,785	$ 39,676	$ 74,512	$ 170,673	$ 421,813	$ -	$ 421,813
Project Management (10% of Future Worth Cost of Annual and Other Direct Capital)					$ 50,954	$ -	$ -	$ 6,917	$ 6,778	$ 3,968	$ 7,451	$ 17,067	$ 42,181	$ -	$ 42,181
Future Worth Cost of Annual and Capital Costs					$ 560,500	$ -	$ -	$ 76,100	$ 74,600	$ 43,600	$ 82,000	$ 187,700	$ 464,000	$ -	$ 464,000
TOTAL PRESENT WORTH COST (Sum of Total Capital and Present Worth of Annual and Future Capital Cost)[3][4][5]					$ 5,679,000	$ 391,000	$ 4,028,000	$ 256,000	$ 212,000	$ 44,000	$ 82,000	$ 188,000	$ 5,199,000	$ 1,719,000	$ 3,481,000

NOTES:

[1]Additional direct costs such as project management, regulatory communications and reporting, and other technical support services not specifically listed are not included in any future annual costs.

[2]Annual cost is year 2014 cost.

[3]This feasibility level cost should not be considered a design cost estimate or guaranteed cost.

[4]Excludes electrical costs for all systems.

[5]Cost rounded up to nearest $1,000.

Annual groundwater monitoring costs reflect a 4% annual increase.

DFCR = Preliminary Draft for Client Review

ERH = electric resistive heating
lf = linear feet
ls = lump sum
n = number of years
O&M = operation and maintenance
PCE = tetrachloroethene
sf = square feet
ton = number of bank cubic yards x 1.7 ton/bank cubic yard

SoundEarth Strategies

Table 10
Comparison Summary Modified Cleanup Action Alternatives
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

	Cleanup Action Alternative	Restoration Time Frame (Years)	MTCA Permanence Criteria and Weighting Factors[1] Protectiveness 30%	Permanence 20%	Long-term Effectiveness 20%	Short-Term Effectiveness 10%	Implementability 10%	Public Concerns 10%	MTCA Composite Benefit Score[2]	Including Development Cost	Including Development Cost-to-Benefit Ratio[3]	Excluding Development Cost	Excluding Development Cost-to-Benefit Ratio[3]
3.1	ERH of Upper Shallow Zone Source Area to Soil Remediation Level, ERD of Lower Shallow Zone and Deep Zone on Property, and ERD of Shallow Zone and Deep Zone off Property	20	8.0	8.0	8.0	7.0	9.0	7.0	7.9	$4,953,000	6.3	$3,234,000	4.1
3.2	ERH of Upper and Lower Shallow Zone Soured Area to Soil Remediation Level, ERD of Lower Shallow Zone and Deep Zone on Property, and ERD of Shallow Zone and Deep Zone off Property	15	8.0	8.0	8.0	7.0	8.0	7.0	7.8	$5,613,000	7.2	$3,935,000	5.0
3.3	ERH of Shallow Zone and Deep Zone Source Area to Groundwater Cleanup Level and ERD of Shallow Zone and Deep Zone off Property	15	8.0	8.0	8.0	7.0	8.0	7.0	7.8	$5,702,000	7.3	$3,560,000	4.6
3.4	ERH of Upper Shallow Zone Source Area to Soil Remediation Level, Chemical Oxidation of Lower Shallow Zone and Deep Zone on Property, and Chemical Oxidation of Shallow Zone and Deep Zone off Property	20	8.0	8.0	8.0	7.0	7.0	7.0	7.7	$5,199,000	6.8	$3,481,000	4.5

NOTES:
[1]Scores indicate quantitative value of criteria for "permanence to the maximum extent practicable." A score of 0 is least favorable and a score of 10 is most favorable.
[2]MTCA Composite Benefit Scores are calculated by summing the mathematical product of the score times the weighting factor for each of the six criteria.
[3]Cost-to-benefit ratio is calculated by dividing the cost (in one hundred thousands) by the MTCA composite benefit score.

ERD = enhanced reductive dechlorination
ERH = electric resistive heating
MTCA = Washington State Model Toxics Control Act

CHARTS

Chart 1
Cleanup Action Alternative Costs and MTCA Composite Benefit Scores
Plastic Sales and Service Site
6870 Woodlawn Avenue Northeast
Seattle, Washington

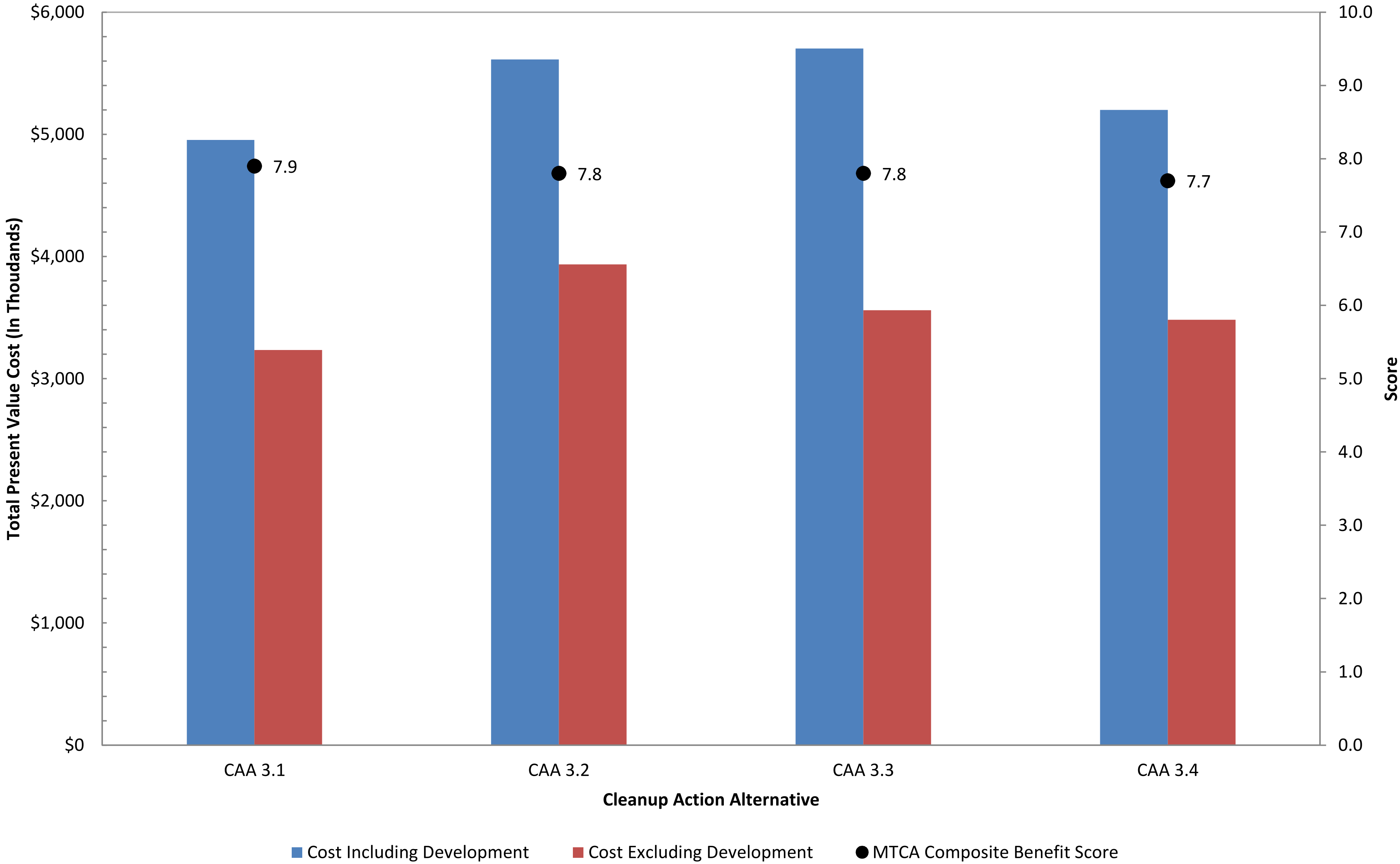
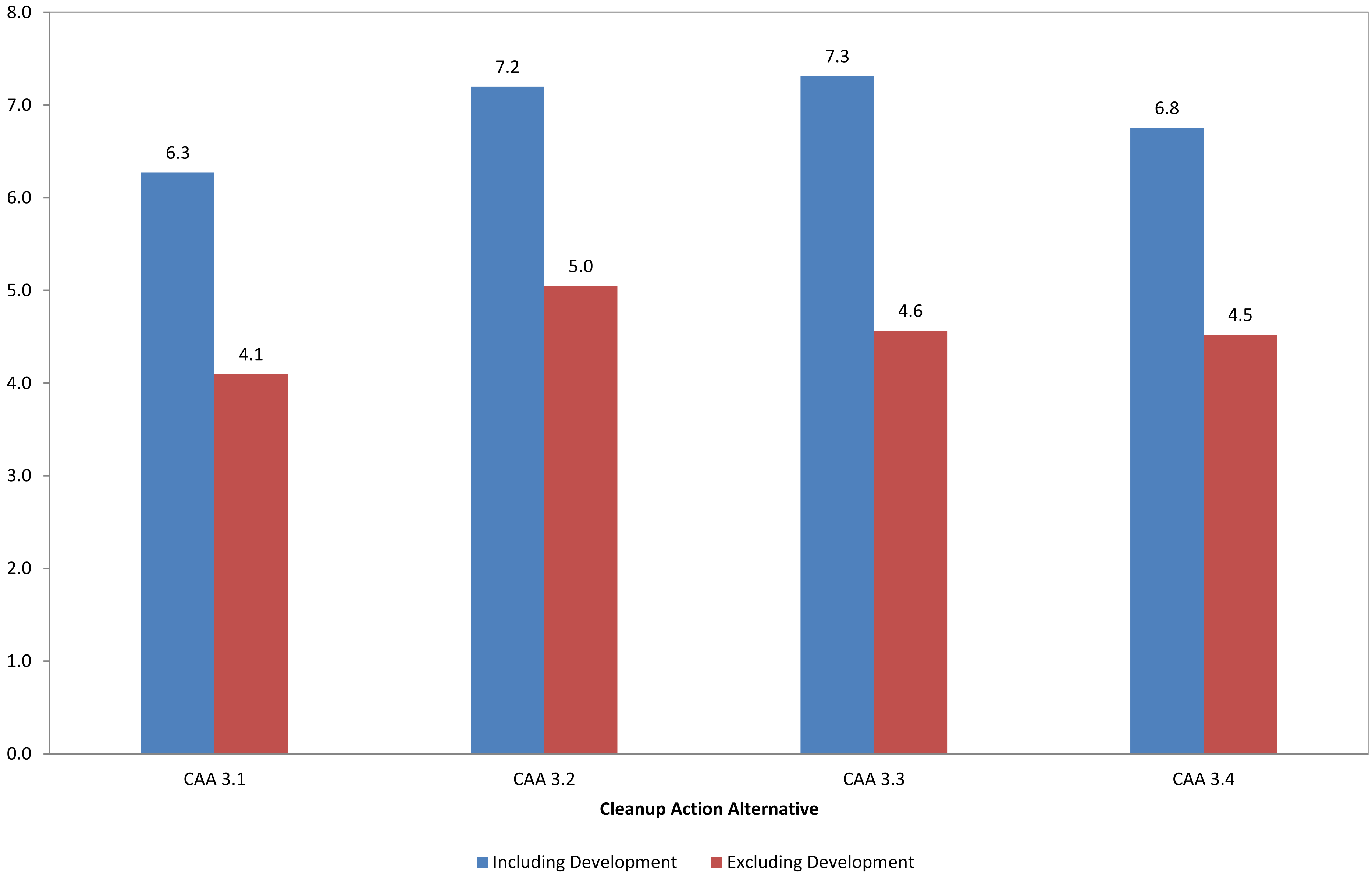


Chart 2
Cleanup Action Alternative Cost-to-Benefit Ratios
Plastic Sales and Service Site
6870 Hearthsotone Woodlawn Avenue Northeast
Seattle, Washington



APPENDIX A

LABORATORY ANALYTICAL REPORTS

Onsite Environmental Inc. #1409-082

OnSite Environmental Inc.

