SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102

FEASIBILITY STUDY REPORT

Property:
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Prepared for:
Frontier Environmental Management LLC
1821 Blake Street, Suite 3C
Denver, Colorado

Report Date:
August 16, 2013

DRAFT – ISSUED FOR ECOLOGY REVIEW

Feasibility Study Report

Prepared for:

Frontier Environmental Management LLC
1821 Blake Street, Suite 3C
Denver, Colorado

Property:

700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Project No.: 0797

Prepared by:

DRAFT

____

Suzy Stumpf, PE
Associate Scientist

DRAFT

____

Terry Montoya, PE
Principal Engineer

Reviewed by:

DRAFT

____

Brian Dixon
Associate Scientist

DRAFT

____

Erin Rothman
Principal Scientist

August 12, 2013

SoundEarth Strategies

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

FIGURES

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

TABLES

CHARTS

APPENDICES

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
1,1-DCE	1,1-dichloroethylene
1,2-DCE	1,2-dichloroethylene
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
Affected ROWs	portions of Valley, Roy, and Broad Streets and 8th, 9th, and Westlake Avenues North
ARAR	applicable or relevant and appropriate requirement
B&V	Black & Veach
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CFR	Code of Federal Regulations
cis-1,2-DCE	cis-1,2-dichloroethylene
CLARC	cleanup levels and risk calculations
COC	chemical of concern
CSM	conceptual site model
CSO	combined sewer overflow
CVOC	chlorinated volatile organic compound
DHC	*Dehalococcoides*
DOF	Dalton, Olmsted & Fuglevand, Inc.
DRPH	diesel-range petroleum hydrocarbons
Ecology	Washington State Department of Ecology
EDB	1,2-dibromoethane
EDC	1,2-dichloroethane

ACRONYMS AND ABBREVIATIONS (CONTINUED)

EOS	edible oil substrate
EPA	U.S. Environmental Protection Agency
ERH	electrical resistance heating
ESA	environmental site assessment
FS	feasibility study
FS Report	Feasibility Study Report
ft/day	feet per day
ft/ft	feet per foot
GeoEngineers	GeoEngineers, Inc.
GeoTech	GeoTech Consultants Inc.
GRPH	gasoline-range petroleum hydrocarbons
HCID	petroleum hydrocarbon identification
HSA	hollow-stem auger
LNAPL	light nonaqueous-phase liquid
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MTCA	Washington State Model Toxics Control Act
NCP	National Soil and Hazardous Substances Pollution Contingency Plan
NWTPH	Northwest Total Petroleum Hydrocarbon
ORPH	oil-range petroleum hydrocarbons
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
PCS	petroleum-contaminated soil

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PCU	Power Control Unit
PID	photoionization detector
PNOD	permanganate natural oxygen demand
the Property	700 Dexter Avenue North, Seattle Washington
PRB	permeable reactive barrier
QA/QC	quality assurance/quality control
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
REC	recognized environmental condition
RETEC	Remediation Technologies, Inc.
RI	remedial investigation
Roux	Roux Associates
ROW	right-of-way
SDOT	Seattle Department of Transportation
SI	subsurface investigation
the Site	soil, soil vapor, and/or groundwater contaminated with gasoline-, diesel-, and oil-range petroleum hydrocarbons; tetrachloroethylene; trichloroethylene; vinyl chloride, and/or cis-1,2-dichloroethylene beneath the Property and portions of the south- and east-adjoining properties, as well as beneath the 8th, 9th and Westlake Avenues North and Valley, Roy, and Broad Streets rights-of-way
SoundEarth	SoundEarth Strategies, Inc.
SPU	Seattle Public Utilities
SVE	soil vapor extraction
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure

ACRONYMS AND ABBREVIATIONS (CONTINUED)

TEE	Terrestrial Ecological Evaluation
TMP	temperature monitoring points
trans-1,2-DCE	trans-1,2-dichloroethylene
USC	United State Code
UST	underground storage tank
VOC	volatile organic compound
WAC	Washington Administrative Code
Windward	Windward Environmental LLC

EXECUTIVE SUMMARY

SoundEarth Strategies, Inc. has prepared this Feasibility Study Report for the 700 Dexter Property located at 700 Dexter Avenue North in Seattle, Washington (the Property), on behalf of Frontier Environmental Management LLC.

This Feasibility Study Report was developed to meet the general requirements of a feasibility study as defined by the Washington State Model Toxics Control Act Regulation in Chapter 173-340, Parts-350 through 390 of the Washington Administrative Code.

Based upon the findings of the investigations summarized herein, the Site includes soil, soil vapor, and/or groundwater contaminated with gasoline-, diesel-, and oil-range petroleum hydrocarbons; tetrachloroethylene; trichloroethylene; vinyl chloride, and/or cis-1,2-dichloroethylene beneath the Property and portions of the south- and east-adjoining properties, as well as beneath the 8th, 9th and Westlake Avenues North and Valley, Roy, and Broad Streets rights-of-way. The impacts beneath the Site likely are associated with the following: (1) a release of chlorinated solvents from the industrial laundry and dry cleaning facility that operated on the Property between 1925 and 1995 and (2) the operation of at least two refueling facilities on the northern portion of the Property and on the east-adjoining properties. The highest concentrations of chlorinated solvents are located in the west-central portion of the Property.

The Site is located on a topographically low-lying area within the South Lake Union neighborhood of Seattle, Washington. Elevations range from 80 feet (northwest corner of the Property) to 60 feet (southeast corner of the Property) above NAVD88, and slope east-northeast toward Lake Union. Residences exclusively occupied the Property from at least 1893 until 1925, when Building A was constructed on the southern half of the Property. In 1930, a refueling facility was constructed on the northwest corner of the Property and was reportedly equipped with several underground storage tanks and two dispenser islands. Building additions were constructed to the north between 1947 and 1966. Building B was constructed in the northeast portion of the Property as an addition to Building A in 1947 and operated initially as a parking garage and automotive repair facility. Four 6,000-gallon underground storage tanks containing heating oil in association with the boiler system were installed beneath Building A in 1947. Building C was constructed on the northwest portion of the Property in 1966. The 1930-vintage gasoline service station was demolished the same year. Building C housed laundry operations, a garage, and offices. A fuel dispenser with as many as three underground storage tanks was constructed on the northeast portion of the Property between 1947 and 1966. Building plans indicate that dry cleaning was conducted on the Property as early as 1966. According to reports by others, dry cleaning machines operated on the western portion of Building A in 1978 and reportedly leaked solvents into the subsurface. The dry cleaning machines were no longer present on the Property by 1990. In 1986, Building B was redeveloped as a wastewater treatment facility for the commercial laundry operations, and several aboveground storage tanks containing acids, caustics, polymers, sludge, and water were installed. Waste material derived from the wastewater treatment facility was either directly discharged through the sewer system or conveyed into a disposal container to the north of Building B. In the mid-1990s, commercial laundry operations ceased, the wastewater treatment system was removed, and the buildings were leased to various tenants, including several automotive repair shops, a bakery, and a car rental office.

EXECUTIVE SUMMARY (CONTINUED)

The results of previous subsurface investigations and the remedial investigation conducted at the Site suggest that the chlorinated solvent impacts confirmed in soil and groundwater beneath the Site are the result of a release from the laundry and dry cleaning facility that operated on the Property from 1925 through 1995. Historical building plans indicated that the bulk of the dry cleaning operations were conducted in Building A, with piping leading from the dry cleaning machines to the sumps in the boiler room on the western portion of Building A. The high concentrations of tetrachloroethylene in soil and groundwater are inferred to be evidence of a release from the former dry cleaning facility that operated on the Property. Concentrations of tetrachloroethylene and associated chemicals of concern in the soil decrease rapidly upgradient of the source area and are carried through advective transport downgradient of the source area. Vertical distribution of solvent-contaminated soil is limited in large part by the presence of a layer of hard silt that underlies the Property at elevations between -5 and 5 feet NAVD88 (i.e., 35 to 45 feet below ground surface). Approximately 70 percent of the solvent mass is held up by the silt layer; the remaining soil contamination extends up to 80 feet below ground surface.

As with solvent-contaminated soil, the bulk of the solvent contamination in groundwater remains above the hard silt layer underlying the Property. The highest concentrations of chlorinated solvents have been detected within the shallow and intermediate water-bearing zones, with relatively low levels detected in the deep water-bearing zone. The elevated concentrations of chlorinated solvents detected in groundwater collected from the deep water-bearing zone consistently drop during subsequent sampling events.

The lateral distribution of tetrachloroethylene is consistent with groundwater flow direction. Tetrachloroethylene in groundwater extends from the Property downgradient to 9th Avenue North. The easternmost well exhibiting chlorinated solvent concentrations in excess of the Washington State Model Toxics Control Act Method A cleanup level is BB-13, which contained a concentration of vinyl chloride at 1.1 micrograms per liter in 1998 and is located on the western edge of Westlake Avenue North. The concentration dropped to below the laboratory reporting limit during a subsequent sampling event conducted by SoundEarth in 2010, indicating that the eastern, downgradient extent of the plume is defined.

Concentrations of petroleum hydrocarbons exceed their respective cleanup levels in soil and groundwater samples collected on the northern portion of the Property and within the 8th Avenue North right-of-way. The petroleum contamination is attributed to the historical operation of refueling facilities on the Property and on the east-adjoining properties. The petroleum hydrocarbon contamination appears vertically limited to the shallow and intermediate water-bearing zones.

Based on the results of the remedial investigation and completion of the conceptual site model, the feasibility study was conducted to develop and evaluate cleanup action alternatives that would facilitate selection of a final cleanup action for the Site in accordance with Chapter 173-340-350(8) of the Washington Administrative Code.

The three following cleanup action alternatives, all incorporating electrical resistance heating (ERH) and soil vapor extraction (SVE), were developed and evaluated in the course of this feasibility study:

- Cleanup Action Alternative 1—ERH/SVE, Excavation of Soil, and In Situ Reductive Dechlorination of Groundwater

EXECUTIVE SUMMARY (CONTINUED)

- Cleanup Action Alternative 2—ERH/SVE, Excavation of Soil, and In Situ Chemical Oxidation of Groundwater
- Cleanup Action Alternative 3—ERH/SVE, Excavation of Soil, and Permeable Reactive Barrier Wall for Groundwater

The three alternatives differ only in the type of groundwater treatment technology. Due to the nature of the development plan, certain elements are common among all three cleanup action alternatives. These common elements and assumptions include the following:

- **Demolition.** Because the remediation activities will be conducted as part of a larger redevelopment project, the costs associated with the demolition and grading permits, as well as the hazardous materials survey and abatement activities, are not included in the feasibility level cost estimates and are assumed to be a development-related cost.
- **Electrical resistive heating and soil vapor extraction.** The ERH and SVE system will target soil and groundwater contamination in the shallow treatment zone, from 0 to 40 feet NAVD88. The ERH and SVE treatment area is defined by tetrachloroethylene concentrations in soil above 14 milligrams per kilogram. The ERH and SVE system is designed to reduce tetrachloroethylene concentrations in the vadose zone soil (30 to 40 feet NAVD88) below 14 milligrams per kilogram and allow for the disposal of the soil at a non-hazardous, Subtitle D landfill. In addition, remediating the source area soil will reduce tetrachloroethylene concentrations in the shallow treatment zone to expedite the restoration of groundwater quality beneath the Site. The vapors generated by the ERH system will be recovered by the SVE system and treated with granular-activated carbon to remove chemicals of concern prior to discharging to the atmosphere. The condensate water generated by the system will be collected and treated with granular activated carbon to remove chemicals of concern prior to discharging to the sanitary sewer.
- **Shoring.** Shoring is required to protect the safety of personnel working in the excavation, as well as the surrounding properties, from damage due to slope failure. For illustration purposes, the shoring design will consist of soldier piles with wood lagging and soil tiebacks. It is anticipated that the shoring will be installed around the entire perimeter of the redevelopment. For the purpose of estimating the remedial costs for each alternative, it is assumed that shoring is a development-related cost and is, therefore, not included in the cost estimates provided in this feasibility study.
- **Excavation.** The removal and disposal of all vadose zone soil from 30 to 40 feet NAVD88 are part of the Property redevelopment plan. A limited area on the northeast corner of the Property would require overexcavation to an elevation of 20 feet NAVD88 to address soil exhibiting evidence of petroleum hydrocarbon contamination. Assuming an excavation elevation of 30 feet NAVD88 across the entire Property and 20 feet NAVD88 for a limited area, approximately 32,000 tons of contaminated soil would be generated during remedial excavation activities. The excavated material would be managed as non-dangerous waste under a contained-out determination issued by the Washington State Department of Ecology. Soil would be excavated within the confines of the shoring as designed by the structural engineer and will be directly loaded into trucks for off-Property land disposal at a Subtitle D facility in accordance with the contained-out determination. The cost associated with the excavation of all vadose zone soil from 30 to 40 feet NAVD88 are part of the Property redevelopment plan is considered a

EXECUTIVE SUMMARY (CONTINUED)

development-related cost and is, therefore, not included in the cost estimates provided in this report. However, the incremental costs for the disposal of contaminated soil from the vadose zone and overexcavation for petroleum-contaminated soil, soil performance sampling, and laboratory analyses are included in the cost estimates provided in this report.

- **Dewatering.** A dewatering trench will be installed within the limits of excavation to remove and treat groundwater encountered during excavation activities and any accumulated surface water during the course of the excavation. Due to the shallow limits of the excavation, 30 feet NAVD88, relative to the groundwater elevation little water is anticipated. The overexcavation to an elevation of 20 feet NAVD88 for petroleum-contaminated soil will require dewatering to facilitate soil removal activities within the shallow water-bearing zone. The groundwater will be pumped to a temporary water storage tank for treatment and disposal. The cost associated with dewatering for the overexcavation of petroleum-contaminated soil is considered a remediation-related cost and is included in the cost estimates provided in this report.
- **Passive vapor mitigation.** The Property redevelopment will incorporate a below-ground concrete parking garage structure with a venting system to remove exhaust from the garage. In addition to the existing air exchange rate for the exhaust mitigation, an impermeable vapor barrier will be incorporated into the new development foundation to act as a permanent barrier to contaminant migration to indoor air. The cost associated with impermeable vapor barrier is considered a remediation cost and is included in the cost estimates provided in this report.
- **Natural attenuation of residual concentrations of chlorinated solvents in groundwater located within and beyond the active treatment area.** Monitored natural attenuation is retained as a complimentary remedial component to other engineered remedial components rather than as a stand-alone or sole remedial component. In accordance with Chapter 173-340-370 of the Washington Administrative Code, monitored natural attenuation is an appropriate supplement to the active treatment approach for the following reasons: source treatment will be conducted to the maximum extent practicable with the planned Property redevelopment and there is evidence of reductive dechlorination based on tetrachloroethylene breakdown products (cis-1,2-dichloroethylene and vinyl chloride). Once source treatment on Property is completed, the concentrations of chemicals of concern in groundwater will drop significantly, thereby reducing the associated risks to human health and the environment.

Based on the results of the feasibility study, Cleanup Action Alternative 1, ERH/SVE, Excavation of Soil with In Situ Reductive Dechlorination of Groundwater is the recommended alternative for the Site because it ranks comparatively high in environmental benefit and is both technically feasible and cost effective. Cleanup Action Alternative 1 satisfies requirements of the Washington State Model Toxics Control Act and significantly reduces risk from contamination to the maximum extent practicable by using in situ treatment to reduce groundwater contamination within the active groundwater treatment area to reach the proposed cleanup levels within a reasonable restoration time frame.

Cleanup Action Alternative 1 addresses the chemicals of concern at the Site in the media of concern: soil gas, soil, groundwater, and indoor air. Cleanup Action Alternative 1 is protective of the indoor air inhalation pathway and of direct contact exposure (dermal contact, ingestion) with soil and with groundwater. The excavation on the Property, subsequent active remediation of the contaminated groundwater, implementation of a groundwater treatment barrier along the Property boundary, and

EXECUTIVE SUMMARY (CONTINUED)

two additional barrier walls downgradient will treat Site-wide groundwater contamination. Elements of Cleanup Action Alternative 1 would be conducted in conjunction with redevelopment of the Property.

This executive summary is presented solely for introductory purposes, and the information contained in this section should be used only in conjunction with the full text of this report. A complete description of the project, Site conditions, investigative methods, and investigation results is contained within this report.

1.0 INTRODUCTION

SoundEarth Strategies, Inc. (SoundEarth) has prepared this Feasibility Study Report (FS Report) for the 700 Dexter Property located at 700 Dexter Avenue North in Seattle, Washington (the Property), on behalf of Frontier Environmental Management LLC. The location of the Property is shown on Figure 1. The FS Report was developed to meet the requirements of a feasibility study (FS) as defined by the Washington State Model Toxics Control Act (MTCA) Regulation in Chapter 173-340, Parts 350 through 390 of the Washington Administrative Code (WAC 173-340-350 through 173-340-390).

The Site is defined by the full lateral and vertical extent of contamination that has resulted from the former operation of a commercial laundry, dry cleaning facility, and gasoline service stations on the Property. Based on the information gathered to date, the Site includes soil, soil vapor, and/or groundwater contaminated with gasoline-, diesel-, and oil-range petroleum hydrocarbons (GRPH, DRPH, and ORPH, respectively); tetrachloroethylene (PCE); trichloroethylene (TCE); vinyl chloride; and/or cis-1,2-dichloroethylene (cis-1,2-DCE) beneath the Property and portions of the south- and east-adjoining properties, as well as beneath the 8th, 9th, and Westlake Avenues North and Valley, Roy, and Broad Streets right-of-ways (ROWs; Figure 2).

1.1 DOCUMENT PURPOSE AND OBJECTIVES

The purpose of the FS Report is to develop and evaluate remedial alternatives for the Site and to select the most appropriate alternative based on future land use and the evaluation criteria listed below. According to MTCA, a 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 cleanup standards.
- Comply with applicable state and federal laws.
- 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:

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

This FS Report 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; and a description of the Site's environmental setting, including the local meteorology, geology, and hydrology.
- **Section 3.0, Previous Environmental Investigations.** This section provides a description of the sampling conducted at the Site between 1985 and 2011. Included is an outline of the field work

performed, as well as a discussion of the findings, conclusions, and remaining data gaps following completion of each phase of investigation.

- **Section 4.0, 2013 Interim Action.** This section summarizes the removal of five underground storage tanks (USTs) on the Property in March 2013.
- **Section 5.0, Summary of the Remedial Investigation.** This section summarizes the scope of work, results, findings, and conclusions of the remedial investigation (RI) conducted at the Site in 2013 (RI Report; SoundEarth 2013).
- **Section 6.0, Conceptual Site Model.** This section provides a summary of the conceptual site model (CSM) derived primarily from the results of the historical research and subsurface investigations (SIs) performed at the Site. Included is a discussion of the confirmed and suspected source areas, the chemicals of concern (COCs), the media of concern, the fate and transport characteristics of the release of hazardous substances, and the potential exposure pathways.
- **Section 7.0, Technical Elements.** The section summarizes technical elements, including applicable or relevant and appropriate requirements (ARARs), COCs, media of concern, and proposed cleanup standards.
- **Section 8.0, Feasibility Study.** This FS includes screening of potentially feasible remedial technologies and development of cleanup action alternatives intended to achieve the objectives described in Section 7.0. The cleanup action alternatives are evaluated with respect to threshold and other requirements for cleanup actions set forth in MTCA. The FS evaluates the alternatives and identifies those that are not effective, not technically possible, or whose costs are disproportionate under the provisions of WAC 173-340-360(3)(e), and the FS provides the basis for identifying a preferred cleanup action alternative.
- **Section 9.0, Preferred Cleanup Action Alternative.** This section summarizes the findings of the FS and identifies the preferred cleanup action alternative based on technical feasibility, effectiveness, protectiveness, and cost.
- **Section 10.0, Bibliography.** This section lists sources used to create this FS Report.
- **Section 11.0, Limitations.** This section discusses document limitations.

2.0 BACKGROUND

This section provides a description of the Site features and location; a summary of historical Site use; and a description of the local geology, hydrology, and meteorology pertaining to the Site. Historical documentation referenced in this section is provided in Appendix A and B of the RI Report.

2.1 SITE LOCATION AND DESCRIPTION

The Site is defined by the extent of contamination caused by the releases of hazardous substances at the Property, as summarized in Section 1.0, above. The Property and adjoining properties, including the ROWs, affected by the release(s) from the Property are described in the following subsections and presented on Figure 2.

2.1.1 The Property

The Property is comprised of a single tax parcel (King County parcel number 224900-0285) that covers approximately 61,440 square feet (1.4 acres) of land in the South Lake Union neighborhood of Seattle, Washington. The Property is listed at 700 Dexter Avenue North. American Linen Supply Company currently owns the Property (King County iMAP 2013a).

The on-Property buildings were demolished in February and March 2013. The Property was formerly improved with a building with four additions, including the following: the original 1925-vintage, single-story building with basement and mezzanine (Building A) in the southeastern portion of the Property; a 1947-vintage, single-story masonry garage (Building B) in the northeast portion of the Property; a 1947-vintage, one-story addition with basement and mezzanine in the southwestern portion of the Property; and a 1966-vintage, one-story concrete building with basement and mezzanine in the northwestern portion of the Property (Building C).

Building A was reportedly heated by a natural-gas-fueled hot water furnace. Potable water and sewer service are not currently provided to the Property. However, according to the earliest side sewer cards of the Property maintained by the Seattle Engineering Department, the sanitary sewer was connected to the Property in 1925. Seattle City Light provides electricity to the Property. No waste disposal services are currently provided to the Property (Figures 3 and 4).

The former Property improvements are presented in plan view on Figure 5.

2.1.2 South-Adjoining Property

The south-adjoining property is located to the south of Roy Street and consists of two tax parcels (King County parcel number 224900-0080 and 224900-0055), which are bisected by the Broad Street ROW underpass. The parcels cover approximately 27,250 square feet (0.63 acres) of land. The property is currently being utilized as a parking and storage lot for the Mercer Corridor Project. The south-adjoining property is owned by Seattle Department of Transportation (SDOT).

2.1.3 East-Adjoining Properties

The east-adjoining properties include the tax parcels bounded by 8th and Westlake Avenues North to the west and east, respectively, and by Aloha and Roy Streets to the north and south, respectively. The descriptions of the parcels located within the east-adjoining properties are summarized below.

2.1.3.1 <u>800 Roy Street Parcel</u>

The parcel listed at 800 Roy Street adjoins the Property to the east, beyond the 8th Avenue North ROW. The 800 Roy Street parcel consists of a single tax parcel (King County parcel number 408880-3530) that covers approximately 67,025 square feet (1.54 acres) of land. A 1926-vintage, one-story warehouse with a basement building occupies the southern half of the property. An asphalt-paved parking lot with storage structures is located on to the north of the building. Seattle City Light currently owns the property and operates it as a maintenance facility for its vehicles and equipment. A self-pay parking lot occupies the northern portion of the parcel.

2.1.3.2 <u>701–753 9th Avenue North Parcels</u>

To the east of 800 Roy Street is an alley, beyond which are four tax parcels listed at 701, 739, and 753 9th Avenue North (King County parcel numbers 408880-3565, 408880-3440, 408880-

3485, and 408880-3435). The four parcels collectively cover approximately 65,827 square feet (1.51 acres) of land. From south to north, the tax parcels are currently owned by Buca Inc., 3D Properties, Double M Properties LLC, and 9th & Aloha LLC.

From south to north, the 701–753 9th Avenue North parcels are currently improved with three masonry buildings: one 1922-vintage, one-story building; one 1924-vintage, two-story building; and one 1955-vintage, one-story building. The parcels are occupied by Buca di Beppo restaurant, Ducati motorcycle dealership and service facility, Maaco Auto Body facility, and a landscape architecture office.

2.1.3.3 900 Roy Street and 707–731 Westlake Avenue North Parcels

To the east of the Property across 9th Avenue North are three tax parcels listed at 900 Roy Street, 707 Westlake, and 731 Westlake (King County parcel numbers 408880-3495, 408880-3500, and 408880-2510). The parcels collectively cover approximately 38,911 square feet (0.89 acres) of land. The parcels are currently owned by SDOT, Pacific Properties Northwest LLC, and Kenney Family Properties LLC.

From south to north, the 900 Roy Street and 707 and 731 Westlake Avenue North parcels are currently improved with three masonry buildings: one 1941-vintage, one-story building; one 1914-vintage, two story building; and one 1921-vintage, two-story building. They are currently occupied by Urban City Coffee, Tap Plastics, People's Bank, Trago restaurant, RoRo's Barbeque restaurant, and World's Sports Grill.

2.1.4 Affected Rights-of-Way

The affected ROWs within the Site include portions of Valley, Roy, and Broad Streets and 8th, 9th, and Westlake Avenues North (Affected ROWs), maintained by the City of Seattle. According to City of Seattle's Arterial Classifications Zoning Map, Roy Street is zoned as a minor arterial from Dexter to 9th Avenue North and as a principal arterial from 9th Avenue North eastward. Broad Street and Westlake Avenues North are also zoned as principal arterials. Valley Street and 8th Avenue North are zoned as access streets. According to SDOT's traffic flow maps from 2011, principal arterials within the Site receive an annual average daily traffic of 23,900 and 35,100 vehicles.

2.2 HISTORICAL LAND USE OF THE SITE

The historical usage of each affected property, which was defined in Section 2.1, is summarized in the following subsections. A more detailed description of land use history and associated Site features is presented in the RI Report (SoundEarth 2013). Selected aerial photographs, available King County Archived Records, City of Seattle archived building permit files, and files provided by the Property owner are included in Appendices A and B of the RI Report (SoundEarth 2013). Relevant historical features of the Property and affected properties and ROWs within the Site are depicted on Figures 3 through 7.

2.2.1 The Property

Residences exclusively occupied the Property from at least 1893 until 1925, when Building A was constructed on the southern half of the Property. A refueling facility was constructed on the northwest corner of the Property and was reportedly equipped with several USTs and two dispenser islands. Building additions were constructed to the north between 1947 and 1966. Building B was constructed in the northeast portion of the Property as an addition to Building A in 1947 and operated initially as a parking garage and automotive repair shop. Four 6,000-gallon

USTs containing heating oil in association with the boiler system were installed beneath Building A in 1947. Building C was constructed on the northwest portion of the Property in 1966. The 1930-vintage gasoline service station was demolished the same year. Building C housed laundry operations, a garage, and offices. A fuel dispenser with as many as three USTs was constructed on the northeast portion of the Property between 1947 and 1966. Building plans indicate that dry cleaning was conducted on the Property as early as 1966. According to reports by others, dry cleaning machines operated on the western portion of Building A in the 1978 and reportedly leaked solvents into the subsurface. The dry cleaning machines were no longer present on the Property by 1990. In 1986, Building B was redeveloped as a wastewater treatment facility for the commercial laundry operations, and several aboveground storage tanks containing acids, caustics, polymers, sludge, and water were installed. Waste material derived from the wastewater treatment facility was either directly discharged through the sewer system or conveyed into a disposal container to the north of Building B. In the mid-1990s, commercial laundry operations ceased, the wastewater treatment system was removed, and the buildings were leased to various tenants, including several automotive repair shops, a bakery, and a car rental office. Historical property features discussed below are also presented on Figures 3 through 6.

2.2.2 South-Adjoining Property

Earliest records indicate that the south-adjoining property originally encompassed an entire city block, bounded by Roy and Mercer Streets and Dexter and Vine (currently 8th) Avenues North to the north, south, west, and east, respectively. The property was originally developed with several residences. Between 1924 and 1930, a diagonal portion of the property was vacated, most of the residences demolished, and Broad Street constructed. Two gasoline service stations and auto repair shops were constructed on the property shortly thereafter. In 1950, a paint manufacturer occupied the southeast portion of the property, and in 1956, additional portions of the south-adjoining property were vacated, most of the aboveground structures were demolished, and the Broad Street Underpass was constructed. A summary of the construction activities are summarized in Section 2.2.4. The remaining portions of the property were purchased by the City of Seattle in 1971, and the remaining aboveground structures were demolished the following year.

2.2.3 East-Adjoining Properties

The historical usage of the affected parcels within the east-adjoining properties, as defined in Section 2.1.3, is summarized in the following subsections.

2.2.3.1 <u>800 Roy Street Parcel</u>

The 800 Roy Street parcel was created by filling events conducted along the southern Lake Union shoreline from the late 1800s until the 1920s. Several residences and rustic cabins occupied the 800 Roy Street Parcel until 1926, when the existing warehouse was constructed. The 800 Roy Street parcel operated as maintenance facility for vehicles and equipment by Puget Sound Power and Light Co. (currently Seattle City Light). A garage located in the northern portion of the building's basement was used to repair, refuel, and wash vehicles. Transformer testing was also performed in the basement. The northern half of the property was used as a vehicle, transformer, fuel, and equipment storage area. Between 1944 and 1955, at least two generations of fuel dispensers and associated USTs were installed on the northern portion of the parcel. Two USTs were reportedly removed in 1993. Washington State Department of Ecology

(Ecology) records indicate the former operation of the former UST systems on the parcel resulted in impacts to the subsurface. The property is currently undergoing cleanup activities.

2.2.3.2 701–753 9th Avenue North Parcels

The 701–753 9th Avenue North parcels were created by filling events along the South Lake Union shoreline in the early 1900s. According to historical records, the parcels remained undeveloped until 1922, when an automotive sales showroom, sales and service shop was constructed on the southern half of the Property and was operated by Mack International Motor Truck Corporation. Between 1946 and 1950, three additional buildings were constructed on the Property and were occupied by automotive welding factory, automotive repair shops, and general retail. As many as four USTs containing waste oil, heating oil, and gasoline were installed beneath the parcels. Ecology and City of Seattle Engineering records indicate that four USTs were removed from the parcels. By 1980, the buildings on the parcels were primarily occupied by automotive dealerships and retail tenants. Impacts to soil were confirmed in 1992 when three of the USTs, located in the northernmost parcel, were removed. In 1996, Maaco Auto Body facility started operating out of the central portion of the Property and installed a flammable liquids storage room and a spray paint booth.

2.2.3.3 900 Roy Street and 707–731 Westlake Avenue North Parcels

The 900 Roy Street and 707–731 Westlake Avenue North parcels were created by filling events along the southern Lake Union shoreline in the early 1900s. According to historical records, the parcels remained undeveloped until 1914, when a one-story masonry building was constructed. A laundry facility operated on the southern parcel in 1917, and by the 1930s it was replaced by a gasoline service station and automotive repair shop. In 1921, a two-story masonry building was constructed in the central parcel and was initially occupied by a lithograph manufacturer and later by a sheet metal fabrication and painting shop. In 1941, the retail gasoline station was replaced and continued operating as an automotive repair shop until at least the 1960s. By 1969, the buildings were occupied by an automotive sales and repair facility. Between 1990 and 2011, all three buildings were remodeled and changed in use from industrial use to food service, retail, and/or residential. Multiple USTs were installed beneath the parcels and were used to store heating oil, waste oil, and fuel.

2.2.4 Affected Rights-of-Way

Valley and Roy Streets and 8th Avenue North ROWs were constructed before 1893, the earliest date of records available for review. Westlake Avenue North was constructed with planks on piles over Lake Union by 1893. Cabins and small structures were present within these ROWs until around 1905. By 1912, filling activities within Lake Union allowed for the expansion of 8th Avenue North, the conversion of Westlake Avenue North from planks to terrestrial material, and the construction of 9th Avenue North. The affected portion of Broad Street, bisecting the south-adjoining property, was constructed by 1917. The Affected ROWs were all paved by 1937. Between 1953 and 1958, the Broad Street ROW was expanded and the Broad Street Underpass was constructed, which required excavation of soil, abandonment or rerouting of existing utilities, and dewatering. Between 1985 and 2002, major tunneling activities were conducted as part of the Denny Way Combined Sewer Overflow (CSO) and Mercer Street Tunnel project. Large-diameter utilities were installed beneath Broad and Roy Street ROWs. In 2011, the 9th Avenue North sewer line was replaced.