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

September 22, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-082

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 9, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

Case Narrative

Samples were collected on September 9, 2014 and received by the laboratory on September 9, 2014. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

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

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW16-20140909**					
Laboratory ID:	09-082-01					
Vinyl Chloride	ND	0.20	EPA 8260C	9-11-14	9-11-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-11-14	9-11-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Trichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*101*	*62-122*				
Toluene-d8	*105*	*70-120*				
4-Bromofluorobenzene	*95*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW21-20140909**					
Laboratory ID:	09-082-02					
Vinyl Chloride	0.73	0.20	EPA 8260C	9-11-14	9-11-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-11-14	9-11-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Trichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*109*	*62-122*				
Toluene-d8	*104*	*70-120*				
4-Bromofluorobenzene	*96*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW08-20140909**					
Laboratory ID:	09-082-03					
Vinyl Chloride	ND	0.20	EPA 8260C	9-11-14	9-11-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-11-14	9-11-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Trichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*105*	*62-122*				
Toluene-d8	*107*	*70-120*				
4-Bromofluorobenzene	*96*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0911W1					
Vinyl Chloride	ND	0.20	EPA 8260C	9-11-14	9-11-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-11-14	9-11-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Trichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*97*	*62-122*				
Toluene-d8	*99*	*70-120*				
4-Bromofluorobenzene	*90*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0911W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**9.46**	**10.0**	10.0	10.0	95	100	63-142	6	17	
Benzene	**9.90**	**10.5**	10.0	10.0	99	105	78-125	6	15	
Trichloroethene	**8.83**	**8.87**	10.0	10.0	88	89	74-125	0	15	
Toluene	**9.82**	**10.1**	10.0	10.0	98	101	80-125	3	15	
Chlorobenzene	**9.23**	**9.43**	10.0	10.0	92	94	80-140	2	15	
Surrogate:										
Dibromofluoromethane					*96*	*97*	*62-122*			
Toluene-d8					*99*	*98*	*70-120*			
4-Bromofluorobenzene					*93*	*91*	*71-120*			

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

TOTAL ORGANIC CARBON
SM 5310B

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW08-20140909**					
Laboratory ID:	09-082-03					
Total Organic Carbon	**ND**	1.0	SM 5310B	9-15-14	9-15-14	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

TOTAL ORGANIC CARBON
SM 5310B
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0915W1					
Total Organic Carbon	**ND**	1.0	SM 5310B	9-15-14	9-15-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-103-02								
	ORIG	DUP							
Total Organic Carbon	**ND**	**ND**	NA	NA	NA	NA	NA	15	
MATRIX SPIKE									
Laboratory ID:	09-103-02								
	MS		MS		MS				
Total Organic Carbon	**9.98**		10.0	ND	100	70-124	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0915W1								
	SB		SB		SB				
Total Organic Carbon	**9.79**		10.0	NA	98	91-119	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

SULFATE
ASTM D516-07

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW08-20140909**					
Laboratory ID:	09-082-03					
Sulfate	**43**	25	ASTM D516-07	9-18-14	9-18-14	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

SULFATE
ASTM D516-07
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0918W1					
Sulfate	**ND**	5.0	ASTM D516-07	9-18-14	9-18-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-082-03								
	ORIG	DUP							
Sulfate	**43.1**	**42.6**	NA	NA	NA	NA	1	10	
MATRIX SPIKE									
Laboratory ID:	09-082-03								
	MS		MS		MS				
Sulfate	**96.6**		50.0	43.1	107	82-123	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0918W1								
	SB		SB		SB				
Sulfate	**10.5**		10.0	NA	105	91-114	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

DISSOLVED GASES
RSK 175

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW08-20140909**					
Laboratory ID:	09-082-03					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

DISSOLVED GASES
RSK 175
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0922W1					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS											
Laboratory ID:	SB0922W1										
	SB	SBD	SB	SBD		SB	SBD				
Methane	**4.55**	**4.69**	4.42	4.42	N/A	**103**	**106**	75-125	3	25	
Ethane	**7.84**	**8.20**	8.32	8.32	N/A	**94**	**99**	75-125	4	25	
Ethene	**9.60**	**9.27**	7.77	7.77	N/A	**124**	**119**	75-125	3	25	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW08-20140909**					
Laboratory ID:	09-082-03					
Nitrate	**ND**	0.050	EPA 353.2	9-11-14	9-11-14	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0911W1					
Nitrate	**ND**	0.050	EPA 353.2	9-11-14	9-11-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-044-01								
	ORIG	DUP							
Nitrate	**3.21**	**3.31**	NA	NA	NA	NA	3	16	
MATRIX SPIKE									
Laboratory ID:	09-044-01								
	MS		MS		MS				
Nitrate	**7.72**		4.00	3.21	113	84-119	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0911W1								
	SB		SB		SB				
Nitrate	**2.15**		2.00	NA	108	86-114	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

TOTAL ALKALINITY
SM 2320B

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW08-20140909**					
Laboratory ID:	09-082-03					
Total Alkalinity	**130**	2.0	SM 2320B	9-11-14	9-11-14	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

TOTAL ALKALINITY
SM 2320B
QUALITY CONTROL

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0911W1					
Total Alkalinity	**ND**	2.0	SM 2320B	9-11-14	9-11-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-082-03								
	ORIG	DUP							
Total Alkalinity	**128**	**134**	NA	NA	NA	NA	5	10	
SPIKE BLANK									
Laboratory ID:	SB0911W1								
	SB		SB		SB				
Total Alkalinity	**100**		100	NA	100	88-114	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	09-082-03					
Client ID:	**MW08-20140909**					
Iron	**ND**	56	6010C	9-9-14	9-16-14	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	9-9-14
Date Analyzed:	9-16-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0909F1

Analyte	Method	Result	PQL
Iron	6010C	**ND**	56

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 9-9-14
Date Analyzed: 9-16-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Iron	**ND**	**ND**	NA	56	

Date of Report: September 22, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 9-9-14
Date Analyzed: 9-16-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Iron	22200	**21200**	96	**20900**	94	2	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

Analytical Resources, Incorporated
Analytical Chemists and Consultants

15 September 2014

David Baumeister
OnSite Environmental, Inc.
14648 NE 95th
Redmond, WA 98052

RE: Client Project: 0651-002-02; 09-082
ARI Job No: YZ40

Dear David:

Please find enclosed the chain-of-custody (COC) record and the final results for the sample from the project referenced above. Analytical Resources, Inc. (ARI) accepted one water sample on September 10, 2014. The sample was analyzed for ferrous iron as requested.

This analysis proceeded without incident of note.

An electronic copy of these reports will remain on file at ARI. Should you have any questions, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
markh@arilabs.com

Enclosures

cc: file YZ40

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

~~YZ39~~ YZ40

OnSite Environmental Inc.

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

Laboratory Reference #: 09-082

Subcontract Laboratory: Analytical Resources, Inc.

Attention: Mark Harris

4611 S 134th Pl, Ste. 100 Tukwila, WA 98168

Phone Number: (206) 695-6200

Date/Time:

Turnaround Request:

1 Day 2 Day 3 Day

Standard

Other:

Project Manager: David Baumeister

email: dbaumeister@onsite-env.com

Project Number: 0651-002-02

Project Name:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	Requested Analysis
	MW08-20140909	9/9/14	1444	W	1	Fe(II), Ferrous

	Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by:		OSE	9/10/14	1130am	
Received by:		Speedy Msg	9/10/14	1130	
Relinquished by:		Speedy Msg	9/10/14	1220	
Received by:		ARI	9/10/14	1220	
Relinquished by:					
Received by:					

YZ40 : 00002

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Onsite

Project Name: ______

COC No(s): ______ NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: Speedy

Assigned ARI Job No. YZ40

Tracking No: ______ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 3.2

Time: 1230

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90877950

Cooler Accepted by: AV Date: 9/10/14 Time: 1230

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES NO

What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: ______

Was sufficient ice used (if appropriate)?	NA	YES	NO
Were all bottles sealed in individual plastic bags?		YES	~~NO~~ AV
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Was Sample Split by ARI: NA YES Date/Time: ______ Equipment: ______ Split by: ______

Samples Logged by: AV Date: 9/10/14 Time: 1230

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Small Air Bubbles ~2mm	Small → "sm" (< 2 mm)
Peabubbles 2-4 mm	Peabubbles → "pb" (2 to < 4 mm)
LARGE Air Bubbles > 4 mm	Large → "lg" (4 to < 6 mm)
	Headspace → "hs" (> 6 mm)

PRESERVATION VERIFICATION 09/10/14

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **YZ40**

PC: Mark
VTSR: 09/10/14

Inquiry Number: NONE
Analysis Requested: 09/10/14
Contact: Baumeister, David
Client: OnSite Environmental, Inc.
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

Project #: 0651-002-02
Project:
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	TPHD <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
14-18331 **YZ40A**	MW08-20140909														*							

* lab to determine preservation

Checked By AV Date 9/10/14

YZ40:00004

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: YZ40
Client: OnSite Environmental, Inc.
Project Event: 0651-002-02
Project Name: N/A

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	MW08-20140909	YZ40A	14-18331	Water	09/09/14 14:44	09/10/14 12:20

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Data Reporting Qualifiers

Effective 12/31/13

Inorganic Data

U Indicates that the target analyte was not detected at the reported concentration

* Duplicate RPD is not within established control limits

B Reported value is less than the CRDL but ≥ the Reporting Limit

N Matrix Spike recovery not within established control limits

NA Not Applicable, analyte not spiked

H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible

L Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U Indicates that the target analyte was not detected at the reported concentration

* Flagged value is not within established control limits

B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.

J Estimated concentration when the value is less than ARI's established reporting limits

D The spiked compound was not detected due to sample extract dilution

E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).

S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte

NA The flagged analyte was not analyzed for

NR Spiked compound recovery is not reported due to chromatographic interference

NS The flagged analyte was not spiked into the sample

M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"

Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**

C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column

P The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**

Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**

Geotechnical Data

A — The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.

F — Samples were frozen prior to particle size determination

SM — Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations

SS — Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis

W — Weight of sample in some pipette aliquots was below the level required for accurate weighting

SAMPLE RESULTS-CONVENTIONALS
YZ40-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/15/14

Project: NA
Event: 0651-002-02
Date Sampled: 09/09/14
Date Received: 09/10/14

Client ID: MW08-20140909
ARI ID: 14-18331 YZ40A

Analyte	Date Batch	Method	Units	RL	Sample
Ferrous Iron	09/10/14 091014#1	SM3500 FeD	mg/L	0.040	0.059

RL Analytical reporting limit
U Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
YZ40-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/15/14

Project: NA
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Ferrous Iron	SM3500 FeD	09/10/14	mg/L	< 0.040 U	

LAB CONTROL RESULTS-CONVENTIONALS
YZ40-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/15/14

Project: NA
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Ferrous Iron SM3500 FeD	ICVL	09/10/14	mg/L	0.525	0.500	105.0%

REPLICATE RESULTS-CONVENTIONALS
YZ40-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/15/14

Project: NA
Event: 0651-002-02
Date Sampled: 09/09/14
Date Received: 09/10/14

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: YZ40A Client ID: MW08-20140909						
Ferrous Iron	SM3500 FeD	09/10/14	mg/L	0.059	0.055	7.0%

MS/MSD RESULTS-CONVENTIONALS
YZ40-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/15/14

Project: NA
Event: 0651-002-02
Date Sampled: 09/09/14
Date Received: 09/10/14

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: YZ40A Client ID: MW08-20140909							
Ferrous Iron	SM3500 FeD	09/10/14	mg/L	0.059	0.404	0.400	86.2%

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

Chain of Custody

Laboratory Number: 09-082

Company: Sound Earth Strategies
Project Number: 0651-002-02
Project Name: Woodlawn East Property
Project Manager:
Sampled by: Grayson Fish

Turnaround Request (in working days)
(Check One)

- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C *limited list	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	TOC	Sulfate	Methane, Ethane, Ethene	Nitrate, Nitrite, Dissolved Fe	Fe(II), Ferrous	% Moisture
1	MW16-20140909	9/9/14	1200	H_2O	3					X																	
2	MW21-20140909	9/9/14	1308	H_2O	3					X																	
3	MW08-20140909	9/9/14	1444	H_2O	9					X												X	X	X	X	X	

Grayson Fish

	Signature	Company	Date	Time
Relinquished	Grayson Fish	Sound Earth Strategies	9/9/14	1533
Received	Van	Speedy	〃	〃
Relinquished	〃	〃	〃	1755
Received	[illegible]	OSE	9/9/14	1755
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
~~Please filter~~ No field filter for Dissolved Fe.

* PCE, TCE, CIS, TRANS-1,2 DCE, 1,1-DCE, VC, MeCl2

Chromatograms with final report ☐

Data Package: Standard ☒ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

Onsite Environmental Inc. #1409-082B

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

October 30, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-082B

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 9, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: October 30, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082B
Project: 0651-002-02

Case Narrative

Samples were collected on September 9, 2014 and received by the laboratory on September 9, 2014. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

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

Date of Report: October 30, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	09-082-03					
Client ID:	**MW08-20140909**					
Manganese	**170**	11	6010C	9-9-14	10-29-14	

Date of Report: October 30, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	9-9-14
Date Analyzed:	10-29-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0909F1

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	11

Date of Report: October 30, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 9-9-14
Date Analyzed: 10-29-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**173**	**173**	0	11	

Date of Report: October 30, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-082B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 9-9-14
Date Analyzed: 10-29-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	1110	**1270**	99	**1260**	98	1	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

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

Chain of Custody

Laboratory Number: 09-082

Company: Sound Earth Strategies
Project Number: 0651-002-02
Project Name: Woodlawn East Property
Project Manager:
Sampled by: Grayson Fish

Turnaround Request (in working days)
(Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C *limited list	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	~~TCLP Metals~~ Dissolved Mn	HEM (oil and grease) 1664A	TOC	Sulfate	Methane, Ethane, Ethene	Nitrate, Alk., Dissolved Fe	Fe(II), Ferrous	% Moisture
1	MW16-20140909	9/9/14	1200	H_2O	3					X																	
2	MW21-20140909	9/9/14	1308	H_2O	3					X																	
3	MW08-20140909	9/9/14	1444	H_2O	9					X										⊗		X	X	X	X	X	

	Signature	Company	Date	Time
Relinquished	Grayson Fish	Sound Earth Strategies	9/9/14	1533
Received	Van	Spdy	"	"
Relinquished	"	"	"	1755
Received	[illegible]	OSE	9/9/14	1755
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
~~Please filter~~ No field filter for Dissolved Fe.
* PCE, TCE, CIS, TRANS-1,2 DCE, 1,1-DCE, VC, MeCl2
⊗ Added 10/21/14. DB (STA)

Chromatograms with final report ☐

Data Package: Standard ☒ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

Onsite Environmental Inc. #1409-083

OnSite
Environmental Inc.

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

September 19, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-083

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 9, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: September 19, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-083
Project: 0651-002-02

Case Narrative

Samples were collected on September 9, 2014 and received by the laboratory on September 9, 2014. They were maintained at the laboratory at a temperature of 2^{o}C to 6^{o}C.

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

Date of Report: September 19, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-083
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW19-20140909**					
Laboratory ID:	09-083-01					
Vinyl Chloride	ND	0.20	EPA 8260C	9-11-14	9-11-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-11-14	9-11-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Trichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*107*	*62-122*				
Toluene-d8	*108*	*70-120*				
4-Bromofluorobenzene	*97*	*71-120*				

Date of Report: September 19, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-083
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	**Result**	**PQL**	**Method**	**Date Prepared**	**Date Analyzed**	**Flags**
Client ID:	**MW13-20140909**					
Laboratory ID:	09-083-02					
Vinyl Chloride	ND	0.20	EPA 8260C	9-11-14	9-11-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-11-14	9-11-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Trichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*110*	*62-122*				
Toluene-d8	*115*	*70-120*				
4-Bromofluorobenzene	*101*	*71-120*				

Date of Report: September 19, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-083
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW12-20140909**					
Laboratory ID:	09-083-03					
Vinyl Chloride	ND	0.20	EPA 8260C	9-11-14	9-11-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-11-14	9-11-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Trichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*113*	*62-122*				
Toluene-d8	*112*	*70-120*				
4-Bromofluorobenzene	*102*	*71-120*				

Date of Report: September 19, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-083
Project: 0651-002-02

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	**Result**	**PQL**	**Method**	**Date Prepared**	**Date Analyzed**	**Flags**
Laboratory ID:	MB0911W1					
Vinyl Chloride	ND	0.20	EPA 8260C	9-11-14	9-11-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-11-14	9-11-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Trichloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-11-14	9-11-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*97*	*62-122*				
Toluene-d8	*99*	*70-120*				
4-Bromofluorobenzene	*90*	*71-120*				

Date of Report: September 19, 2014
Samples Submitted: September 9, 2014
Laboratory Reference: 1409-083
Project: 0651-002-02

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0911W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**9.46**	**10.0**	10.0	10.0	95	100	63-142	6	17	
Benzene	**9.90**	**10.5**	10.0	10.0	99	105	78-125	6	15	
Trichloroethene	**8.83**	**8.87**	10.0	10.0	88	89	74-125	0	15	
Toluene	**9.82**	**10.1**	10.0	10.0	98	101	80-125	3	15	
Chlorobenzene	**9.23**	**9.43**	10.0	10.0	92	94	80-140	2	15	
Surrogate:										
Dibromofluoromethane					*96*	*97*	*62-122*			
Toluene-d8					*99*	*98*	*70-120*			
4-Bromofluorobenzene					*93*	*91*	*71-120*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

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

Chain of Custody

Page 1 of 1

Laboratory Number: 09-083

Company: SOUNDEARTH STRATEGIES
Project Number: 0651-002-02
Project Name: HEARTHSTONE WOODLAWN EAST
Project Manager: AUDREY HACKETT
Sampled by: JONATHAN LOEFFLER

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C *	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A						% Moisture
1	MW19-20140909	9/9/14	1240	WATER	3					X																	
2	MW13-20140909	9/9/14	1418	WATER	↓					X																	
3	MW12-20140909	9/9/14	1525	WATER	↓					X																	

JHL

	Signature	Company	Date	Time
Relinquished	[signature]	SOUNDEARTH	9/9/14	1530
Received	Van	Spdy	〃	1530
Relinquished	Van	〃	〃	1755
Received	[signature]	OSE	9/9/14	1755
Relinquished				
Received				

Reviewed/Date

Reviewed/Date

Comments/Special Instructions
* PCE, TCE, CIS & TRANS-1,2-DCE, 1,1-DCE, VC, MeCl₂

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐

Onsite Environmental Inc. #1409-103

OnSite Environmental Inc.

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

September 22, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-103

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 10, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

Case Narrative

Samples were collected on September 10, 2014 and received by the laboratory on September 10, 2014. They were maintained at the laboratory at a temperature of $2^{o}C$ to $6^{o}C$.

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

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW15-20140910**					
Laboratory ID:	09-103-01					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*104*	*62-122*				
Toluene-d8	*95*	*70-120*				
4-Bromofluorobenzene	*96*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW22-20140910**					
Laboratory ID:	09-103-02					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*103*	*62-122*				
Toluene-d8	*94*	*70-120*				
4-Bromofluorobenzene	*93*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	**Result**	**PQL**	**Method**	**Date Prepared**	**Date Analyzed**	**Flags**
Laboratory ID:	MB0916W1					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*93*	*62-122*				
Toluene-d8	*96*	*70-120*				
4-Bromofluorobenzene	*94*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0916W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**8.40**	**8.21**	10.0	10.0	84	82	63-142	2	17	
Benzene	**8.58**	**8.40**	10.0	10.0	86	84	78-125	2	15	
Trichloroethene	**7.88**	**7.72**	10.0	10.0	79	77	74-125	2	15	
Toluene	**8.31**	**8.28**	10.0	10.0	83	83	80-125	0	15	
Chlorobenzene	**8.37**	**8.30**	10.0	10.0	84	83	80-140	1	15	
Surrogate:										
Dibromofluoromethane					*98*	*93*	*62-122*			
Toluene-d8					*93*	*94*	*70-120*			
4-Bromofluorobenzene					*95*	*96*	*71-120*			

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

DISSOLVED GASES
RSK 175

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW22-20140910**					
Laboratory ID:	09-103-02					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

DISSOLVED GASES
RSK 175
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0922W1					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS											
Laboratory ID:	SB0922W1										
	SB	SBD	SB	SBD		SB	SBD				
Methane	**4.55**	**4.69**	4.42	4.42	N/A	**103**	**106**	75-125	3	25	
Ethane	**7.84**	**8.20**	8.32	8.32	N/A	**94**	**99**	75-125	4	25	
Ethene	**9.60**	**9.27**	7.77	7.77	N/A	**124**	**119**	75-125	3	25	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

SULFATE
ASTM D516-07

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW22-20140910**					
Laboratory ID:	09-103-02					
Sulfate	**24**	10	ASTM D516-07	9-18-14	9-18-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

SULFATE
ASTM D516-07
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0918W1					
Sulfate	**ND**	5.0	ASTM D516-07	9-18-14	9-18-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-082-03								
	ORIG	DUP							
Sulfate	**43.1**	**42.6**	NA	NA	NA	NA	1	10	
MATRIX SPIKE									
Laboratory ID:	09-082-03								
	MS		MS		MS				
Sulfate	**96.6**		50.0	43.1	107	82-123	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0918W1								
	SB		SB		SB				
Sulfate	**10.5**		10.0	NA	105	91-114	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

TOTAL ORGANIC CARBON
SM 5310B

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW22-20140910**					
Laboratory ID:	09-103-02					
Total Organic Carbon	**ND**	1.0	SM 5310B	9-15-14	9-15-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

TOTAL ORGANIC CARBON
SM 5310B
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0915W1					
Total Organic Carbon	**ND**	1.0	SM 5310B	9-15-14	9-15-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-103-02								
	ORIG	DUP							
Total Organic Carbon	**ND**	**ND**	NA	NA	NA	NA	NA	15	
MATRIX SPIKE									
Laboratory ID:	09-103-02								
	MS		MS		MS				
Total Organic Carbon	**9.98**		10.0	ND	100	70-124	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0915W1								
	SB		SB		SB				
Total Organic Carbon	**9.79**		10.0	NA	98	91-119	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW22-20140910**					
Laboratory ID:	09-103-02					
Nitrate	**4.9**	0.050	EPA 353.2	9-11-14	9-11-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0911W1					
Nitrate	**ND**	0.050	EPA 353.2	9-11-14	9-11-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-044-01								
	ORIG	DUP							
Nitrate	**3.21**	**3.31**	NA	NA	NA	NA	3	16	
MATRIX SPIKE									
Laboratory ID:	09-044-01								
	MS		MS		MS				
Nitrate	**7.72**		4.00	3.21	113	84-119	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0911W1								
	SB		SB		SB				
Nitrate	**2.15**		2.00	NA	108	86-114	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

TOTAL ALKALINITY
SM 2320B

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW22-20140910**					
Laboratory ID:	09-103-02					
Total Alkalinity	**100**	2.0	SM 2320B	9-11-14	9-11-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

TOTAL ALKALINITY
SM 2320B
QUALITY CONTROL

Matrix: Water
Units: mg $CaCO3$/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0911W1					
Total Alkalinity	**ND**	2.0	SM 2320B	9-11-14	9-11-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-082-03								
	ORIG	DUP							
Total Alkalinity	**128**	**134**	NA	NA	NA	NA	5	10	
SPIKE BLANK									
Laboratory ID:	SB0911W1								
	SB		SB		SB				
Total Alkalinity	**100**		100	NA	100	88-114	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	09-103-02					
Client ID:	**MW22-20140910**					
Iron	**ND**	56	6010C	9-11-14	9-16-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	9-11-14
Date Analyzed:	9-16-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0911F1

Analyte	Method	Result	PQL
Iron	6010C	**ND**	56

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-16-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Iron	**ND**	**ND**	NA	56	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered:	9-11-14
Date Analyzed:	9-16-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	09-082-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Iron	22200	**21200**	96	**20900**	94	2	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

Analytical Resources, Incorporated
Analytical Chemists and Consultants

16 September 2014

David Baumeister
OnSite Environmental, Inc.
14648 NE 95th
Redmond, WA 98052

RE: Client Project: 0651-002-02; 09-103
ARI Job No: YZ57

Dear David:

Please find enclosed the chain-of-custody (COC) record and the final results for the sample from the project referenced above. Analytical Resources, Inc. (ARI) accepted one water sample on September 11, 2014. The sample was analyzed for ferrous iron as requested.

It was noted upon sample receipt that the bottle for this sample contained headspace.

This analysis proceeded without incident of note.

An electronic copy of these reports will remain on file at ARI. Should you have any questions, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
markh@arilabs.com

Enclosures

cc: file YZ57

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Y257

OnSite Environmental Inc.

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

Page 1 of 1

Laboratory Reference #: 09-103

Subcontract Laboratory: Analytical Resources, Inc.

Attention: Mark Harris

4611 S 134th Pl, Ste. 100 Tukwila, WA 98168

Phone Number: (206) 695-6200

Date/Time:

Turnaround Request:

1 Day ~~2 Day~~ 3 Day

Standard

Other:

Project Manager: David Baumeister

email: dbaumeister@onsite-env.com

Project Number: 0651-002-02

Project Name:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	Requested Analysis
	MW22-20140910	9/10/14	13:40	W	1	Ferrous Iron, Fe(II)

	Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by:		OnSite Env	9/11/14	800	
Received by:		ARI	9/11/14	1015	
Relinquished by:					
Received by:					
Relinquished by:					
Received by:					

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Onsite

COC No(s): NA

Assigned ARI Job No. Y257

Project Name.

Delivered by. Fed-Ex UPS Courier Hand Delivered Other Speedy

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 3.1
Time: 1015

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90877952

Cooler Accepted by: AV Date: 9/11/14 Time: 1015

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:			
Was sufficient ice used (if appropriate)?	NA	YES	NO
Were all bottles sealed in individual plastic bags?		YES	NO
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Was Sample Split by ARI : NA YES Date/Time: Equipment: Split by:

Samples Logged by: AV Date: 9/11/14 Time. 1025

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Small Air Bubbles ~2mm	Peabubbles 2-4 mm	LARGE Air Bubbles > 4 mm

Small → "sm" (< 2 mm)
Peabubbles → "pb" (2 to < 4 mm)
Large → "lg" (4 to < 6 mm)
Headspace → "hs" (> 6 mm)

PRESERVATION VERIFICATION 09/11/14

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **YZ57**

PC: Mark
VTSR: 09/11/14

Inquiry Number: NONE
Analysis Requested: 09/11/14
Contact: Baumeister, David
Client: OnSite Environmental, Inc.
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

Project #: 0651-002-02
Project:
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	TPHD <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
14-18420 **YZ57A**	MW22-20140910														*							

* lab to determine preservation

Checked By AV Date 9/11/14

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: YZ57
Client: OnSite Environmental, Inc.
Project Event: 0651-002-02
Project Name: N/A

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	MW22-20140910	YZ57A	14-18420	Water	09/10/14 13:40	09/11/14 10:15

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Data Reporting Qualifiers

Effective 12/31/13

Inorganic Data

U Indicates that the target analyte was not detected at the reported concentration

* Duplicate RPD is not within established control limits

B Reported value is less than the CRDL but ≥ the Reporting Limit

N Matrix Spike recovery not within established control limits

NA Not Applicable, analyte not spiked

H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible

L Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U Indicates that the target analyte was not detected at the reported concentration

* Flagged value is not within established control limits

B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.

J Estimated concentration when the value is less than ARI's established reporting limits

D The spiked compound was not detected due to sample extract dilution

E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).

S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte

NA The flagged analyte was not analyzed for

NR Spiked compound recovery is not reported due to chromatographic interference

NS The flagged analyte was not spiked into the sample

M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"

Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**

C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column

P The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**

Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**

Geotechnical Data

A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.