2.3 FUTURE LAND USE

American Linen Supply Company is currently engaged in a purchase and sale agreement with Frontier Renewal, an interim title holder and sister company to FEM.

FEM specializes in comprehensive environmental risk management and is overseeing the execution of the Property and Site-wide cleanups. Frontier Renewal is contractually obligated to relinquish control of the Property to an end-use developer in the second quarter of 2014. The most recent development plans for the Property include a bio-tech campus with underground parking.

2.4 ENVIRONMENTAL SETTING

This section provides a summary of the environmental setting of the Site.

2.4.1 Meteorology

Climate in the Seattle area is generally mild and experiences moderate seasonal fluctuations in temperature. Average temperatures range from 40s in the winter to the 60s in the summer. The coldest month of the year is January, which has an average minimum temperature of 36.00 Fahrenheit (°F), while the warmest month of the year is August, which has an average maximum temperature of 74.90 °F.

The annual average precipitation in the Seattle area is 38.25 inches; the wettest month of the year is December, when the area receives an average precipitation of 6.06 inches (IDcide 2013).

2.4.2 Topography

The Site and vicinity lie within the Puget Trough or Lowland portion of the Pacific Border Physiographic Province (USGS 2011). The Puget Lowland is a broad, low-lying region situated between the Cascade Range to the east and the Olympic Mountains and Willapa Hills to the west. In the north, the San Juan Islands form the division between the Puget Lowland and the Strait of Georgia in British Columbia. The province is characterized by roughly north–south-oriented valleys and ridges, with the ridges that locally form an upland plain at elevations of up to about 500 feet above sea level (NAVD88). The moderately to steeply sloped ridges are separated by swales, which are often occupied by wetlands, streams, and lakes. The physiographic nature of the Puget Lowland was prominently formed by the last retreat of the Vashon Stade of the Fraser Glaciation, which is estimated to have occurred between 14,000 and 18,000 years before present (Waitt Jr. and Thorson 1983).

The Site is located on a topographically low-lying area within the South Lake Union Neighborhood of Seattle. Elevations range from 80 feet (northwest corner of the Property) to 60 feet (southeast corner of the Property) NAVD88 and slopes east-northeast toward Lake Union (King County 2013a). Lake Union is located approximately 0.1 miles to the east of the Property, and Elliot Bay is located approximately 1 mile to the southwest of the Property (USGS 1983).

2.4.3 Groundwater Use

According to the Ecology Water Well Logs database (Ecology 2013), two water supply wells are located at 100 Fourth Avenue North, approximately 0.5 miles southwest of the Site. The two supply wells were installed on the property owned by Fisher Broadcasting in 1999 and 2001. The wells were drilled to depths of 148 and 155 feet below ground surface (bgs). Each well was fitted with 10 feet of screen from the well bottom. These water supply wells reviewed in

Ecology's database encountered static water levels between 77 and 80 feet bgs, but appear hydrologically upgradient from the water-bearing zones encountered in the monitoring wells installed at the Site. The purpose of the wells is unknown, but it is unlikely that they are used as a potable water source.

Seattle Public Utilities (SPU) provides the potable water supply to the City of Seattle. SPU's main source of water is derived from surface water reservoirs located within the Cedar and South Fork Tolt River watersheds (City of Seattle 2013c). According to King County's Interactive Map for the County's Groundwater Program, there are no designated aquifer recharge or wellhead protection areas within several miles of the Site (King County IMAP 2013b).

2.5 GEOLOGIC AND HYDROGEOLOGIC SETTING

The following sections summarize the regional geology and hydrogeology in the Site vicinity, as well as the geologic and hydrogeologic conditions encountered beneath the Site.

2.5.1 Regional Geology and Hydrogeology

According to *The Geologic Map of Seattle—A Progress Report* (Troost et al. 2005), the surficial geology in the vicinity of the Site consists of deposits corresponding to the Vashon Stade of the Fraser Glaciation and pre-Fraser glacial and interglacial periods. In the immediate Site vicinity, surficial deposits have been mapped as anthropogenic fill, Vashon-age recessional sand, glacial till, ice-contact deposits, advance sand deposits, pre-Fraser Olympia beds, and pre-Fraser undifferentiated glacial and nonglacial deposits (Troost et al. 2005).

Near-surface deposits in developed areas with associated regrading and reclamation have been deposited with anthropogenic fill, which may include reworked native near-surface deposits mixed with organic materials and debris. Fill thicknesses in such areas can exceed 30 feet.

The youngest pre-Fraser deposits in the Seattle area, known as the Olympia beds, were deposited during the last interglacial period, approximately 18,000 to 70,000 years ago, and underlie the fill material. The Olympia beds consist of very dense, fine to medium, clean to silty sands and intermittent gravel channel deposits interbedded with hard silts and peats (Troost and Booth 2008; Galster and Laprade 1991). Organic matter and localized iron-oxide horizons are common. The Olympia beds have known thicknesses of up to 80 feet. Beneath the Olympia beds are various older deposits of glacial and nonglacial origin. In general, deposits from older interglacial and glacial periods are similar to deposits from the most recent glacial cycle because of similar topographic and climactic conditions (Troost and Booth 2008).

Often difficult to distinguish from, but frequently found within and below similar depth intervals as, the pre-Fraser deposits, Vashon glacial advance sand deposits consist of very dense sand with variable gravel contents and generally little fines, with local interbeds or inclusions of fine-grained deposits, particularly near the upper and lower contacts of the formation. The deposits can be massive or bedded, and are locally at least 200 feet thick (Troost et al. 2005).

The Vashon ice-contact deposits in the vicinity of the Site are generally discontinuous, highly variable in thickness and lateral extent, and consist of loose to very dense, intermixed glacial till and glacial outwash deposits. The till typically consists of sandy silt with gravel. The outwash consists of sand and gravel, with variable amounts of silt (Troost et al. 2005).

The Vashon recessional outwash deposits in the vicinity of the Site are generally discontinuous and consist of loose to very dense layered sand and gravel, which are generally well sorted (poorly graded). Layers of silty sand and silt are less common. The Vashon recessional lacustrine deposits consist of layered silt and clay, which range in plasticity from low to high and may contain localized intervals of sand or peat. The recessional lacustrine deposits may grade into recessional outwash deposits (Troost et al. 2005).

The glacial and nonglacial deposits beneath the Seattle area comprise the unconsolidated Puget Sound aquifer system, which can extend from ground surface to depths of more than 3,000 feet. Coarse-grained units within this sequence generally function as aquifers and alternate with fine-grained units that function as aquitards (Vaccaro et al. 1998). Above local or regional water table aquifers, discontinuous perched groundwater may be present in coarse-grained intervals seated above fine-grained intervals. Below the regional water table, the alternating pattern of coarse- and fine-grained units results in a series of confined aquifers. Regional groundwater flow is generally from topographic highs toward major surface water bodies such as Puget Sound and Lake Union. Vertical hydraulic gradients are typically upward near the major surface water bodies, and downward inland (Floyd Snider McCarthy Team 2003, Vaccaro et al. 1998).

2.5.2 Site Geology

Based on the results of the investigations summarized in later sections of this report, subsurface soil beneath the site consists primarily of anthropogenic fill locally mantling recent lacustrine deposits, Vashon-age glacial deposits, and possible pre-Fraser glacial deposits. The locations of the borings and wells advanced at the Site are shown in Figure 8. Cross sections depicting subsurface soil characteristics and geologic units encountered in the explorations are presented as Figures 9 and 10. Detailed boring logs are included as Appendix C of the RI Report.

The subsurface soil beneath the Site is interpreted to consist of the following geologic units, from youngest to oldest: artificial (anthropogenic) fill, post-Vashon lacustrine deposits, Vashon glacial till or Vashon age ice-contact deposits, and advance sand deposits and glacial till or drift of either Vashon age or pre-Fraser age. These units are described in the following sections.

2.5.2.1 Artificial (Anthropogenic) Fill

Virtually the entire Site is underlain by a variable thickness of artificial fill, consisting primarily of silty sand or sandy silt with variable gravel and cobbles, and localized anthropogenic materials (concrete, asphalt, metal, glass, and dimension lumber) or wood debris. In 1966, six soil borings (designated #1 through #6) were advanced on the Property for the purpose of evaluating lithology beneath the Property. The results of the evaluation indicated that the northwestern portion of the Property was underlain by fill material from ground surface to depths ranging between 4 and 15 feet bgs. The fill was composed of varying anthropogenic materials mixed with soil, including charred wood and rubble, brick, and furnace slag mixed with gravel, sand, and clay. Near-surface soil in the north-central portion of the Property was comprised of “oil and gravel.” Prior to the construction of Building C, much of the fill material, which was categorized as "waste material," was excavated to between 15 and 25 feet bgs. Cross sections of the excavation extent and boring logs indicate that all the fill material encountered beneath the footprint of Building C was excavated, with exception of black sandy gravel fill encountered in boring #3, located 5 to 10 feet north of the northwestern corner of Building C.

Fill materials generally thicken from west to east, to a thickness of 25 to 30 feet observed in boring B119 adjacent to 9th Avenue North. Work completed by others (HWA Associates 1998) indicates that fill material located to the east of 9th Avenue North generally exhibits a higher content of wood and sawdust related to several lumber mills that previously operated along the shore of Lake Union.

2.5.2.2 Lacustrine Deposits

Previous work by others (SPU 2003, Shannon and Wilson, Inc. 1970) indicates that the anthropogenic fill material near the south end of Lake Union is underlain by recent naturally occurring lacustrine deposits that represent the filling of the southern margin of Lake Union. These deposits consist of soft to medium stiff clay and silt with localized peat and were generally identified to the east of the Property. Clay and silt deposits encountered at elevations of approximately -5 feet to 5 feet NAVD88 in borings B108, B113, and B115 and at elevations of approximately 20 feet to 28 feet NAVD88 in borings B104 and B107 may be representative of these deposits. Though not encountered as a continuous stratum within the areas of the current assessment, these lacustrine deposits locally act as an aquitard between the anthropogenic fill material and underlying formations.

2.5.2.3 Ice-Contact Deposits, Glacial Till, and Subglacial Meltout Till Deposits

Ice-contact deposits, glacial till, and/or subglacial meltout till underlie the fill soil throughout the site located to the west of 9th Avenue North. This sequence of heterogeneous glacial deposits is likely pre-Vashon in age, although the upper portion of the sequence may include Vashon-age till. These combined strata are present at elevations ranging from about -50 feet NAVD88 to approximately 45 feet NAVD88. Beneath the Property, a distinctive, very hard, silt-rich layer was consistently encountered at elevations between -5 and 5 feet NAVD88 (i.e., 35 to 45 feet bgs) and appeared to act as a confining layer (Figure 9).

The thickness of these combined units decreases dramatically toward the east to 9th Avenue North. These heterogeneous deposits exhibit similar characteristics and appear to grade laterally and vertically into one another, resulting in some degree of difficulty when differentiating between the units.

The ice-contact deposits consist of medium dense to very dense, predominantly poorly-graded silty fine sand and sandy silt with varying gravel/sand and gravel-rich zones encountered below the eastern portion of the Property and extending to the east. The ice-contact deposits are characterized by slightly to moderately cemented and overly or transitioning to glacial till or subglacial meltout till. The ice-contact deposits were encountered in the borings located on the central portion of the Property and areas to the east.

Glacial till consists of dense to very dense silty fine sand varying to fine sandy silt with variable gravel and cobbles. The till was encountered directly below the fill material on the western portion of the Property and areas to the west, north, and south. The till is also characterized by local, sand-rich water-bearing zones that range in thickness from less than 1 inch to up to 10 feet. The till locally transitions laterally toward the east to subglacial meltout till deposits or ice-contact deposits.

The subglacial meltout till consists of dense to very dense, predominantly poorly-graded silty fine sand and sandy silt with varying gravel contents and sand and gravel-rich zones encountered below the Property and extending to the east.

2.5.2.4 Glacial Outwash Deposits

The glacial outwash deposits generally consist of relatively clean sand and gravelly sand with local silt-rich interbeds. This formation is encountered at an elevation of about -50 feet NAVD88 and extending down to an elevation of -75 feet to -95 feet NAVD88, with an average thickness of about 30 to 40 feet. These deposits are distinguished from sand-rich zones within the overlying ice melt deposits and meltout till deposits by the thickness and nature of the sand-rich deposits, though the contact in some cases is gradual and transitional.

2.5.2.5 Older Glacial Till/Drift Deposits

The deepest formation encountered beneath the site is interpreted to be older pre-Fraser glacial till/drift deposits. These deposits are encountered below the advance sand deposits observed in borings MW101, MW103, MW104, and MW106. The older till/drift deposits consist of very dense, slightly to moderately cemented silty sand to sandy silt with variable gravel content. These deposits are texturally similar to the overlying glacial till deposits and are distinguished by stratigraphic occurrence.

2.5.3 Site Hydrology

Shallow groundwater was encountered at various depth intervals at the Site, with a series of discontinuous water-bearing zones that extend down to the top of the deep glacial outwash deposits. Groundwater flow within the upper glacial deposits varies in response to the lateral and vertical variability within the heterogeneous glacial sediments underlying the fill materials. The conceptual groundwater model developed for the Site is depicted on Figure 11 and consists of the following four units:

- A shallow water-bearing zone comprised of fill, lacustrine deposits, and weathered and unweathered glacial deposits.
- An intermediate water-bearing zone comprised of dense to very dense heterogeneous glacial deposits (i.e., ice-contact deposits, till, and/or subglacial meltout till) that appear to function as a leaky aquitard.
- A deep outwash aquifer comprised of glacial outwash deposits encountered beneath the intermediate water-bearing interval.
- A lower aquitard comprised of very dense, fine-grained glacial drift deposits underlying the deep outwash aquifer.

The depths and thicknesses of the hydrologic units vary throughout the Site. The shallow water-bearing zone is unconfined and consists of perched groundwater and the local water table. The heterogeneous glacial deposits underlying the shallow water-bearing zone form a leaky aquitard that overlies the confined deep outwash aquifer. The intermediate water-bearing zone consists of the multiple coarser-grained saturated intervals exhibiting semi-confined to confined hydraulic conditions within the finer-grained deposits that comprise the leaky aquitard.

Based on data collected to date, groundwater within the shallow water-bearing zone, the intermediate water-bearing intervals, and the deep outwash aquifer flows primarily in a general eastward direction. Water level measurements indicate downward vertical gradients within the intermediate water-bearing zone, as well as between the intermediate water-bearing zone and the deep outwash aquifer. The vertical gradients between the intermediate water-bearing zone and the deep outwash aquifer decrease from west to east toward Lake Union.

The following subsections summarize the physical and hydraulic characteristics of the hydrostratigraphic units.

2.5.3.1 Shallow Water-Bearing Zone

The shallow water-bearing zone was encountered at depths of about 10 to 20 feet bgs (about 20 to 30 feet NAVD88). The shallow water-bearing zone often consists of localized perched groundwater conditions that appear to grade into a more extensive local water table aquifer that overlies lacustrine sediments and finer-grained dense glacial materials. In some areas, the shallow water-bearing zone appears to be in direct hydraulic continuity with the upper water-bearing interval(s) of the underlying intermediate water-bearing zone.

Beneath most of the Property and in explorations located east of the Property, the shallow water-bearing zone is present within or at the base of anthropogenic fill soils and/or weathered glacial sediments, and it is underlain by unweathered dense fine-grained glacial deposits or recent lacustrine sediments. Beneath the western portion of the Site, an unweathered layer of dense glacial deposits consisting of ice melt deposits, glacial till, or subglacial meltout till underlies the shallow water-bearing zone. The thickness and hydraulic characteristics of the shallow water-bearing zone vary beneath the Site. Based on the limited saturated thickness and varying depths of saturated soil, the shallow water-bearing zone beneath the western portion of the Site is characteristic of perched groundwater conditions, and is typically less than 10 feet thick. East of the Property, the shallow water-bearing zone appears to form a more continuous local water table aquifer ranging in thickness from about 10 to 20 feet, with an elevation that approaches the Lake Union water surface elevation.

Based on water level measurements obtained from the wells completed in this unit, groundwater flow directions vary over relatively short distances, ranging from a northeast to east direction beneath and adjacent to the Property. This variability in flow direction is likely the result of the varying thickness and physical characteristics of the fill material relative to the underlying weathered and unweathered glacial deposits.

2.5.3.2 Intermediate Water-Bearing Zone

Underlying the shallow water-bearing zone is a relatively thick sequence of very dense heterogeneous glacial deposits with multiple layers of saturated, coarse-grained intervals interbedded with fine-grained, very dense layers of silt and sandy silt. This thick sequence of discontinuous to semi-continuous layers and lenses of dense glacial deposits is identified as the intermediate water-bearing zone (Figure 11). The intermediate water-bearing zone appears to function primarily as a leaky aquitard overlying the deep outwash aquifer.

Sand and silty sand intervals within this sequence of ice melt deposits, glacial till, and/or subglacial meltout till comprise multiple water-bearing intervals within the intermediate water-bearing zone. The water-bearing intervals within this sequence vary in depth, thickness, and lateral extent, and are often overlain and underlain by damp to moist, fine-grained deposits that function as localized aquitards. Groundwater levels for wells completed in the intermediate water-bearing zone indicate confined hydraulic conditions for the coarser-grained water bearing intervals.

As shown in Figure 11, the intermediate water-bearing zone decreases in thickness from west to east beneath the Site. This water-bearing zone extends from about 25 to 90 feet bgs (-50 to 15 feet NAVD88) beneath and in the vicinity of the Property. Beneath 9th Avenue North, however, the intermediate water-bearing zone appears to be less than about 15 feet thick (Figure 11). The intermediate water-bearing interval also appears to decrease in thickness toward the south.

The intermediate water-bearing zone was divided into two depth intervals designated as Intervals A and B based on the depths of several of the monitoring wells installed prior to the RI field investigation. Interval A corresponds to monitoring wells completed with well screen depths ranging from approximately 35 feet to 45 feet bgs, and Interval B corresponds to monitoring wells completed with deeper well screens to maximum depths of about 80 feet bgs beneath the Property.

Figure 12 presents the groundwater contour map for wells completed within Interval A based on water level measurements obtained on March 29, 2013. Groundwater flows in a general west to east direction toward Lake Union, with a slight shift to an east to southeast direction in the vicinity of 9th Avenue North. The average hydraulic gradient for this intermediate water-bearing interval was 0.024 feet/foot (ft/ft) at the time of the measurements. The hydraulic gradient decreases to about 0.005 ft/ft in the vicinity of 9th Avenue North, which appears to correspond to the decreasing thickness of the intermediate water-bearing zone in this area of the Site. Data obtained during earlier monitoring events indicated similar flow directions and gradients.

Groundwater levels obtained from wells completed in other depth intervals within the intermediate water-bearing zone indicated a general easterly flow direction. However, the resulting data did not indicate a consistent trend in groundwater flow direction or gradients. This is probably the result of the varying lithologies and hydraulic characteristics of the discontinuous saturated intervals intersected by the wells screened at these greater depth intervals.

Water level data collected to date indicates that seasonal fluctuations range from about 2 to 3 feet in individual wells completed in the intermediate water-bearing zone (Table 1).

Data obtained from slug tests conducted at the Property in 2013 indicate a wide range of hydraulic conductivities for the saturated intervals within the intermediate water-bearing zone. Hydraulic conductivities ranging from about 0.021 to 63 feet per day (ft/day) were estimated from slug tests completed in the intermediate water-bearing zone wells. This range of estimated hydraulic conductivities corresponds to the range of saturated sediments (dense sandy silt to sand) intersected by individual well screen intervals. Slug test methods and results are summarized in Appendix D of the RI Report (SoundEarth 2013).

Based on the results of the slug test analyses, estimated groundwater seepage velocities averages about 0.61 ft/day in wells completed in silty sand and sand intervals between the Property and the alley located adjacent to the east of the Property. The lower hydraulic gradients measured between the alley and 9th Avenue North result in a lower average groundwater seepage velocity of about 0.4 ft/day in this area of the Site. The lowest estimated groundwater seepage velocity of 0.002 ft/day was estimated for well W-MW01, which appears to correspond to the hydraulic characteristics of the sandy silt intervals frequently encountered in the lower 20 to 30 feet of the intermediate water-bearing zone.

2.5.3.3 Deep Outwash Aquifer

The deep outwash aquifer is comprised of the glacial outwash deposits underlying the heterogeneous glacial deposits that form the intermediate water-bearing zone. This aquifer is encountered in explorations throughout the South Lake Union/East Queen Anne Hill area and is often referred to as the outwash aquifer. The deep outwash aquifer is a confined aquifer within the vicinity of the Property, with a thickness ranging from about 25 to 45 feet. It extends from about 90 to 125 feet bgs (-50 to -85 feet NAVD88) beneath the Property. As shown in Figure 11, the deep outwash aquifer is encountered at shallower depths (about 55 feet bgs) and appears to increase in thickness in the eastern portion of the Site towards 9th Avenue North. Available subsurface information for other properties located east of 9th Avenue North indicates that this trend continues, with the top of the outwash aquifer encountered at depths ranging from about 40 to 50 feet bgs.

Figure 13 presents the groundwater contour map for the deep outwash aquifer based on water level measurements obtained on March 29, 2013. Groundwater flows in a general east to southeast direction, with a relatively low average hydraulic gradient of about 0.003 ft/ft. Data obtained since the initial water level measurements were collected in September 2011 indicated a similar groundwater flow direction and gradient during other time periods, with seasonal water level fluctuations in the aquifer ranging from about 1.5 to 2.5 feet.

The hydraulic conductivity of the deep outwash aquifer is estimated to range from about 4 to 54 ft/day based on slug test data obtained from monitoring wells MW104, MW105, and MW115. Groundwater seepage velocities for the deep outwash aquifer are estimated to average about 0.5 ft/day.

2.5.3.4 Lower Aquitard

Older glacial drift and/or glacial till sediments underlying the deep outwash aquifer were encountered in several of the deeper monitoring well borings. These older glacial sediments are comprised of very dense silt and silty sand, and appear to function as an effective aquitard beneath the deep outwash aquifer. The thickness of the lower aquitard is unknown, although samples obtained from the boring for well MW101 indicate that the aquitard is at least 25 feet thick beneath the Property.

3.0 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

The following subsections summarize the results of previous investigations conducted at the Site; a more detailed discussion of the previous investigations is provided in the RI Report (SoundEarth 2013). Sample locations are presented in plan view on Figure 8. Soil and groundwater analytical results are presented in plan and cross-sectional view on Figures 9 and 10 and Figures 14 through 19, and in Tables 1 through 9. For evaluation purposes, those concentrations that exceed the current MTCA Method A or Method B cleanup levels for soil and groundwater are presented in bold red font in the tables. The remainder of this report includes references to cleanup levels; unless otherwise specified, these refer to the 2001 MTCA Method A or 2012 MTCA Method B Cleanup Levels for Unrestricted Land Use for soil and groundwater.

3.1 1992 ROUX PHASE I ENVIRONMENTAL SITE ASSESSMENT

Roux Associates (Roux), of Concord, California, conducted a Phase I Environmental Site Assessment (ESA) of the Property in 1992 (Roux 1992). The purpose of the Phase I ESA was to identify recognized environmental conditions (RECs) associated with the use, manufacture, storage, and/or disposal of hazardous or toxic substances at the properties in question. Roux identified the following RECs associated with the Property in 1992:

- The current (at that time) and historical storage of fuel in the yard area. Based on information provided by Maryatt Industries personnel, an extensive fuel release may have occurred before 1992.
- The current (at that time) and historical storage of heating oil in USTs beneath the Property. No integrity testing of the USTs had been performed since their installation in 1947.
- The current (at that time) and historical storage and use of solvents on the Property. Historical volume handling and disposal practices of the solvents were not revealed during the Phase I ESA. Solvent use at the time of the Phase I ESA was limited to approximately 10 gallons per month. Some solvents were disposed of through the wastewater treatment plant, while solvent-containing material was disposed of in a sludge disposal container to the north of the wastewater treatment area.
- The presence of potentially polychlorinated biphenyl (PCB)-containing transformers on the Property. An explosion occurred at one of the transformers. The Phase I ESA did not describe the location of the transformer nor did it indicate the source of the information.
- The storage of fuel in USTs beneath the 800 Roy Street parcel.
- An unknown volume of chemicals released on the north-adjoining property. The Seattle Fire Department responded to a chemical spill at the Esterline/Korry marine products facility. The type of chemical spilled was not revealed.
- The historical and/or current storage of fuel in the vicinity of the Property.

3.2 1992 ROUX PHASE II ENVIRONMENTAL SITE ASSESSMENT

Roux conducted a Phase II ESA at the Property in October 1992 (Roux 1993). Roux reportedly advanced a total of six borings to depths between 15 and 36.5 feet bgs and completed them as monitoring wells R-MW1 through R-MW6. Boring R-MW1 was advanced within the Property's yard area; boring R-MW2 was advanced near the 1960s-vintage fuel dispenser located in the northeastern portion of the Property; R-MW3 and R-MW6 were advanced along the eastern Property boundary; boring R-MW4 was advanced within the sidewalk to the north of the south-adjoining property; R-MW5 was advanced within the Dexter Avenue North ROW. Soil samples collected from the borings were submitted for analysis of chlorinated volatile organic compounds (CVOCs) including PCE, TCE, vinyl chloride, and trans-1,2-dichloroethylene (trans-1,2-DCE). Dalton, Olmsted & Fuglevand, Inc. (DOF) conducted a groundwater monitoring event in concert with Roux's groundwater sampling activities. Groundwater samples were collected from monitoring wells R-MW1 through R-MW6 by both consultants several days after drilling activities and submitted for analysis of CVOCs including PCE, TCE, vinyl chloride, trans-1,2-DCE, 1,1-dichloroethylene (1,1-DCE), and methylene chloride; GRPH; DRPH; ORPH; and/or benzene, toluene, ethylbenzene, and total xylenes (BTEX).

Summary. The results of the Phase II ESA confirmed that the former storage of fuel on the Property and former use of the Property as a dry cleaning facility resulted in a release of solvents and petroleum hydrocarbons to soil and/or groundwater beneath the Property. Elevated concentrations of PCE were confirmed south and southeast of the Property boundaries.

Data Gaps. Because only some analytical data for the soil and groundwater samples collected during the Phase II ESA were available for review, it is not apparent whether any other chemicals were analyzed and, if so, whether the concentrations exceed the current (2001) cleanup levels. Neither soil nor` groundwater contamination was bound vertically or horizontally.

3.3 1997 BLACK AND VEATCH PHASE II ENVIRONMENTAL SITE ASSESSMENT

Black & Veatch (B&V) conducted a Phase II ESA under contract with King County in association with the Denny Way/Lake Union CSO project (B&V 1998). The purpose of the Phase II ESA was to provide King County with geotechnical data to facilitate construction efforts and to evaluate if any properties located along the project corridor had impacted soil and/or groundwater beneath the project area. The project area was bound by Valley and Republican Streets to the north and south, respectively, and Nob Hill and Terry Avenues North to the west and east, respectively. Of the 56 borings advanced during the investigation, borings BB-5, BB-7, BB-8, BB-10, BB-12, BB-13, BB-14, TB-12, TB-18, and pumping wells PW-1 and PW-4 were located within the vicinity of the Property. Soil and groundwater samples were collected from all of the borings installed during the investigation and were analyzed for GRPH, DRPH, and ORPH. Select soil and groundwater samples were also analyzed for CVOCs, polycyclic aromatic hydrocarbons (PAHs), and BTEX. However, only data indicating detectable concentrations of CVOCs, PAHs, and BTEX were summarized in the report. These detectable concentrations included groundwater collected from monitoring wells BB-5, BB-8, BB-10, BB-12, BB-13, and TB-18.

Summary. PCE and its degradation products were confirmed in groundwater samples collected from wells as far as 360 feet to the east of the Property; however, the source of the impacts was not confirmed.

Data Gaps. Neither soil nor groundwater contamination was bound vertically or horizontally. Analytical methods have since been modified.

3.4 2000 THERMORETEC UNDER-BUILDING SOIL AND GROUNDWATER TESTING

ThermoRetec conducted a subsurface investigation in June 2000 at the Property (ThermoRetec 2000). The purpose of the investigation was to evaluate the lateral extent of solvent-impacted soil and groundwater within the Property boundary. Nine borings were advanced on the Property (B-1 through B-3, B-4A, B-4B, B-4C, and B-5 through B-10). Groundwater was encountered at depths ranging from 8 to 14.5 feet bgs. Reconnaissance groundwater samples were collected from borings B-2 and B-6 through B-10 using a peristaltic pump. Select soil and reconnaissance groundwater samples were submitted for laboratory analysis of CVOCs, including PCE, TCE, vinyl chloride, cis- and trans-1,2-DCE, and chloroform.

Summary. The highest concentrations of solvents in soil were located in borings B-2, B-6, B-8, and B-9, located near the former dry cleaning machines; soil concentrations in this area exceeded the land ban criteria. The highest concentration of PCE in groundwater detected to date was encountered in the groundwater sample collected from boring B-9, at a concentration of 120,000 micrograms per liter (µg/L). The potential source of CVOCs previously detected in soil and groundwater samples collected from beneath the Property appeared to have been discovered.

Data Gaps. Because only some analytical data for the soil and groundwater samples collected during the ThermoRetec investigation were available for review, it is not apparent whether any other chemicals were analyzed and, if so, whether the concentrations exceed the current (2001) cleanup levels. Neither soil nor groundwater contamination was bound vertically or horizontally.

3.5 2001 GEOENGINEERS SUPPLEMENTAL REMEDIAL INVESTIGATION

GeoEngineers, Inc. (GeoEngineers) conducted a supplemental RI at the Property in July 2001 (GeoEngineers 2002). The purpose of the supplemental RI was to evaluate a potential source area of dry cleaning solvents; David Maryatt, of Maryatt Industries, indicated that one of the three dry cleaning machines in operation on the Property in the 1980s may have leaked dry cleaning solvents into the subsurface. Boring G-MW1 was advanced to an approximate maximum depth of 38 feet bgs in the vicinity of the former dry cleaning machines in order to evaluate the shallow groundwater beneath the Property. Boring G-MW2 was advanced in a relative downgradient location from the former dry cleaning machines to a maximum depth of approximately 18 feet bgs to evaluate a shallow-seated water-bearing zone. Boring G-SB4 was advanced further downgradient from the former dry cleaning machines adjacent to a floor drain, but was abandoned at approximately 18 feet bgs because of difficult drilling conditions. Boring G-MW-3 was advanced in the immediate vicinity of G-SB4 to an approximate depth of 38 feet bgs as a replacement boring location. Groundwater was encountered at two depths during drilling activities: a perched water-bearing zone at approximately 10 feet bgs and a deeper water-bearing zone at approximately 32 feet bgs. GeoEngineers collected groundwater samples from the perched water-bearing zone in all three newly installed monitoring wells using low-flow sampling techniques several days after drilling activities.

Select soil samples collected from borings G-MW1 and G-SB4 and groundwater samples collected from G-MW1, G-MW1, and G-MW3 were submitted for laboratory analysis of CVOCs, including PCE, TCE, vinyl chloride, 1,2-dichloroethane [EDC], cis-1,2-DCE, trans-1,2-DCE, and 1,3,5-trimethylbenzene; naphthalene; and BTEX by U.S. Environmental Protection Agency (EPA) Method 8260B. Soil samples with the highest detected concentrations of PCE were also submitted for analysis of Toxicity Characteristic Leaching Procedure (TCLP) by EPA Method 1311/8260B.

Summary. The results of the supplemental RI confirmed a source of the solvents identified in previous investigations. The highest concentrations of PCE were confirmed near the former dry cleaning machines; soil concentrations in this area exceeded the land ban criteria, and perched groundwater also contained elevated concentrations of PCE.

Data Gaps. Neither soil nor groundwater contamination was bound vertically or horizontally.