F Samples were frozen prior to particle size determination

SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations

SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis

W Weight of sample in some pipette aliquots was below the level required for accurate weighting

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
Ferrous Iron by Method SM3500 FeD

Data Release Authorized:
Reported: 09/16/14
Date Received: 09/11/14
Page 1 of 1

QC Report No: YZ57-OnSite Environmental, Inc.
Project:
0651-002-02

Client/ ARI ID	Date Sampled	Matrix	Analysis Date & Batch	RL	Result
MW22-20140910 YZ57A 14-18420	09/10/14	Water	09/11/14 091114#1	0.040	< 0.040 U

Reported in mg/L

RL-Analytical reporting limit
U-Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
YZ57-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/16/14

Project: NA
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte	Date/Time	Units	Blank
Ferrous Iron	09/11/14 10:58	mg/L	< 0.040 U

LAB CONTROL RESULTS-CONVENTIONALS
YZ57-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/16/14

Project: NA
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte	Date/Time	Units	LCS	Spike Added	Recovery
Ferrous Iron	09/11/14 10:58	mg/L	0.487	0.500	97.4%

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

Chain of Custody

Laboratory Number: 09-103

Company: SoundEarth Strategies
Project Number: 0651-002-02
Project Name: Hearthstone Woodlawn E Property
Project Manager: Audrey Hacket
Sampled by: Kristine Sommer

Turnaround Request (in working days)
(Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers
1	MW15-20140910	9/10/14	1105	W	3
2	MW22-20140910	9/10/14	1340	W	9
KS	~~MW22-20140910~~		~~1340~~	~~W~~	
KS	~~MW22-20140910~~		~~1345~~	~~W~~	
KS	~~MW22-20140910~~		~~1350~~	~~W~~	

Lab ID	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C * CVOCs	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	Dissolved Gases (methane/ethane/ethene) RSK 175	Sulfate 300.0	TOC 415.1	Nitrate, Alkalinity, Dissolved Fe 300.0, SM2320B, 200.8	Fe(II), Ferrous	% Moisture
1					X																	
2					X												X	X	X	X	X	

	Signature	Company	Date	Time
Relinquished	[signature]	SoundEarth Strat	9/10/2014	1430
Received	[signature]	SOUNDEARTH	9/10/14	1430
Relinquished	[signature]	SOUNDEARTH	9/10/14	1550
Received	[signature]	SPEEDY	9/10/14	1556
Relinquished	[signature]	SPEEDY	9/10/14	1747
Received	[signature]	OnSite Env	9/10/14	1747
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
CVOCs Analytes: PCE, TCE, cis+trans-1,2-DCE, 1,1-DCE, Vinyl Chloride, methylene Chloride.
Dissolved Fe not field filtered.

Chromatograms with final report [ ]

Data Package: Standard [ ] Level III [ ] Level IV [ ]   Electronic Data Deliverables (EDDs) [ ] ______

Onsite Environmental Inc. #1409-103B

OnSite Environmental Inc.

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

October 30, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-103B

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 10, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103B
Project: 0651-002-02

Case Narrative

Samples were collected on September 10, 2014 and received by the laboratory on September 10, 2014. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

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

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	09-103-02					
Client ID:	**MW22-20140910**					
Manganese	**ND**	11	6010C	9-11-14	9-29-14	

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	9-11-14
Date Analyzed:	9-29-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0911F1

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	11

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-29-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**173**	**173**	0	11	

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-103B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-29-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	1110	**1270**	99	**1260**	98	1	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

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

Chain of Custody

Laboratory Number: 09-103

Company: SoundEarth Strategies
Project Number: 0651-002-02
Project Name: Hearthstone Woodlawn E Property
Project Manager: Audrey Hacket
Sampled by: Kristine Sommer

Turnaround Request (in working days)
(Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C * CVOCs	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	~~TCLP Metals~~ Dissolved Mn	HEM (oil and grease) 1664A	Dissolved Gases (Methane / Ethane / Ethene) ~~BTEX~~	Sulfate 300.0	TOC 415.1	Nitrate, Alkalinity, Chloride, Dissolved Fe 300.0, SM2320B, 200.8	Fe(II), Ferrous	% Moisture
1	MW15-20140910	9/10/14	1105	W	3					X																	
2	MW22-20140910	9/10/14	1340	W	9					X										X		X	X	X	X	X	
KS	~~MW22-20140910~~		~~1340~~	~~W~~																							
KS	~~MW22-20140910~~		~~1345~~	~~W~~																							
KS	~~MW22-20140910~~		~~1350~~	~~W~~																							

	Signature	Company	Date	Time
Relinquished	[signature]	SoundEarth Strat	9/10/2014	1430
Received	[signature]	SOUNDEARTH	9/10/14	1430
Relinquished	[signature]	SOUNDEARTH	9/10/14	1550
Received	[signature]	SPEEDY	9/10/14	1550
Relinquished	[signature]	SPEEDY	9/10/14	1747
Received	[signature]	OnSite Env	9/10/14	1747
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
CVOCs Analytes: PCE, TCE, cis+trans-1,2-DCE, 1,1-DCE, vinyl chloride, methylene chloride.
Dissolved Fe not field filtered.
(X) Added 10/21/14. DB (STA)

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

Onsite Environmental Inc. #1409-104

OnSite
Environmental Inc.

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

September 22, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-104

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 10, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-104
Project: 0651-002-02

Case Narrative

Samples were collected on September 10, 2014 and received by the laboratory on September 10, 2014. They were maintained at the laboratory at a temperature of 2°C to 6°C.

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

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-104
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW14-20140910**					
Laboratory ID:	09-104-01					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*102*	*62-122*				
Toluene-d8	*97*	*70-120*				
4-Bromofluorobenzene	*94*	*71-120*				

Date of Report: September 22, 2014
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VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW07-20140910**					
Laboratory ID:	09-104-02					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	0.26	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	4.5	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*106*	*62-122*				
Toluene-d8	*97*	*70-120*				
4-Bromofluorobenzene	*93*	*71-120*				

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VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW09-20140910**					
Laboratory ID:	09-104-03					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	89	0.40	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*113*	*62-122*				
Toluene-d8	*103*	*70-120*				
4-Bromofluorobenzene	*101*	*71-120*				

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VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	**Result**	**PQL**	**Method**	**Date Prepared**	**Date Analyzed**	**Flags**
Client ID:	**MW24-20140910**					
Laboratory ID:	09-104-04					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	0.27	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	17	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*104*	*62-122*				
Toluene-d8	*95*	*70-120*				
4-Bromofluorobenzene	*93*	*71-120*				

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VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	**Result**	**PQL**	**Method**	**Date Prepared**	**Date Analyzed**	**Flags**
Client ID:	**MW26-20140910**					
Laboratory ID:	09-104-05					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*107*	*62-122*				
Toluene-d8	*91*	*70-120*				
4-Bromofluorobenzene	*89*	*71-120*				

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VOLATILES EPA 8260C
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0916W1					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*93*	*62-122*				
Toluene-d8	*96*	*70-120*				
4-Bromofluorobenzene	*94*	*71-120*				

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VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0916W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**8.40**	**8.21**	10.0	10.0	84	82	63-142	2	17	
Benzene	**8.58**	**8.40**	10.0	10.0	86	84	78-125	2	15	
Trichloroethene	**7.88**	**7.72**	10.0	10.0	79	77	74-125	2	15	
Toluene	**8.31**	**8.28**	10.0	10.0	83	83	80-125	0	15	
Chlorobenzene	**8.37**	**8.30**	10.0	10.0	84	83	80-140	1	15	
Surrogate:										
Dibromofluoromethane					*98*	*93*	*62-122*			
Toluene-d8					*93*	*94*	*70-120*			
4-Bromofluorobenzene					*95*	*96*	*71-120*			

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DISSOLVED GASES
RSK 175

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW07-20140910**					
Laboratory ID:	09-104-02					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

Client ID:	**MW09-20140910**					
Laboratory ID:	09-104-03					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

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DISSOLVED GASES
RSK 175
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0922W1					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS											
Laboratory ID:	SB0922W1										
	SB	SBD	SB	SBD		SB	SBD				
Methane	**4.55**	**4.69**	4.42	4.42	N/A	**103**	**106**	75-125	3	25	
Ethane	**7.84**	**8.20**	8.32	8.32	N/A	**94**	**99**	75-125	4	25	
Ethene	**9.60**	**9.27**	7.77	7.77	N/A	**124**	**119**	75-125	3	25	

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SULFATE
ASTM D516-07

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW07-20140910**					
Laboratory ID:	09-104-02					
Sulfate	**32**	10	ASTM D516-07	9-18-14	9-18-14	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW09-20140910**					
Laboratory ID:	09-104-03					
Sulfate	**27**	10	ASTM D516-07	9-18-14	9-18-14	

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SULFATE
ASTM D516-07
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0918W1					
Sulfate	**ND**	5.0	ASTM D516-07	9-18-14	9-18-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-082-03								
	ORIG	DUP							
Sulfate	**43.1**	**42.6**	NA	NA	NA	NA	1	10	
MATRIX SPIKE									
Laboratory ID:	09-082-03								
	MS		MS		MS				
Sulfate	**96.6**		50.0	43.1	107	82-123	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0918W1								
	SB		SB		SB				
Sulfate	**10.5**		10.0	NA	105	91-114	NA	NA	

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TOTAL ORGANIC CARBON
SM 5310B

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW07-20140910**					
Laboratory ID:	09-104-02					
Total Organic Carbon	**ND**	1.0	SM 5310B	9-15-14	9-15-14	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW09-20140910**					
Laboratory ID:	09-104-03					
Total Organic Carbon	**ND**	1.0	SM 5310B	9-15-14	9-15-14	

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TOTAL ORGANIC CARBON
SM 5310B
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0915W1					
Total Organic Carbon	**ND**	1.0	SM 5310B	9-15-14	9-15-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-103-02								
	ORIG	DUP							
Total Organic Carbon	**ND**	**ND**	NA	NA	NA	NA	NA	15	
MATRIX SPIKE									
Laboratory ID:	09-103-02								
	MS		MS		MS				
Total Organic Carbon	**9.98**		10.0	ND	100	70-124	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0915W1								
	SB		SB		SB				
Total Organic Carbon	**9.79**		10.0	NA	98	91-119	NA	NA	

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NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW07-20140910**					
Laboratory ID:	09-104-02					
Nitrate	**2.7**	0.050	EPA 353.2	9-11-14	9-11-14	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW09-20140910**					
Laboratory ID:	09-104-03					
Nitrate	**4.7**	0.10	EPA 353.2	9-11-14	9-11-14	

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NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0911W1					
Nitrate	**ND**	0.050	EPA 353.2	9-11-14	9-11-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-044-01								
	ORIG	DUP							
Nitrate	**3.21**	**3.31**	NA	NA	NA	NA	3	16	
MATRIX SPIKE									
Laboratory ID:	09-044-01								
	MS		MS		MS				
Nitrate	**7.72**		4.00	3.21	113	84-119	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0911W1								
	SB		SB		SB				
Nitrate	**2.15**		2.00	NA	108	86-114	NA	NA	

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TOTAL ALKALINITY
SM 2320B

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW07-20140910**					
Laboratory ID:	09-104-02					
Total Alkalinity	**140**	2.0	SM 2320B	9-11-14	9-11-14	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW09-20140910**					
Laboratory ID:	09-104-03					
Total Alkalinity	**96**	2.0	SM 2320B	9-11-14	9-11-14	

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TOTAL ALKALINITY
SM 2320B
QUALITY CONTROL

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0911W1					
Total Alkalinity	**ND**	2.0	SM 2320B	9-11-14	9-11-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-082-03								
	ORIG	DUP							
Total Alkalinity	**128**	**134**	NA	NA	NA	NA	5	10	
SPIKE BLANK									
Laboratory ID:	SB0911W1								
	SB		SB		SB				
Total Alkalinity	**100**		100	NA	100	88-114	NA	NA	

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DISSOLVED IRON
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	09-104-02					
Client ID:	**MW07-20140910**					
Iron	**ND**	56	6010C	9-11-14	9-16-14	
Lab ID:	09-104-03					
Client ID:	**MW09-20140910**					
Iron	**ND**	56	6010C	9-11-14	9-16-14	

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DISSOLVED IRON
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	9-11-14
Date Analyzed:	9-16-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0911F1

Analyte	Method	Result	PQL
Iron	6010C	**ND**	56

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DISSOLVED IRON
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-16-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Iron	**ND**	**ND**	NA	56	

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DISSOLVED IRON
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-16-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Iron	22200	**21200**	96	**20900**	94	2	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

Analytical Resources, Incorporated
Analytical Chemists and Consultants

16 September 2014

David Baumeister
OnSite Environmental, Inc.
14648 NE 95th
Redmond, WA 98052

RE: Client Project: 0651-002-02; 09-104
ARI Job No: YZ55

Dear David:

Please find enclosed the chain-of-custody (COC) record and the final results for the samples from the project referenced above. Analytical Resources, Inc. (ARI) accepted two water samples on September 11, 2014. The samples were analyzed for ferrous iron as requested.

It was noted upon sample receipt that the bottles for these samples contained headspace.

A matrix spike (MS) was prepared and analyzed in conjunction with sample MW07-20140910. The percent recovery for ferrous iron was low following the analysis of the MS. Since the percent recovery for ferrous iron was within acceptable QC limits for the corresponding LCS, it was concluded that the sample matrix was the cause of the poor MS recovery. No corrective actions were taken.