3.6 2004 AND 2009 DALTON, OLMSTED & FUGLEVAND, INC. GROUNDWATER SAMPLING

DOF conducted groundwater sampling events at the Property on December 10, 2004 (DOF 2004), and on January 29 and 30, 2009 (DOF 2009), in order to monitor the concentrations of CVOCs and petroleum hydrocarbons beneath the Site. On December 10, 2004, DOF sampled monitoring well G-MW3 (DOF 2004), and on January 29, 2009, DOF sampled on-Property wells G-MW1, G-MW2, R-MW1, R-MW2, R-MW3, R-MW5, and R-MW6 and off-Property monitoring wells BB-8 and BB-8A, which were installed between 1997 and 2009 during the Denny Way/Lake Union CSO project (DOF 2009). Monitoring well R-MW4, which was located to the south of the Property within the southern sidewalk of Roy Street, was decommissioned before the January 2009 groundwater sampling event. Groundwater samples were submitted for laboratory analysis of GRPH, BTEX, and CVOCs, including PCE, TCE, vinyl chloride, cis-1,2-DCE, trans-1,2-DCE, and 1,1-DCE.

Summary. The highest concentration of PCE in groundwater to date was encountered in the groundwater sample collected from monitoring well G-MW3 at a concentration of 220,000 µg/L.

Data Gaps. Groundwater impacts were not bound in any direction.

3.7 1992-2002 EAST-ADJOINING PROPERTIES SUBSURFACE INVESTIGATIONS AND REMEDIAL ACTIONS

Below is a summary of the subsurface investigations and remedial actions conducted on the east-adjoining properties.

3.7.1 800 Roy Street

In early 1992, the 800 Roy Street parcel owner, Seattle Parks and Recreation, notified Ecology of a leaking fuel pump dispenser associated with the 1955-vintage UST system. Fueling operations were suspended in October 1992. SCS Engineers conducted a vapor survey in the vicinity of the known and suspected USTs, as well as along the eastern parcel boundary to investigate if contamination beneath the parcel extended beyond the parcel boundaries (RETEC 1993). The results of the vapor survey indicated that a volatile organic compounds (VOCs) were present in the vicinity of the 550-gallon UST and 1955-vintage pump island and the 2,700-gallon UST. Vapor survey points located near the eastern parcel boundary did not exhibit elevated VOCs.

In March, June, September, and October 1993, E.P. Johnson removed the 2,700- and 550-gallon USTs and their associated product piping and excavated approximately 3,195 tons of petroleum-contaminated soil (PCS) from the parcel (RETEC 1993; RETEC 1995). The excavation reached maximum depths between 7 and 25 feet bgs. Further exploration was inhibited vertically once the groundwater table was encountered within the excavation. Samples collected from stockpiled soil and from groundwater seepage within the excavation confirmed petroleum impacts to soil and groundwater beneath the parcel as a result of the former operation of refueling facilities. Soil samples collected from the sidewalls and bottoms of the final extents of the excavation were submitted for laboratory analysis of Resource Conservation and Recovery Act (RCRA) metals, including arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver; GRPH; DRPH; ORPH; BTEX; TCLP analysis; PCB total Aroclors; and/or CVOCs. The results of these analyses indicated that soil exhibiting concentrations of GRPH, BTEX constituents, and lead above their respective cleanup levels remained beneath the 800 Roy Street parcel and likely extended beneath the building, as well as off the parcel to the east and west. CVOCs were not detected in the soil samples analyzed. The excavated PCS was disposed of off the site for treatment and the excavation was backfilled with clean imported soil (RS-1 through RS-19 and RS-21 through RS-37).

Subsurface investigations were conducted by others in 1993 and 2002. The results of laboratory analyses of samples collected during these investigations indicated that soil and groundwater beneath the 800 Roy Street Parcel were impacted with petroleum-hydrocarbons, cPAHs, metals, and CVOCs. CVOCs were not detected at concentrations above their laboratory reporting limits in any of the soil samples analyzed. Groundwater samples collected during these investigations from monitoring wells located in the vicinity of the 800 Roy Street parcel contained concentrations of GRPH and/or one or more BTEX constituents exceeding the applicable cleanup levels (monitoring wells MW-1 through MW-9, SCL-MW101, SCL-MW102, and MW105). The groundwater sample collected from monitoring well MW-2 in 1993 contained concentrations of PCE, TCE, cis-1,2-DCE, and vinyl chloride exceeding their respective cleanup levels (Table 1).

Summary. Petroleum hydrocarbon and CVOC impacts originating from the Property were confirmed in groundwater beneath the 8th Avenue North ROW, in the vicinity of the 800 Roy Street parcel.

Data Gaps. Discrete petroleum hydrocarbon soil and groundwater plumes originating from the Property and the 800 Roy Street parcel were not delineated. The extent of PCE and its degradation products in groundwater was not defined to the northeast of the Property. The locations of several soil and groundwater sampling locations could not be confirmed.

3.7.2 1992 753 9th Avenue North Parcel Investigations

Between June and September 1992, subsurface investigations and three UST removals were conducted at the 753 9th Avenue Parcel. In June 1992, Environmental Associates Inc. conducted a subsurface investigation at the parcel, which consisted of advancing borings to the east of the parcel within the Westlake Avenue North ROW and in the vicinity of three 1948-vintage USTs with capacities of 1,000, 300, and 675 gallons used to store gasoline, used oil, and heating oil, respectively, located to the west of the building within the asphalt-paved parking lot. A summary of the investigation was provided in a report by GeoTech Consultants Inc. (GeoTech 1992). The locations and depths of the borings were not provided in the summary. Soil and groundwater samples were collected from the borings and analyzed for petroleum hydrocarbon identification (HCID). According to GeoTech's summary of the June 1992 investigation, none of the soil or groundwater samples collected from the borings contained concentrations of DRPH exceeding the 1989 MTCA Method A cleanup levels. GeoTech also indicated in their letter report that an investigation of the property to the north of the 753 9th Avenue North parcel was conducted and that the results of the investigation confirmed that groundwater in two wells located downgradient of the parcel and north of the building within the Aloha Street ROW had been impacted by petroleum hydrocarbons; the results of this investigation were not available for review.

In July and September 1992, GeoTech removed the three 1948-vintage USTs (GeoTech 1992) and conducted test pit investigations. Upon removal of the tanks, pinholes were observed in the USTs. Soils were excavated around each of the tanks at depths between 12 and 14 feet; soil samples collected from the bottoms of each excavation, and from the stockpiled soil, which did not appear to be contaminated, were submitted for laboratory analysis of BTEX and HCID or GRPH.

Summary. Soil beneath the 753 9th Avenue North parcel had confirmed petroleum impacts. Test pits advanced approximately along the western parcel boundary and in the northwest corner of the parcel confirmed petroleum contamination from approximately 4 feet to a depth of 12 to 14 feet bgs, indicating that the area of contamination extended throughout the parking lot behind the building an unknown distance, under the building, and off the parcel toward the west. Concentrations of GRPH and one or more BTEX constituents exceeding the cleanup level were detected in samples collected from the excavations from depths of 7 and 14 feet bgs. Petroleum impacts encountered in soil within the test pits advanced near the western property boundary were observed at depths above those of the USTs and from an upgradient location, indicating that the contamination was likely coming from a source west to southwest of the parcel. Groundwater impacts were confirmed downgradient of the parcel.

Data Gaps. Because the laboratory analytical results and locations and depths of the soil and groundwater samples from the June 1992 SI were not available for review, it is not apparent whether additional chemicals, including CVOCs, were analyzed and if so, whether the concentrations exceed the current (2001) cleanup levels. Potential groundwater impacts resulting from the former operation of a dry cleaning facility and gasoline USTs at the Property were not evaluated on the 753 9th Avenue North parcel.

3.8 2008 CH2M HILL 9TH AVENUE SEWER UPGRADE ENVIRONMENTAL INVESTIGATION

CH2M Hill conducted an environmental investigation along the 9th Avenue North corridor between Republican and Aloha Street in April 2008 (CH2M HILL 2008). The purpose of the investigation was to evaluate if any soil and/or groundwater contamination was present and to manage it within the proposed sewer alignment activity area. Four soil borings were advanced within the 9th Avenue North ROW using hollow-stem auger (HSA) methods to maximum depths of 7 to 26 feet bgs; boring CHB-07 was advanced northeast of the Property between Ward and Aloha Streets, boring CHB-08 was advanced to the east of the Property between Aloha and Roy Streets, boring CHB-09 was advanced to the southeast of the Property between Roy and Mercer Streets, and CHB-10 was advanced to the south-southeast of the Property between Mercer and Republican Streets. Reconnaissance groundwater samples were collected from borings CHB-07, CHB-08, and CHB-09 using a temporary well screen. Soil and groundwater samples were not collected from boring CHB-10 because the potential for contamination in that boring location was considered low. Soil and reconnaissance groundwater samples collected from borings CHB-07, CHB-08, and CHB-09 were submitted for analysis of GRPH, DRPH, and CVOCs.

Summary. GRPH, DRPH, ORPH, BTEX, and CVOC concentrations in soil samples collected from borings CHB-07, CHB-08, and CHB-09 were below the applicable laboratory reporting limits and/or cleanup levels (Table 2). However, Concentrations of vinyl chloride and cis-1,2-DCE exceeding the applicable cleanup levels were detected in the reconnaissance groundwater sample collected from boring CHB-07. Therefore, groundwater beneath the 9th Avenue ROW was confirmed to have petroleum and CVOC impacts.

Data Gaps. The compliant CVOC concentrations encountered in soil and groundwater samples collected from boring CHB-08 indicated that the eastern boundary of the Site did not extend beyond the 9th Avenue North ROW between Aloha and Roy Streets. However, the exact locations of borings CHB-07, CHB-08, and CHB-09 were not presented in CH2M HILL's summary report, making the eastern Site boundary definition incomplete.

3.9 2010 AND 2011 SOUNDEARTH GROUNDWATER SAMPLING EVENTS

SoundEarth collected groundwater samples from monitoring wells located at the Site on May 3, 2010, and June 2 and 3, 2011, using low flow purging methods. On May 3, 2010, SoundEarth collected groundwater samples from off-Property wells BB-8, BB-8A, BB-12, BB12A, and BB-13 and submitted them for laboratory analysis of PCE, TCE, vinyl chloride, cis- and trans-1,2-DCE , 1,1-DCE, and methylene chloride. On June 2 and 3, 2011, SoundEarth collected groundwater samples from on-Property wells G-MW1, G-MW2, G-MW3, R-MW1, R-MW2, R-MW3, R-MW5, and R-MW6, and off-Property wells BB-8 and BB-8A, as well as monitoring well MW-9, located across the 8th Avenue North ROW, near the 800 Roy Street parcel. The groundwater samples were submitted for analysis of GRPH, DRPH, ORPH, BTEX, and/or VOCs, including PCE, TCE, cis- and trans-1,2-DCE, 1,1-DCE, methylene chloride, 1,2-dibromoethane (EDB), EDC, naphthalene, 1,3,5- and 1,2,4-trimethylbenzene, and acetone.

Groundwater Results. PCE concentrations exceeding the cleanup levels were detected in groundwater samples collected from on-Property monitoring wells R-MW1, G-MW1, G-MW2, and G-MW3 and off-Property wells BB-8 and BB-8A. The PCE concentration of 33,000 µg/L detected in the groundwater sample collected from monitoring wells G-MW3, was reduced in concentration when compared to the maximum historical concentration of 220,000 µg/L (Table 1).

TCE, cis-1,2-DCE, and vinyl chloride concentrations exceeding the applicable cleanup levels were detected in groundwater samples collected from monitoring wells G-MW1, G-MW3, BB-8 and BB-8A. Concentrations of vinyl chloride were also detected in groundwater samples collected from monitoring wells R-MW1, R-MW6. The TCE, cis-1,2-DCE, and vinyl chloride concentrations in the groundwater sample collected from monitoring well G-MW2 were below the laboratory reporting limit of 1,000, 1,000, and 200 µg/L, respectively, due to the dilution of the sample, but it is reasonable to infer that the concentrations of TCE, cis-1,2-DCE, and vinyl chloride were above the cleanup level because of the concentration of PCE detected in the same groundwater sample and the historical presence of those analytes in groundwater collected from the well during previous sampling events (Table 1).

Concentrations of DRPH exceeding the cleanup level were detected in groundwater samples collected from monitoring wells R-MW1 and R-MW2. The groundwater sample collected from R-MW1 also contained a concentration of ORPH exceeding the cleanup level (Table 1).

Concentrations of GRPH exceeding the cleanup level were detected in groundwater samples collected from monitoring wells R-MW1, R-MW2, G-MW1, G-MW2, and G-MW3. A benzene concentration exceeding the cleanup level was also detected in the groundwater sample collected from R-MW2. Concentrations of benzene, ethylbenzene, and total xylenes remained below the applicable laboratory reporting limits in groundwater samples collected from monitoring wells G-MW2 and G-MW3; however, these samples were diluted due to the high concentrations of GRPH, therefore raising the detection limits of each of the analytes to a concentration greater than the applicable cleanup level (Table 1).

Concentrations of GRPH, DRPH, ORPH, BTEX, trans-1,2-DCE, 1,1-DCE, methylene chloride, EDB, EDC, naphthalene, 1,3,5- and 1,2,4-trimethylbenzene, and acetone in groundwater samples collected from off-Property wells remained below applicable laboratory reporting limits and/or cleanup levels. Groundwater samples collected from on-Property monitoring wells R-MW2, R-MW3 and R-MW5, and off-Property wells BB-12, BB-12A, and BB-13 did not contain concentrations of COCs exceeding applicable laboratory reporting limits and/or cleanup levels.

Summary. The results of the 2010 and 2011 groundwater sampling events indicated that although PCE and its degradation products were still present in groundwater beneath the Site, concentrations had slightly attenuated beneath portions of the Site since previous investigations.

Data Gaps. Groundwater contamination was not bound vertically or horizontally.

3.10 2012 WINDWARD ENVIRONMENTAL SUBSURFACE SOIL AND GROUNDWATER INVESTIGATIONS

In January and February 2012, Windward Environmental LLC (Windward) conducted a subsurface soil and groundwater investigation at the Site (Windward 2012). The purpose of the SI was to further evaluate the lateral and vertical extent of contamination beneath the Property and to confirm if contaminated soil and groundwater extended off-Property to the east. Four soil borings were advanced during the investigation (borings P-03, P-06, P-07 and P-08) near the eastern Property boundary within the sidewalk of 8th Avenue North and near monitoring well R-MW1 in order to better evaluate the vertical extent of solvent contamination previously encountered in soil collected from R-MW1.

Reconnaissance groundwater samples were collected from borings P-06 and P-08 during drilling activities at stratified depths of 20, 40, and 60 feet bgs. After the reconnaissance groundwater samples were collected, borings P-03, P-06, P-07, and P-08 were completed as monitoring wells W-MW-01 through W-MW-04, respectively. Windward collected groundwater samples from on-Property monitoring wells G-MW1, G-MW2, G-MW3, R-MW1, R-MW2, R-MW3, R-MW5, R-MW6, and off-Property monitoring wells MW-9, BB-8, and BB-13.

The selected soil and reconnaissance and low-flow groundwater samples were submitted for laboratory analysis of VOCs, including PCE, TCE, vinyl chloride, EDC, 1,2-dichloroethane, cis- and trans-1,2-DCE, and 1,3,5- and 1,2,4-trimethylbenzene, as well as BTEX.

Soil Results. Fill was encountered in borings P-03, P-06, P-07, and P-08 from ground surface to maximum depths ranging from 15 to 23 feet bgs. Soil samples collected from all four borings contained concentrations of PCE and TCE exceeding the applicable cleanup levels. The PCE concentrations detected in the soil samples collected from borings P-03 at 22.5 to 23 feet bgs, P-06 at 30.5 to 31 feet bgs, and P-7 at depths of 33.5 to 34, 43 to 43.5, and 53 to 53.5 feet bgs also exceeded Washington State Dangerous Waste criteria. A concentration of vinyl chloride exceeding the cleanup level was detected in boring P-08 at a depth of 9 feet bgs. Soil samples collected from borings P-06, P-07, and P-08 at depths greater than 76 feet bgs did not exhibit concentrations of PCE, TCE, or other CVOCs exceeding the applicable cleanup levels. Concentrations of BTEX constituents, cis- and trans-1,2-DCE, and other CVOCs remained below applicable laboratory reporting limits and or cleanup levels.

Reconnaissance Groundwater Results. PCE, TCE, vinyl chloride, and cis-1,2-DCE concentrations exceeding the cleanup levels were detected in reconnaissance groundwater samples collected from P-06/W-MW-02 at stratified depths of 30 to 40 and 50 to 60 feet bgs and from P-08/W-MW-04 at stratified depths of 10 to 20, 30 to 40, and 50 to 60 feet bgs. Trans-1,2-DCE and 1,1-DCE were detected in several of the groundwater samples, but were below the applicable cleanup levels. BTEX concentrations remained below the applicable laboratory detection limits and/or cleanup levels in all of the reconnaissance groundwater samples; however, the laboratory detection limits for benzene were raised to above cleanup levels in the reconnaissance groundwater samples collected from W-MW-02.

Groundwater Results. Concentrations of PCE exceeding the cleanup level were detected in the groundwater samples collected from monitoring wells W-MW-01 through W-MW-04. Concentrations of cis-1,2-DCE and TCE exceeding their respective cleanup levels were detected in groundwater samples collected from monitoring wells W-WM-02, W-WM-03, and W-MW-04. BTEX concentrations remained below the applicable laboratory detection limits and cleanup levels in the groundwater samples;

however, the laboratory detection limits for benzene were raised to above cleanup levels in the groundwater samples collected from W-MW-2 and W-MW-4.

Summary. Concentrations of PCE exceeding the cleanup level and dangerous waste criteria were confirmed to extend to the northeast of the suspected source area previously identified near boring G-SB4/G-MW3, indicating a separate probable source area near the vicinity of P-07/W-MW-03. Concentrations of PCE and/or its degradation products were confirmed at depths greater than those explored during previous investigations: from 40 to 82 feet bgs.

Data Gaps. The lateral and vertical extent of impacts in soil and groundwater remained undefined. In addition, SoundEarth questions the drilling methodology used by Windward with respect to the omission of conductor casing during the drilling event. Given the high concentrations of CVOCs observed approximately 30 to 40 feet bgs, likely present as dense nonaqueous-phase liquid, it is reasonable to suspect that contaminants could have been carried down through the borehole during drilling activities, thus biasing soil and groundwater samples collected below these depths.

3.11 2011 AND 2012 SOUNDEARTH PREFERRED PATHWAY INVESTIGATION

Between April 2011 and March 2012, SoundEarth completed a preferential pathway investigation for legal counsel representing the Property owner in support of an insurance claim coverage case. The purpose of the investigation was to evaluate potential pathways on Property that may have contributed to a release of PCE to the subsurface. This scope of work included an investigation of the configuration and integrity of the on-Property sanitary sewer system; sampling and analytical testing of water and sludge collected from the sewer line cleanouts, drains, and sumps; and collection and analytical testing of soil samples collected from the vicinity of the sewer line infrastructure.

In April 2011, SoundEarth subcontracted a plumbing company to video record the condition of accessible portions of the on-Property sanitary sewer lines prior to investigation activities. A portion of the northern sanitary sewer line appeared to be damaged.

Between April and June 2011, sludge samples were collected from floor Sumps No. 2 through Sump No. 5, located on the basement level and from one of the 1925-vintage water treatment drainage trenches located on the first floor of the building. Sludge samples were also collected from sewer line cleanouts C.O. No. 1 and C.O. No. 2, located in Building C (Figure 4). Sump No. 1 was dry and contained no residual fluid. Each sample was analyzed for VOCs by EPA Method 8260C. Additional stratified samples of water, sludge mixed with water, and sludge were collected from Sump No. 4 and submitted for laboratory analyses.

All of the sludge samples collected from Sump Nos. 2, 4, and 5 contained concentrations of PCE exceeding dangerous waste criteria. The sample collected from Sump No. 5 and three of the four samples collected from Sump No. 4 also exceeded Land Ban criteria. The sample from Sump No. 3 did not contain detectable concentrations of PCE. Sludge samples collected from sewer line cleanouts associated with the northern sewer line (C.O. No. 1 and C.O. No. 2) exhibited elevated concentrations of PCE (5.5 milligrams per kilogram [mg/kg] and 2.6 mg/kg, respectively). C.O. No. 2 also contained detectable concentrations of BTEX constituents, TCE, and cis-1,2-DCE. The process water sample collected from Sump No. 4 contained elevated concentrations of PCE, TCE and cis-1,2-DCE. The PCE and cis-1,2-DCE concentrations exceeded King County's screening levels for VOCs (Tables 8 and 9). The water and sludge were removed from Sump No. 4 and disposed of off the Property as dangerous waste.

In July 2011, SoundEarth cleaned and saw cut a hole in the base of Sump No. 4 to assess its structural integrity and to evaluate whether or not the sump had leaked. A soil sample collected from approximately 1 foot below the base of the sump exhibited a PCE concentration of 19 mg/kg, which was considerably lower in concentration of PCE than found in the sludge samples within the sump (Table 3). The results of the structural assessment of the sump and soil sampling suggested that only minor leaking occurred.

In February 2012, SoundEarth excavated two test pits (designated as EX01 and EX02) along the southern sewer line alignment in the vicinity of Sump No. 2 (Figure 20). The purpose of this phase of work was to observe the conditions and structural integrity of the sewer line in the area of boring B-9, which exhibited elevated concentrations of PCE in shallow soil. Test pit EX01 exposed the 6-inch-diameter, cast iron sewer line. While the line appeared to sag slightly at the belled joint connections, no obvious perforations or breaks in the line were observed. Soil samples were collected from excavation EX01 and submitted for analytical testing for CVOCs by EPA Method 8260C. Soil samples collected from EX01 exhibited PCE concentrations of up to 190 mg/kg at a depth of 6 feet bgs. TCE concentrations between 0.052 and 0.38 mg/kg were also detected in the soil samples (Table 3). These results confirmed the presence of shallow PCE impacts adjacent to the southern sewer line.

Soil samples collected from test pit EX02 were screened in the field using a photoionization detector (PID), which did not reveal obvious soil impacts. No samples were analyzed from excavation EX02.

Summary. The results of the preferred pathway evaluation indicated that a portion of the PCE waste stream from Property dry cleaning was disposed of into Sump No. 4, which likely conveyed the PCE-impacted effluent through the southern sewer line. The results also suggest that Sump No. 4 did not appear to leak significantly, though leakage may have occurred at joints within the sewer line. Sludge collected from cleanouts C.O. No. 1 and C.O. No. 2 and Sump No. 5 suggest that a portion of the PCE waste stream was conveyed through the northern sewer line as well. Excavated soils from Sump 4 and EX01 were drummed on site and disposed of as F002-listed dangerous waste.

Data Gaps. PCE in shallow soil was not bound laterally.

3.12 SUMMARY OF DATA GAPS

The results of previous investigations indicate that lateral and vertical extent of PCE-contaminated soil meeting Washington State's Dangerous Waste criteria had not been defined. The lateral and vertical extent of PCE contamination in soil exceeding land ban criteria appeared to be limited to the west-central portion of the Property in the vicinity of borings B-9 and G-MW1 at depths between 4 and 20 feet bgs. The lateral and vertical extent of impacts off the Property to the north, south, east, and west were not delineated.

4.0 2013 INTERIM ACTION

On March 22, 2013, SoundEarth oversaw the removal of four 6,000-gallon USTs (Tank 1 through Tank 4) and a fifth 500- to 600-gallon UST, located near the center of the Property (Tank 5). Upon removing the concrete foundation in the vicinity of Tank 2, droplets of liquid mercury were discovered. The mercury was containerized and disposed of as hazardous waste to a regulated facility under the oversight of NRC Environmental Services. Tanks 1 through 4, which contained no measurable product, were cleaned by Marine Vacuum Services, Inc. Tanks 1 through 4 appeared to be in good condition upon removal, with no visible perforations or rust. Tank 5 was in poor condition, with numerous perforations; no material was contained within Tank 5. Soil samples were collected from the sidewalls and bottom of each UST excavation and were submitted for analysis of DRPH and ORPH by Northwest Total Petroleum Hydrocarbon (NWTPH) Method NWTPH-Dx. The soil samples collected from the bottom of the Tank 2 excavation was also submitted for analysis of RCRA 8 metals, which included arsenic, barium, cadmium, chromium lead, mercury, selenium, and silver, by EPA Methods 200.8 and 1631E. Concentrations of DRPH, ORPH, and metals remained below their respective laboratory reporting limits and/or cleanup levels in all of the soil samples collected from the excavation limits. The tank excavations were backfilled with recycled concrete. A report summarizing the field activities and laboratory analytical results is provided in Appendix E of the RI Report (SoundEarth 2013).

5.0 SUMMARY OF THE REMEDIAL INVESTIGATION

In July, August, and December 2012 and February, March, and April 2013, SoundEarth conducted an RI at the Site. The objectives of the RI included the following:

- Addressing on-Property data gaps for CVOCs in soil and groundwater.
- Evaluating the lateral and vertical extent of soil and groundwater contamination both on and off the Property.
- Comparing soil and groundwater results to those collected by Windward to evaluate the drilling methodology and usefulness of their data.
- Collecting soil gas samples for the purpose of evaluating the vapor intrusion pathway downgradient of the Property.
- Collecting sufficient data to conduct an FS and ultimately develop a cleanup action plan for the Site.

5.1 SOIL BORING ADVANCEMENT AND SAMPLING

The drilling and well installation activities conducted as part of this RI were performed in July 10 through August 15, 2012; December 4 through 18, 2012; February 4, 2013; March 21, 2013; and March 18 through April 4, 2013. In July and August 2012, borings B101 through B106 were advanced by Major Drilling using a sonic probe drilling rig. Borings B107 through B116 were advanced in December 2012; boring B117 on February 4, 2013; and borings B118, B119, and DB01 through DB14 in March and April 2013, by Cascade Drilling LP using an HSA drill rig.

Borings B101 through B106 and B113 were advanced into the regionally identified advance outwash sand aquifer, to maximum depths of approximately 80 to 140 feet bgs. Borings B111, B112, DB05, DB05A, and DB06 through DB10 were advanced to maximum depths between 70 and 90.5 feet bgs. Borings B107 through B10, B114 through B119, DB01 through DB04, and DB11 through DB14 were advanced approximately between 40 and 60.5 feet bgs.

Boring B101 was advanced in the central portion of the Property to further evaluate the vertical extent of PCE contamination in soil and groundwater previously encountered in boring P-07/well W-MW-03 and to assess the validity of the Windward data. Borings DB01 through DB14 were also advanced on the Property to evaluate the extent of PCE contamination previously observed in soil beneath the Property.

Ten borings were advanced within the ROWs to the east of the Property in order to evaluate the lateral and vertical extent of PCE contamination in soil and groundwater downgradient of the Property; borings B103 and B108 through B111 were advanced in the alleyway between 8th and 9th Avenues North; borings B104 and B107 were advanced within the 8th Avenue North ROW, adjacent to boring P-06/well W-MW-02, and were also used to assess the validity of the Windward data; and borings B113, B115, and B116 were advanced within the 9th Avenue North ROW.

Boring B105 was advanced within the Roy Street ROW, southeast of the Property and adjacent to well BB-8, in an effort to assess the vertical extent of PCE impacts in groundwater observed in that well. Borings B106 and B114 were advanced south of the Property within a City of Seattle-owned land parcel and the Broad Street ROW, respectively, in order to evaluate current groundwater conditions in the vicinity of former monitoring well R-MW4.

Borings B102 and B112 were advanced within the Valley Street and Dexter Avenue North ROWs, respectively, in an effort to evaluate whether PCE contamination extended off the Property to the north and/or west.

Boring B117 was advanced within the Dexter Avenue North ROW to the southwest of the Property in order to evaluate PCE impacts in groundwater inferred as hydraulically upgradient from the Property.

Conductor casing was installed to 40 and 80 feet bgs in boring B102 and to 50 feet bgs in boring B111 to provide a barrier between water-bearing zones and mitigate downward migration of contamination through the water table. A summary (in numerical order) of the boring/monitoring well IDs, locations, purpose, installation date(s), depths advanced, and well completion details (if applicable) is presented in Table 10.

After the maximum depth was achieved in each sample interval, relatively undisturbed, discrete soil samples were collected from each soil sonic rig-advanced boring continuously and from each HSA rig-advanced boring at 5-foot intervals throughout the maximum depth explored. Soil samples were collected from the center of the core sample to avoid cross-contamination. The soil was classified using the Unified Soil Classification System. Soil characteristics, including moisture content, relative density, texture, and color, were recorded on boring logs, provided in Appendix C of the RI Report (SoundEarth 2013). The depths at which changes in soil lithology were observed and where groundwater was first encountered are also included on the boring logs. Selected portions of recovered soil core samples were placed in a plastic bag so the presence or absence of VOCs could be quantified using a PID. Soil samples were selected for analysis based on previous data, field indications of potential contamination including visual and olfactory notations, PID readings, and/or the location of the sample proximate to the soil-groundwater interface.

After collection, soil samples were labeled with a unique sample ID, placed on ice in a cooler, and delivered to Friedman & Bruya, Inc. of Seattle, Washington, under standard chain-of-custody protocols for laboratory analysis. Select soil samples were submitted for laboratory analysis of VOCs, including PCE, TCE, vinyl chloride, EDC, EDB, cis- and trans-1,2-DCE, and 1,3,5- and 1,2,4-trimethylbenzene by EPA Method 8260C. Soil samples collected from DB02, DB14, and B107 were also submitted for analysis of GRPH by Method NWTPH-Gx and BTEX by EPA Method 8260C.

5.2 RECONNAISSANCE GROUNDWATER SAMPLES

Reconnaissance groundwater samples were collected from borings B101 through B106, B115, B116, DB01 through DB05, DB05A, DB10, DB13, and DB14 during drilling activities using a temporary screen and a peristaltic or bladder pump at various depths, as indicated in Table 1. The reconnaissance groundwater samples were submitted for laboratory analysis of VOCs, including PCE, TCE, vinyl chloride, EDC, EDB, cis- and trans-1,2-DCE, and 1,3,5- and 1,2,4-trimethylbenzene by EPA Method 8260C. The reconnaissance groundwater samples collected from borings B104 and DB14 were also analyzed for GRPH and/or BTEX by Method NWTPH-Gx and EPA Method 8260C, respectively, at depths of 60 and 80 feet bgs. Additional reconnaissance groundwater samples were collected from borings B102, B103, and B105 at each of the depths sampled and were field-filtered through a 0.45-micron filter prior to analysis because the groundwater samples exhibited high turbidity. A field duplicate sample was collected from boring B101 at 80 feet bgs for quality assurance/quality control (QA/QC) purposes.

Reconnaissance groundwater samples are useful for screening and site characterization, although concentrations are typically considered an estimate as the collection process can produce a measureable difference from the samples' true value. The most common causes of sample bias are:

- Turbidity – Turbidity can cause bias as a result of the adsorbtion of chemicals onto, or the release of chemicals from, the surface of particles in the sample (EPA 2005).
- Disturbance – Disturbances such as pressure decreases, temperature, exposure to atmospheric conditions, desorption from sampler materials, and agitation can all contribute to sample bias (EPA 2005).
- Sampling Interval – The potential for contaminated groundwater to travel between sampling intervals exists, potentially biasing the results at the point of interest.

Additionally, the relatively short time frame associated with the collection of reconnaissance groundwater samples may be insufficient for adequate well development and equilibration with the surrounding formation.

5.3 MONITORING WELL INSTALLATION

Borings B101 through B117 were completed as monitoring wells MW101 through MW117, respectively. Each monitoring well was constructed of 2-inch-diameter blank PVC casing, flush-threaded to approximately 10 feet of 0.010-inch slotted well screen. The bottom of each of the wells was fitted with a threaded PVC bottom cap, and the top of each well was fitted with a locking compression-fit well cap. The annulus of the monitoring wells was filled with #10/20 silica sand to a minimum height of 1 foot above the top of the screened interval. A bentonite seal with a minimum thickness of 1 foot was installed above the sand pack. The wells were completed at the surface with a flush-mounted, traffic-rated well box set in concrete. The well completion details are presented in Table 10 and in the boring logs, which are provided in Appendix C of the RI Report.

Three water-bearing zones were identified during drilling activities: a shallow water-bearing zone comprised of fill and encountered at depths of 10 to 20 feet bgs; a relatively thick intermediate water-bearing zone comprised of dense to very dense heterogeneous glacial sediments, encountered between 25 and 80 feet bgs, and divided into "A" and "B" zones; and a deep outwash aquifer comprised of glacial advance outwash deposits encountered beneath the intermediate water-bearing zone.

Monitoring wells MW101 through MW106 were screened in the deep water-bearing zone to maximum depths between 114 and 140 feet bgs. Monitoring wells MW107 through MW110 and MW114 through MW117 were screened in the intermediate "A" water-bearing zone. Monitoring wells MW111 and MW112 were screened in the intermediate "B" water-bearing zone.

5.4 GROUNDWATER MONITORING EVENT

SoundEarth collected groundwater samples from the newly installed monitoring wells subsequent to their development and the existing monitoring wells between July 2012 and March 2013 using low-flow sampling techniques. Monitoring wells MW101 through MW106 were sampled between July 20 and August 22, 2012, monitoring wells MW107 through MW116 were sampled on December 21, 2012; MW117 was sampled on February 8, 2013; monitoring wells MW118 and MW119 were sampled on March 25, 2013. SoundEarth also conducted a groundwater monitoring event on September 4, 5, and 6, 2012, during which low-flow groundwater samples were collected from monitoring wells MW101 through MW106, R-MW1 through R-MW3, R-MW5, R-MW6, MW-9, BB-8, W-MW-01 through W-MW-4, G-MW1, G-MW2, and G-MW3. The monitoring wells were sampled during each of these sampling events using a combination of peristaltic and bladder pumps and the same low-flow protocols, as employed previously.

Groundwater measurements were collected on September 4 and December 21, 2012, from monitoring wells G-MW1, G-MW2, G-MW3, R-MW1, R-MW2, R-MW3, R-MW5, R-MW6, W-MW-1, W-MW-2, W-MW-3, W-MW-4, BB-8, MW-9, and M101 through MW106. Groundwater measurements were also collected from monitoring wells MW107 through MW116 on December 21, 2012. Groundwater measurements were also collected from all of the monitoring wells mentioned, as well as the newly installed monitoring wells MW117, MW118, and MW119, on March 29. 2013. Groundwater measurements were collected relative to the top of well casings to an accuracy of 0.01 feet using an electronic water meter.

Groundwater samples were collected from each monitoring well in accordance with EPA's *Low Flow (Minimal Drawdown) Ground-Water Sampling Procedures* (1996) and SoundEarth's *Standard Operating Procedures-007: Groundwater Sampling* at least 24 hours following well development. Purging and sampling of monitoring wells MW102, MW104, MW106, and MW112 were performed using a bladder pump and dedicated polyethylene tubing. Purging and sampling of monitoring wells W-MW-01 through W-MW-04, R-MW1, R-MW2, R-MW3, R-MW5, R-MW6, G-MW1, G-MW2, G-MW3, BB-8, MW-9, MW101, MW103, MW105, MW107 through MW111, and MW113 through MW117 were performed using a peristaltic pump with dedicated polyethylene tubing. During purging, water quality parameters that were monitored and recorded included temperature, pH, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential. Each well was purged until, at a minimum, pH, specific conductivity, and turbidity or dissolved oxygen stabilized. Samples were placed directly into clean, laboratory-prepared containers.

After collection, groundwater samples were labeled with a unique sample ID, placed on ice in a cooler, and delivered to Friedman & Bruya, Inc. under standard chain-of-custody protocols for laboratory analysis. Groundwater samples were submitted for laboratory analysis of VOCs, including PCE, TCE, vinyl chloride, EDC, EDB, cis- and trans-1,2-DCE, and 1,3,5- and 1,2,4-trimethylbenzene, by EPA Method 8260C. Select groundwater samples were also submitted for analysis of BTEX by EPA Method 8260C. The groundwater sample collected from monitoring well MW107 was also submitted for laboratory analysis of GRPH by Method NWTPH-Gx and DRPH/ORPH by Method NWTPH-Dx. Field duplicate samples were collected from monitoring wells MW103 on September 5, G-MW1 on September 6, and MW107 on December 21, 2012, for QA/QC purposes.

5.5 SOIL GAS SAMPLING

On March 11, 2013, SoundEarth performed a vapor intrusion investigation adjacent to the 800 Roy Street parcel. The purpose of the investigation was to evaluate whether vapor intrusion from PCE-contaminated groundwater beneath the 800 Roy Street parcel has adversely impacted indoor ambient air quality in the basement of the 800 Roy Street building. Soil gas samples were collected from permanent soil gas monitoring points SV01, SV02, and SV03, which were advanced in the sidewalk on the west side of the 800 Roy Street parcel by ESN Northwest to a maximum depth of 13 feet bgs. The locations of soil gas monitoring points are shown on Figures 8 and 20.

Soil gas samples were collected in the vadose zone just above the groundwater capillary fringe at depths ranging from 11.75 and 12.75 feet bgs. The sample depths were selected to emulate a sub-slab soil gas sample collected in accordance with Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (2009). The soil gas monitoring points were constructed of 6-inch-long, stainless steel mesh implants from an approximate depth of 12.75 feet bgs and were connected to a riser composed of 0.5-inch-diameter, Teflon-lined polyethylene tubing. The soil gas monitoring points were fitted with a flush-mounted monument at ground surface.

A minimum of three "dead" volumes were purged from the soil gas monitoring points prior to sample collection. Purging and sampling was conducted through a laboratory-certified flow controller set to a flow rate of 167 milliliters per minute. The sample collection time was approximately 46 minutes for SV01 and SV02, and 47 minutes for SV03. The samples were analyzed for the presence of PCE, TCE, cis- and trans-1,2-DCE, and vinyl chloride by EPA Modified Method TO-15 SIM.

5.6 REMEDIAL INVESTIGATION RESULTS

Analytical results for soil and groundwater samples collected during the RI are presented on Figures 14 through 19 and in Tables 1, 2, and 11. Laboratory analytical reports are included as Appendix F of the RI Report (SoundEarth 2013).

5.6.1 Soil Results

The following is a summary of the soil analytical data generated during the RI conducted by SoundEarth in July 2012 through March 2013:

- Fill was encountered from ground surface to maximum depths between 10 and 18 feet bgs in on-Property boring B101 and off-Property borings B102 and B103. Very dense, glacially derived sediments predominantly composed of silty sands and sandy silts, with sections of gravel containing varying amounts of silts and sands, were encountered below the Site (Figures 9 and 10). Wet sand with some silt and gravel was encountered at depths below 80 feet bgs and interpreted as glacial outwash deposits.
- Soil samples collected from on-Property borings B101, DB02, DB03, and DB05 through DB13, and off-Property borings B103 through B107, B109 through B111, and B114 contained concentrations of PCE and TCE exceeding the applicable

cleanup levels. PCE and TCE concentrations that exceeded their respective cleanup levels were detected in soil collected from between 5 and 70 feet bgs. PCE concentrations exceeding the cleanup level were also detected in the soil samples collected from greater depths in B101 at 81 feet bgs and boring B104 at a depth of 80 feet bgs. The PCE concentrations detected in the soil samples collected from borings B101, B107, DB05, DB06, and DB07 at depths of between 30 and 40 feet bgs; boring DB10 at depths between 20 and 50 feet bgs; boring DB11 at a depth of 45 feet bgs; and boring DB12 at a depth of 20 feet bgs exceeded Washington State's Dangerous Waste criteria. A concentration of PCE at the cleanup level was detected in the soil sample collected from boring DB14 at a depth of 40 feet bgs.

- GRPH and/or benzene concentrations exceeding the cleanup level were detected in the soil samples collected from boring DB14 at depths of 10 and 20 feet bgs.
- Soil samples collected from borings B102, B108, B112, B113, B115, B116, B117, B118, B119, and DB01 did not exhibit concentrations of PCE or TCE exceeding the applicable cleanup levels and/or laboratory reporting limits. TCE was not detected in any of the soil samples collected from DB04 at concentrations above the laboratory reporting limits.
- None of the soil samples collected from the borings advanced during the RI contained concentrations of cis- or trans-1,2-DCE, 1,1-DCE, vinyl chloride, or other VOCs above their respective cleanup levels.
- GRPH and BTEX concentrations remained below laboratory reporting limit and the applicable cleanup levels in soil samples collected from borings B107 and DB02.

5.6.2 Reconnaissance Groundwater Results

The following is a summary of the reconnaissance groundwater analytical data generated during the RI:

- PCE concentrations exceeding the cleanup level were detected in reconnaissance groundwater samples collected from on-Property boring B101 at 80 feet bgs; borings DB02 through DB10, DB12, DB13, and DB14 at depths between 10 and 80 feet bgs; off-Property borings B103 at 40 and 80 feet bgs; B104 at 60, 80, and 100 feet bgs; and B106 at 35, 50, and 90 feet bgs. A concentration of PCE at the cleanup level was also detected in the reconnaissance groundwater sample collected from off-Property boring B102 at 30 feet bgs.
- Concentrations of TCE exceeding the cleanup level were detected in reconnaissance groundwater samples collected from on-Property borings B101 at 80 feet bgs; DB02, DB03, DB05, DB05A, DB06 through DB10, and DB12 through DB14 at depths between 10 and 70 feet bgs; off-Property borings B103 at 40 and 80 feet bgs; B104 at 60, 80, and 100 feet bgs; and B106 at 50 feet bgs.
- Cis-1,2-DCE concentrations exceeding the cleanup level were detected in reconnaissance groundwater samples collected from on-Property borings B101 and DB03, DB05A, DB08, DB09, DB12, DB13, and DB14 at depths between 10 and 80 feet bgs; off-Property borings B103 at 40 and 80 feet bgs; B104 at 60 and 80 feet bgs; and B106 at 50 feet bgs. A concentration of cis-1,2-DCE at the cleanup level was

also detected in the reconnaissance groundwater sample collected from DB13 at a depth of 15 feet bgs.

- Concentrations of vinyl chloride exceeding the cleanup level were detected in reconnaissance groundwater samples collected from on-Property boring B101 at 80 feet bgs and borings DB02, DB03, DB05A, DB08, DB09, DB13, and DB14 at depths between 35 and 70 feet bgs; off-Property boring B102 at 30 feet bgs; B103 at 40 and 80 feet bgs; B104 at 60, 80, and 100 feet bgs; and B106 at 35, 50, and 90 feet bgs. A concentration of vinyl chloride at the cleanup level was also detected in the reconnaissance groundwater sample collected from boring B102 at a depth of 50 feet bgs.
- Concentrations of detectable VOCs in groundwater samples collected from borings B102 and B103 were greatly reduced in the filtered samples when compared to the non-filtered samples.
- A methylene chloride concentration was detected in reconnaissance groundwater sample collected from boring B104 at depths of 80 feet bgs; however, the resultant concentrations were flagged by the laboratory because methylene chloride was also detected in the method blank. Therefore, the detected concentration is considered a result of laboratory contamination.
- Trans-1,2,-DCE and 1,1-DCE were not detected at concentrations exceeding their respective cleanup levels in any of the reconnaissance groundwater samples collected during the RI.
- Reconnaissance groundwater samples collected from boring B104 did not contain concentrations of BTEX constituents exceeding their respective cleanup levels.
- Reconnaissance groundwater samples collected from borings B105 and DB01 did not contain concentrations of VOCs above their respective laboratory reporting limits.
- Because PCE concentrations were so high in the reconnaissance groundwater samples collected from borings DB07, DB10, and DB12, the samples required dilution, which elevated the laboratory detection limits of TCE, cis-1,2-DCE, trans-1,2,-DCE, and vinyl chloride to above their respective cleanup levels. Therefore, it is not possible to determine if the concentrations of some of these CVOCs exceeded the cleanup levels in the samples collected from DB07, DB10, and DB12.

5.6.3 Groundwater Results

The following is a summary of the groundwater analytical results generated during the RI.

Shallow Wells: G-MW2, R-MW1, R-MW2, R-MW3, R-MW5, R-MW6, and MW-9

- Concentrations of PCE exceeding the cleanup level were detected in the groundwater samples collected from monitoring wells G-MW2, R-MW1, and R-MW3.
- Concentrations of TCE and cis-1,2-DCE exceeding the cleanup level were detected in groundwater sample collected from monitoring well G-MW2.

- Concentrations of vinyl chloride exceeding the cleanup level were detected in groundwater samples collected from monitoring wells R-MW1 and MW-9.
- Concentrations of BTEX, trans-1,2-DCE, 1,1-DCE, and EDC remained below their respective laboratory reporting limits and/or cleanup levels in all of the shallow wells sampled during the RI.
- Groundwater samples collected from monitoring wells R-MW2, R-MW5, and R-MW6 did not contain detectable concentrations of VOCs.

Intermediate Zone (Interval A) Wells: G-MW1, G-MW3, BB-8, MW107 through MW110, and MW114 through MW117

- Concentrations of PCE exceeding the cleanup level were detected in the groundwater samples collected from monitoring wells G-MW1, G-MW3, BB-8, MW107, MW109, MW110, MW114, MW115, and MW116.
- Concentrations of TCE exceeding the cleanup level were detected in groundwater samples collected from monitoring wells G-MW1, G-MW3, BB-8, MW107, MW109, MW110, and MW114.
- Concentrations of cis-1,2-DCE exceeding the cleanup level were detected in groundwater samples collected from monitoring wells G-MW1, G-MW3, MW107, MW108, MW109, MW110, MW114, MW115, and BB-8.
- Concentrations of vinyl chloride exceeding the cleanup level were detected in groundwater samples collected from monitoring wells G-MW1, G-MW3, MW107 through MW110, MW114, and MW115.
- A concentration of GRPH exceeding the cleanup level was detected in the groundwater sample collected from monitoring well MW107, located to the east of the Property within the 8th Avenue North ROW. Concentrations of DRPH and ORPH were below their applicable cleanup levels in the groundwater sample.
- Concentrations of PCE and TCE were below the laboratory reporting limit and/or cleanup level in groundwater samples collected from monitoring well MW108.
- The groundwater sample collected from monitoring well MW117, located within the Dexter Avenue North ROW to the south of the Property, did not contain detectable concentrations of VOCs.
- Groundwater samples collected from monitoring wells G-MW1, G-MW3, BB-8, and MW107, which were selected for additional BTEX analysis, did not contain concentrations of BTEX constituents above their respective cleanup levels.
- Trans-1,2-DCE, 1,1-DCE, and EDC were not detected at concentrations exceeding their respective cleanup levels in any of the groundwater samples collected from the Intermediate “A” wells sampled during the RI.

Intermediate Zone (Interval B) Wells: W-MW01 through W-MW04, MW111, and MW112

- Concentrations of PCE exceeding the cleanup level were detected in the groundwater samples collected from monitoring wells W-MW-02, W-MW-03, W-MW-04, and MW111.
- Concentrations of TCE exceeding the cleanup level were detected in the groundwater samples collected from monitoring wells W-MW02, W-MW04, and MW111.
- Concentrations of cis-1,2-DCE exceeding the cleanup level were detected in groundwater samples collected from monitoring wells W-MW-02, W-MW-03, W-MW-04, and MW111.
- Concentrations of vinyl chloride exceeding the cleanup level were detected in groundwater samples collected from monitoring wells W-MW-01 through W-MW-04 and MW111.
- The groundwater sample collected from monitoring well MW112, located in the Dexter Avenue North ROW to the west of the Property, did not contain detectable concentrations of VOCs.
- Concentrations of PCE, TCE, and cis,1,2-DCE were below the laboratory reporting limits and cleanup levels in the groundwater sample collected from monitoring well W-MW-01.
- Groundwater samples collected from monitoring wells W-MW-01 through W-MW-04, which were selected for additional BTEX analysis, did not contain concentrations of BTEX constituents above their respective cleanup levels.
- Trans-1,2-DCE, 1,1-DCE, and EDC were not detected at concentrations exceeding their respective cleanup levels in any of the groundwater samples collected from the Intermediate "B" wells sampled during the RI.
- Groundwater samples collected from monitoring wells W-MW-01 through W-MW-04, after redevelopment, contained significantly lower concentrations of VOCs compared to those observed by Windward, suggesting their initial data may have been biased high due to drilling and sampling methodology.

Deep Wells: MW101 through MW106 and MW113

- A concentration of PCE exceeding the cleanup level was detected in the groundwater sample collected from monitoring wells MW103.
- Concentrations of TCE and vinyl chloride exceeding the cleanup level were detected in groundwater samples collected from monitoring wells MW103 and MW113.
- Concentrations of cis-1,2-DCE exceeding the cleanup level were detected in groundwater samples collected from monitoring wells MW103 and MW113**.**
- Concentrations of vinyl chloride exceeding the cleanup level were detected in groundwater samples collected from monitoring wells MW103, MW105, and MW113.

- Groundwater samples collected from on-Property monitoring well MW101 and monitoring wells MW102, MW104, and MW106 located to the north, east and south of the Property, respectively, did not contain detectable concentrations of VOCs.
- Monitoring wells MW101 through MW106, which were selected for additional BTEX analysis, did not contain concentrations of BTEX constituents above their respective cleanup levels.
- Concentrations of PCE, TCE, and cis-1,2,-DCE remained below their respective laboratory reporting limits and cleanup levels in the groundwater sample collected from monitoring well MW105. PCE also remained below the cleanup level in the groundwater sample collected from monitoring well MW113.

5.6.4 Soil Gas Results

PCE was detected in all three soil gas samples at concentrations ranging from 1.5 to 4.6 micrograms per cubic meter (μg/m^3). Vinyl chloride and cis 1,2-DCE were detected in soil gas sample SV01 at concentrations of 0.71 μg/m^3 and 0.31 μg/m^3, respectively. TCE was only detected in soil gas sample SV03 at a concentration of 0.39 μg/m^3. Concentrations of all remaining analytes in the soil gas samples were not detected above laboratory reporting limits.

In accordance with Ecology's vapor intrusion guidance, concentrations of PCE, TCE, and vinyl chloride in the soil gas samples were compared to screening levels in soil gas that are protective of indoor air quality. Soil gas screening levels were calculated using their respective MTCA Method B indoor air cleanup levels for carcinogenicity, obtained from Ecology's cleanup levels and risk calculations (CLARC) database and divided by a vapor attenuation factor of 0.1. Detectable concentrations of PCE, TCE, and vinyl chloride in soil gas samples collected during the RI were all less than their calculated screening levels of 96, 3.7, and 2.8 μg/m^3, respectively, which would be protective of indoor air. A screening level protective of indoor air was not calculated for cis-1,2-DCE because the CLARC database has not provided an indoor air cleanup level since toxicity values were updated in 2010. The previous MTCA Method B indoor air cleanup level for cis-1,2-DCE for non-carcinogenicity was 160 μg/m^3, making the screening level 1,600 μg/m^3.

5.7 DATA GAPS

The borings and monitoring wells advanced and/or installed as part of this RI represent SoundEarth's reasonable efforts to evaluate the Site under the access limitations typical of a dense urban environment. However, following the completion of the RI, data gaps remain for the Site and include the following:

- The northern extent of chlorinated solvent contamination in groundwater has not been defined.
- The lateral and vertical extents of petroleum hydrocarbons in soil beneath the Property have not been defined.
- The vertical extent of petroleum contamination in groundwater has not been defined off the Property.

6.0 CONCEPTUAL SITE MODEL

This section provides a conceptual understanding of the Site derived from the results of the historical research and the subsurface investigations performed at the Site. Included is a discussion of the confirmed and suspected source areas, the COCs, media of concern, the fate and transport characteristics of the release of hazardous substances, the potential exposure pathways, and the definition of the Site. The CSM serves as the basis for developing technically feasible cleanup action alternatives and selecting a final cleanup action. The CSM is considered to be dynamic and may be refined throughout the cleanup action process as additional information becomes available.

This section discusses the components of the CSM developed for the Site based on the completion of multiple phases of investigation conducted by SoundEarth and others. Figures 21 through 22 provide visual representations of the information presented below.

6.1 CONFIRMED AND SUSPECTED SOURCE AREAS

The results of the investigations conducted at the Site suggest that the solvent impacts confirmed in soil and groundwater beneath the Site are the result of a release from the laundry and dry cleaning facility that operated on the Property from 1926 through 1995. Dry cleaning operations were conducted on the Property as early as 1966; by 1962, PCE was the primary dry cleaning agent in the United States. At the time, 90 percent of the PCE consumed in the United States was used for dry cleaning (Chemical Engineering News 1963). Considering the scale of the laundry and dry cleaning operations conducted at the Property, it is reasonable to expect that the use of dry cleaning solvents at the Property reflected that of the rest of the country.

Historical building plans indicated that the dry cleaning machines were installed on the first floor of Building A, with piping leading from the dry cleaning machines to the sumps in the boiler room of Building A. Anecdotal evidence suggests that dry cleaning operations were primarily conducted on the first floor of Building A (Figure 3). Consistent with this information, the highest concentrations of chlorinated solvents are located beneath the western portion of the Property, in the vicinity of the former Sump Nos. 2 and 4 and the associated sewer lines beneath former Building A. The results of the 2011 and 2012 preferential pathway investigation indicated that dry cleaning effluent may have flowed into Sump No. 4, which likely connected through the southern sewer line. Although it is not likely that Sump No. 4 leaked significantly, the joints within the sewer line may have contributed to a release of PCE-contaminated effluent into the subsurface beneath the Property. The results of laboratory analysis on sludge collected from cleanouts C.O. No. 1 and C.O. No. 2 and Sump No. 5, soil collected from test pit EX01 and borings B-07 and B101, and soil collected from boring B107 suggest that a portion of the PCE-contaminated effluent was conveyed through the northern, southern, and eastern sewer lines as well. The highest concentrations of GRPH in groundwater beneath the Property are located in the west-central portion of the Property, collocated with the highest concentrations of PCE. The distribution of solvents in soil and groundwater suggest that the primary source of the release is located in this area, although additional, smaller releases may have contributed to shallow solvent contamination elsewhere on the Property, including in the vicinity of the former water/sludge treatment facility that operated in Building C between 1986 and 1995. No ongoing chlorinated solvent releases to soil exist at the Site because dry cleaning operations ceased in the 1990s; however, the contaminated soil continues to act as a secondary source to soil vapor and groundwater.

Two generations of refueling facilities operated on the northern portion of the Property and four USTs containing heating oil operated in the southwestern portion of the Property. Anecdotal evidence indicates that the circa 1961 UST system located in the northeast corner of the Property leaked petroleum hydrocarbons into the subsurface. The distribution of petroleum hydrocarbons in groundwater in the northeast portion of the Property suggest that a release from the circa 1961 UST system has impacted groundwater. It is unlikely that ongoing petroleum hydrocarbon releases to soil beneath the Site exist since both fuel UST systems were reportedly removed between 1966 and 1985 and the heating oil USTs were removed in 2013; however, PCS may continue to act as a secondary source to soil vapor and groundwater.

6.2 CHEMICALS OF CONCERN

Based on the findings of the RI, the primary COCs at the Site are PCE and TCE located in soil and groundwater beneath the Property; the 8th Avenue North ROW; the south- and east-adjoining properties; the 9th Avenue North ROW; and the Valley, Roy, and Broad Streets ROWs.

With the exception of groundwater within the farthest downgradient wells, concentrations of secondary COCs are encompassed by the larger PCE/TCE plume. Secondary COCs identified for the Site include the following:

- Metals and PAHs in fill material beneath the Property.
- GRPH, DRPH, ORPH, and BTEX located beneath the Property and the 8th Avenue North ROW.
- Cis-1,2-DCE and vinyl chloride located beneath the Property; the 8th Avenue North ROW; the south and east-adjoining properties; the 9th Avenue North ROW; and the Valley, Roy, and Broad Streets ROWs.

6.3 MEDIA OF CONCERN

Soil and groundwater have been confirmed as affected media at the Site. Indoor air has been retained as potential media of concern based on the elevated concentrations of PCE in soil and groundwater beneath the Site.

6.4 CONTAMINANT FATE AND TRANSPORT OF CHLORINATED SOLVENTS

This section includes a discussion of the transport mechanisms and environmental fate of chlorinated solvents in the subsurface.

Chlorinated solvents present beneath the Site include PCE, TCE, cis-1,2-DCE, and vinyl chloride, which are confirmed to be present at levels requiring further action under MTCA in both soil and groundwater. The PCE-related compounds are likely present as a result of chemical or biological degradation of PCE. Because both PCE and the degradation products share similar environmental fate and transport characteristics and are present in the same media, PCE is the focus of the contaminant fate and transport discussion.

The RI activities conducted at the Site have demonstrated the following:

- A shallow, perched water-bearing zone is located beneath the Site at depths between 20 and 30 feet NAVD88 (i.e., 10 and 20 feet bgs), consistent with the depth and thickness of the fill material underlying the area.

- An intermediate water-bearing zone, comprised of Intervals A and B, overlies and encompasses a hard silt layer, above which approximately 70 percent of the contaminant mass is retained. The silt layer has been observed at elevations between -5 and 5 feet NAVD88 (i.e., 35 to 45 feet bgs).
- A deep water-bearing zone was encountered at depths of 90 to 125 feet bgs (-50 to -85 feet NAVD88) in the general vicinity of the Property. This zone encompasses a regional confined aquifer comprised of glacial outwash deposits.
- Concentrations of PCE are highest in groundwater samples collected in the west-central portion of the Property in the vicinity of B-9, GMW-2, G-MW3, DB05A, DB10, and DB12; PCE concentrations in groundwater collected from each of these borings/wells exceeded 100,000 µg/L during at least one sampling event. The highest concentration of PCE was 230,000 µg/L in groundwater collected from DB05A in March 2013. Groundwater exhibiting these concentrations was encountered between 10 and 45 feet bgs.
- Groundwater beneath the Site generally flows east toward Lake Union; the contaminant distribution in groundwater is consistent with the measured flow direction. The highest concentrations of chlorinated solvents have been detected within the shallow and intermediate water-bearing zones, with relatively low levels detected in the deep water-bearing zone. In most cases, supplemental sampling events indicate that the concentrations detected in the deeper water-bearing zone may have been a result of a high data bias due to elevated turbidity in the newly-installed wells.
- PCE in groundwater extends from the Property downgradient to 9th Avenue North. The easternmost well exhibiting chlorinated solvent concentrations in excess of the MTCA Method A cleanup level is BB-13, which contained a concentration of vinyl chloride at 1.1 µg/L in 1998 and is located on the western edge of Westlake Avenue North. The concentration dropped to below the laboratory reporting limit during a subsequent sampling event conducted by SoundEarth in 2010, indicating that the eastern extent of the plume has been defined.
- Concentrations of PCE in borings B-9 and G-MW1, which are located adjacent to former Building A (i.e., the west-central portion of the Property), exceed the land ban criteria of 60 mg/kg at depths between 4 and 20 feet bgs (Figure 16). A comparatively larger volume of soil exceeds the dangerous waste threshold of 14 mg/kg; however, concentrations of chlorinated solvents in soil generally diminish outward and downgradient of the primary source area, and the distribution of the solvents in soil generally follow that of groundwater.
- PCE has migrated vertically through soil to depths of up to 80 feet bgs in the areas explored (Figures 23 and 24). PCE contamination in soil extends south and east beyond the Property's boundaries and beneath the adjoining ROWs and portions of the south- and east-adjoining properties.
- The highest concentrations of petroleum hydrocarbons are located beneath the northern portion of the Property and within the 8th Avenue North ROW. The release of petroleum hydrocarbons is attributed to the former operation of refueling facilities on the Property and the east-adjoining properties.

6.4.1 Transport Mechanisms Affecting Distribution of Chlorinated Solvents in the Subsurface

The lateral, crossgradient, and upgradient distributions of PCE concentrations in the vadose zone likely are a result of vapor-phase transport via diffusion from source areas and transport over time. In addition to vapor-phase transport, PCE and its degradation products in the subsurface can be transported in the dissolved-phase via groundwater or other water that comes into contact with the contaminated soil. PCE, TCE, and cis-1,2-DCE in groundwater generally follow horizontal and vertical groundwater gradients, assuming some degree of seasonal fluctuation in groundwater flow direction. Groundwater beneath the Site generally flows toward the east; the contaminant distribution beneath the Site indicates that the majority of the contaminant migration beneath the Site appears to be a result of advective transport via bulk movement of groundwater. Upgradient contaminant migration, as well as some of the crossgradient distribution patterns, likely resulted from long-term diffusion and subsequent dispersion of the solvents in the subsurface.

The mobility of the highest concentrations of COCs is limited by the presence of a hard silt layer underlying much of the Property at elevations between -5 and 5 feet NAVD88. The silt layer appears to significantly restrict the vertical migration of COCs.

6.4.2 Environmental Fate of Chlorinated Solvents in the Subsurface

The primary COC at the Site is PCE. PCE is a volatile compound that will volatilize into a gaseous state from soil and/or groundwater. In areas of the Site where an impermeable cover is not present, some PCE in vapor will escape to the atmosphere. Once in the atmosphere, it will rapidly attenuate via photodegradation. However, once PCE enters the subsurface, chemical attenuation processes, such as hydrolysis, direct mineralization, and reductive dehalogenation, may affect the PCE in soil and groundwater, resulting in a natural reduction or breakdown into nontoxic components, such as chloride and carbon dioxide. Biological attenuation processes, such as reductive dechlorination and cometabolic degradation, also may affect the reduction of PCE in soil and groundwater under conducive subsurface conditions. If reductive biodegradation of PCE is occurring, the first indication is the presence of degradation compounds that include TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride.

TCE, cis-1,2-DCE, and vinyl chloride have been detected in soil and groundwater beneath the Site, demonstrating that biological and possibly chemical attenuation processes are occurring at the Site. In addition, groundwater parameters collected during a 2011 groundwater monitoring event at the Site demonstrated that dissolved oxygen concentrations were below 0.5 milligrams per liter (mg/L) at five of the 11 wells sampled within and near the source area. With the exception of one of the wells, dissolved oxygen was below 2 mg/L in all of the wells sampled. In addition, six of the 11 wells exhibited oxidation-reduction potential values well within the range required for biodegradation to be likely or possible, especially in combination with low dissolved oxygen (EPA 1998).

6.5 Contaminant Fate and Transport of Petroleum Hydrocarbons

This section includes a discussion of the transport mechanisms and environmental fate of petroleum hydrocarbons in the subsurface.

6.5.1 Transport Mechanisms Affecting Distribution of Petroleum Hydrocarbons in the Subsurface

The environmental transport mechanisms of petroleum hydrocarbons are related to the separate phases in the subsurface. The three phases of petroleum contamination in the subsurface at the Site are vapor (in soil vapor), residual contamination (sorbed contamination on soil particles), and aqueous phase (contaminants dissolved in groundwater). Each phase is in equilibrium in the subsurface with the other phases, and the relative ratio of total subsurface contamination by petroleum hydrocarbons between the four phases is controlled by dissolution, volatilization, and sorption.

GRPH observed in soil and groundwater beneath the Site has been transported from source areas and distributed throughout the Site primarily by dispersive and advective transport mechanisms within the saturated zone. As with other chemicals, petroleum hydrocarbons tend to spread out as groundwater flows away from the source area. The extent of the hydrocarbon plume depends on the volume of the release, soil density, particle size, and seepage velocity.

Volatilization of the contaminant plume can result in mass removal of hydrocarbons by releasing vapor into the vadose zone, where soil hydrocarbon vapor can be biodegraded to an extent not possible in light nonaqueous-phase liquids (LNAPL) or dissolved phases, depending on environmental conditions. Sorption of contaminants onto soil particles or interstitial soil spaces can immobilize contaminants. Contaminants sorbed onto soil particles are not free to transport via aqueous transport or LNAPL advection. Residual contamination, although not necessarily broken down quickly over time, is generally immobile.