The remaining analyses proceeded without incident of note.

An electronic copy of these reports will remain on file at ARI. Should you have any questions, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
markh@arilabs.com

Enclosures

cc: file YZ55

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

YZSS

OnSite Environmental Inc.

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

Laboratory Reference #: 09-104

Subcontract Laboratory: Analytical Resources, Inc.

Attention: Mark Harris

4611 S 134th Pl, Ste. 100 Tukwila, WA 98168

Phone Number: (206) 695-6200

Date/Time:

Turnaround Request:

1 Day 2 Day 3 Day

Standard

Other:

Project Manager: David Baumeister

email: dbaumeister@onsite-env.com

Project Number: 0651-002-02

Project Name:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	Requested Analysis
	MW07-20140910	9/10/14	11:05	W	1	Ferrous Iron, Fe(II)
	MW09-20140910	9/10/14	13:00	W	1	Ferrous Iron, Fe(II)

	Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by:	[signature]	OnSite Env	9/11/14	800	
Received by:	[signature]	ARI	9/11/14	1015	
Relinquished by:					
Received by:					
Relinquished by:					
Received by:					

00227 : YZSS

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Cascadia

COC No(s): NA

Assigned ARI Job No: YZ55

Project Name:

Delivered by Fed-Ex UPS Courier Hand Delivered Other: Speedy

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 3.1
Time: 1015

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90877952

Cooler Accepted by: AV Date: 9/11/14 Time: 1015

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other:			
Was sufficient ice used (if appropriate)?	NA	YES	NO
Were all bottles sealed in individual plastic bags?		YES	NO
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Was Sample Split by ARI: NA YES Date/Time: Equipment: Split by:

Samples Logged by: AV Date: 9/11/14 Time: 1035

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Small Air Bubbles ~2mm	Peabubbles' 2-4 mm	LARGE Air Bubbles > 4 mm	
			Small → "sm" (< 2 mm)
			Peabubbles → "pb" (2 to < 4 mm)
			Large → "lg" (4 to < 6 mm)
			Headspace → "hs" (> 6 mm)

PRESERVATION VERIFICATION 09/11/14
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **YZ55**

Inquiry Number: NONE
Analysis Requested: 09/11/14
Contact: Baumeister, David
Client: OnSite Environmental, Inc.
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

PC: Mark
VTSR: 09/11/14

Project #: 0651-002-02
Project:
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	TPHD <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
14-18416 **YZ55A**	MW07-20140910														*							
14-18417 **YZ55B**	MW09-20140910														*							

*lab to determine preservation

Checked By AV Date 9/11/14

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: YZ55
Client: OnSite Environmental, Inc.
Project Event: 0651-002-02
Project Name: N/A

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	MW07-20140910	YZ55A	14-18416	Water	09/10/14 11:05	09/11/14 10:15
2.	MW09-20140910	YZ55B	14-18417	Water	09/10/14 13:00	09/11/14 10:15

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Data Reporting Qualifiers

Effective 12/31/13

Inorganic Data

U Indicates that the target analyte was not detected at the reported concentration

* Duplicate RPD is not within established control limits

B Reported value is less than the CRDL but ≥ the Reporting Limit

N Matrix Spike recovery not within established control limits

NA Not Applicable, analyte not spiked

H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible

L Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U Indicates that the target analyte was not detected at the reported concentration

* Flagged value is not within established control limits

B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.

J Estimated concentration when the value is less than ARI's established reporting limits

D The spiked compound was not detected due to sample extract dilution

E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

Q	Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).
S	Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
NA	The flagged analyte was not analyzed for
NR	Spiked compound recovery is not reported due to chromatographic interference
NS	The flagged analyte was not spiked into the sample
M	Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
Y	The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
EMPC	Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**
C	The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
P	The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference
X	Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**
Z	Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**

Geotechnical Data

A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.

F Samples were frozen prior to particle size determination

SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations

SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis

W Weight of sample in some pipette aliquots was below the level required for accurate weighting

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
Ferrous Iron by Method SM3500 FeD

Data Release Authorized:
Reported: 09/16/14
Date Received: 09/11/14
Page 1 of 1

QC Report No: YZ55-OnSite Environmental, Inc.
Project:
0651-002-02

Client/ ARI ID	**Date Sampled**	**Matrix**	**Analysis Date & Batch**	**RL**	**Result**
MW07-20140910 YZ55A 14-18416	09/10/14	Water	09/11/14 091114#1	0.040	0.173
MW09-20140910 YZ55B 14-18417	09/10/14	Water	09/11/14 091114#1	0.040	< 0.040 U

Reported in mg/L

RL-Analytical reporting limit
U-Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
YZ55-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/16/14

Project: NA
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte	Date/Time	Units	Blank
Ferrous Iron	09/11/14 10:58	mg/L	< 0.040 U

LAB CONTROL RESULTS-CONVENTIONALS
YZ55-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/16/14

Project: NA
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte	Date/Time	Units	LCS	Spike Added	Recovery
Ferrous Iron	09/11/14 10:58	mg/L	0.487	0.500	97.4%

REPLICATE RESULTS-CONVENTIONALS
YZ55-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/16/14

Project: NA
Event: 0651-002-02
Date Sampled: 09/10/14
Date Received: 09/11/14

Analyte	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: YZ55A Client ID: MW07-20140910					
Ferrous Iron	09/11/14	mg/L	0.173	0.183	5.6%

MS/MSD RESULTS-CONVENTIONALS
YZ55-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/16/14

Project: NA
Event: 0651-002-02
Date Sampled: 09/10/14
Date Received: 09/11/14

Analyte	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: YZ55A Client ID: MW07-20140910						
Ferrous Iron	09/11/14	mg/L	0.173	0.273	0.400	25.0%

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

Chain of Custody

Laboratory Number: 09-104

Company: SOUNDEARTH STRATEGIES
Project Number: 0651-002-02
Project Name: HEARTHSTONE WOODLAWN EAST PROPERTY
Project Manager: AUDREY HACKET
Sampled by: JONATHAN LOEFFLER

Turnaround Request (in working days)
(Check One)

- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C * cVOCs	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	Dissolved Gases (Methane, Ethane, Ethene) RSK 175	Sulfate ~~300.0~~	TOC 415.1	Nitrate, Alkalinity, Dissolved Fe ~~300.0~~, SM2320B, ~~300.0~~	Fe(II), Ferrous	% Moisture
1	MW14-20140910	9/10/14	1000	WATER	3					X																	
2	MW07-20140910	9/10/14	1105	WATER	9					X												X	X	X	X	X	
3	MW09-20140910	9/10/14	1300	WATER	9					X												X	X	X	X	X	
4	MW24-20140910	9/10/14	1420	WATER	3					X																	
5	MW26-20140910	9/10/14	1533	WATER	3					X																	

9/10/14

	Signature	Company	Date	Time
Relinquished	[signature]	SOUNDEARTH	9/10/14	1550
Received	[signature]	SPEEDY	9/10/14	1550
Relinquished	[signature]	SPEEDY	9/10/14	1747
Received	[signature]	OnSite Env	9/10/14	1747
Relinquished				
Received				

Reviewed/Date

Reviewed/Date

Comments/Special Instructions

*CVOCs ANALYTES: PCE, TCE, cis+trans-1,2-DCE, 1,1-DCE, Vinyl Chloride, Methylene Chloride.

Dissolved Fe not field filtered

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

Onsite Environmental Inc. #1409-104B

OnSite
Environmental Inc.

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

October 30, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-104B

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 10, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-104B
Project: 0651-002-02

Case Narrative

Samples were collected on September 10, 2014 and received by the laboratory on September 10, 2014. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

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

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-104B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	09-104-02					
Client ID:	**MW07-20140910**					
Manganese	**ND**	11	6010C	9-11-14	9-29-14	
Lab ID:	09-104-03					
Client ID:	**MW09-20140910**					
Manganese	**ND**	11	6010C	9-11-14	9-29-14	

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-104B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	9-11-14
Date Analyzed:	9-29-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0911F1

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	11

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-104B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-29-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**173**	**173**	0	11	

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-104B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-29-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	1110	**1270**	99	**1260**	98	1	

OnSite
Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

OnSite Environmental Inc.

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

Chain of Custody

Laboratory Number: 09-104

Company: SOUNDEARTH STRATEGIES
Project Number: 0651-002-02
Project Name: HEARTHSTONE WOODLAWN EAST PROPERTY
Project Manager: AUDREY HACKET
Sampled by: JONATHAN LOEFFLER

Turnaround Request (in working days)

(Check One)

- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C * cVOCs	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	~~TCLP Metals~~ Dissolved Mn	HEM (oil and grease) 1664A	Dissolved Gases (Methane, Ethane, Ethene) RSK 175	Sulfate ~~300.0~~	TOC 415.1	Nitrate, Alkalinity, Dissolved Fe ~~300.0~~, SM2320B, ~~300.8~~	Fe(II), Ferrous	% Moisture
1	MW14-20140910	9/10/14	1000	WATER	3					X																	
2	MW07-20140910	9/10/14	1105	WATER	9					X										X		X	X	X	X	X	
3	MW09-20140910	9/10/14	1300	WATER	9					X										X		X	X	X	X	X	
4	MW24-20140910	9/10/14	1420	WATER	3					X																	
5	MW26-20140910	9/10/14	1533	WATER	3					X																	

JL 9/10/14

	Signature	Company	Date	Time
Relinquished	[signature]	SOUNDEARTH	9/10/14	1550
Received	[signature]	SPEEDY	9/10/14	1550
Relinquished	[signature]	SPEEDY	9/10/14	1747
Received	[signature]	[illegible]	9/10/14	1747
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

*CVOCs ANALYTES: PCE, TCE, cis+trans-1,2-DCE, 1,1-DCE, Vinyl Chloride, Methylene Chloride.

Dissolved Fe not field filtered

(X) Added 10/21/14. DB (STA)

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

Onsite Environmental Inc. #1409-105

OnSite
Environmental Inc.

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

September 22, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-105

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 10, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

Case Narrative

Samples were collected on September 10, 2014 and received by the laboratory on September 10, 2014. They were maintained at the laboratory at a temperature of 2^{o}C to 6^{o}C.

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

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW02-20140910**					
Laboratory ID:	09-105-01					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	0.49	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	4.0	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*116*	*62-122*				
Toluene-d8	*104*	*70-120*				
4-Bromofluorobenzene	*99*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW03-20140910**					
Laboratory ID:	09-105-02					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	0.79	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	0.58	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	64	0.40	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*120*	*62-122*				
Toluene-d8	*108*	*70-120*				
4-Bromofluorobenzene	*105*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW10-20140910**					
Laboratory ID:	09-105-03					
Vinyl Chloride	ND	2.0	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	2.0	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	10	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	2.0	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	2.0	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	2.0	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	600	4.0	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*118*	*62-122*				
Toluene-d8	*107*	*70-120*				
4-Bromofluorobenzene	*105*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW01-20140910**					
Laboratory ID:	09-105-04					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	1.6	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*116*	*62-122*				
Toluene-d8	*106*	*70-120*				
4-Bromofluorobenzene	*103*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW04-20140910**					
Laboratory ID:	09-105-05					
Vinyl Chloride	920	200	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	200	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1000	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	200	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	3800	200	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	3400	200	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	28000	200	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*112*	*62-122*				
Toluene-d8	*102*	*70-120*				
4-Bromofluorobenzene	*100*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**FD01-20140910**					
Laboratory ID:	09-105-06					
Vinyl Chloride	950	200	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	200	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1000	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	200	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	3700	200	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	3200	200	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	26000	200	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*111*	*62-122*				
Toluene-d8	*102*	*70-120*				
4-Bromofluorobenzene	*99*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	**Result**	**PQL**	**Method**	**Date Prepared**	**Date Analyzed**	**Flags**
Laboratory ID:	MB0916W1					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*93*	*62-122*				
Toluene-d8	*96*	*70-120*				
4-Bromofluorobenzene	*94*	*71-120*				

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0916W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**8.40**	**8.21**	10.0	10.0	84	82	63-142	2	17	
Benzene	**8.58**	**8.40**	10.0	10.0	86	84	78-125	2	15	
Trichloroethene	**7.88**	**7.72**	10.0	10.0	79	77	74-125	2	15	
Toluene	**8.31**	**8.28**	10.0	10.0	83	83	80-125	0	15	
Chlorobenzene	**8.37**	**8.30**	10.0	10.0	84	83	80-140	1	15	
Surrogate:										
Dibromofluoromethane					*98*	*93*	*62-122*			
Toluene-d8					*93*	*94*	*70-120*			
4-Bromofluorobenzene					*95*	*96*	*71-120*			

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

DISSOLVED GASES
RSK 175

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW10-20140910**					
Laboratory ID:	09-105-03					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW01-20140910**					
Laboratory ID:	09-105-04					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

DISSOLVED GASES
RSK 175
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0922W1					
Methane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethane	**ND**	0.50	RSK 175	9-22-14	9-22-14	
Ethene	**ND**	0.50	RSK 175	9-22-14	9-22-14	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS											
Laboratory ID:	SB0922W1										
	SB	SBD	SB	SBD		SB	SBD				
Methane	**4.55**	**4.69**	4.42	4.42	N/A	**103**	**106**	75-125	3	25	
Ethane	**7.84**	**8.20**	8.32	8.32	N/A	**94**	**99**	75-125	4	25	
Ethene	**9.60**	**9.27**	7.77	7.77	N/A	**124**	**119**	75-125	3	25	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