6.5.2 Environmental Fate in the Subsurface

The most significant fate process for petroleum hydrocarbons is biodegradation (i.e., natural attenuation). Biological degradation of contaminants in LNAPL, dissolved, residual, and vapor phases, is possible under a variety of environmental conditions, although it occurs predominantly in the aqueous, residual, and vapor phases. Degradation products of gasoline constituents are generally less toxic than their parent species. Petroleum hydrocarbons that are the most mobile (having the least viscosity and most solubility in water) are also the most easily biodegraded (e.g., aromatics). Because petroleum constituents contain thousands of carbon compounds, there is a vast array of biochemical transformations that occur in situ in the soil and groundwater media. For example, hydroxylation can alter hydrocarbon compounds to ketone or alcohol products that are less toxic or more biologically available; aromatic reduction can convert aromatic groups to naphthenes; ring cleavage can destroy aromatic functional group species; and reduction can alter olefin functionality. The alteration and destruction of petroleum hydrocarbon constituents occur both by microbial enzyme catalytic reactions on the contaminant substrate or by direct digestion of contaminants as an electron donor or acceptor. Any number of reactions can occur within the subsurface by microorganisms that can change the chemical distribution and concentrations of the contaminants.

6.6 Exposure Pathways

This section discusses the confirmed and potential human health and ecological exposure pathways at the Site with the following goals: (1) identifying those pathways requiring remediation to reduce or eliminate unacceptable risks to human health or the environment and (2) applying the findings to the development of potentially feasible remedial technologies. A CSM highlighting the complete pathways is presented on Figure 22.

6.6.1 Soil Pathway

Potential exposure pathways for soil contamination include volatilization into soil vapor and subsequent exposure through the vapor pathway discussed in Section 6.6.3 or via the direct contact pathway, which comprises direct contact via dermal contact with and/or ingestion of soil beneath the Site. Protection from direct contact exposure to affected soil would require capping or excavation. At present, much of the ground surface of the Property is covered with the foundation of the former buildings, with the exception of the portions of Building B that were removed prior to the decommissioning of the four 6,000-gallon USTs associated with the former boiler room. The remaining soil exhibiting concentrations of PCE that exceed the MTCA Method B soil cleanup level of 14 mg/kg, which is considered protective of the direct contact pathway for dermal contact and/or ingestion, is covered with concrete, asphalt, and/or building structures, which minimize the risk of direct contact. While future development activities at the Site could result in exposure to contaminated soil above direct contact levels during construction, this pathway will be mitigated by virtue of the plan to remove soil within the top 15 feet of the Property containing concentrations of COCs in excess of their respective cleanup levels prior to and during redevelopment activities.

6.6.2 Groundwater Pathway

Groundwater is affected by releases directly into a groundwater-bearing zone or by unsaturated soil contamination desorbed from the soil particles by infiltrating surface water or seasonally high groundwater conditions. Potential exposure pathways for groundwater contamination include volatilization into soil vapor and subsequent exposure through the vapor pathway discussed in Section 6.6.3 or via the direct contact pathway, which comprises both the dermal contact and ingestion pathways. No groundwater supply wells at or in the vicinity of the Site are used for potable water supply. The deep water-bearing zone underlying the Site may qualify as a potential future source of potable water; however, because of the availability of municipal water supplies in the Site vicinity, there is a low probability that groundwater in the deep water-bearing zone beneath the Site or adjoining parcels would be used as a potable water source. Because there is no practical use of groundwater in the Site vicinity, excavation activities would be required for direct contact with groundwater to become a potential risk to human health. Future development or remediation activities that may be conducted within the shallow perched interval or the intermediate water-bearing zones could result in exposure to contaminated groundwater during remedial construction activities.

6.6.3 Vapor Pathway

The air-filled pore space between soil grains in the unsaturated zone or partially saturated zone is referred to as soil gas or soil vapor. Soil vapor can become contaminated from volatilization of a PCE source, specifically from PCE as a nonaqueous-phase liquid, but also from PCE adsorbed to soil mineral surfaces and, to a lesser degree, dissolved in groundwater. Ecology guidance for evaluating soil vapor intrusion risks into structures provides generic chemical-specific screening levels for both groundwater and soil vapor that are protective of human health (Ecology 2009a).

Because no buildings are currently located on the Property, the soil gas data collected during the RI were used to evaluate the potential for vapor intrusion into adjoining, off-Property buildings.

The maximum detected COC soil gas concentrations and the associated screening levels protective of indoor air from the guidance are summarized in the following table.

COC	Maximum Detected Concentration in Soil Vapor (µg/m^3)	Soil Gas Screening Level Protective of the Vapor Intrusion Pathway (µg/m^3) (Ecology 2009a)
PCE	4.6	96
TCE	0.39	3.7
Cis-1,2-DCE	0.31	160[a]
Vinyl chloride	0.71	2.8
GRPH	Not Measured	1,400–27,000[b]

NOTES:
[a]2009 guidance value. CLARC database does not currently have an indoor air cleanup level for cis-1,2-DCE.
[b]The screening levels vary by fraction for petroleum hydrocarbons (air-phase petroleum hydrocarbons):
The standard for EC9-12 aliphatics is 1,400 µg/m^3.
The standard for EC9-10 aromatics is 1,800 µg/m^3.
The standard for EC5-8 aliphatics is 27,000 µg/m^3.

A comparison of the maximum detected COC concentrations in soil gas with the respective vapor intrusion screening level indicates that there is not a vapor intrusion risk under a standard exposure scenario involving a slab-on-grade, crawl space, or full basement construction at off-Property locations. In addition, any on-Property risks will be mitigated in the future by virtue of remediating the contaminated soil and groundwater prior to and during Property redevelopment.

Because the groundwater contamination plume will remain at least temporarily following remediation activities, the groundwater screening levels for vapor intrusion are appropriately used for a screening level evaluation of the risk of vapor intrusion for future land use on the Property. The referenced guidance indicates that when conducting a Tier 1 evaluation of vapor intrusion risk, the maximum measured groundwater concentrations should be compared to the screening levels. The maximum detected COC concentrations in groundwater beneath the Property and the associated groundwater screening level protective of indoor air from the guidance, and updated using Ecology's CLARC database, revised in September 2012, are summarized in the following table.

Chemicals of Concern	Maximum Detected Concentration in Groundwater (µg/L)	Groundwater Screening Level Protective of the Vapor Intrusion Pathway (µg/L) (Ecology 2009a Appendix B)[1]
PCE	220,000	25
TCE	4,800	1.5
Cis-1,2-DCE	7,600	160[a]
Vinyl chloride	630	0.34
GRPH/DRPH/ORPH	7,200/26,000/25,000	2.9–1,300[b]
Benzene	684	2.4

NOTES:
[1]Groundwater Screening Level is equal to the indoor air cleanup level divided by the product of an attenuation factor of 0.001, Henry's Law constant at 13 degrees Celsius (the average temperature of groundwater in Washington), and a conversion factor of 1,000.
[a]2009 guidance value. CLARC database does not currently have an indoor air cleanup level for cis-1,2-DCE.
[b]The screening levels vary by fraction for volatile petroleum hydrocarbons (volatile petroleum hydrocarbons):
The standard for EC8-10 aliphatics + EC10-12 aliphatics is 2.9 µg/L.
The standard for EC5-6 aliphatics + EC6-8 aliphatics is 140 µg/L.
The standard for C8-10 aromatics + EC10-12 aromatics is 1,300 µg/L.

A comparison of the maximum detected COC concentrations in groundwater with the respective vapor intrusion screening level indicates that there would be a potential vapor intrusion risk from all of the COCs under the standard exposure scenarios involving a slab-on-grade, crawl space, or full basement construction on the Property.

6.7 TERRESTRIAL ECOLOGICAL EVALUATION

A Terrestrial Ecological Evaluation (TEE) is required by WAC 173-340-7940 at locations where a release of a hazardous substance to soil has occurred. The TEE is intended to assess potential risk to plants and animals that live entirely or primarily on affected land. The Site qualifies for an exclusion from conducting a TEE, under the criteria specified in WAC 173-340-7491(b). Soil contamination is covered by pavement and other physical barriers that prevent plants and wildlife from being exposed. If the contaminated soil is left in place, an institutional control, such as an environmental covenant, will be required by Ecology. If soil is remediated beneath the Site to the depths of 15 feet bgs, the standard point of compliance, the Site will also qualify for an exclusion from conducting a TEE under WAC 173-340-7491(a) and an institutional control will not be required by Ecology. The TEE considers Site area, Site land use, Site habitat quality, likelihood that the Site will attract wildlife, and COCs occurring in Site soil. No further consideration of ecological impacts is required under MTCA.

6.8 CONCEPTUAL SITE MODEL SUMMARY

A summary of the geologic, hydrogeologic, and laboratory analytical data are presented on Figures 21 and 22, which display a conceptual model of Site conditions. As shown on Figures 9 through 11, the subsurface soil beneath the Site is interpreted to consist of the following geologic units, from youngest to oldest: anthropogenic fill, post-Vashon lacustrine deposits, Vashon glacial till or Vashon age ice-contact deposits, and advance outwash deposits and glacial till or drift of either Vashon age or pre-Fraser age.

The results of previous subsurface investigations and the RI conducted at the Site suggest that the chlorinated solvent impacts confirmed in soil and groundwater beneath the Site are the result of a release from the laundry and dry cleaning facility that operated on the Property from 1925 through 1995. Historical building plans indicated that the bulk of the dry cleaning operations were conducted in Building A, with piping leading from the dry cleaning machines to the sumps in the boiler room on the western portion of Building A. Consistent with this information, the highest concentrations of chlorinated solvents are located near Building A in the west-central portion of the Property.

The high concentrations of PCE in soil and groundwater are inferred to be evidence of a release from the former dry cleaning facility that operated on the Property. Concentrations of PCE and associated COCs in the soil decrease rapidly upgradient of the source area and are carried through advective transport downgradient of the source area. Vertical distribution of solvent-contaminated soil is limited in large part by the presence of a layer of hard silt that underlies the Property at elevations between -5 and 5 feet NAVD88 (i.e., 35 to 45 feet bgs). Approximately 70 percent of the solvent mass is held up by the silt layer; the remaining soil contamination extends up to 80 feet bgs.

As with solvent-contaminated soil, the bulk of the solvent contamination in groundwater remains above the hard silt layer underlying the Property. The highest concentrations of chlorinated solvents have been detected within the shallow and intermediate water-bearing zones, with relatively low levels detected in the deep water-bearing zone. While elevated concentrations of chlorinated solvents have been detected in groundwater collected from the deep water-bearing zone, they consistently drop during subsequent sampling events.

The lateral distribution of PCE is consistent with groundwater flow direction. PCE in groundwater extends from the Property downgradient to 9th Avenue North. The easternmost well exhibiting chlorinated solvent concentrations in excess of the MTCA Method A cleanup level is BB-13, which contained a concentration of vinyl chloride at 1.1 µg/L in 1998 and is located on the western edge of Westlake Avenue North. The concentration dropped to below the laboratory reporting limit during a subsequent sampling event conducted by SoundEarth in 2010, indicating that the eastern, downgradient extent of the plume is defined.

Concentrations of petroleum hydrocarbons exceed their respective cleanup levels in soil and groundwater samples collected on the northern portion of the Property and within the 8th Avenue North ROW. The petroleum contamination is attributed to the historical operation of refueling facilities on the Property and on the east-adjoining properties. The petroleum hydrocarbon contamination appears vertically limited to the shallow and intermediate water-bearing zones.

As indicated in Section 6.7, the Site qualifies for a TEE exclusion based on WAC 173-340-7491. Section 6.6 discusses potential exposure pathways that could affect human health at the Site. In summary, the following exposure pathways are of concern for future human health exposure at the Site:

- **Soil Pathway.** Direct contact via dermal contact and/or ingestion by construction workers encountering contaminated soil during future construction activities on the Site. However, the soil pathway is not considered complete under the planned future use of the Property. Additional discussion of soil pathways is included in Section 6.6.1.

- **Groundwater Pathway.** Direct contact via dermal contact and/or ingestion by construction workers encountering contaminated perched groundwater 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. Additional discussion of groundwater pathways is included in Section 6.6.2.
- **Vapor Pathway.** A screening level vapor intrusion evaluation suggests that there is the potential for an unacceptable vapor intrusion risk from contaminants in soil and/or groundwater intruding into existing structures at the Site, as well as short-term inhalation of volatilized contaminants by construction workers during future construction activities on the Site. However, the vapor intrusion pathway is not considered complete under the planned future use of the Property. Additional discussion of the vapor pathway is included in Section 6.6.3.

7.0 TECHNICAL ELEMENTS

Remedial action objectives (RAOs) are used to define the technical elements for the screening evaluation and to select remedial alternatives. The technical elements include ARARs, COCs, media of concern, and cleanup standards.

7.1 REMEDIAL ACTION OBJECTIVES

RAOs are statements of the goals that a remedial alternative should achieve in order to be retained for further consideration as part of the FS. The purpose of establishing RAOs for a site is to provide remedial alternatives that protect human health and the environment (WAC 173-340-350). In addition, RAOs are designated in order to:

- Implement administrative principles for cleanup (WAC 173-340-130).
- Meet the requirements, procedures, and expectations for conducting an FS and developing cleanup action alternatives as discussed in WAC 173-340-350 through 173-340-370.
- Develop cleanup levels (WAC 173-340-700 through 173-340-760) and remedial alternatives that are protective of human health and the environment.

In particular, RAOs must address the following threshold requirements from WAC 173-340:

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

The overall RAO for this FS is to identify a remedial alternative(s) that will treat the primary source area and reduce COC concentrations in groundwater to below the applicable cleanup levels at the points of compliance proposed in Section 7.4. In addition to mitigating risks to human health and the environment, achieving the RAO ultimately will allow Ecology to issue a determination of No Further Action (NFA) for the Site.

In consideration of the anticipated future use of the Property, specific objectives for the preferred remedy include the following:

- Use in situ treatment of soil beneath the Property to an elevation of 0 feet NAVD88 and the subsequent excavation of vadose zone soil containing COCs that present a risk to human health and the environment to 30 feet NAVD88 (approximately 10 feet bgs) from lot line to lot line, as well as a limited area down to 20 feet NAVD88 (approximately 20 feet bgs) to address PCS.
- Use in situ treatment methods to reduce COCs in groundwater across the entire Site to mitigate conflicts with adjoining and future land use.
- Prevent further off-Property migration of COCs in groundwater at concentrations exceeding cleanup levels.
- Provide engineering controls to prevent the unacceptable risks to human health posed by COCs in groundwater until cleanup levels are achieved.
- Acquire a determination of NFA for the Site.

7.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Under WAC 173-340-350 and 173-340-710, ARARs include regulatory cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that specifically address a contaminant, remedial action, location, or other circumstances at a site.

MTCA defines relevant and appropriate requirements as:

> Those cleanup action standards, standards of control, and other environmental requirements, criteria or limitations established under state and federal law that, while not legally applicable to the hazardous substance, cleanup action, location, or other circumstances at a site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site.

The criteria specified in WAC 173-340-710(4) shall be used to determine if a requirement is relevant and appropriate.

Remedial actions conducted under MTCA must comply with the substantive requirements of the ARARs but are exempt from their procedural requirements (WAC 173-340-710[9]). Specifically, this exemption applies to state and local permitting requirements under the Washington State Water Pollution Control Act, Solid Waste Management Act, Hazardous Waste Management Act, Clean Air Act, State Fisheries Code, and Shoreline Management Act.

ARARs were screened to assess their applicability to the Site. The following table summarizes the preliminary ARARs.

Preliminary ARARs for the Site

Preliminary ARAR	Citation or Source
MTCA	Chapter 70.105 of the Revised Code of Washington (RCW)
MTCA Cleanup Regulation	WAC 173-340
Ecology, Toxics Cleanup Program – Guidance To Be Considered	*Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*, Review DRAFT, October 2009, Publication No. 09-09-047
State Environmental Policy Act	RCW 43.21C
Washington State Shoreline Management Act	RCW 90.58; WAC 173-18, 173-22, and 173-27
The Clean Water Act	33 United States Code [USC] 1251 et seq.
Comprehensive Environmental Response, Compensation, and Liability Act of 1980	42 USC 9601 et seq. and Part 300 of Title 40 of the Code of Federal Regulations (CFR) [40 CFR 300])
The Fish and Wildlife Coordination Act	16 USC 661-667e; the Act of March 10, 1934; Ch. 55; 48 Stat. 401)
Endangered Species Act	16 USC 1531 et seq.; 50 CFR 17, 225, and 402
Native American Graves Protection and Repatriation Act	25 USC 3001 through 3013; 43 CFR 10 and Washington's Indian Graves and Records Law (RCW 27.44)
Archaeological Resources Protection Act	16 USC 470aa et seq.; 43 CFR 7
Washington Dangerous Waste Regulations	WAC 173-303
Solid Waste Management Act	RCW 70.95; WAC 173-304 and 173-351
Occupational Safety and Health Administration Regulations	29 CFR Parts 1910, 1926
Washington Department of Labor and Industries Regulations	WAC 296
Water Quality Standards for Surface Waters of the State of Washington	RCW 90.48 and 90.54; WAC 173-201A
Water Quality Standards for Ground Water	WAC 173-200
Department of Transportation Hazardous Materials Regulations	40 CFR Parts 100 through 185
Washington State Water Well Construction Act	RCW 18.104; WAC 173-160
City of Seattle regulations, codes, and standards	All applicable or relevant and appropriate regulations, codes, and standards
King County regulations, codes, and standards	All applicable or relevant and appropriate regulations, codes, and standards

7.3 MEDIA AND CHEMICALS OF CONCERN

The Property redevelopment plan currently includes excavating to an elevation of approximately 30 feet NAVD88 for subgrade parking. The depth of the planned excavation is expected to remove soil from the vadose zone exhibiting solvent concentrations that exceed applicable cleanup levels. A small area also will be overexcavated to a depth of 20 feet NAVD88 to address PCS. The soil will be transported offsite for disposal at an appropriate land disposal site. Although soil is currently the primary media of concern, upon the in situ treatment of contaminated soil beneath the Property and the subsequent excavation and removal of contaminated soil from the vadose zone, groundwater will become the primary media of concern. Secondary media of concern include soil vapor and indoor air by virtue of vapor transport from groundwater. The primary and secondary media and associated COCs are shown in the table below:

Media of Concern	Chemicals of Concern
Soil	PCE, TCE, GRPH, DRPH, ORPH, BTEX, metals, and PAHs
Groundwater	PCE, TCE, cis-1,2-DCE, vinyl chloride, GRPH, DRPH, ORPH, and BTEX
Soil Vapor, Indoor Air	PCE, TCE, cis-1,2-DCE, vinyl chloride, GRPH, and benzene

7.4 CLEANUP STANDARDS

The selected cleanup action alternatives must comply with the MTCA cleanup regulations specified in WAC 173-340 and with applicable state and federal laws. The cleanup levels selected for the Site are consistent with the RAOs, which state that the remedial objective is to reduce concentrations of COCs in soil and/or groundwater to below the MTCA Method A (or B, as applicable) cleanup levels. In addition to mitigating risks to human health and the environment, achieving the RAOs will allow Ecology to issue a determination of NFA under Ecology's voluntary cleanup program. The associated media-specific cleanup levels for the identified COCs are summarized in Sections 7.4.1 through 7.4.3 below.

7.4.1 Cleanup Levels

The cleanup levels for the COCs and media of concern are tabulated below, including the source of the standard. The proposed cleanup levels for the Site are the MTCA Method A cleanup levels for COCs in soil, which are protective of the direct-contact pathway and protective of groundwater. The MTCA Method A cleanup levels are proposed for COCs in groundwater. If no promulgated MTCA Method A cleanup level exists for a given chemical, the proposed cleanup level is the MTCA Method B Standard Formula Value for carcinogenic or noncarcinogenic compounds, depending upon the carcinogenic properties of the compound.

Proposed Cleanup Levels for Soil

Chemicals of Concern	Cleanup Level (mg/kg)	Source
GRPH	30	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)
DRPH	2,000	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)
ORPH	2,000	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)
Benzene	0.03	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)
Toluene	7	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)
Ethylbenzene	6	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)
Total Xylenes	9	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)
PCE	0.05	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)
TCE	0.03	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)
Cis-1,2-DCE	160	MTCA Method B, Non-Carcinogen; WAC 173-340-740(3)(b)(i)
Vinyl chloride	0.67	MTCA Method A, Unrestricted; WAC 173-340-740(2)(b)(i)

Proposed Cleanup Levels for Groundwater

Chemicals of Concern	Cleanup Level (µg/L)	Source
GRPH	800	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
DRPH	500	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
ORPH	500	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
Benzene	5	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
Toluene	1,000	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
Ethylbenzene	700	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
Total Xylenes	1,000	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
PCE	5	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
TCE	5	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)
Cis-1,2-DCE	16	MTCA Method B, Table Value; WAC 173-340-720(4)(b)(iii)
Vinyl chloride	0.2	MTCA Method A, Table Value; WAC 173-340-720(3)(b)(i)

Proposed Cleanup Levels for Soil Gas

Chemicals of Concern	Cleanup Level[1] ($\mu g/m^3$)	Source
GRPH[2]	1,400/14,000	"Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action", Review DRAFT, October 2009, Publication No. 09-09-047; Appendix B, Method B; PCE and TCE Updated in CLARC Database on September 2012
Benzene	3.2/32	
PCE	96/960	
TCE	3.7/37	
Cis-1,2-DCE	160/1,600 (NC)	
Vinyl chloride	2.8/28	

NOTES:

[1]The first value is the screening level for sub-slab measurements; the second value is the screening level for deep (> 15 feet below ground surface) soil gas measurements.

[2]This is the lowest (most conservative) of the three screening level values for air-phase petroleum hydrocarbon fractions.

NC = noncarcinogenic

Proposed Cleanup Levels for Indoor Air

Chemicals of Concern	Cleanup Level ($\mu g/m^3$)	Source
GRPH[1]	140	*Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*, Review DRAFT, October 2009, Publication no. 09-09-047; Appendix B, Method B; PCE and TCE Updated in CLARC Database on September 2012
Benzene	0.32	
PCE	9.6	
TCE	0.37	
Cis-1,2-DCE	16 (NC)	
Vinyl chloride	0.28	

NOTES:

[1]This is the lowest of the three screening level values for air-phase petroleum hydrocarbon fractions.

NC = noncarcinogenic

7.4.2 Points of Compliance

The point of compliance is the location where the enforcement limits that are set in accordance with WAC 173-200-050 will be measured and cannot be exceeded (WAC 173-200-060). Once the cleanup levels have been attained at the defined points of compliance, the impacts present beneath the Property will no longer be considered a threat to human health or the environment. In situations where achieving the standard point of compliance is not practicable, conditional points of compliance can be implemented under the expectation that the persons responsible for undertaking the cleanup action shall demonstrate that all practical methods of treatment will be used in the Site cleanup and will not result in a greater overall threat to human health and the environment (WAC 134-340-720).

7.4.2.1 Point of Compliance for Groundwater

In accordance with WAC 173-340-720(8)(a)(b), the point of compliance for groundwater is defined as the uppermost level of the saturated zone extending vertically to the lowest depth that potentially could be impacted by the COCs throughout the Site. Based on the results of the FS summarized herein, the proposed groundwater treatment alternative provides a barrier to any ongoing off-site migration of contaminated groundwater, while at the same time enhancing the natural attenuation of groundwater.

7.4.2.2 Point of Compliance for Soil

In accordance with WAC 173-340-740 (6) (b-d), the point of compliance for direct contact exposure is throughout the Property from the ground surface to 15 feet bgs, which is a reasonable estimate of the depth of soil that could be excavated and distributed at the soil surface as a result of development activities. All soil containing concentrations of COCs above the MTCA Method A cleanup levels will be excavated to a depth of 10 feet bgs (i.e., 30 feet NAVD88) and removed from the Property. Soil within the vadose zone will be excavated from lot line to lot line, and soil within the saturated zone will be treated using in situ technologies.

7.4.2.3 Point of Compliance for Soil Gas

Cleanup standards and points of compliance for soil gas have not been promulgated as of the date of this document, although soil gas screening levels have been published as draft guidance by Ecology (Ecology 2009a) and are included as ARARs for this document. The points of compliance for soil gas are identified in the referenced guidance for both sub-slab gas (soil gas encountered just beneath a building) and deeper soil gas (defined as equal to, or greater than, 15 feet bgs).

7.4.2.4 Point of Compliance for Indoor Air

Cleanup standards and points of compliance for indoor air have not been promulgated as of the date of this document, although indoor air cleanup levels have been published as draft guidance (Ecology 2009a) and are included as ARARs for this document. The points of compliance will be the standard point of compliance per WAC 173-340-750(6), which is ambient air throughout the Property.

8.0 FEASIBILITY STUDY

The purpose of this FS is to develop and evaluate cleanup action alternatives to facilitate selection of a cleanup action at the Site in accordance with WAC 173-340-350(8). The FS is intended to provide sufficient information to enable Ecology and the Property owner to reach concurrence on the selection of a cleanup action. Details regarding the implementation of the selected cleanup action for the Site will be documented in a Cleanup Action Plan.

This FS includes screening of potentially feasible remedial technologies and development of cleanup action alternatives intended to achieve the remedial action objectives described in Section 7.1. The cleanup action alternatives are evaluated with respect to threshold and other requirements for cleanup actions set forth in MTCA. This FS evaluates the alternatives and identifies those that are not effective, not technically possible, or whose costs are disproportionate under the provisions of WAC 173-340-360(3)(e), and it provides the basis for identifying a preferred cleanup action alternative.

In accordance with WAC 173-340-350(8)(c)(ii), an FS generally will include at least one permanent cleanup action alternative, as defined in WAC 173-340-200, to serve as a baseline against which other alternatives will be evaluated for the purpose of determining whether the cleanup action selected is permanent to the maximum extent practicable. For the purposes of achieving the RAOs and facilitating redevelopment activities, each of the alternatives discussed below incorporates excavation and removal of the source area, which fulfills the requirements of a permanent cleanup action alternative.

8.1 EVALUATION OF FEASIBLE REMEDIATION TECHNOLOGIES

Remedial components (technologies) were evaluated with respect to the degree to which they comply with the cleanup requirements set forth in MTCA. According to MTCA, a 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 cleanup standards.
- Comply with applicable state and federal laws.
- Provide for compliance monitoring.

These criteria represent the minimum standards for an acceptable cleanup action.

WAC 173 340-360 (2)(b) also requires the cleanup action alternative to:

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

Using the above criteria, several remedial technologies were evaluated and screened for effectiveness, implementability, and relative cost to produce a short list for further inclusion in the development of alternatives. Table 12 summarizes the remedial component screening process. The remedial components that passed the screening process include the following:

- **Excavation and Land Disposal of Contaminated Soil.** For the purposes of this FS, the excavation of contaminated soil from the Property will include the removal of the impacted soil to an elevation of 30 feet NAVD88 to remove COCs from the vadose zone. Overexcavation of soil located in the northeast corner of the Property to an elevation of 20 feet NAVD88 is necessary to remove PCS that exceeds MTCA Method A cleanup levels. Land disposal is the act of removing contaminated soil from an uncontrolled condition and placing it in a controlled condition where it will produce fewer adverse environmental impacts. A controlled condition generally refers to engineered landfills that feature low permeability liners, witness systems, and leachate collection systems to prevent the disposed soil from leaching into the environment and mitigate future liability associated with the contamination.

- **Dewatering during Excavation.** Extensive dewatering is not anticipated due to the relatively shallow limits of the excavation (approximately 30 feet NAVD88, i.e., 10 feet bgs). The overexcavation of PCS will require dewatering to reach 20 feet NAVD88 since shallow groundwater beneath the Property is at approximately 30 feet NAVD88. As the excavation proceeds, it will encounter the shallow water-bearing zone across the Property. Dewatering is the process of pumping the groundwater that infiltrates the limits of the excavation. The water is collected at a low point in the excavation where it is then pumped to a water storage tank at the ground surface for treatment and disposal.

- **Soil Vapor Extraction.** Soil vapor extraction (SVE) is the process of inducing a pressure and concentration gradient in the subsurface to cause volatile compounds, including PCE, TCE, GRPH, and benzene, to desorb from the soil and flow with the vapor stream to a common collection point for discharge or treatment. Collected vapors will be treated with granular-activated carbon prior to being discharged to the atmosphere.

- **Resistive Thermal Heating with Vapor Extraction.** Contaminated soil and groundwater is heated using electrical resistance to a temperature sufficient to cause the contaminants in the subsurface to volatilize to the vapor phase, where they are recovered by vapor extraction. Recovered vapor and water are treated with granular-activated carbon to remove contaminants before they are discharged.

- **In Situ Chemical Oxidation with Permanganate.** Permanganate has proven to be an effective chemical oxidant for the treatment of chlorinated solvents (PCE, TCE, cis-1,2-DCE, and vinyl chloride) in soil and groundwater. A solution of permanganate as a salt of either potassium or sodium is injected into the groundwater to chemically oxidize these target COCs.

- **Reductive Dechlorination (Anaerobic Bioremediation).** Reductive dechlorination is a proven remedial technology for chlorinated solvents. The fermentation of edible oil by indigenous microorganisms injected into the groundwater produces a rapid and significant reduction in dissolved oxygen concentrations in the saturated zone. This provides the strongly negative oxidation/reduction potential necessary to treat the target COCs by reductive dechlorination. The anaerobic zone extends far beyond the radius of influence of the edible oil itself, enhances attenuation of contaminants both up- and crossgradient of the active treatment zone, and serves as a barrier around the periphery of the treatment zone/groundwater plume, which mitigates the migration of contaminated groundwater beyond Site boundaries. Reductive dechlorination is a biotic process completed by anaerobic bacteria. Complete dechlorination of PCE produces non-toxic chloride, ethene, and ethane gas.

- **Passive Vapor Barrier.** Passive vapor barriers are materials that exhibit very low gas flow permeability and that can prevent the intrusion of vapor-phase VOCs into the interior of the building. The foundation of the future on-Property development will include the floor and walls of a one- to two-story, with below-ground parking garage.
- **Monitored Natural Attenuation.** Monitored natural attenuation refers to the methods used to evaluate whether natural attenuation processes are effectively remediating a contaminant plume, and if so, at what rate. Contaminants released to the environment in concentrations that pose risks to human health or the environment are subject to natural degradation processes such as volatilization, diffusion, biotic and abiotic reactions, and dilution. These naturally occurring attenuation processes are distinguished from an engineered remedy employed to increase the rate of remediation above the rate observed through these "natural" processes. In many cases, natural attenuation is the most cost-effective means for achieving cleanup levels.

  Monitored natural attenuation is retained as a complimentary remedial component to other engineered remedial components rather than as a stand-alone or sole remedial component to be consistent with the expectations for natural attenuation stipulated under MTCA. Under MTCA, monitored natural attenuation can be considered an active remedial measure if Site conditions conform to the expectations listed in WAC 173-340-370(7), as follows:

  – Source control (including removal and/or treatment of hazardous substances) has been conducted to the maximum extent practicable.

  – Leaving contaminants in place during the restoration time frame does not pose an unacceptable threat to human health or the environment.

  – There is evidence that natural biodegradation or chemical degradation is occurring and will continue to occur at a reasonable rate at the site.

  – Appropriate monitoring requirements are conducted to ensure that the natural attenuation process is taking place and that human health and the environment are protected.

8.2 CLEANUP ACTION ALTERNATIVE DEVELOPMENT AND DESCRIPTION

The development of cleanup action alternatives considered only those remedial components that effectively treat the COCs in the affected media of concern and that were conducive to the future Property redevelopment plan. The most recent development plans for the Property include a bio-tech campus with underground parking. Preliminary site plans indicate that the entire Property will be excavated to a final grade depth of 30 feet NAVD88. Excavating the entire Property to this depth will remove shallow soil exhibiting COCs above the respective cleanup levels and remove the majority of the source material from the Property.

Three cleanup action alternatives have been developed that are comprised of various combinations of the remedial components retained from the component screening step. The electrical resistance heating (ERH) and SVE system and the excavation and off-site land disposal of contaminated soil are common to each of the alternatives presented in the FS. The cleanup action alternatives differ only in the type of treatment employed to remediate groundwater.

Because of the significant elevation changes—and associated relative depths bgs—across the Site, discussions regarding elevation and depth are hereafter presented in elevations above NAVD88.

The three alternatives, which are described in more detail in the following subsections, include the following:

- Cleanup Action Alternative 1, ERH/SVE, Excavation of Soil, and In Situ Reductive Dechlorination of Groundwater
- Cleanup Action Alternative 2, ERH/SVE, Excavation of Soil, and In Situ Chemical Oxidation of Groundwater
- Cleanup Action Alternative 3, ERH/SVE, Excavation of Soil, and Permeable Reactive Barrier Wall for Groundwater

8.2.1 Common Components and Basic Assumptions

For each cleanup action alternative, the Site was separated into three vertical treatment zones for the ease of discussion and presentation of the conceptual layout of each alternative. The treatment zones are designated as: Shallow Treatment Zone, Intermediate Treatment Zone, and Deep Treatment Zone (Figures 23 and 24). These zones were identified based on the CSM and hydrogeologic model for the Site.

The three cleanup action alternatives reviewed in detail in this FS differ only in the type of groundwater treatment technology used. Due to the nature of the redevelopment plan, the following elements are common among all three cleanup action alternatives.

Demolition. Because the remediation activities will be conducted as part of a larger redevelopment project, the costs associated with the demolition and grading permits, as well as the hazardous materials survey and abatement activities, are not included in the feasibility level cost estimates and are assumed to be a development-related cost.

Electrical resistive heating and soil vapor extraction. The ERH and SVE system treatment area covers approximately 37,500 square feet (Figures 25 and 26). The ERH and SVE system would target soil and groundwater contamination in the shallow treatment zone, from 0 to 40 feet NAVD88. The ERH and SVE treatment area was defined by:

- Soil within the vadose zone (30 to 40 feet NAVD88) containing concentrations of PCE above 14 mg/kg. This is shown as the Hot Spot Area depicted on Figures 25 and 26.
- Groundwater between 0 to 40 feet NAVD88 containing concentrations of COCs above 5,000 µg/L.

The ERH and SVE system would be designed to reduce PCE concentrations in the vadose zone soil (30 to 40 feet NAVD88) below 14 mg/kg and allow for the disposal of the soil at a non-hazardous, Subtitle D landfill. In addition, remediating the source area soil will also reduce PCE concentrations in the shallow treatment zone to expedite the restoration of groundwater quality beneath the Site.

The vapors generated by the ERH system would be recovered by the SVE system and treated with granular-activated carbon to remove COCs prior to discharging to the atmosphere. The condensate water generated by the system would be collected and treated with granular-activated carbon to remove COCs prior to discharging to the sanitary sewer.

Shoring. Shoring is required to protect the safety of personnel working in the excavation, as well as the surrounding properties, from damage due to slope failure. For illustration purposes, the shoring design would consist of soldier piles with wood lagging and soil tiebacks. It is anticipated that the shoring would be installed around the entire perimeter of the redevelopment. For the purpose of estimating the remedial costs for each cleanup action alternative, it is assumed that shoring is a development-related cost and is, therefore, not included in the cost estimates provided in this FS.

Excavation. Each alternative includes the removal and disposal of all vadose zone soil from 30 to 40 feet NAVD88 as part of the Property redevelopment plan (Figures 27 and 28). The estimated limits of soil containing concentrations of COCs above the MTCA Method A cleanup level are shown on Figure 27. A limited area on the northeast corner of the Property would require overexcavation to an elevation of 20 feet NAVD88 to address soil exhibiting evidence of petroleum hydrocarbon contamination. Assuming an excavation elevation of 30 feet NAVD88 across the entire Property and 20 feet NAVD88 for a limited area, approximately 32,000 tons of contaminated soil would be generated during remedial excavation activities. The excavated material would be managed as non-dangerous waste under a contained-out determination issued by Ecology. Soil would be excavated within the confines of the shoring as designed by the structural engineer and would be directly loaded into trucks for off-Property land disposal at a Subtitle D facility in accordance with the contained-out determination. The cost associated with the excavation of all vadose zone soil from 30 to 40 feet NAVD88 are part of the Property redevelopment plan is considered a development-related cost and is, therefore, not included in the cost estimates provided in this report. However, the incremental costs for the disposal of contaminated soil from the vadose zone and overexcavation for petroleum-contaminated soil, soil performance sampling, and laboratory analyses are included in the cost estimates provided in this report.

Dewatering. A dewatering trench would be installed within the limits of excavation to remove and treat groundwater encountered during excavation activities and any accumulated surface water during the course of the excavation. Due to the shallow limits of the excavation, 30 feet NAVD88, relative to the groundwater elevation, little water is anticipated. The overexcavation to an elevation of 20 feet NAVD88 for PCS would require dewatering to facilitate soil removal activities within the shallow water-bearing zone. The groundwater would be pumped to a temporary water storage tank for treatment and disposal. The cost associated with dewatering for the overexcavation of PCS is considered a remediation-related cost and is included in the cost estimates provided in this report.

Passive vapor mitigation. The Property redevelopment would incorporate a below-ground concrete parking garage structure with a venting system to remove exhaust from the garage. In addition to the existing air exchange rate for the exhaust mitigation, an impermeable vapor barrier would be incorporated into the new development foundation to act as a permanent barrier to contaminant migration to indoor air. The cost associated with impermeable vapor barrier is considered a remediation cost and is included in the cost estimates provided in this report.

Natural attenuation of residual concentrations of chlorinated solvents in groundwater located within and beyond the active treatment area. Monitored natural attenuation is retained as a complimentary remedial component to other engineered remedial components rather than as a stand-alone or sole remedial component. In accordance with WAC 173-340-370, monitored natural attenuation is an appropriate supplement to the active treatment approach for the following reasons: source treatment will be conducted to the maximum extent practicable with the planned Property redevelopment and there is evidence of reductive dechlorination based on PCE breakdown products (cis,1-2,DCE and vinyl chloride). Once source treatment on Property is completed, the concentrations of COCs in groundwater will drop significantly, thereby reducing the associated risks to human health and the environment.

8.2.2 Cleanup Action Alternative 1—ERH/SVE, Excavation of Soil, and In Situ Reductive Dechlorination of Groundwater

Cleanup Action Alternative 1 includes installing an ERH and SVE system on Property within the shallow treatment zone from 0 to 40 feet NAVD88, injecting an edible oil substrate (EOS) into the shallow and intermediate treatment zones to treat the groundwater plume using in situ reductive dechlorination, and excavating on-Property soil to an elevation of 30 feet NAVD88. Figures 23 through 32 provide a conceptual illustration of how this cleanup action alternative might be implemented.

The ERH system consists of electrodes and temperature monitoring points (TMPs) that would be installed in the approximate spacing shown on Figure 25. The electrodes would be constructed in borings advanced to 0 feet NAVD88 (i.e., approximately 30 feet into the saturated zone) within the Property boundaries using standard HSA drilling techniques. The electrodes would be comprised of Schedule 40 steel. The details of the electrode head completions are proprietary and would be provided at the time of construction. Groundwater within the treatment zone would be heated to a temperature of 100 degrees Celsius to transfer the dissolved COCs to the vapor phase for subsequent recovery by vapor extraction. During heating, subsurface temperatures would be measured at TMPs located within the treatment area. Each of the TMPs would consist of Schedule 80 PVC pipe installed in borings advanced using standard HSA drilling techniques. Pipes for the collection of recovered soil vapor would be connected to the electrodes to convey soil vapor from the treatment area by vacuum to a treatment building (Figure 26). The treatment system, consisting of the power control unit, condenser, two SVE blowers, and the granular-activated carbon units associated with treating the condensate and vapor generated by the system, would be located on the northern portion of the Property (Figure 26).

After installation of the electrodes, TMPs, and the vapor extraction mechanical and treatment equipment, the system would be subjected to startup and testing. After testing, power would be applied to the Property continuously except for during system adjustments and routine maintenance. Thermocouples in the TMPs would be monitored continuously using a Power Control Unit (PCU) control and remote monitoring systems. The PCU is a variable transformer system capable of providing three simultaneous power outputs at automatically adjustable voltages. During operations, the heating contractor would monitor the system remotely and provide weekly updates and conduct site visits every other week for visual inspection and maintenance of the ERH components of the system. Additional trips would be made as necessary to ensure that the ERH system is functioning efficiently and effectively.

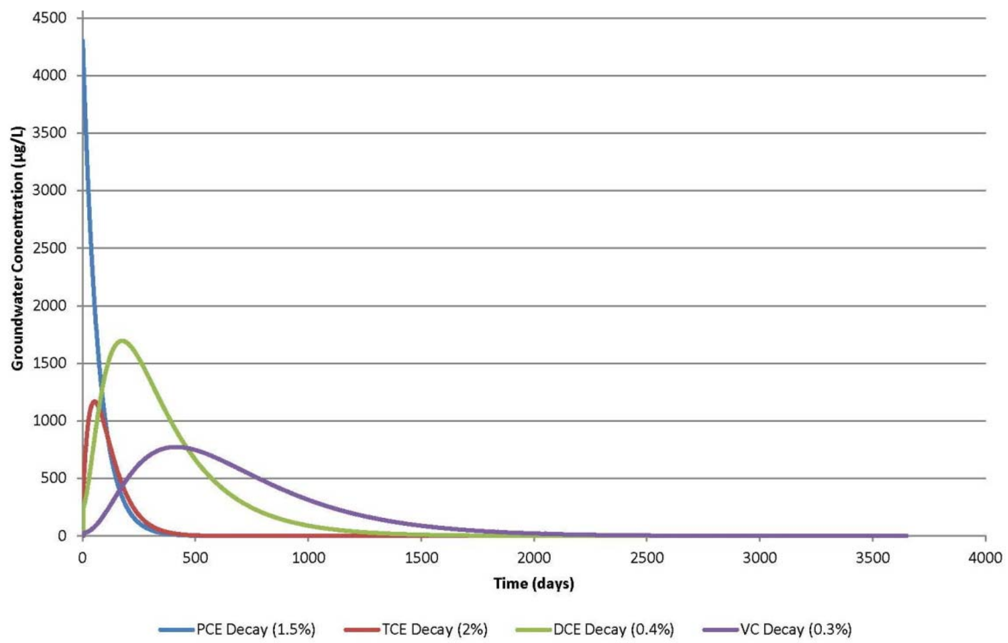
Upon decommissioning of the system and prior to conducting excavation activities on the Property, confirmational soil samples would be collected from the vadose zone (30 to 40 feet NAVD88) to ensure that the system effectively reduced concentrations of PCE to below 14 mg/kg to allow for the disposal of the soil at a non-hazardous, Subtitle D landfill under Ecology's contained-out determination.

As illustrated on Figures 29 through 32, injection wells would be installed across the Property for source zone treatment and as barrier treatment walls along the eastern and southern Property boundaries for the purpose of injecting EOS to treat the solvent plume. EOS would be used as a carbon source to deplete dissolved oxygen present in the aquifer, generate free hydrogen, and sustain a robust anaerobic dechlorinating microbial population. The indigenous microbial population will consume oxygen and generate an anaerobic environment, which is needed for *Dehalococcoides* genus bacteria (DHC)-mediated reductive dechlorination to occur. Reductive dechlorination of chlorinated VOCs occurs under strictly anaerobic conditions; unlike in aerobic conditions, where bacteria obtain energy by oxidizing reduced compounds (i.e., petroleum) while utilizing oxygen as the electron acceptor, reductive dechlorination is mediated by anaerobic bacteria (e.g., DHC), which obtain energy by oxidizing hydrogen (H_2) and utilizing the chlorinated VOC as the electron acceptor. Through this process, chlorine atoms within the solvent molecules are replaced by hydrogen one by one. As such, PCE is reduced to TCE, which is reduced to cis-1,2-DCE, which is reduced to vinyl chloride, vinyl chloride is reduced to ethene, and ethene is reduced to carbon dioxide as a detoxified final degradation product. The presence of degradation products in groundwater across the Site confirms that Site conditions are conducive to reductive dechlorination, and enhancing this naturally occurring process with EOS will significantly reduce the remedial time frame.

Based on observed Site conditions, it is anticipated that the groundwater plume south of Roy Street and east of 8th Avenue North would be addressed by natural attenuation. The treatment of the source zone with ERH and SVE, excavation of vadose zone soil, and the in situ groundwater treatment on the Property would significantly reduce the concentrations in groundwater beneath the Property and Site. Biodegradation is evident in off-Property wells by the presence of PCE degradation products and natural biodegradation of the COCs in groundwater would continue. Should natural attenuation prove insufficient in remediating off-Property groundwater, contingency injection wells would then be utilized. For the purposes of calculating remedial costs in this FS, it is anticipated that all contingency wells will be utilized.

The injection wells installed in the shallow treatment zone would be placed on 17-foot centers across the Property to address the source zone and on 10-foot centers for the barrier treatment walls (Figures 29 and 32). The injection wells installed in the intermediate treatment zone would be placed in on 10-foot centers for the barrier treatment walls (Figures 30 and 32). Three north-south transects of EOS injection wells would be installed on 20-foot centers to treat the source area within the intermediate treatment zone beneath Property (Figure 30). If necessary, the injection wells installed in the deep treatment zone off-Property would be placed on 20-foot centers (Figures 31 and 32). No off-Property barrier treatment walls are planned south of Roy Street due to site constraints, major subsurface utilities, and lack of implementability.

The relatively wide spacing of the injection wells along each transect is based on soil bulk density estimates developed by EOS Remediation, as well as the relatively permeable soil texture. This information was used to develop the approximate volume of EOS necessary to support a zone of anaerobic dechlorination sufficient to degrade the chlorinated solvents within groundwater beneath the Site (Appendix A). Due to the relatively long reaction time of the EOS, injection transects would be spaced 75 feet apart (a distance equivalent to the distance travelled by groundwater in 3 years with a seepage velocity of 25 feet per year) and oriented perpendicular to the groundwater flow direction in a barrier-type design. The groundwater seepage velocity for each treatment zone was based on the average seepage velocity for each groundwater bearing zone and was estimated at 150 feet per year for the shallow treatment zone, 25 feet per year for the intermediate treatment zone, and 180 feet per year for the deep treatment zone. The seepage velocity for each groundwater-bearing zone is discussed in greater detail in Section 2.5.3, Site Hydrology.



Graph 1. Empirical data demonstrating attenuation of chlorinated solvents at another site with lower starting concentrations and no source removal. Treatment of the source area by ERH and SVE will significantly reduce contaminant concentrations in the vadose zone and groundwater, so it is reasonable to anticipate a similar or enhanced degradation rate relative to what is observed here.

Manifold piping would be used to introduce EOS into each of the injection wells. After the initial injection on Property, the interior injection wells and those along the southern Property boundary would be decommissioned and the remedial excavation would commence. The injection well network would remain in place along the eastern Property boundary in the event that future injections of EOS could be conducted as necessary. The time to inject approximately 100,000 pounds of EOS is 12 months; 4 months for on-Property well installation and injection, and 8 months for off-Property barrier treatment walls.

The remedial excavation would commence once the ERH and SVE system achieved the treatment goals and the EOS injection event was completed on the Property. The excavation limits would extend from lot line to lot line and to 30 feet NAVD88 and involve excavating contaminated soil from the vadose zone (30 to 40 feet NAVD88) and transporting the excavated material off the Property for land disposal (Figures 27 and 28). To address PCS detected above MTCA Method A cleanup levels beneath the northeast portion of the Property this area would be overexcavated to approximately 20 feet NAVD88 (Figure 27). Shoring consisting of soldier piles, wood lagging, and tie backs would be installed as the excavation proceeds. Field screening and soil stockpile samples would be used to document COC concentrations in soil and to confirm compliance with the contained-out determination.

It is anticipated that all contaminated soil removed from the excavation area would meet the contained-out criteria for PCE for disposal at a Subtitle D disposal facility (Figure 27). To meet the requirements of the contained-out determination, detectable concentrations of PCE must be below 14 mg/kg. Approximately 32,000 tons of soil would be removed from the Property for off-site disposal. No land ban dangerous waste (i.e., PCE concentrations greater than 60 mg/kg) nor dangerous waste suitable for land disposal at a RCRA Subtitle C disposal facility (i.e., PCE concentrations greater than 14 and less than 60 mg/kg) is anticipated to be generated during excavation activities. Post-treatment soil concentrations would be evaluated by collecting and analyzing confirmational soil samples prior to excavation activities. After the final grades are achieved, the vapor barrier would be incorporated as a component of the building foundation.

Key assumptions for this cleanup action alternative include the following:

- The ERH system would consist of approximately 165 electrodes and 16 temperature monitoring points.
- The soil cuttings generated by the installation of the ERH system would generate approximately 265 tons of soil to be disposed of as hazardous waste at a permitted disposal facility.
- The ERH and SVE system would operate for a period of 4 months, with monthly operations, maintenance, and air and water discharge compliance sampling.
- Permits required to operate the ERH and SVE system would include a utility permit for a power upgrade, wastewater discharge permit for the discharge of treated condensate water to the sanitary sewer, and an air discharge permit to discharge recovered vapors to the atmosphere following treatment by granular-activated carbon.
- Collection of post ERH and SVE system confirmation soil samples from the vadose zone.
- Approximately 210 injection points and 82 contingency injection points would be installed both on- and off-Property to inject EOS and treat the Site-wide groundwater plume. In addition, EOS would be injected into a stainless steel injection point contained within each of the 165 electrode wells. Approximately 100,000 pounds of EOS would be injected across the site.
- Access would be provided to install the off-Property injection barrier walls.
- The Site would be registered with Ecology's Underground Injection Control program prior to initiating EOS injections.
- The soil cuttings generated by the installation of the injection points would generate approximately 400 tons of soil to be disposed of. It was estimated that approximately 10 percent of the total soil generated (i.e., approximately 40 tons) would be disposed of at a RCRA Subtitle C disposal facility and the remaining 360 tons would be disposed of as a contained-out waste at a Subtitle D disposal facility.
- Approximately 32,000 tons of soil would be excavated from the Property for disposal at a Subtitle D facility. Performance soil samples would be collected.
- Construction dewatering for the overexcavation of PCS.

- Shoring will consist of soldier piles, wood lagging, and soil tiebacks specified in the geotechnical engineer's design.
- A vapor barrier wall would be installed as part of the foundation for the proposed redevelopment.
- Quarterly compliance groundwater monitoring would be performed from the network of existing groundwater monitoring wells for 10 years.
- Groundwater samples from selected monitoring wells would be submitted for geochemical parameters (sulfate, nitrate, total alkalinity, methane, ethene, ethane, ferrous iron, manganese, and total organic carbon) to evaluate natural attenuation to the south and east of the Property.
- The life cycle for this alternative is assumed to be 10 years for the purpose of estimating the present worth cost. This duration should not be construed as a guaranteed remediation time frame.

The feasibility study level cost estimate for this alternative is presented in Table 13. The estimated present worth cost is $12,515,600.

8.2.3 Cleanup Action Alternative 2—ERH/SVE, Excavation of Soil, and In Situ Chemical Oxidation of Groundwater

Cleanup Action Alternative 2 includes the installation of an ERH and SVE system on the Property within the shallow treatment zone from 0 to 40 feet NAVD88, injection of sodium permanganate into the shallow and intermediate treatment zones to treat the groundwater plume using in situ chemical oxidation, and the excavation of on-Property soil to an elevation of 30 feet NAVD88. Figures 25 through 28 and 33 through 36 provide a conceptual illustration of how this cleanup action alternative might be implemented. The ERH and SVE system and excavation components from Cleanup Action Alternative 1 would also be implemented for Cleanup Action Alternative 2.

Based on observed Site conditions, it is anticipated that the groundwater plume south of Roy Street and east of 8th Avenue North would be addressed by natural attenuation. The treatment of the source zone with ERH and SVE, excavation of vadose zone soil, and the in situ groundwater treatment on the Property would significantly reduce the concentrations in groundwater beneath the Property and Site. Biodegradation is evident in off-Property wells by the presence of PCE degradation products and natural biodegradation of the COCs in groundwater would continue. Should natural attenuation prove insufficient in remediating off-Property groundwater, contingency injection wells would then be utilized. For the purposes of calculating remedial costs in this FS, it is anticipated that all contingency wells will be utilized.

As illustrated on Figures 33 through 36, injection wells would be installed across the Property for source zone treatment and as barrier treatment walls along the eastern and southern Property boundaries and two additional barrier treatment walls, if necessary, hydraulically downgradient to the east for the purpose of injecting the chemical oxidant.

The injection wells installed in the shallow treatment zone would be placed on 17-foot centers across the Property to address the source zone and on 5-foot centers for the barrier treatment walls (Figures 33 and 36). The injection wells installed in the intermediate treatment zone would be placed in on 5-foot centers for the barrier treatment walls (Figures 34 and 36). Sixteen north-south transects of permanganate injection wells would be installed on 10-foot centers to treat the source area within the intermediate treatment zone beneath Property (Figures 34 and 36). If necessary, the injection wells installed in the deep treatment zone off the Property would be placed on 10-foot centers (Figures 35 and 36). No off-Property barrier treatment walls are planned south of Roy Street due to site constraints, major subsurface utilities, and lack of implementability.

While permanganate is persistent in the subsurface, it requires direct contact with COCs. Therefore, the injection transects would be spaced 25 feet apart to ensure adequate coverage throughout the source zone and oriented perpendicular to the groundwater flow direction in a barrier-type design.

The mass of permanganate required to oxidize COCs in groundwater was estimated based on Permanganate Natural Oxidant Demand (PNOD) and the amount of oxidant required to oxidize COCs dissolved in groundwater. The site had an average PNOD of 18.4 grams per kilogram, which is relatively high (Appendix B). The permanganate barrier walls were designed to treat the groundwater much like a permeable reactive barrier (PRB). Approximately 4,870 tons of permanganate would be required to treat COCs in groundwater. Calculations for estimating the permanganate dose are provided in Appendix C.

Manifold piping would be used to introduce a permanganate solution into each of the injection wells. After the initial injection on the Property, the interior injection wells and those along the southern Property boundary would be decommissioned and the remedial excavation would commence. The injection well network would remain in place along the northern Property boundary in the event that future injections of permanganate could be conducted, as necessary. The time required to inject approximately 4,850 tons of permanganate is based on the seepage velocities for each treatment zone. The estimated time to inject permanganate into both the shallow and deep treatment zones is 12 months. The estimated time to inject permanganate into the intermediate treatment zone is 7 years because of a much lower average seepage velocity of 25 feet per year. It, therefore, would take the COCs in groundwater a longer time to come into contact with the chemical oxidant.

Key assumptions for this cleanup action alternative include the following:

- The ERH system would consist of approximately 165 electrodes and 16 temperature monitoring points.
- The soil cuttings generated by the installation of the ERH system would generate approximately 265 tons of soil to be disposed of as hazardous waste at a permitted disposal facility.
- The ERH and SVE system would operate for a period of 4 months, with monthly operations, maintenance, and air and water discharge compliance sampling.
- Permits required to operate the ERH and SVE system would include a utility permit for a power upgrade, wastewater discharge permit for the discharge of treated condensate water to the sanitary sewer, and an air discharge permit to discharge recovered vapors to the atmosphere following treatment by granular-activated carbon.
- Approximately 632 injection points and 171 contingency injection points would be installed both on and off Property to inject permanganate and treat the Site-wide

groundwater plume. Approximately 4,850 tons of permanganate would be injected across the site.

- Access would be provided to install the off-Property injection barrier walls.
- The site would be registered with Ecology's Underground Injection Control program prior to initiating permanganate injections.
- The soil cuttings generated by the installation of the injection points would generate approximately 1,100 tons of soil to be disposed of. It was estimated that approximately 10 percent of the total soil generated or 110 tons would be disposed of at a RCRA Subtitle C disposal facility and the remaining 990 tons would be disposed of as a contained-out waste at a Subtitle D disposal facility.
- Approximately 32,000 tons of soil would be excavated from the Property for disposal at a Subtitle D facility. Soil performance soil samples would be collected.
- Construction dewatering would be installed for the overexcavation of PCS.
- Shoring would consist of soldier piles, wood lagging, and soil tiebacks specified in the geotechnical engineer's design.
- A vapor barrier wall would be installed as part of the foundation for the proposed redevelopment.
- Quarterly compliance groundwater monitoring would be performed from the network of existing groundwater monitoring wells for 10 years.
- Groundwater samples from selected monitoring wells would be submitted for geochemical parameters (sulfate, nitrate, total alkalinity, methane, ethene, ethane, ferrous iron, manganese, and total organic carbon) to evaluate natural attenuation.
- The life cycle for this alternative is assumed to be 10 years for the purpose of estimating the present worth cost. This duration should not be construed as a guaranteed remediation time frame.

The feasibility study level cost estimate for this alternative is presented in Table 14. The estimated present worth cost is $61,372,100.

8.2.4 Cleanup Action Alternative 3—ERH/SVE, Soil Excavation with Permeable Reactive Barrier Wall for Groundwater

The ERH and SVE system and excavation and land disposal component for Cleanup Action Alternatives 1 and 2 would also be implemented for Cleanup Action Alternative 3 (Figures 25 through 28).

Based on observed Site conditions, it is anticipated that the groundwater plume south of Roy Street and east of 8^{th} Avenue North would be addressed by natural attenuation. The treatment of the source zone with ERH and SVE, excavation of vadose zone soil, and the in situ groundwater treatment on the Property would significantly reduce the concentrations in groundwater beneath the Property and Site. Biodegradation is evident in off-Property wells by the presence of PCE degradation products and natural biodegradation of the COCs in groundwater would continue. Should natural attenuation prove insufficient in remediating off-

Property groundwater, contingency injection wells would then be utilized. For the purposes of calculating remedial costs in this FS, it is anticipated that all contingency wells will be utilized.

The treatment of site wide groundwater would involve the installation of three PRBs across the Site to intercept contaminated groundwater. As groundwater flows through the reactive material in the barrier, zero valent iron, it acts as a catalyst to break down the COCs. Zero valent iron is a commonly used passive treatment technology for dissolved-phase COCs. Figures 37 through 40 provide a conceptual illustration of the extent and locations of the potential PRBs. The PRBs do not extend south of Roy Street due to site constraints, major subsurface utilities, and lack of implementability.

A drilling contractor using a large, 4-foot-diameter auger would drill down to the design depth of the PRB to remove soil from the proposed PRB footprint: approximately -40 feet NAVD88 along the eastern and northern Property boundaries and -80 feet NAVD88 for the two PRBs located hydraulically downgradient and east of the Property. The excavated material would be field-screened and segregated for proper characterization and off-site disposal. Approximately 1,000 linear feet of PRB was estimated for this alternative. A mixture of sand and iron fillings would be mixed on the Site and backfilled into the PRB footprint.

The estimated mass of soil cuttings to be generated during the installation of the three PRBs is approximately 18,000 tons. It was estimated that approximately 10 percent of the total soil generated, or 1,800 tons, would be disposed of at a RCRA Subtitle C disposal facility, and the remaining 16,200 tons would be disposed of as a contained-out waste at a Subtitle D disposal facility.

Key assumptions for this cleanup action alternative include the following:

- ERH system would consist of approximately 165 electrodes and 16 temperature monitoring points.
- The soil cuttings generated by the installation of the ERH system would generate approximately 265 tons of soil to be disposed of as hazardous waste at a permitted disposal facility.
- The ERH and SVE system would operate for a period of 4 months, with monthly operations, maintenance, and air and water discharge compliance sampling.
- Permits required to operate the ERH and SVE system would include a utility permit for a power upgrade, wastewater discharge permit for the discharge of treated condensate water to the sanitary sewer, and an air discharge permit to discharge recovered vapors to the atmosphere following treatment by granular-activated carbon.
- Approximately 1,000 linear feet of PRB would be installed: approximately 500 linear feet on the Property to -40 feet NAVD88 and approximately 510 linear feet off the Property to -80 feet NAVD88.
- Access would be provided to install the PRBs located off Property.
- The soil cuttings generated by the installation during the PRB wall installation would generate approximately 18,000 tons of soil to be disposed of. It is estimated that 1,800 tons would be disposed of at a RCRA Subtitle C disposal facility, and the

remaining 16,200 would be disposed of as a contained-out waste at a Subtitle D disposal facility.

- Approximately 32,000 tons of soil would be excavated from the Property for off-site disposal at a Subtitle D facility. Collection of soil performance soil samples.
- Construction dewatering would be installed for the overexcavation of PCS.
- Shoring will consist of soldier piles, wood lagging, and soil tiebacks specified in the geotechnical engineer's design.
- A vapor barrier would be installed as part of the foundation for the proposed redevelopment.
- Quarterly compliance groundwater monitoring would be performed from the network of existing groundwater monitoring wells for 15 years.
- Groundwater samples from selected monitoring wells would be submitted for geochemical parameters (sulfate, nitrate, total alkalinity, methane, ethene, ethane, ferrous iron, manganese, and total organic carbon) to evaluate natural attenuation.
- The life cycle for this alternative is assumed to be 15 years for the purpose of estimating the present worth cost. This duration should not be construed as a guaranteed remediation time frame.

The feasibility study level cost estimate for this alternative is presented in Table 15. The estimated present worth cost is $21,148,000.

8.3 EVALUATION OF ALTERNATIVES

This section presents the criteria used to evaluate the potentially feasible cleanup action alternatives with respect to the RAO established for the Property. Remedial components were identified per the requirements set forth in MTCA under WAC 173-340-350(8)(b) and the focused screening of potential remedial components using the requirements and procedures for selecting cleanup actions as set forth in MTCA under WAC 173-340-360(2)(a)(b). The criteria used to evaluate and compare applicable cleanup action alternatives were derived from WAC 173-340-360(3)(f) and include the following:

- **Protectiveness.** The overall protectiveness of human health and the environment includes the degree to which existing risks are reduced, the time required to reduce risk at the facility and attain cleanup standards, the risks resulting from implementing the alternative, and improvement of overall environmental quality of the Site.
- **Permanence.** The degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances includes the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and the sources of releases, the degree of irreversibility of the waste treatment process, and the characteristics and quantity of treatment residuals generated during the treatment process.
- **Effectiveness over the long term.** The degree of certainty that the alternative will be successful depends on the reliability of the alternative during the period of time over which hazardous substances are expected to remain on the Property, as well as the magnitude of residual risk associated with the contaminated soil and/or groundwater components. The following types of cleanup action components, presented in descending order, may be used as a guide when

assessing the relative degree of long-term effectiveness of the chosen alternative: reuse or recycling; destruction or detoxification; immobilization or solidification; on- or off-site disposal in an engineered, lined, and monitored facility; on-site isolation or containment with attendant engineering controls; and institutional controls and monitoring.

- **Management of short-term risks.** Short-term risks include risks to human health and the environment associated with the alternative during its construction and implementation, and the effectiveness of measures that will be taken to manage such risks.
- **Technical and administrative implementability.** The ability to implement the alternative includes consideration of the technical feasibility of the alternative, administrative and regulatory requirements, permitting, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with the future development plans for the Site.
- **Consideration of public concerns.** Consideration of public concerns is mandated under the MTCA cleanup regulation for an Ecology-led or potentially liable person-led cleanup action under an Agreed Order or Consent Decree. A public participation plan generated and implemented by both the Site owner and Ecology includes a mandatory public review and comment period. Because public comments have not yet been solicited by Ecology, consideration of public concerns regarding this FS is preliminarily included in this document.

8.3.1 Cleanup Action Alternative Cost Estimating

The following section presents the types and scope of costs considered when preparing the feasibility study cost estimates for use in the disproportionate cost analysis in accordance with WAC 173-340-360(3)(e) and 173-340-360(f)(iii).