SULFATE
ASTM D516-07

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW10-20140910**					
Laboratory ID:	09-105-03					
Sulfate	**37**	10	ASTM D516-07	9-18-14	9-18-14	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW01-20140910**					
Laboratory ID:	09-105-04					
Sulfate	**26**	10	ASTM D516-07	9-18-14	9-18-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

SULFATE
ASTM D516-07
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0918W1					
Sulfate	**ND**	5.0	ASTM D516-07	9-18-14	9-18-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-082-03								
	ORIG	DUP							
Sulfate	**43.1**	**42.6**	NA	NA	NA	NA	1	10	
MATRIX SPIKE									
Laboratory ID:	09-082-03								
	MS		MS		MS				
Sulfate	**96.6**		50.0	43.1	107	82-123	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0918W1								
	SB		SB		SB				
Sulfate	**10.5**		10.0	NA	105	91-114	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

TOTAL ORGANIC CARBON
SM 5310B

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW10-20140910**					
Laboratory ID:	09-105-03					
Total Organic Carbon	**ND**	1.0	SM 5310B	9-15-14	9-15-14	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW01-20140910**					
Laboratory ID:	09-105-04					
Total Organic Carbon	**1.5**	1.0	SM 5310B	9-15-14	9-15-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

TOTAL ORGANIC CARBON
SM 5310B
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0915W1					
Total Organic Carbon	**ND**	1.0	SM 5310B	9-15-14	9-15-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-103-02								
	ORIG	DUP							
Total Organic Carbon	**ND**	**ND**	NA	NA	NA	NA	NA	15	
MATRIX SPIKE									
Laboratory ID:	09-103-02								
	MS		MS		MS				
Total Organic Carbon	**9.98**		10.0	ND	100	70-124	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0915W1								
	SB		SB		SB				
Total Organic Carbon	**9.79**		10.0	NA	98	91-119	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW10-20140910**					
Laboratory ID:	09-105-03					
Nitrate	**ND**	0.050	EPA 353.2	9-11-14	9-11-14	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW01-20140910**					
Laboratory ID:	09-105-04					
Nitrate	**4.1**	0.050	EPA 353.2	9-11-14	9-11-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0911W1					
Nitrate	**ND**	0.050	EPA 353.2	9-11-14	9-11-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-044-01								
	ORIG	DUP							
Nitrate	**3.21**	**3.31**	NA	NA	NA	NA	3	16	
MATRIX SPIKE									
Laboratory ID:	09-044-01								
	MS		MS		MS				
Nitrate	**7.72**		4.00	3.21	113	84-119	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0911W1								
	SB		SB		SB				
Nitrate	**2.15**		2.00	NA	108	86-114	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

TOTAL ALKALINITY
SM 2320B

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW10-20140910**					
Laboratory ID:	09-105-03					
Total Alkalinity	**120**	2.0	SM 2320B	9-11-14	9-11-14	

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW01-20140910**					
Laboratory ID:	09-105-04					
Total Alkalinity	**150**	2.0	SM 2320B	9-11-14	9-11-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

TOTAL ALKALINITY
SM 2320B
QUALITY CONTROL

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0911W1					
Total Alkalinity	**ND**	2.0	SM 2320B	9-11-14	9-11-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	09-082-03								
	ORIG	DUP							
Total Alkalinity	**128**	**134**	NA	NA	NA	NA	5	10	
SPIKE BLANK									
Laboratory ID:	SB0911W1								
	SB		SB		SB				
Total Alkalinity	**100**		100	NA	100	88-114	NA	NA	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	09-105-03					
Client ID:	**MW10-20140910**					
Iron	**ND**	56	6010C	9-11-14	9-16-14	
Lab ID:	09-105-04					
Client ID:	**MW01-20140910**					
Iron	**ND**	56	6010C	9-11-14	9-16-14	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	9-11-14
Date Analyzed:	9-16-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0911F1

Analyte	Method	Result	PQL
Iron	6010C	**ND**	56

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-16-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Iron	**ND**	**ND**	NA	56	

Date of Report: September 22, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105
Project: 0651-002-02

DISSOLVED IRON
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-16-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Iron	22200	**21200**	96	**20900**	94	2	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

Analytical Resources, Incorporated
Analytical Chemists and Consultants

16 September 2014

David Baumeister
OnSite Environmental, Inc.
14648 NE 95th
Redmond, WA 98052

RE: Client Project: 0651-002-02; 09-105
ARI Job No: YZ56

Dear David:

Please find enclosed the chain-of-custody (COC) record and the final results for the samples from the project referenced above. Analytical Resources, Inc. (ARI) accepted two water samples on September 11, 2014. The samples were analyzed for ferrous iron as requested.

It was noted upon sample receipt that the bottles for these samples contained headspace.

These analyses proceeded without incident of note.

An electronic copy of these reports will remain on file at ARI. Should you have any questions, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
markh@arilabs.com

Enclosures

cc: file YZ56

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

YZ56

OnSite Environmental Inc.

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

Laboratory Reference #: 09-105

Subcontract Laboratory: Analytical Resources, Inc.

Attention: Mark Harris

4611 S 134th Pl, Ste. 100 Tukwila, WA 98168

Phone Number: (206) 695-6200

Date/Time:

Turnaround Request:

1 Day 2 Day 3 Day

Standard

Other:

Project Manager: David Baumeister

email: dbaumeister@onsite-env.com

Project Number: 0651-002-02

Project Name:

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	Requested Analysis
	MW10-20140910	9/10/14	11:45	W	1	Ferrous Iron, Fe(II)
	MW01-20140910	9/10/14	14:25	W	1	Ferrous Iron, Fe(II)

	Signature	Company	Date	Time	Comments/Special Instructions
Relinquished by:	[signature]	OnSite Inc	9/11/14	800	
Received by:	T Hoola	Speedy	9-11-14	921	
Relinquished by:	T Hargu	Speedy	9-11-14		
Received by:	[signature]	ARI	9/11/14	1015	
Relinquished by:					
Received by:					

Y Z 5 6 : 0 0 0 0 2

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Cristec

COC No(s): NA

Assigned ARI Job No: YZ56

Project Name

Delivered by Fed-Ex UPS Courier Hand Delivered Other: Speedy

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 3.1
Time: 1015

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90877952

Cooler Accepted by: AV Date: 9/11/14 Time: 1015

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used? Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other			
Was sufficient ice used (if appropriate)?	NA	YES	NO
Were all bottles sealed in individual plastic bags?		YES	NO
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		

Was Sample Split by ARI: NA YES Date/Time: Equipment: Split by:

Samples Logged by: AV Date: 9/11/14 Time: 1025

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Small Air Bubbles ~2mm	Peabubbles 2-4 mm	LARGE Air Bubbles > 4 mm

Small → "sm" (< 2 mm)
Peabubbles → "pb" (2 to < 4 mm)
Large → "lg" (4 to < 6 mm)
Headspace → "hs" (> 6 mm)

PRESERVATION VERIFICATION 09/11/14
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **YZ56**

PC: Mark
VTSR: 09/11/14

Inquiry Number: NONE
Analysis Requested: 09/11/14
Contact: Baumeister, David
Client: OnSite Environmental, Inc.
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

Project #: 0651-002-02
Project:
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	TPHD <2	Fe2+ <2	DMET FLT	DOC FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
14-18418 **YZ56A**	MW10-20140910														*							
14-18419 **YZ56B**	MW01-20140910														*							

* lab to determine preservation

Checked By AV Date 9/11/14

YZ56:00024

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: YZ56
Client: OnSite Environmental, Inc.
Project Event: 0651-002-02
Project Name: N/A

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	MW10-20140910	YZ56A	14-18418	Water	09/10/14 11:45	09/11/14 10:15
2.	MW01-20140910	YZ56B	14-18419	Water	09/10/14 14:25	09/11/14 10:15

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Data Reporting Qualifiers

Effective 12/31/13

Inorganic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Duplicate RPD is not within established control limits
B	Reported value is less than the CRDL but ≥ the Reporting Limit
N	Matrix Spike recovery not within established control limits
NA	Not Applicable, analyte not spiked
H	The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
L	Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U	Indicates that the target analyte was not detected at the reported concentration
*	Flagged value is not within established control limits
B	Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
J	Estimated concentration when the value is less than ARI's established reporting limits
D	The spiked compound was not detected due to sample extract dilution
E	Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).

S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte

NA The flagged analyte was not analyzed for

NR Spiked compound recovery is not reported due to chromatographic interference

NS The flagged analyte was not spiked into the sample

M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”

Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value “calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria” **(Dioxin/Furan analysis only)**

C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column

P The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**

Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**

Geotechnical Data

A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.

F Samples were frozen prior to particle size determination

SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations

SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis

W Weight of sample in some pipette aliquots was below the level required for accurate weighting

INORGANICS ANALYSIS DATA SHEET
Ferrous Iron by Method SM3500 FeD

ANALYTICAL RESOURCES INCORPORATED

Data Release Authorized:
Reported: 09/16/14
Date Received: 09/11/14
Page 1 of 1

QC Report No: YZ56-OnSite Environmental, Inc.
Project:
0651-002-02

Client/ ARI ID	**Date Sampled**	**Matrix**	**Analysis Date & Batch**	**RL**	**Result**
MW10-20140910 YZ56A 14-18418	09/10/14	Water	09/11/14 091114#1	0.040	0.048
MW01-20140910 YZ56B 14-18419	09/10/14	Water	09/11/14 091114#1	0.040	0.041

Reported in mg/L

RL-Analytical reporting limit
U-Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
YZ56-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/16/14

Project: NA
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte	Date/Time	Units	Blank
Ferrous Iron	09/11/14 10:58	mg/L	< 0.040 U

LAB CONTROL RESULTS-CONVENTIONALS
YZ56-OnSite Environmental, Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 09/16/14

Project: NA
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte	Date/Time	Units	LCS	Spike Added	Recovery
Ferrous Iron	09/11/14 10:58	mg/L	0.487	0.500	97.4%

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

Chain of Custody

Laboratory Number: 09-105

Company: Sound Earth Strategies
Project Number: 0651-002-02
Project Name: WOOD LAWN EAST Property
Project Manager: Audrey Hackett
Sampled by: Grayson Fish

Turnaround Request (in working days) (Check One):
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	Methane, Ethane, Ethene	Sulfate	TOC	Nitrate, Alkalinity, Fe (Dissolved)	Fe(II), Ferrous	% Moisture
1	MW02-20140910	9/10/14	0925	H_2O	3					X																	
2	MW03-20140910	9/10/14	1032		3					X																	
3	MW10-20140910	9/10/14	1145		9					X												X	X	X	X	X	
4	MW01-20140910	9/10/14	1425		9					X												X	X	X	X	X	
5	MW04-20140910	9/10/14	1310		3					X																	
6	FD01-20140910	9/10/14	1340		3					X																	

	Signature	Company	Date	Time
Relinquished	Grayson Fish	Sound Earth	9/10/14	1553
Received	[illegible]	SPEEDY	9/10/14	1553
Relinquished	[illegible]	SPEEDY	9/10/14	1747
Received	[illegible]	OnSite Env	9/10/14	1747
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions:
CVOCs Analytes: PCE, TCE, cis + trans-1,2-DCE, 1,1-DCE, vinyl chloride, Methylene chloride

Dissolved Fe not field filtered

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

Onsite Environmental Inc. #1409-105B

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

October 30, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-105B

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 10, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105B
Project: 0651-002-02

Case Narrative

Samples were collected on September 10, 2014 and received by the laboratory on September 10, 2014. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

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

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	09-105-03					
Client ID:	**MW10-20140910**					
Manganese	**100**	11	6010C	9-11-14	9-29-14	
Lab ID:	09-105-04					
Client ID:	**MW01-20140910**					
Manganese	**ND**	11	6010C	9-11-14	9-29-14	

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	9-11-14
Date Analyzed:	9-29-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0911F1

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	11

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-29-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**173**	**173**	0	11	

Date of Report: October 30, 2014
Samples Submitted: September 10, 2014
Laboratory Reference: 1409-105B
Project: 0651-002-02

DISSOLVED MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 9-11-14
Date Analyzed: 9-29-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	1110	**1270**	99	**1260**	98	1	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

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

Chain of Custody

Laboratory Number: 09-105

Company: Sound Earth Strategies
Project Number: 0651-002-02
Project Name: WOODLAWN EAST Property
Project Manager: Audrey Hackett
Sampled by: Grayson Fish

Turnaround Request (in working days)
(Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	~~TCLP Metals~~ Dissolved Mn	HEM (oil and grease) 1664A	Methane, Ethane, Ethene	Sulfate	TOC	Nitrate, Alkalinity, Fe(Dissolved)	Fe(II), Ferrous	% Moisture
1	MW02-20140910	9/10/14	0925	H_2O	3					X																	
2	MW03-20140910	9/10/14	1032		3					X																	
3	MW10-20140910	9/10/14	1145		9					X										X		X	X	X	X	X	
4	MW01-20140910	9/10/14	1425		9					X										X		X	X	X	X	X	
5	MW04-20140910	9/10/14	1310		3					X																	
6	FD01-20140910	9/10/14	1340		3					X																	

	Signature	Company	Date	Time
Relinquished	Grayson Fish	Sound Earth	9/10/14	1553
Received	[illegible]	Speedy	9/10/14	1553
Relinquished	[illegible]	Speedy	9/10/14	1747
Received	[illegible]	OnSite Env	9/10/14	1747
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