- **Capital Costs.** These costs include expenditures for equipment, labor, and material necessary to implement a remedial action. Indirect costs may be incurred for engineering, financial, or other services not directly involved with implementation of remedial alternatives but necessary for completion of this activity.
- **Operation and Maintenance Costs.** These are post-construction costs necessary to provide effective implementation of the alternative. Such costs may include, but are not limited to, operating labor; maintenance materials and labor; disposal of residues; and administrative, insurance, and licensing costs.
- **Monitoring Costs.** These costs are incurred from monitoring activities associated with remedial activities. Cost items may include sampling labor, laboratory, analyses, and report preparation.
- **Present Worth Analysis.** Present worth analysis provides a method of evaluating and comparing costs that occur over different time periods by discounting all future expenditures to the present year. The present worth cost or value represents the amount of money which, if invested in year 0 and disbursed as needed, would be sufficient to cover all costs associated with a remedial alternative. The assumptions necessary to derive a present worth cost are inflation rate, discount rate, and period of performance. A discount rate, which is similar to an interest rate, is used to account for the time value of money. EPA policy on the use of discount rates for RI/FS cost analyses is stated in the preamble to the National Oil and Hazardous

Substances Pollution Contingency Plan (NCP) published at the Federal Register (55 FR 8722) and in the Office of Solid Waste and Emergency Response Directive 9355.3-20 titled Revisions to OMB Circular A-94 on Guidelines and Discount Rates for Benefit-Cost Analysis (EPA 1993). Based on the NCP and this directive, a discount rate of 7 percent is recommended in developing present value cost estimates for remedial action alternatives during the FS. This specified rate of 7 percent represents a "real" discount rate in that it approximates the marginal pretax rate of return on an average investment in the private sector in recent years and has been adjusted to eliminate the effect of expected inflation. For this FS, more conservative real discount rates ranging from 0.0 percent for 3 years to 1.7 percent for 15 years were used based on the December 2012 revisions to Appendix C of the OMB Circular A-94. The real discount rates used to estimate the present worth of annual operating costs are based on the estimated restoration time frame (life cycle) for each alternative and are extrapolated from the referenced OMB Circular, which is published annually.

- Because it is assumed that all capital costs are incurred in year 0, the present worth analysis is performed only on annual operation and maintenance and groundwater monitoring costs. The total present worth for a given alternative is equal to the sum of the capital costs and the present worth of annual operation and maintenance and monitoring costs over the anticipated life cycle of the alternative.

8.3.2 Evaluation Results

A summary of the evaluation of the cleanup action alternatives using the MTCA evaluation criteria (WAC 173-340-360[3][f]) is described below and summarized in the Cleanup Action Alternatives Screening Summary. Table 16 includes parameters used in the disproportionate cost analysis, such as the MTCA Composite Benefit Score and the estimated costs as described in Section 8.4, Disproportionate Cost Analysis Results.

- **Protectiveness.** The two types of exposure risk associated with the presence of COCs at the Site are terrestrial ecological risk and human health risk. Because the Site qualifies for a TEE exclusion based on WAC 173-340-7491, mitigating the potential human health risk associated with exposure to the COCs in indoor air, soil, and groundwater at the Site would be the primary objective of any cleanup action implemented. Each of the three alternatives provides a high degree of protectiveness considering that the source area on the Property is being addressed by a combination of ERH/SVE, excavation, and in situ groundwater treatment. Although Alternative 2 (Chemical Oxidation) would provide the greatest degree of protection due to the direct oxidation of COCs, its effectiveness is limited because the chemical oxidant requires direct contact with COCs. Alternative 3 (PRB) scores the lowest since this is a passive technology and has the longest remedial time frame. In addition, regardless of the groundwater treatment alternative implemented, the concrete floor slab and foundation walls of the proposed underground parking garage of the future development would be constructed to act as a barrier against direct contact with subsurface contamination and the impermeable vapor barrier would eliminate the potential for vapor intrusion into the building interior.

- **Permanence.** All three alternatives scored similarly for these criteria because of the treatment of the source area using ERH and SVE and limited excavation, and they vary only by the type of groundwater treatment. All three alternatives have similar limitations for the in situ treatment of groundwater, which includes limited access for the installation of injection points and PRB materials, underground utilities, and main traffic corridors. In addition, regardless of the groundwater treatment alternative implemented, the source zone on Property would be significantly reduced by the proposed ERH and SVE system.

- **Effectiveness over the Long Term.** All three alternatives scored similarly because the cleanup action for the source area is the same. Reducing the source area mass on Property is key to reducing dissolved-phase concentrations of COCs extending beyond the Property boundaries. Alternative 1 (EOS) has a greater impact in the subsurface because it is not limited to direct contract with COCs, and it augments the existing environment and reducing conditions favorable for reductive dechlorination. Again, all alternatives employ the same remedial approach for soil on the Property.

- **Management of Short-Term Risks.** Each of the alternatives presents significant short-term risks because each includes high-risk activities associated with shoring (drilling), excavation (heavy equipment), installation of injection wells, and electrocution from the ERH system. Short-term risks would be higher for Cleanup Action Alternatives 2 and 3 when compared to Cleanup Action Alternative 1 because of the risks of injury to workers from exposure to chemical oxidants. Cleanup Action Alternative 1 scores highest for this criterion comparatively because it does not pose a risk of chemical exposure.

- **Technical and Administrative Implementability.** Cleanup Action Alternatives 1 and 3 score higher than Cleanup Action Alternative 2 because Cleanup Action Alternative 2 requires an active groundwater treatment system for 7 years and includes the introduction of approximately 10 million pounds of oxidant. Cleanup Action Alternative 3 poses obstacles to implementation because of the large size of the mixing equipment required to mix the sand and iron filings and the large-diameter auger for installation of the PRB. Cleanup Action Alternative 2 would be difficult to implement because of the large number of injection wells to be installed, as well as handling and mixing a large volume of powerful chemical oxidant in the field.

- **Public Concerns.** Cleanup Action Alternative 1 scores higher than the other alternatives because it provides the greatest area of coverage with the least amount of short-term risks.

- **Cost.** Using these criteria the total present worth costs of Cleanup Action Alternatives 1 through 3 are as follows:
  - Cleanup Action Alternative 1—$12,515,600 (Table 13)
  - Cleanup Action Alternative 2—$61,372,100 (Table 14)
  - Cleanup Action Alternative 3—$21,148,000 (Table 15)

8.4 DISPROPORTIONATE COST ANALYSIS RESULTS

The purpose of the disproportionate cost analysis is to facilitate selection of the cleanup action alternative providing the highest degree of permanence to the maximum extent practicable. This disproportionate cost analysis considers Cleanup Action Alternatives 1 through 3. Costs are considered disproportionate if the incremental costs of one alternative versus a less expensive alternative exceed the incremental benefit achieved by the more expensive alternative.

The disproportionate cost analysis was conducted according to the methodology provided by Ecology (2009b) in accordance with WAC 173-340-360(3)(e). The cleanup action alternative evaluation presented in Table 16 is in a format suggested by Ecology (Ecology 2009b). Table 16 provides a semi-quantitative assessment of the MTCA criteria for permanence to the maximum extent practicable (WAC 173-340-360[3][f]). A numeric score ranging from 0 to 10 is assigned for each of the criteria based on best professional judgment. The higher the score, the more favorable the criterion evaluation is under MTCA. The criteria scores are weighted according to Ecology suggestions (Ecology 2009b) and as indicated in Table 16. An MTCA Composite Benefit Score is calculated for each cleanup action alternative by summing the mathematical product of the criterion score times the weighting factor and represents a quantitative measure of environmental benefit that would be realized with implementation of a cleanup action alternative. Based on Site conditions, the weighting factors for the six criteria are Protectiveness–30 percent, Permanence–30 percent, Long-Term Effectiveness–20 percent, Short-Term Risks–10 percent, and Implementability–10 percent. If, for example, the scores for each of these criteria are 10, 8, 8, 2, and 3, the MTCA Composite Benefit Score is calculated as follows: (10)(0.3) + (8)(0.3) + (8)(0.2) + (2)(0.1) + (3)(0.1) = 7.5. A score of 7.5 represents a moderate to high environmental benefit on a scale of 0 (lowest environmental benefit) to 10 (highest environmental benefit).

Table 16 provides details regarding the basis for scoring and estimated costs for the three cleanup action alternatives. Because each cleanup action alternative exhibits the same remedial response and cost for the ERH/SVE system and the soil remediation approach (i.e., excavation and land disposal), they vary only by the groundwater treatment.

As indicated above, the cost of Cleanup Action Alternative 1 is less than other alternatives. Chart 1 plots the relative cost and composite ranking scores and Chart 2 plots the cost-to-benefit ratios for the cleanup action alternatives in order to illustrate the relative cost and benefits afforded by each alternative. The cost-to-benefit ratio for each cleanup action alternative was generated based on the total cost of the cleanup action alternative.

The results of the analysis demonstrate that Cleanup Action Alternative 1 clearly exhibits the lowest cost-to-benefit ratio.

9.0 PREFERRED CLEANUP ACTION ALTERNATIVE

After performing the comparative analysis and ranking of the cleanup action alternatives in accordance with the MTCA evaluation criteria, Cleanup Action Alternative 1 is the best approach to fully remediate the Site while meeting the requirements of the Property stakeholders. Cleanup Action Alternative 1 is the recommended alternative, and it includes source removal via ERH/SVE and excavation on the Property, as well as the application of in situ reductive dechlorination to treat the Site-wide groundwater plume. Cleanup Action Alternative 1 meets the threshold requirements for cleanup actions set forth in WAC 173-340-360(3) and WAC 173-340-370. Elements of Cleanup Action Alternative 1 would be conducted in conjunction with redevelopment of the Property.

Cleanup Action Alternative 1 addresses the COCs at the Site in all media of concern: soil gas, soil, groundwater, and indoor air. Cleanup Action Alternative 1 is protective of the indoor air inhalation pathway and of direct contact exposure (e.g., dermal contact, ingestion) with soil and groundwater. Treatment of the source area, active remediation of the contaminated groundwater beneath the Property, and the contingent installation of barrier treatment walls off-Property demonstrate that Cleanup Action Alternative 1 is protective of groundwater. The cost to implement Cleanup Action Alternative 1 is less than competing alternatives and exhibits a low cost-to-benefit ratio compared to the competing alternatives.

Details concerning the implementation of the recommended cleanup action alternative and the decision process used to evaluate whether modifications to the selected approach are warranted will be provided in the draft Cleanup Action Plan.

10.0 BIBLIOGRAPHY

Aerial Photographs of the Property and Adjoining Areas for the Year 1937. Reviewed online at <http://info.kingcounty.gov/transportation/kcdot/roads/mapandrecordscenter/mapvault/Default.aspx?DocId=hS7EmTU6FpM1>. May 24, 2012.

Aerial Photographs for the Property and Adjoining Areas for the Years 1946, 1953, 1961, 1965, 1970, 1978, 1985, 1989, 1995, 2001. Reviewed at the Maps Collection in the Suzzallo Library at the University of Washington, Seattle, Washington on April 19, 2009.

Aerial Photographs for the Property and Adjoining Areas for the Years 2007, 2011, and 2012. Reviewed in Google Earth on November 1, 2012.

Baist's Real Estate Atlases of Seattle, Washington, for the years 1908 and 1912.

Black & Veatch (B&V). 1998. *Denny Way/Lake Union CSO Project. Phase II Environmental Site Assessment.* Prepared for King County Department of Natural Resources, Seattle, Washington. September.

Bush, Roed & Hitchings, Inc. 2012. *Survey Map of the 700 Dexter Property*. January 6, February 7, October 16, December 28.

Chemical Engineering News. 1963. "New Dry-Cleaning System under Field Test." *Chemical Engineering News*. 41 (no. 28).

CHM2 HILL. 2008. *Draft Memorandum Regarding the 9th Avenue Sewer Upgrade Environmental Investigation Summary*. From Mario Lopez and Rachel Chang, CH2MHILL. To Roger Beieler. May 19.

City of Seattle. 2003. *Seattle Arterial Classifications Planning Map*. <http://www.seattle.gov/transportation/streetclassmaps/plan.pdf>. Accessed March 28, 2013.

_____. 2011. Traffic Flow Data and Maps - 2011. <http://www.seattle.gov/transportation/tfdmaps.htm>. Accessed March 28, 2013.

_____. 2013a. Archived Building Plans for the Property and Adjoining Properties. Reviewed at Department of Planning and Development, Seattle, Washington.

_____. 2013b. Archived Engineer's Vault Utility and Road Maps. Reviewed at Department of Planning and Development, Seattle, Washington.

_____. 2013c. Water Supply for the City of Seattle: March 26: Conditions and Outlook. <http://www.seattle.gov/util/About_SPU/Water_System/Water_Supply/WaterSupply/index.htm>.

_____. 2013d. Department of Planning and Development Permit and Complaint Status for the Property and Adjoining Properties. <http://web1.seattle.gov/DPD/permitstatus/default.aspx.> Accessed March 25.

_____. 2013e. Construction Updates for the Mercer Corridor Program. http://www.seattle.gov/transportation/ppmp_mercer_construction.htm. March 28.

_____. 2013f. City of Seattle Zoning as of January 24, 2013. <http://www.seattle.gov/dpd/Research/gis/webplots/k35e.pdf>. Accessed March 28.

Dalton, Olmsted, & Fuglevand, Inc (DOF). 2004. Memorandum Regarding the Results of Ground Water Sampling, American Linen Site, 773 Valley Street, Seattle, Washington. From Matt Dalton, DOF. To Dave Maryatt, American Linen. December 21.

_____. 2008. Memorandum Regarding the Evaluation of Remedial Alternatives and "Order-of-Magnitude" Costs, Former American Linen Site, 773 Valley Street, Seattle, Washington. From Matt Dalton, DOF. To Dave Maryatt, American Linen. February 5.

_____. 2009. Memorandum Regarding the Results of January 2009 Sampling, American Linen Site, 773 Valley Street, Seattle, Washington. From Matt Dalton, DOF. To Dave Maryatt, American Linen. March 6.

Floyd Snider McCarthy Team. 2003. User's Guide: North BINMIC Hydrogeologic and Environmental Settings Report Brownfields Pilot Project.

Galster, R.W. and W.T. Laprade (Galster and Laprade). 1991. "Geology of Seattle, Washington, United States of America." *Bulletin of the Association of Engineering Geologists*. 28 (no. 3): 235–302.

GeoEngineers, Inc. (GeoEngineers). 2002. *Supplemental Remedial Investigation Report, Former American Linen Site, 771 Valley Street, Seattle, Washington*. July 8.

GeoTech Consultants, Inc. (GeoTech). 1992. Letter Regarding Underground Storage Tank Removal and Supplemental Environmental Studies, Bayside Volvo, 753 9th Avenue North, Seattle, Washington. From John F. Cole, Geotech Consultants, Inc., Senior Environmental Geologist. To Ira Alexander. September 15.

Hart Crowser, Inc. 1989. Letter Regarding Site Characterization, Seattle School District Building, 810 Dexter Avenue North, Seattle, Washington. From Scott F. Ferris, Hart Crowser, Inc., Sr. Project Chemical Engineer, to Melvin Smith of Seattle Public Schools. July 24.

________. 1990. Letter Regarding Observation of Site Remediation Activities and Underground Storage Tank Closure Report, Seattle School District Building, 810 Dexter Avenue North, Seattle, Washington. From Scott F. Ferris, Hart Crowser, Inc., Associate Chemical Engineer, to Joe Hickey of the Washington State Department of Ecology, Northwest Regional Office. January 9.

Howard, Philip H., Gloria W. Sage, William F. Jarvis, and Anthony Gray. 1990. *Handbook of Environmental Fate and Exposure Data for Organic Chemicals*. Lewis Publishers, Inc.

HWA Geosciences, Inc. 1998. *Draft Geotechnical Report, Denny Way/Lake Union CSO, Contract B, Seattle Washington, HWA Project No. 97061*. Prepared for Cosmopolitan Engineering Group Inc., and Black and Veatch Inc. September 23.

IDcide.com (Idcide). 2013. Seattle, Washington Weather. <http://www.idcide.com/weather/wa/seattle.htm>. Accessed May 7.

Interstate Technology & Regulatory Council. 2007. *Vapor Intrusion Pathway: A Practical Guideline*. VI-1. Washington, D.C.: Interstate Technology & Regulatory Council, Vapor Intrusion Team. <www.itrcweb.org>. January.

King County. 2013. Archived Appraisal Data for the Site and Surrounding Parcels. Reviewed at Puget Sound Regional Archives, Bellevue Community College, Bellevue, Washington.

King County iMAP. 2013a. Property information for Site and Surrounding Parcels. Reviewed online at <http://www.kingcounty.gov/operations/gis/Maps/ iMAP.aspx>. February 25.

________. 2013b. King County's Groundwater Program. Reviewed online at <http://www5.kingcounty.gov/iMAP/viewer.htm?mapset=GroundWater>. June 19.

King County Recorder's Office. 2013. Official Public Records for the Site and Surrounding Properties. Accessed online at <http://www.kingcounty.gov/business/Recorders/RecordsSearch.aspx>. March 26th.

Kroll Map Company, Inc. Atlases of Seattle, Washington, for the years 1920, 1924, 1930, 1939, 1950, 1966, 1977, and 1995. Reviewed at Seattle Public Library, Central Branch, Seattle, Washington.

The Pacific Northwest Center for Geologic Mapping Studies (Pacific NW Geologic Mapping). 2007. *Geologic Map of King County, Washington*. D.B. Booth, K.A. Troost, and A.P. Wisher, Compilers. March.

Remedial Technologies, Inc. (RETEC). 1993. Site Characterization Report, Roy Street Facility, Seattle Department of Parks and Recreation, Seattle, Washington. August.

________. 1994a. Letter Regarding the Results of the April 25, 1994 Groundwater Sampling Event. From Grant Hainsworth, RETEC, Environmental Engineer. To Tim Motzer, Seattle Department of Parks and Recreation, Project Manager. May 12.

________. 1994b. *Remedial Alternatives Report, Roy Street Facility, Seattle Department of Parks and Recreation, Seattle, Washington*. July.

________. 1995. *Revised Site Characterization Report, Roy Street Facility, Seattle Department of Parks and Recreation, Seattle, Washington*. February.

Robinson, R., Cox, E., and Dirks., 2002. M. *Tunneling in Seattle – A History of Innovation*. North American Tunneling Conference, Seattle, Washington.

Roux Associates. 1992. *Draft Phase I Environmental Site Assessment, Maryatt Industries, 773 Valley Street, Seattle, Washington*. June 23.

________. 1993. Fax Regarding Data Tables and Well Logs from the Phase II Environmental Site Assessment. From Brad Hall, Roux, to Chuck Maryatt, Maryatt Industries. July 28.

Sanborn Map Company, Inc. Fire Insurance Maps of Seattle, Washington, for the years 1893, 1905, 1917, 1949, 1950, and 1969.

SCS Engineers. 1992. Site Investigation to Assess Soil Contamination and Locate Underground Storage Tanks, 802 Roy Street, Parks Department Shops Complex, Seattle Washington. May.

Shannon and Wilson, Inc. 1970. *Final Geotechnical Data Report, Mercer Street Tunnel Contract, Denny Way/Lake Union CSO Project.*

Seattle Public Utilities (SPU). 2003. Geotechnical Data Report, South Lake Union Park, Seattle, Washington. July.

SoundEarth Strategies, Inc. 2013. *Remedial Investigation Report, 700 Dexter Property, 700 Dexter Avenue North, Seattle, Washington*. June 3 (Draft).

State Coalition for the Remediation of Drycleaners. 2009. *Chemicals Used in Dry-cleaning Operations*.

ThermoRetec. 2000. Letter Report Regarding the Results of Under-Building Soil and Groundwater Testing at the Maryatt Industries Property. Mark Larsen, ThermoRetec, Senior Project Manager. To Brandon Crocker, Nexus Properties, Inc. July 12.

Troost, K.G., D.B. Booth, A.P. Wisher, and S.A. Shimel (Troost et al.). 2005. *The Geologic Map of Seattle – a Progress Report*. US Geological Survey Open File Report 2005-1252.

Troost, K.G. and D.B. Booth (Troost and Booth). 2008. *Geology of Seattle and the Seattle Area, Washington*. Reviews in Engineering Geology Vol. 20, p 1-36.

U.S. Environmental Protection Agency (EPA). 1993. *Revisions to OMB Circular A-94 on Guidelines and Discount Rates for Benefit-Cost Analysis.* OSWER Directive 9355.3-20. June 25.

________. 1996. *Guidelines for Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures.* Office of Solid Waste and Emergency Response. EPA/540/S-95/504. April.

________. 1998. *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water*. Office of Research and Development. EPA/600/R-98/128. September.

________. 2005. *Ground-Water Sampling and Monitoring with Direct Push Technologies.* Office of Solid Waste and Emergency Response. EPA/540/R-04/005. August.

U.S. Geological Survey (USGS). 1983. Topographic Map of Seattle South, Washington Quadrangle.

Urban Redevelopment LLC (Urban). 2002. Lab Reports for soil and groundwater samples collected from the 800 Roy Street Parcel. June.

Vaccaro, J.J., A.J. Hansen, Jr., and M.A. Jones, 1998. *Hydrogeologic Framework of the Puget Sound Aquifer System, Washington and British Columbia*. US Geological Survey Professional Paper 1424-D. 77p.

Washington State Department of Ecology (Ecology). 2009*. Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*. Publication No. 09-09-47. (Draft) October.

________. 2013. Washington State Well Log Viewer. Accessed at <http://apps.ecy.wa .gov/welllog/MapSearch/viewer.htm?&FASTSTART=YES&SESSIONID=352870351>. October 14.

________. 2013. Cleanup Site Search. Accessed at <https://fortress.wa.gov/ecy/ gsp/Sitepage.aspx?csid=9747>. May 17.

Windward Environmental LLC. 2012. *Subsurface Soil and Groundwater Investigation, American Linen Supply Company, Inc., Site, 700 Dexter Avenue North, Seattle, Washington*. March 21.

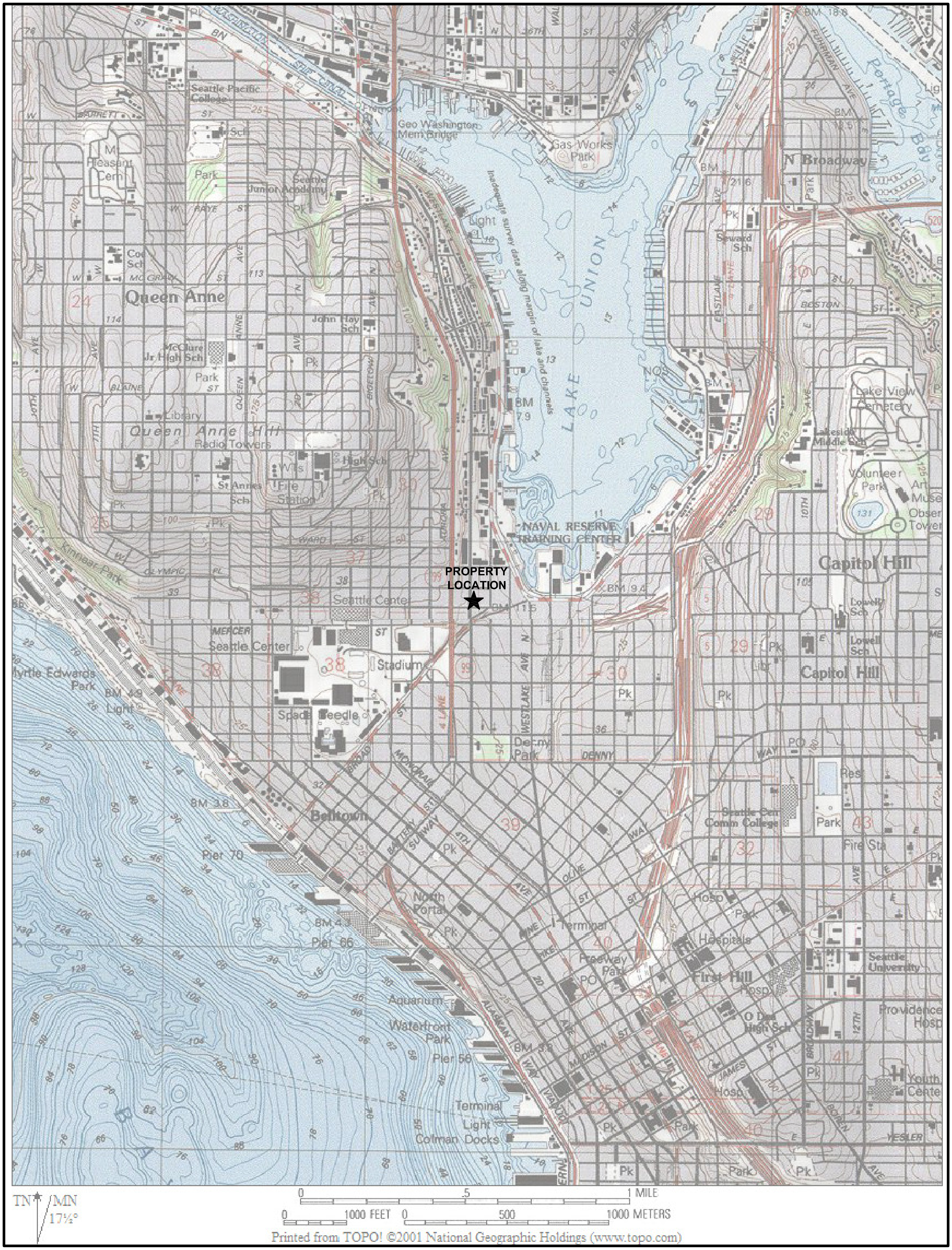
11.0 LIMITATIONS

The services, findings, and conclusions described in this report were prepared for the specific application to this project and were developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area. A potential always remains for the presence of unknown, unidentified, or unforeseen subsurface contamination on portions of the Property not sampled. 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.

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

FIGURES

11/9/2012



Printed from TOPO! ©2001 National Geographic Holdings (www.topo.com)

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

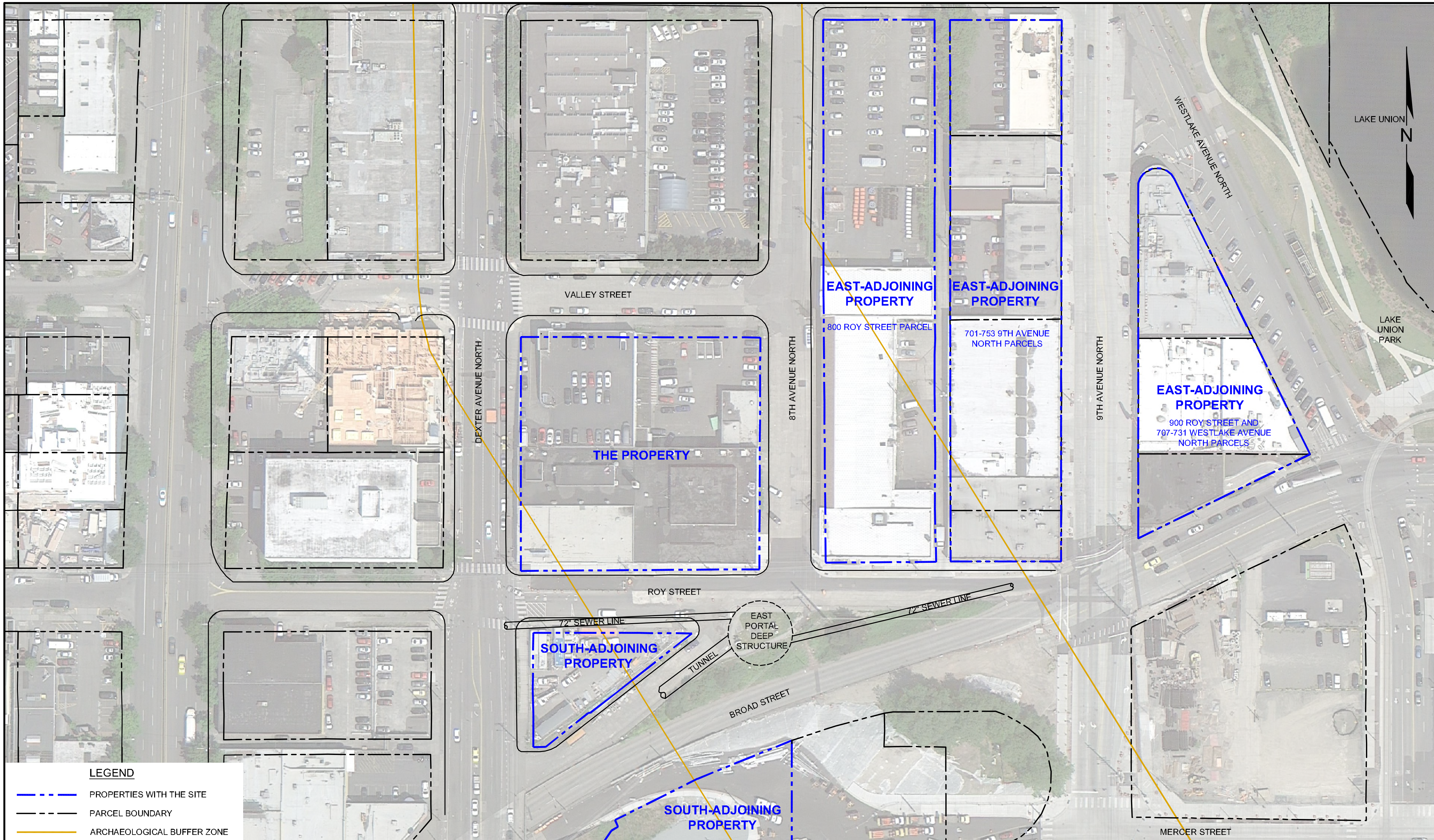
DATE:	11/07/12
DRAWN BY:	NAC
CHECKED BY:	DRAFT
CAD FILE:	0797-001_FIG1

PROJECT NAME:	700 DEXTER PROPERTY
PROJECT NUMBER:	0797-001
STREET ADDRESS:	700 DEXTER AVENUE NORTH
CITY, STATE:	SEATTLE, WASHINGTON

FIGURE 1
PROPERTY LOCATION MAP

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\FIGURE 1\0797-001_FIG1.DWG

WWW.SOUNDEARTHINC.COM



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_SLC

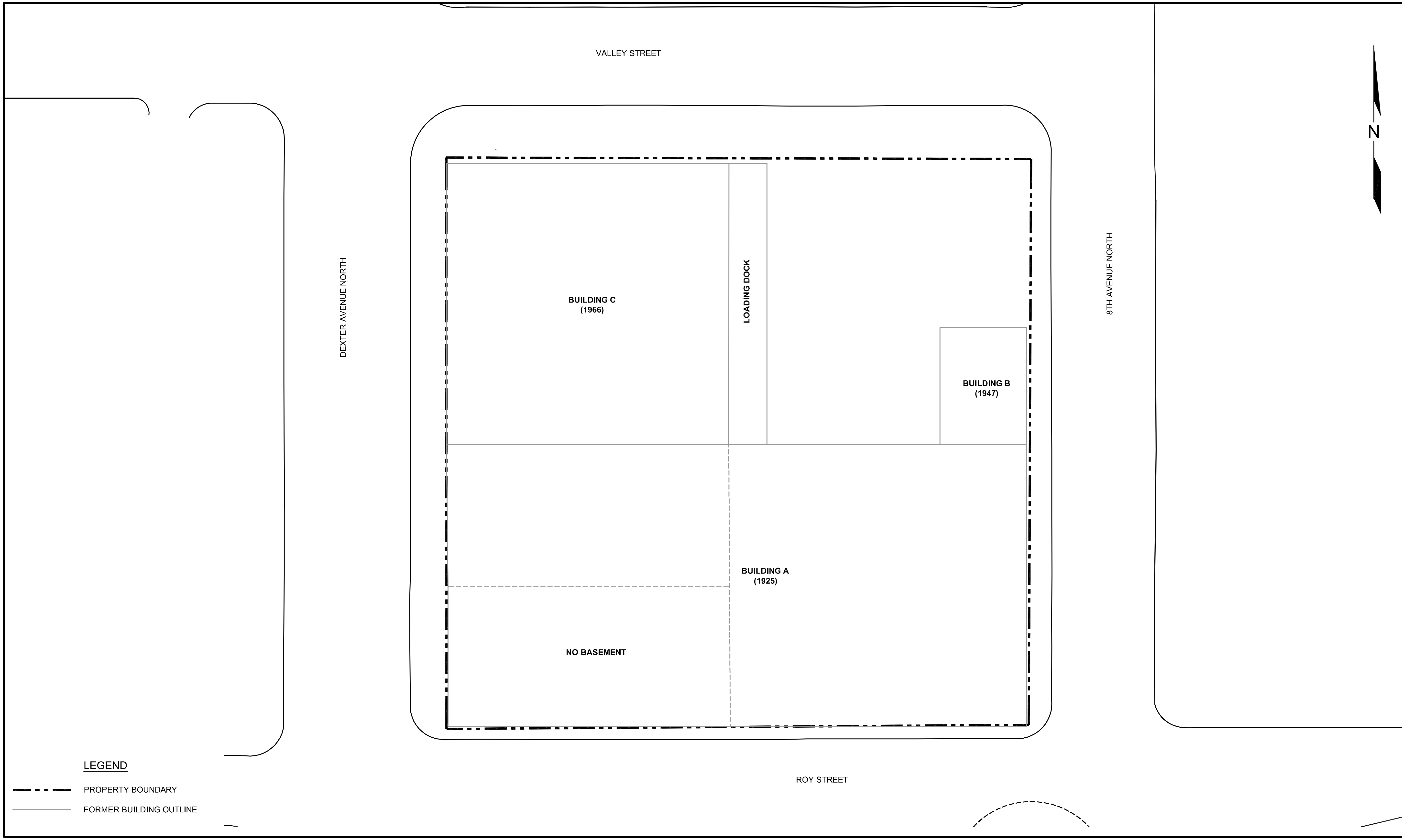
PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 2
SITE LOCATION MAP