CVOCs Analytes: PCE, TCE, cis + trans-1,2-DCE, 1,1-DCE, vinyl chloride, Methylene chloride

Dissolved Fe not field filtered

(X) Added 10/21/14. DB (STA)

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

Onsite Environmental Inc. #1409-127

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

September 18, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002-02
Laboratory Reference No. 1409-127

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on September 12, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: September 18, 2014
Samples Submitted: September 12, 2014
Laboratory Reference: 1409-127
Project: 0651-002-02

Case Narrative

Samples were collected on September 11, 2014 and received by the laboratory on September 12, 2014. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

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

Date of Report: September 18, 2014
Samples Submitted: September 12, 2014
Laboratory Reference: 1409-127
Project: 0651-002-02

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW05-20140911**					
Laboratory ID:	09-127-01					
Vinyl Chloride	ND	0.20	EPA 8260C	9-18-14	9-18-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-18-14	9-18-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-18-14	9-18-14	
(trans) 1,2-Dichloroethene	0.27	0.20	EPA 8260C	9-18-14	9-18-14	
(cis) 1,2-Dichloroethene	5.6	0.20	EPA 8260C	9-18-14	9-18-14	
Trichloroethene	22	0.20	EPA 8260C	9-18-14	9-18-14	
Tetrachloroethene	71	0.40	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*104*	*62-122*				
Toluene-d8	*100*	*70-120*				
4-Bromofluorobenzene	*96*	*71-120*				

Date of Report: September 18, 2014
Samples Submitted: September 12, 2014
Laboratory Reference: 1409-127
Project: 0651-002-02

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0916W1					
Vinyl Chloride	ND	0.20	EPA 8260C	9-16-14	9-16-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-16-14	9-16-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Trichloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-16-14	9-16-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*93*	*62-122*				
Toluene-d8	*96*	*70-120*				
4-Bromofluorobenzene	*94*	*71-120*				
Laboratory ID:	MB0918W1					
Vinyl Chloride	ND	0.20	EPA 8260C	9-18-14	9-18-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	9-18-14	9-18-14	
Methylene Chloride	ND	1.0	EPA 8260C	9-18-14	9-18-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-18-14	9-18-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	9-18-14	9-18-14	
Trichloroethene	ND	0.20	EPA 8260C	9-18-14	9-18-14	
Tetrachloroethene	ND	0.20	EPA 8260C	9-18-14	9-18-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*102*	*62-122*				
Toluene-d8	*101*	*70-120*				
4-Bromofluorobenzene	*97*	*71-120*				

Date of Report: September 18, 2014
Samples Submitted: September 12, 2014
Laboratory Reference: 1409-127
Project: 0651-002-02

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0916W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**8.40**	**8.21**	10.0	10.0	84	82	63-142	2	17	
Benzene	**8.58**	**8.40**	10.0	10.0	86	84	78-125	2	15	
Trichloroethene	**7.88**	**7.72**	10.0	10.0	79	77	74-125	2	15	
Toluene	**8.31**	**8.28**	10.0	10.0	83	83	80-125	0	15	
Chlorobenzene	**8.37**	**8.30**	10.0	10.0	84	83	80-140	1	15	
Surrogate:										
Dibromofluoromethane					*98*	*93*	*62-122*			
Toluene-d8					*93*	*94*	*70-120*			
4-Bromofluorobenzene					*95*	*96*	*71-120*			
Laboratory ID:	SB0918W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**9.32**	**8.80**	10.0	10.0	93	88	63-142	6	17	
Benzene	**9.28**	**8.83**	10.0	10.0	93	88	78-125	5	15	
Trichloroethene	**8.83**	**7.99**	10.0	10.0	88	80	74-125	10	15	
Toluene	**9.13**	**8.41**	10.0	10.0	91	84	80-125	8	15	
Chlorobenzene	**9.42**	**8.96**	10.0	10.0	94	90	80-140	5	15	
Surrogate:										
Dibromofluoromethane					*102*	*96*	*62-122*			
Toluene-d8					*104*	*99*	*70-120*			
4-Bromofluorobenzene					*99*	*98*	*71-120*			

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

OnSite Environmental Inc.

Analytical Laboratory Testing Services
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Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 09-127

Company: SOUNDEARTH STRATEGIES
Project Number: 0651-002-02
Project Name: HEARTHSTONE WOODLAWN EAST PROP.
Project Manager: AUDREY HACKETT
Sampled by: JONATHAN LOEFFLER

Turnaround Request (in working days)
(Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C * cVOCs	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A						% Moisture
1	MW05-20140911	9/11/14	1230	WATER	3					X																	

JLF 9/11/14

	Signature	Company	Date	Time
Relinquished	[signature]	SOUNDEARTH	9/12/14	
Received	[signature]	SPEEDY	9/12/14	8:25
Relinquished	[signature]	SPEEDY	9/12/14	9:43
Received	Alex Armantrout	OSE	9/12/14	945
Relinquished				
Received				

Reviewed/Date
Reviewed/Date

Comments/Special Instructions
*cVOC ANALYTES: PCE, TCE, cis- + trans-1,2-DCE, 1-1 DCE, Vinyl Chloride, Methylene Chloride

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

Onsite Environmental Inc. #1410-105

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

October 16, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002
Laboratory Reference No. 1410-105

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on October 8, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

Case Narrative

Samples were collected on October 7, 2014 and received by the laboratory on October 8, 2014. They were maintained at the laboratory at a temperature of 2°C to 6°C.

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

TOC by SM 5310B Analysis

Sample MW11-20141007 (10-105-01) was received at a pH of 6.0. The sample was preserved with 1:1 HCl to a pH of less than 2 before analysis.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW11-20141007**					
Laboratory ID:	10-105-01					
Vinyl Chloride	ND	0.20	EPA 8260C	10-10-14	10-10-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Methylene Chloride	ND	1.0	EPA 8260C	10-10-14	10-10-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Trichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Tetrachloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*105*	*62-122*				
Toluene-d8	*102*	*70-120*				
4-Bromofluorobenzene	*99*	*71-120*				

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW27-20141007**					
Laboratory ID:	10-105-02					
Vinyl Chloride	ND	0.20	EPA 8260C	10-10-14	10-10-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Methylene Chloride	ND	1.0	EPA 8260C	10-10-14	10-10-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Trichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Tetrachloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*106*	*62-122*				
Toluene-d8	*99*	*70-120*				
4-Bromofluorobenzene	*95*	*71-120*				

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW06-20141007**					
Laboratory ID:	10-105-03					
Vinyl Chloride	72	50	EPA 8260C	10-10-14	10-10-14	
1,1-Dichloroethene	ND	50	EPA 8260C	10-10-14	10-10-14	
Methylene Chloride	ND	250	EPA 8260C	10-10-14	10-10-14	
(trans) 1,2-Dichloroethene	ND	50	EPA 8260C	10-10-14	10-10-14	
(cis) 1,2-Dichloroethene	320	50	EPA 8260C	10-10-14	10-10-14	
Trichloroethene	450	50	EPA 8260C	10-10-14	10-10-14	
Tetrachloroethene	10000	50	EPA 8260C	10-10-14	10-10-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*105*	*62-122*				
Toluene-d8	*102*	*70-120*				
4-Bromofluorobenzene	*97*	*71-120*				

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

VOLATILES EPA 8260C

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW25-20141007**					
Laboratory ID:	10-105-04					
Vinyl Chloride	ND	0.20	EPA 8260C	10-14-14	10-14-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	10-14-14	10-14-14	
Methylene Chloride	ND	1.0	EPA 8260C	10-14-14	10-14-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	10-14-14	10-14-14	
(cis) 1,2-Dichloroethene	0.37	0.20	EPA 8260C	10-14-14	10-14-14	
Trichloroethene	0.36	0.20	EPA 8260C	10-14-14	10-14-14	
Tetrachloroethene	12	0.20	EPA 8260C	10-14-14	10-14-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*104*	*62-122*				
Toluene-d8	*101*	*70-120*				
4-Bromofluorobenzene	*94*	*71-120*				

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB1010W1					
Vinyl Chloride	ND	0.20	EPA 8260C	10-10-14	10-10-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Methylene Chloride	ND	1.0	EPA 8260C	10-10-14	10-10-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Trichloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Tetrachloroethene	ND	0.20	EPA 8260C	10-10-14	10-10-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*95*	*62-122*				
Toluene-d8	*98*	*70-120*				
4-Bromofluorobenzene	*98*	*71-120*				
Laboratory ID:	MB1014W1					
Vinyl Chloride	ND	0.20	EPA 8260C	10-14-14	10-14-14	
1,1-Dichloroethene	ND	0.20	EPA 8260C	10-14-14	10-14-14	
Methylene Chloride	ND	1.0	EPA 8260C	10-14-14	10-14-14	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	10-14-14	10-14-14	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	10-14-14	10-14-14	
Trichloroethene	ND	0.20	EPA 8260C	10-14-14	10-14-14	
Tetrachloroethene	ND	0.20	EPA 8260C	10-14-14	10-14-14	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*101*	*62-122*				
Toluene-d8	*100*	*70-120*				
4-Bromofluorobenzene	*95*	*71-120*				

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB1010W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**10.5**	**10.8**	10.0	10.0	105	108	63-142	3	17	
Benzene	**9.81**	**9.71**	10.0	10.0	98	97	78-125	1	15	
Trichloroethene	**8.40**	**8.52**	10.0	10.0	84	85	74-125	1	15	
Toluene	**8.83**	**8.80**	10.0	10.0	88	88	80-125	0	15	
Chlorobenzene	**9.68**	**9.86**	10.0	10.0	97	99	80-140	2	15	
Surrogate:										
Dibromofluoromethane					*96*	*96*	*62-122*			
Toluene-d8					*97*	*99*	*70-120*			
4-Bromofluorobenzene					*102*	*105*	*71-120*			

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
Laboratory ID:	SB1014W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**11.5**	**10.9**	10.0	10.0	115	109	63-142	5	17	
Benzene	**10.8**	**10.1**	10.0	10.0	108	101	78-125	7	15	
Trichloroethene	**9.32**	**8.80**	10.0	10.0	93	88	74-125	6	15	
Toluene	**10.7**	**10.0**	10.0	10.0	107	100	80-125	7	15	
Chlorobenzene	**9.82**	**9.51**	10.0	10.0	98	95	80-140	3	15	
Surrogate:										
Dibromofluoromethane					*103*	*94*	*62-122*			
Toluene-d8					*100*	*96*	*70-120*			
4-Bromofluorobenzene					*97*	*95*	*71-120*			

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

DISSOLVED GASES
RSK 175

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW11-20141007**					
Laboratory ID:	10-105-01					
Methane	**42**	3.0	RSK 175	10-10-14	10-10-14	
Ethane	**ND**	3.0	RSK 175	10-10-14	10-10-14	
Ethene	**ND**	3.0	RSK 175	10-10-14	10-10-14	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

DISSOLVED GASES
RSK 175
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1010W1					
Methane	**ND**	0.50	RSK 175	10-10-14	10-10-14	
Ethane	**ND**	0.50	RSK 175	10-10-14	10-10-14	
Ethene	**ND**	0.50	RSK 175	10-10-14	10-10-14	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS											
Laboratory ID:	SB1010W1										
	SB	SBD	SB	SBD		SB	SBD				
Methane	**4.14**	**4.87**	4.42	4.42	N/A	**94**	**110**	75-125	16	25	
Ethane	**7.32**	**8.60**	8.32	8.32	N/A	**88**	**103**	75-125	16	25	
Ethene	**8.19**	**9.61**	7.77	7.77	N/A	**105**	**124**	75-125	16	25	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

SULFATE
ASTM D516-07

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW11-20141007**					
Laboratory ID:	10-105-01					
Sulfate	**50**	25	ASTM D516-07	10-14-14	10-14-14	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

SULFATE
ASTM D516-07
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1014W1					
Sulfate	**ND**	5.0	ASTM D516-07	10-14-14	10-14-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	10-105-01								
	ORIG	DUP							
Sulfate	**50.3**	**51.6**	NA	NA	NA	NA	3	10	
MATRIX SPIKE									
Laboratory ID:	10-105-01								
	MS		MS		MS				
Sulfate	**97.3**		50.0	50.3	94	82-123	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB1014W1								
	SB		SB		SB				
Sulfate	**10.4**		10.0	NA	104	91-114	NA	NA	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

TOTAL ORGANIC CARBON
SM 5310B

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW11-20141007**					
Laboratory ID:	10-105-01					
Total Organic Carbon	**2.6**	1.0	SM 5310B	10-13-14	10-13-14	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

TOTAL ORGANIC CARBON
SM 5310B
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1013W1					
Total Organic Carbon	**ND**	1.0	SM 5310B	10-13-14	10-13-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	10-106-09								
	ORIG	DUP							
Total Organic Carbon	**ND**	**ND**	NA	NA	NA	NA	NA	15	
MATRIX SPIKE									
Laboratory ID:	10-106-09								
	MS		MS		MS				
Total Organic Carbon	**9.98**		10.0	ND	100	70-124	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB1013W1								
	SB		SB		SB				
Total Organic Carbon	**9.55**		10.0	NA	96	91-119	NA	NA	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW11-20141007**					
Laboratory ID:	10-105-01					
Nitrate	**ND**	0.050	EPA 353.2	10-13-14	10-13-14	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1013W1					
Nitrate	**ND**	0.050	EPA 353.2	10-13-14	10-13-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	10-106-02								
	ORIG	DUP							
Nitrate	**0.0645**	**0.0594**	NA	NA	NA	NA	8	16	
MATRIX SPIKE									
Laboratory ID:	10-106-02								
	MS		MS		MS				
Nitrate	**2.22**		2.00	0.0645	108	84-119	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB1013W1								
	SB		SB		SB				
Nitrate	**2.09**		2.00	NA	105	86-114	NA	NA	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

TOTAL ALKALINITY
SM 2320B

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW11-20141007**					
Laboratory ID:	10-105-01					
Total Alkalinity	**110**	2.0	SM 2320B	10-10-14	10-10-14	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

TOTAL ALKALINITY
SM 2320B
QUALITY CONTROL

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1010W1					
Total Alkalinity	**ND**	2.0	SM 2320B	10-10-14	10-10-14	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	10-105-01								
	ORIG	DUP							
Total Alkalinity	**114**	**118**	NA	NA	NA	NA	3	10	
SPIKE BLANK									
Laboratory ID:	SB1010W1								
	SB		SB		SB				
Total Alkalinity	**108**		100	NA	108	88-114	NA	NA	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

DISSOLVED IRON
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	10-105-01					
Client ID:	**MW11-20141007**					
Iron	**ND**	56	6010C	10-8-14	10-15-14	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

DISSOLVED IRON
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	10-8-14
Date Analyzed:	10-15-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB1008F1

Analyte	Method	Result	PQL
Iron	6010C	**ND**	56

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

DISSOLVED IRON
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 10-8-14
Date Analyzed: 10-15-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 10-105-01e

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Iron	**ND**	**ND**	NA	56	

Date of Report: October 16, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105
Project: 0651-002

DISSOLVED IRON
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 10-8-14
Date Analyzed: 10-15-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 10-105-01e

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Iron	22200	**23900**	107	**23400**	106	2	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

Analytical Resources, Incorporated
Analytical Chemists and Consultants

9 October 2014

David Baumeister
OnSite Environmental, Inc.
14648 NE 95th
Redmond, WA 98052

RE: Client Project: 0651-002-02; Soundearth Strategies
ARI Job No: ZD74

Dear David:

Please find enclosed the chain-of-custody (COC) record and the final results for the sample from the project referenced above. Analytical Resources, Inc. (ARI) accepted one water sample on October 7, 2014. The sample was analyzed for ferrous iron as requested.

This analysis proceeded without incident of note.

An electronic copy of these reports will remain on file at ARI. Should you have any questions, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Mark D. Harris
Project Manager
206/695-6210
markh@arilabs.com

Enclosures

cc: file ZD74

MDH/mdh

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

OnSite Environmental Inc.

14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • Fax: (425) 885-4603

Chain of Custody

Laboratory Number:

Company: SOUNDEARTH STRATEGIES

Project Number: 0651-002-02

Project Name: HEARTHSTONE WOODLAWN EAST

Project Manager: AUDREY HACKETT

Sampled by: JONATHAN LOEFFLER

Turnaround Request (in working days)

(Check One)

- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Day
- [ ] 3 Day
- [x] Standard (7 working days)
- [ ] ______ (other)

Requested Analysis

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals	HEM by 1664	VPH	EPH	Fe(II), Ferrous by SM3500				% Moisture
	MW11-20141007	10/07/14	1020	H_2O	1																X				

	Signature	Company	Date	Time
Relinquished by	[signature]	SOUNDEARTH	10/7/14	1353
Received by	[signature]	SPEEDY	10/7/14	1353
Relinquished by				
Received by	[signature]	ACT	10-7-14	1435
Relinquished by				
Received by				
Reviewed by/Date		Reviewed by/Date		

Comments/Special Instructions:
Fe(II), Ferrous sample has a 24hr hold-time.

Chromatograms with final report ☐

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Onsite

Project Name: Heartlstom Woodlawn East

COC No(s): ____________ NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: ______

Assigned ARI Job No. ZD74

Tracking No. ____________ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) 10.3
Time: ______

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90877552

Cooler Accepted by: TB Date: 10-7-14 Time: 1435

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used? ... Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: ______			
Was sufficient ice used (if appropriate)?	NA	YES	NO
Were all bottles sealed in individual plastic bags?		YES	NO
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		______

Was Sample Split by ARI: NA YES Date/Time: ______ Equipment: ______ Split by: ______

Samples Logged by: TB Date: 10-7-14 Time: 1445

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Small Air Bubbles ~2mm	Peabubbles 2-4 mm	LARGE Air Bubbles > 4 mm	
			Small → "sm" (< 2 mm)
			Peabubbles → "pb" (2 to < 4 mm)
			Large → "lg" (4 to < 6 mm)
			Headspace → "hs" (> 6 mm)

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: ZD74
Client: Onsite Environmental Inc.
Project Event: 0651-002-02
Project Name: Hearthstone Woodlawn East

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	MW11-20141007	ZD74A	14-21010	Water	10/07/14 10:20	10/07/14 14:35

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Data Reporting Qualifiers

Effective 12/31/13

Inorganic Data

U Indicates that the target analyte was not detected at the reported concentration

* Duplicate RPD is not within established control limits

B Reported value is less than the CRDL but ≥ the Reporting Limit

N Matrix Spike recovery not within established control limits

NA Not Applicable, analyte not spiked

H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible

L Analyte concentration is ≤5 times the Reporting Limit and the replicate control limit defaults to ±1 RL instead of the normal 20% RPD

Organic Data

U Indicates that the target analyte was not detected at the reported concentration

* Flagged value is not within established control limits

B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.

J Estimated concentration when the value is less than ARI's established reporting limits

D The spiked compound was not detected due to sample extract dilution

E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20%Drift or minimum RRF).

S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte

NA The flagged analyte was not analyzed for

NR Spiked compound recovery is not reported due to chromatographic interference

NS The flagged analyte was not spiked into the sample

M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"

Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**

C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column

P The analyte was detected on both chromatographic columns but the quantified values differ by ≥40% RPD with no obvious chromatographic interference

X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**

Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**

Geotechnical Data

A	The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.
F	Samples were frozen prior to particle size determination
SM	Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations
SS	Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis
W	Weight of sample in some pipette aliquots was below the level required for accurate weighting

SAMPLE RESULTS-CONVENTIONALS
ZD74-Onsite Environmental Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 10/09/14

Project: Hearthstone Woodlawn East
Event: 0651-002-02
Date Sampled: 10/07/14
Date Received: 10/07/14

Client ID: MW11-20141007
ARI ID: 14-21010 ZD74A

Analyte	Date Batch	Method	Units	RL	Sample
Ferrous Iron	10/07/14 100714#1	SM3500 FeD	mg/L	0.040	0.889

RL Analytical reporting limit
U Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
ZD74-Onsite Environmental Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 10/09/14

Project: Hearthstone Woodlawn East
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Ferrous Iron	SM3500 FeD	10/07/14	mg/L	< 0.040 U	

LAB CONTROL RESULTS-CONVENTIONALS
ZD74-Onsite Environmental Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 10/09/14

Project: Hearthstone Woodlawn East
Event: 0651-002-02
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Ferrous Iron SM3500 FeD	ICVL	10/07/14	mg/L	0.483	0.500	96.6%

REPLICATE RESULTS-CONVENTIONALS
ZD74-Onsite Environmental Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 10/09/14

Project: Hearthstone Woodlawn East
Event: 0651-002-02
Date Sampled: 10/07/14
Date Received: 10/07/14

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: ZD74A Client ID: MW11-20141007						
Ferrous Iron	SM3500 FeD	10/07/14	mg/L	0.889	0.891	0.2%

MS/MSD RESULTS-CONVENTIONALS
ZD74-Onsite Environmental Inc.

ANALYTICAL RESOURCES INCORPORATED

Matrix: Water
Data Release Authorized:
Reported: 10/09/14

Project: Hearthstone Woodlawn East
Event: 0651-002-02
Date Sampled: 10/07/14
Date Received: 10/07/14

Analyte	Method	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: ZD74A Client ID: MW11-20141007							
Ferrous Iron	SM3500 FeD	10/07/14	mg/L	0.889	1.26	0.400	92.8%

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Chain of Custody

Laboratory Number: 10-105

Company: SoundEarth Strategies
Project Number: 0651-002
Project Name: Hearthstone-Woodlawn E
Project Manager: Audrey Hackett
Sampled by: E. Forbes

Turnaround Request (in working days)

(Check One)

- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Day
- [ ] 3 Day
- [x] Standard (7 working days)
- [ ] ________ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.
1	MW11-20141007	10/7/14	1020	H_2O	8
2	MW27-20141007	10/7/14	1255	H_2O	3
3	MW06-20141007	10/7/14	1422	H_2O	3
4	MW25-20141007	10/7/14	1542	H_2O	3

EF 10/7/14

Requested Analysis

Lab ID	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by ~~8260B~~ C CVOCs	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals
1				X								
2				X								
3				X								
4				X								

Lab ID	HEM by 1664	VPH	EPH	Dissolved gases (methane, Ethane, Ethene) RSK 175	Sulfate 300.0	TOC 415.1	Nitrate, Alkalinity, Dis. Fe, 300.0, SM2320B, 200.8	% Moisture	~~Fe(II), Ferrous~~
1				X	X	X	X		~~X~~
2									
3									
4									

	Signature	Company	Date	Time
Relinquished by	[signature]	SOUNDEARTH	10/7/14	
Received by	[signature]	Speedy Msngr.	10-8-14	1140
Relinquished by	[signature]	" "	" "	1346
Received by	[signature]	OSE	10/8/14	1346
Relinquished by				
Received by				
Reviewed by/Date		Reviewed by/Date		

Comments/Special Instructions:
CVOCs: PCE, TCE, cis + trans-1,2-DCE, 1,1-DCE, vinyl chloride, methylene chloride

Dissolved Fe not field filtered

- [ ] Chromatograms with final report

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Onsite Environmental Inc. #1410-105B

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

October 30, 2014

Audrey Hackett
Sound Earth Strategies
2811 Fairview Avenue East, Suite 2000
Seattle, WA 98102

Re: Analytical Data for Project 0651-002
Laboratory Reference No. 1410-105B

Dear Audrey:

Enclosed are the analytical results and associated quality control data for samples submitted on October 8, 2014.

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

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

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: October 30, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105B
Project: 0651-002

Case Narrative

Samples were collected on October 7, 2014 and received by the laboratory on October 8, 2014. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

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

Date of Report: October 30, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105B
Project: 0651-002

DISSOLVED MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	10-105-01					
Client ID:	**MW11-20141007**					
Manganese	**19**	11	6010C	10-8-14	10-29-14	

Date of Report: October 30, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105B
Project: 0651-002

DISSOLVED MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	10-8-14
Date Analyzed:	10-29-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB1008F1

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	11

Date of Report: October 30, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105B
Project: 0651-002

DISSOLVED MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered:	10-8-14
Date Analyzed:	10-29-14
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	09-082-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**173**	**173**	0	11	

Date of Report: October 30, 2014
Samples Submitted: October 8, 2014
Laboratory Reference: 1410-105B
Project: 0651-002

DISSOLVED MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 10-8-14
Date Analyzed: 10-29-14

Matrix: Water
Units: ug/L (ppb)

Lab ID: 09-082-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	1110	**1270**	99	**1260**	98	1	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

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

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

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

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

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

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

I - Compound recovery is outside of the control limits.

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

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

L - The RPD is outside of the control limits.

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

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

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

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

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

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

Q - Surrogate recovery is outside of the control limits.

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

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

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

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

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

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

X - Sample extract treated with a mercury cleanup procedure.

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

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

Z -

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

Chain of Custody

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Phone: (425) 883-3881 • Fax: (425) 885-4603

Company: SoundEarth Strategies
Project Number: 0651-002
Project Name: Hearthstone-Woodlawn E
Project Manager: Audrey Hackett
Sampled by: E. Forbes

Turnaround Request (in working days)

(Check One)

- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Day
- [ ] 3 Day
- [x] Standard (7 working days)
- [ ] ________ (other)

Laboratory Number: 10-105

Requested Analysis

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by ~~8260B~~ ⊕ cVOCs	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	~~TCLP Metals~~ Dissolved Mn	HEM by 1664	VPH	EPH	Dissolved gases (methane, ethane, ethene) RSK 175	Sulfate 300.0	TOC 415.1	Nitrate, Alkalinity, Dis. Fe, 300.0 SM2320B, 200.8	* ~~% Moisture~~ Ferrous Iron	Fe(II), ~~Ferrous~~ DB
1	MW11-20141007	10/7/14	1020	H_2O	8				X								X				X	X	X	X	X	X
2	MW27-20141007	10/7/14	1255	H_2O	3				X																	
3	MW06-20141007	10/7/14	1422	H_2O	3				X																	
4	MW25-20141007	10/7/14	1542	H_2O	3				X																	

EF 10/7/14

	Signature	Company	Date	Time
Relinquished by	[signature]	SOUNDEARTH	10/7/14	
Received by	[signature]	Speedy Msngr.	10-8-14	1140
Relinquished by	[signature]	" "	" "	1346
Received by	[signature]	OSE	10/8/14	1346
Relinquished by				
Received by				
Reviewed by/Date		Reviewed by/Date		

Comments/Special Instructions:

cVOCs: PCE, TCE, cis + trans-1,2-DCE, 1,1-DCE, vinyl chloride, methylene chloride

Dissolved Fe not field filtered

* Sub directly to ART. DB

X Added 10/21/14. DB (STA)

Chromatograms with final report ☐

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