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_SLC.DWG 6/10/2013



6/10/2013
P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_PP.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

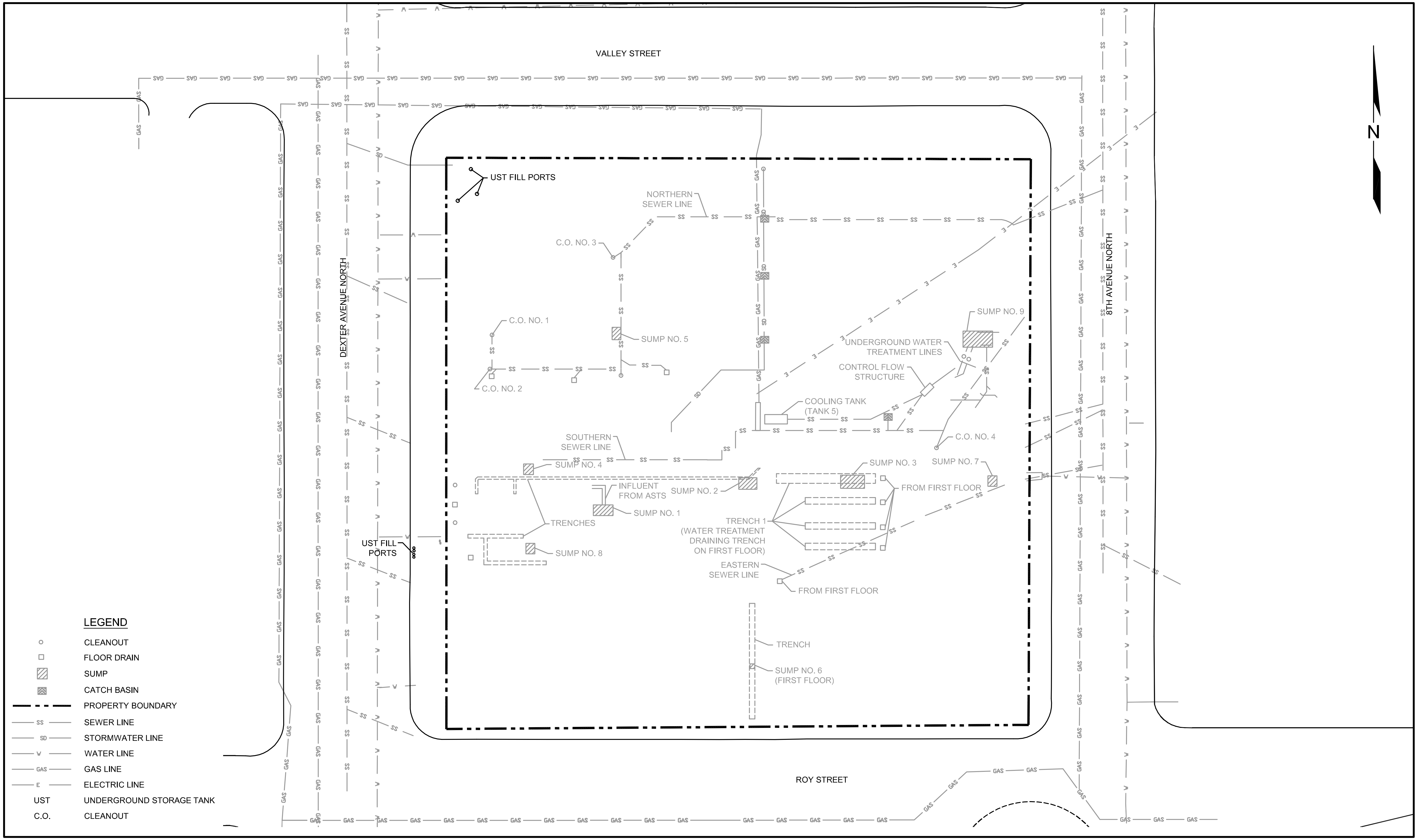
DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_PP

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 3
PROPERTY PLAN



6/10/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_UTIL.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

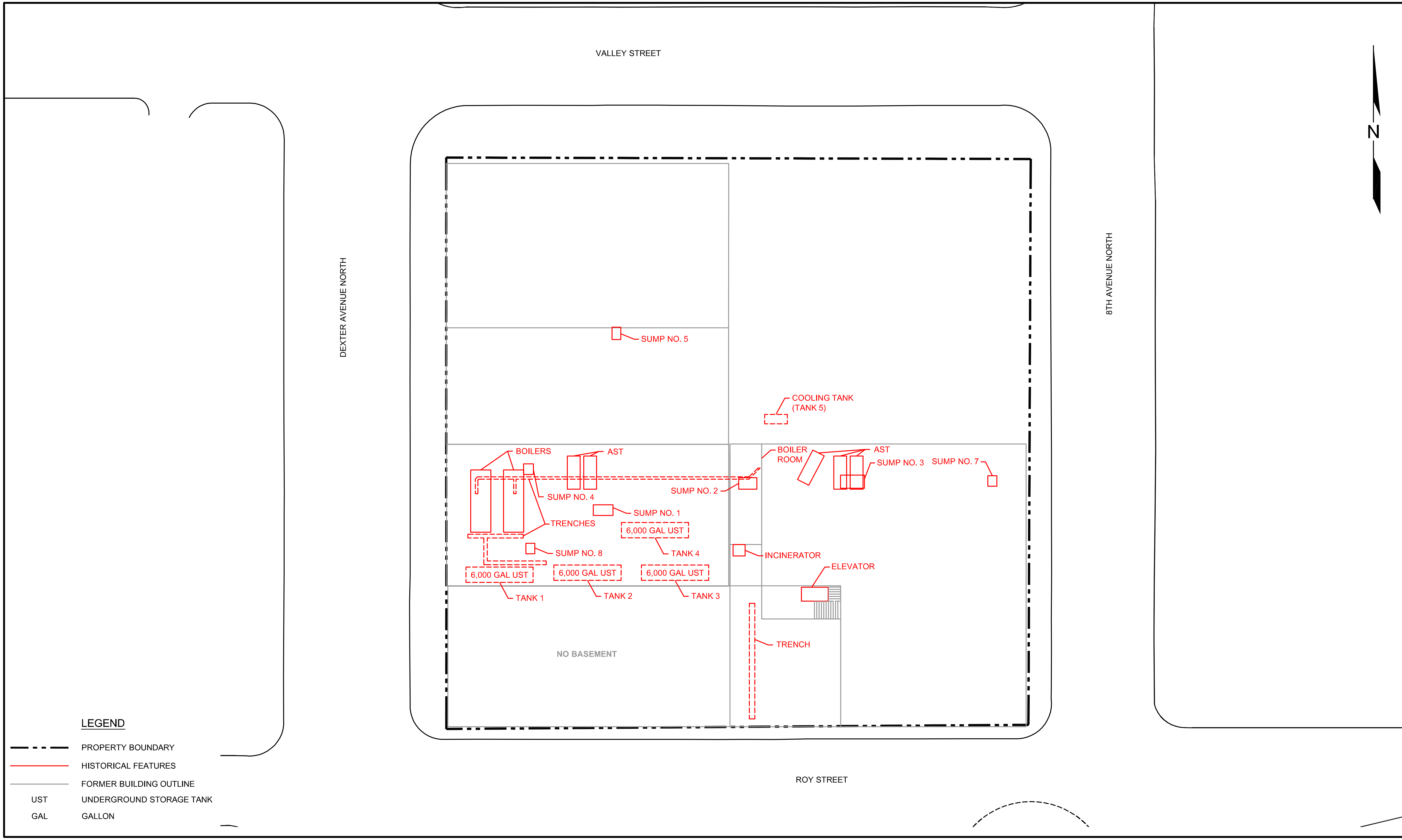
DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_UTIL

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 4
SUBSURFACE UTILITIES MAP



6/10/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_HIST_BASEMENT.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

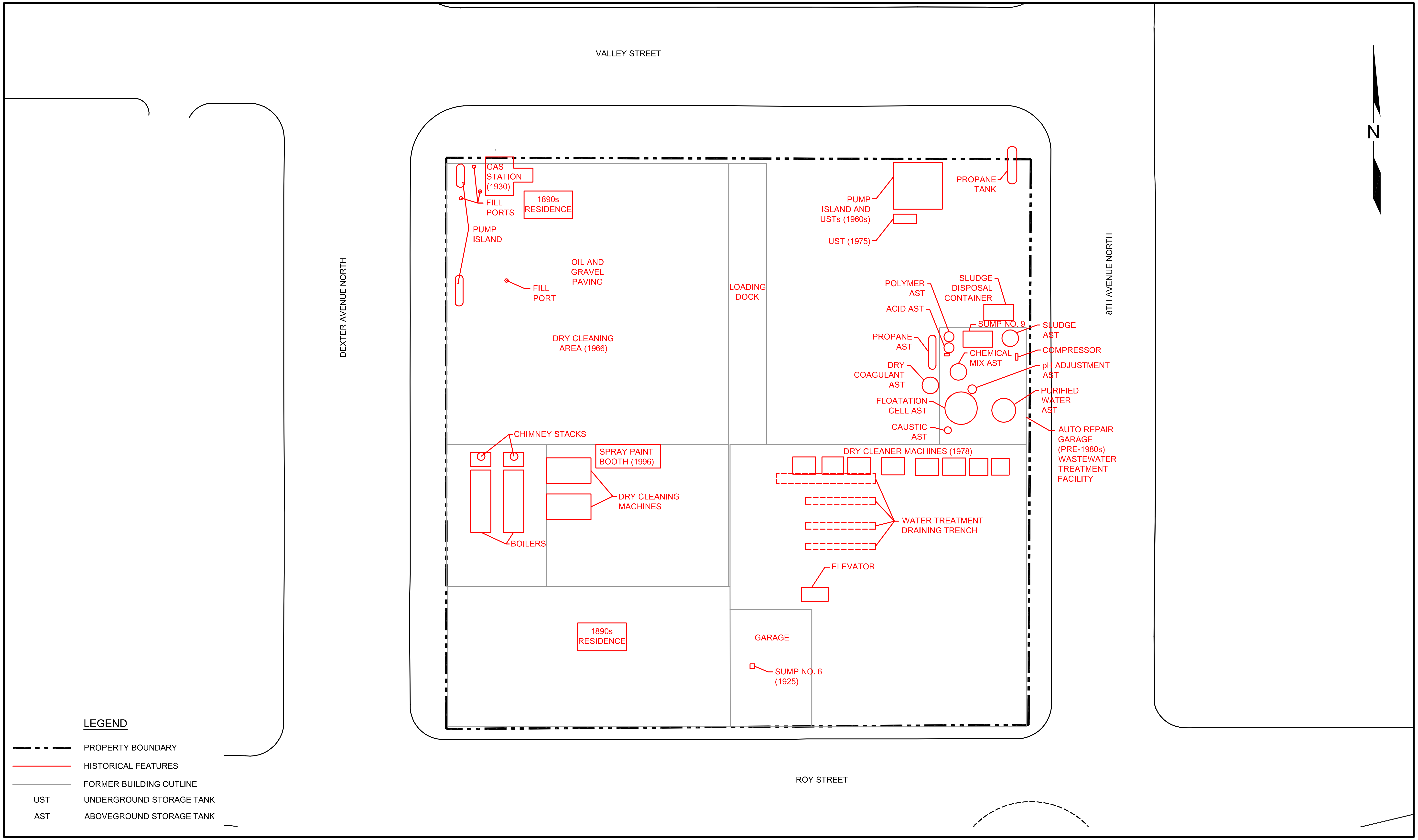
DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_HIST_BASEMENT

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 5
HISTORICAL PROPERTY FEATURES
BASEMENT



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_HIST_FIRST

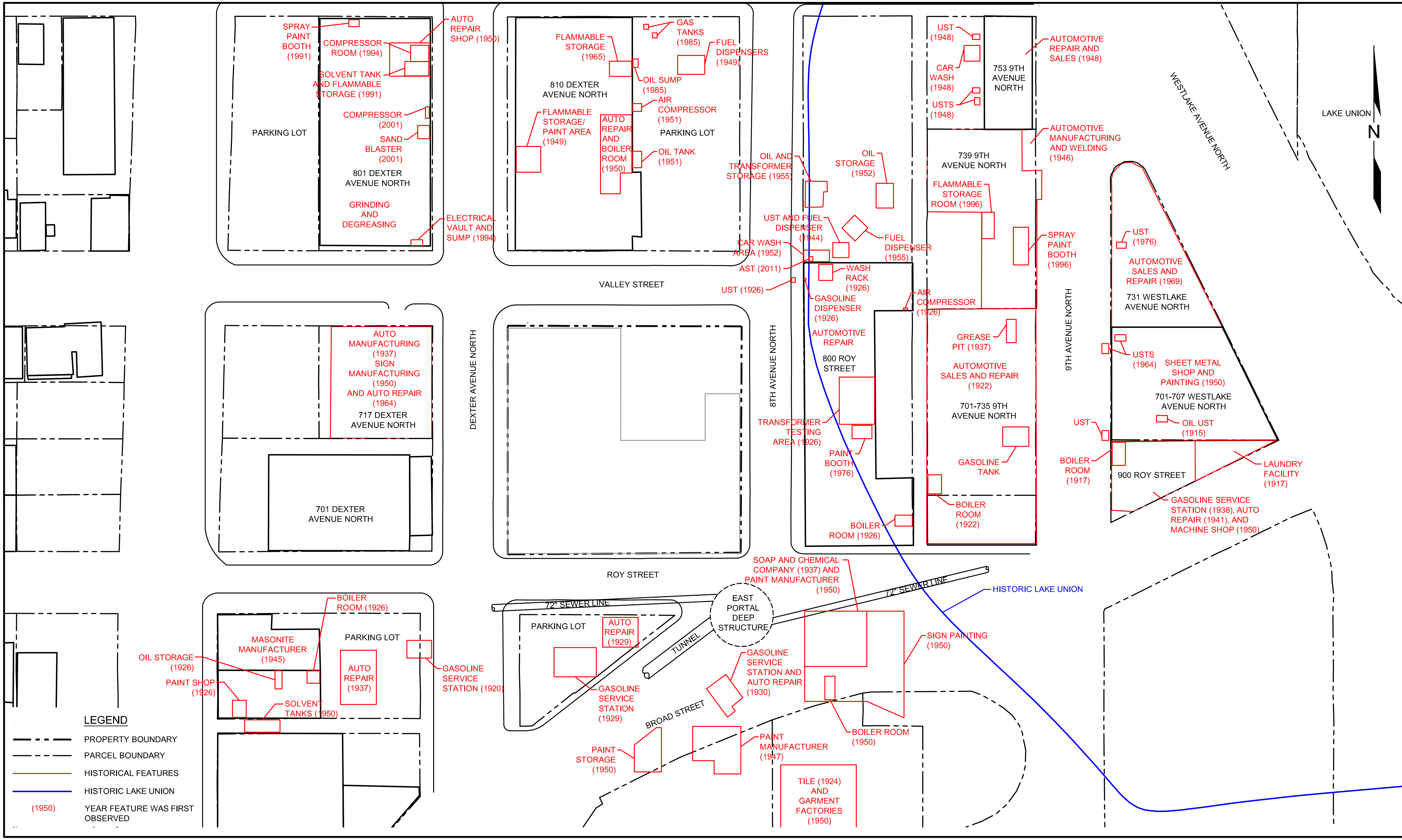
PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 6
HISTORICAL PROPERTY FEATURES
FIRST FLOOR

6/10/2013
P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_HIST_FIRST.DWG



P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_HIST_OFF.DWG 6/10/2013

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

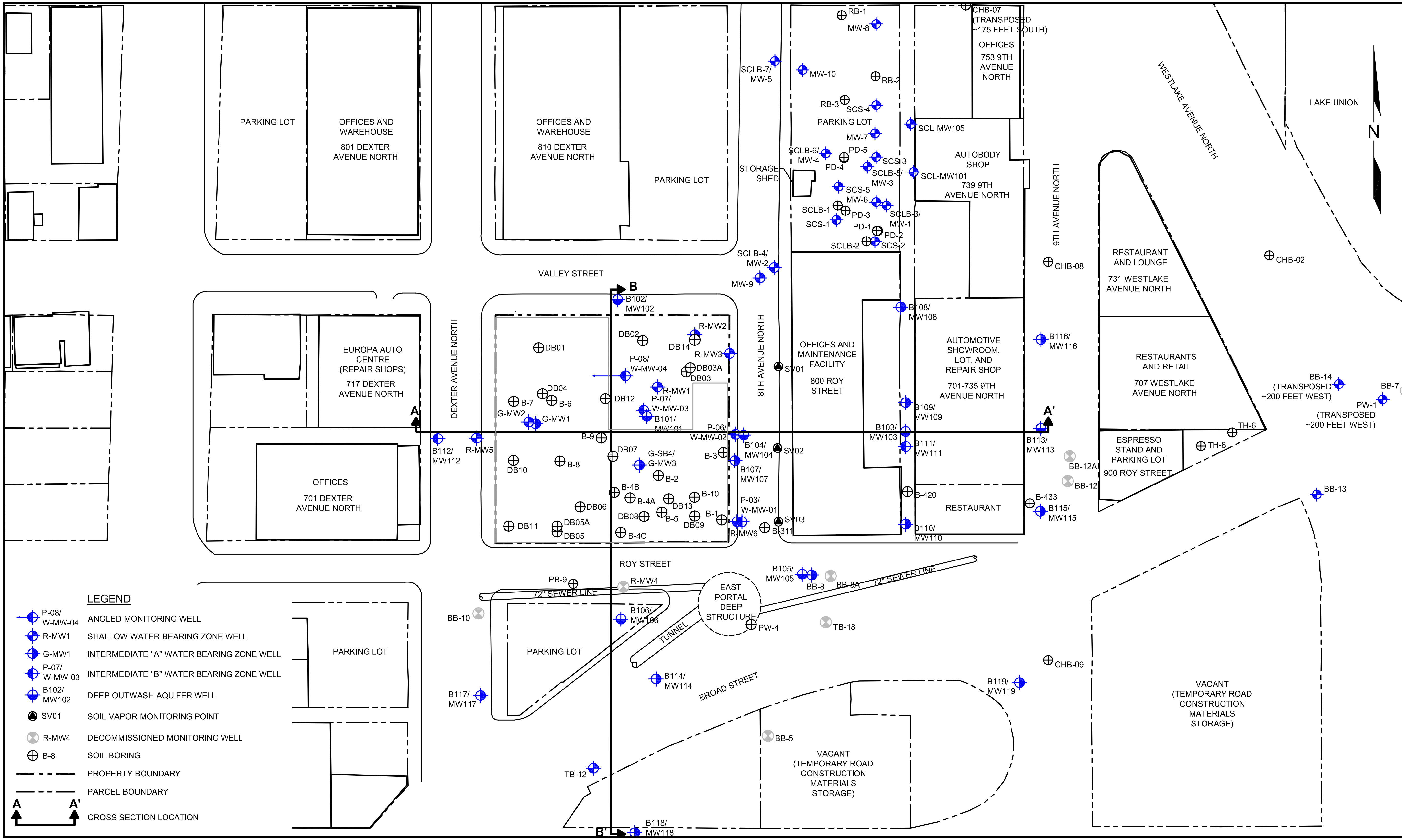
DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_HIST_OFF

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 7
HISTORICAL OFF-PROPERTY FEATURES



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

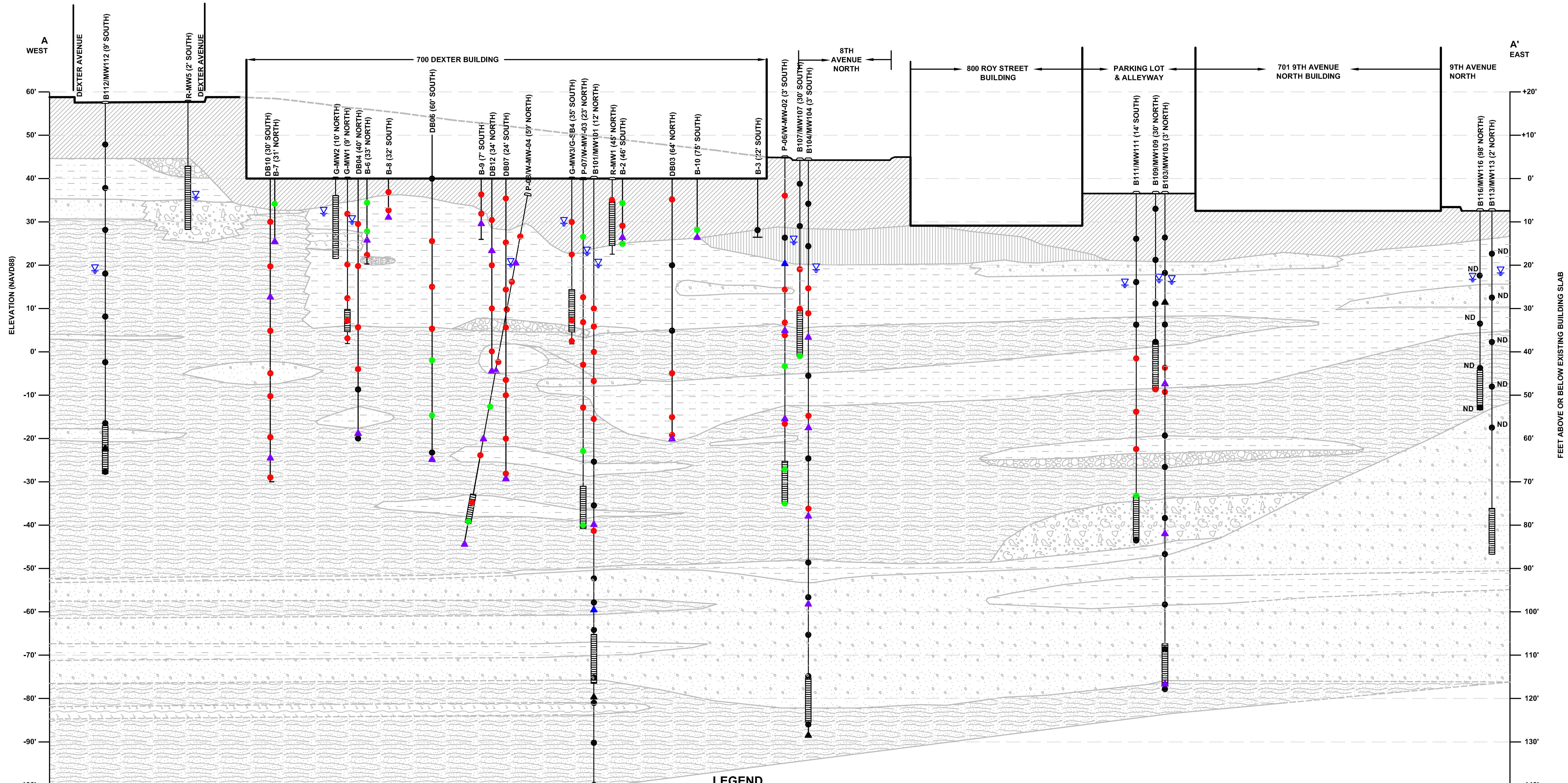
DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_SEL

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 8
SITE EXPLORATION LOCATION PLAN



LEGEND

- **ML:** INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS
- **SM:** SILTY SANDS, SAND - CLAY MIXTURES
- **SM-ML**
- **SM-MH**
- **SM-GM**
- **SP:** POORLY GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
- **SP-SM**
- **SP-GP:** POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
- **GM:** SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
- **GW:** WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
- **FILL**
- (12' NORTH) DISTANCE OF BORING/WELL FROM CROSS SECTION LINE
- MONITORING WELL WITH SCREEN INTERVAL
- GROUNDWATER DEPTH (MARCH 29, 2013)

PCE CONCENTRATIONS IN STRATIGRAPHIC GROUNDWATER SAMPLES (µg/L):

- ▲ CONCENTRATION BELOW LABORATORY REPORTING LIMIT
- ▲ CONCENTRATION AT OR BELOW MTCA METHOD A CLEANUP LEVEL
- ▲ CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVEL

PCE CONCENTRATIONS IN SOIL (mg/kg):

- ● CONCENTRATION BELOW LABORATORY REPORTING LIMIT
- ● CONCENTRATION AT OR BELOW MTCA METHOD A CLEANUP LEVEL
- ● CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVEL

PCE	TETRACHLOROETHYLENE
MTCA	WASHINGTON STATE MODEL TOXICS CONTROL ACT
µg/L	MICROGRAMS PER LITER
mg/kg	MILLIGRAMS PER KILOGRAM

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

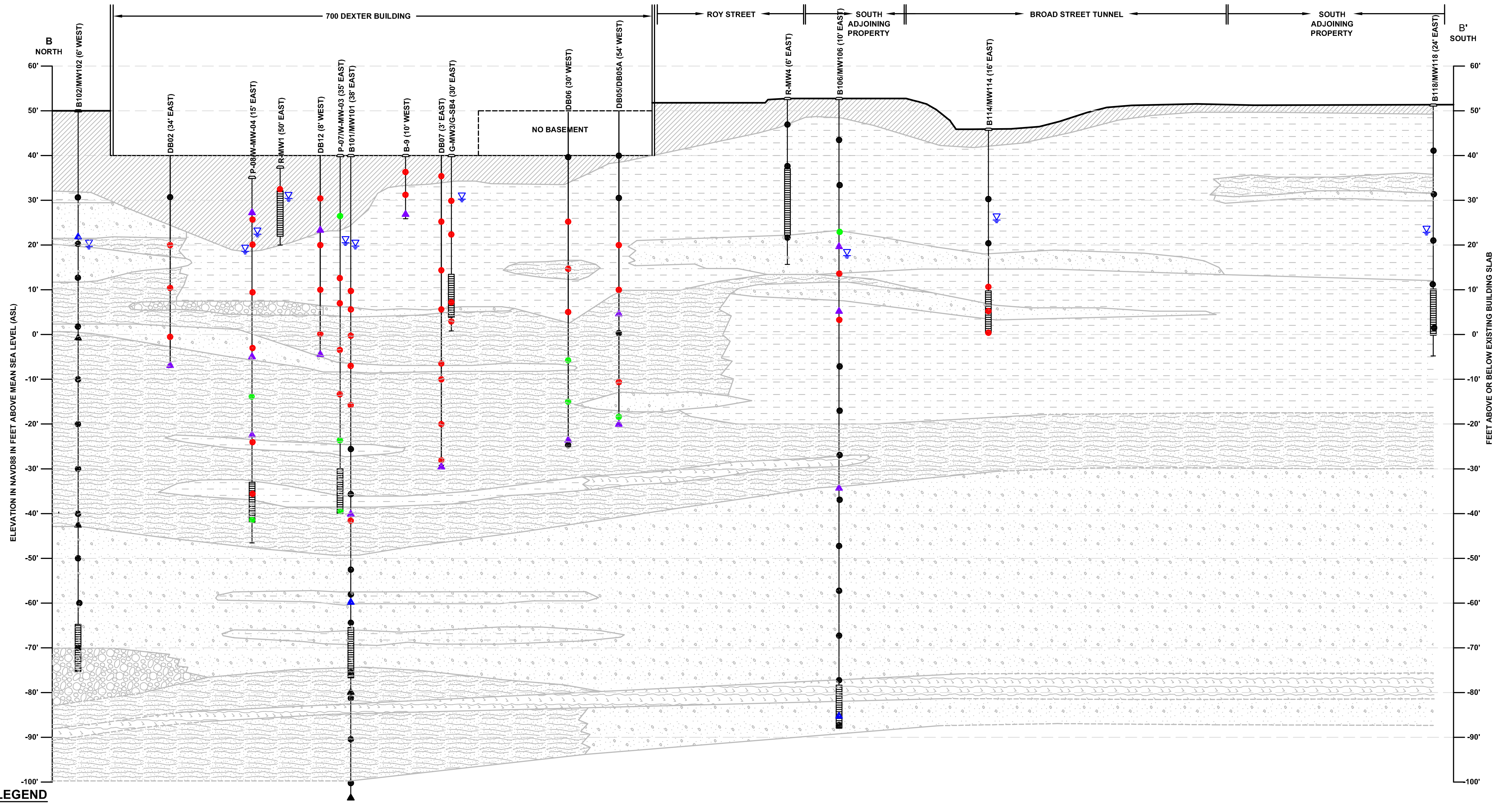
DATE:	05/08/2013
DRAWN BY:	BLR/NAC/JQC
CHECKED BY:	CCC
CAD FILE:	0797-001_2013FS_RXAA

PROJECT NAME:	700 DEXTER PROPERTY
PROJECT NUMBER:	0797-001
STREET ADDRESS:	700 DEXTER AVENUE NORTH
CITY, STATE:	SEATTLE, WASHINGTON

REGION:

0 25 50 100
APPROXIMATE HORIZONTAL SCALE IN FEET

FIGURE 9
GEOLOGIC CROSS SECTION A - A'



LEGEND

ML: INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS

SM: SILTY SANDS, SAND - CLAY MIXTURES

SM-ML

SM-MH

SM-GM

SP: POORLY GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES

SP-SM

SP-GP: POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES

GM: SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES

GW: WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES

FILL

(12' NORTH) DISTANCE OF BORING/WELL FROM CROSS SECTION LINE

MONITORING WELL WITH SCREEN INTERVAL

GROUNDWATER DEPTH (MARCH 29, 2013)

PCE CONCENTRATIONS IN STRATIGRAPHIC GROUNDWATER SAMPLES (µg/L):

- CONCENTRATION BELOW LABORATORY REPORTING LIMIT
- CONCENTRATION AT OR BELOW MTCA METHOD A CLEANUP LEVEL
- CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVEL

µg/L MICROGRAMS PER LITER

PCE CONCENTRATIONS IN SOIL (mg/kg):

- CONCENTRATION BELOW LABORATORY REPORTING LIMIT
- CONCENTRATION AT OR BELOW MTCA METHOD A CLEANUP LEVEL
- CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVEL

PCE TETRACHLOROETHYLENE

MTCA WASHINGTON STATE MODEL TOXICS CONTROL ACT

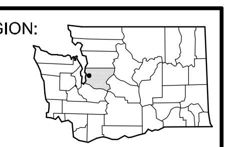
mg/kg MILLIGRAMS PER KILOGRAM

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 05/08/2013
DRAWN BY: BLR/JQC/NAC
CHECKED BY: CCC
CAD FILE: 0797-001_2013FS_RXBB

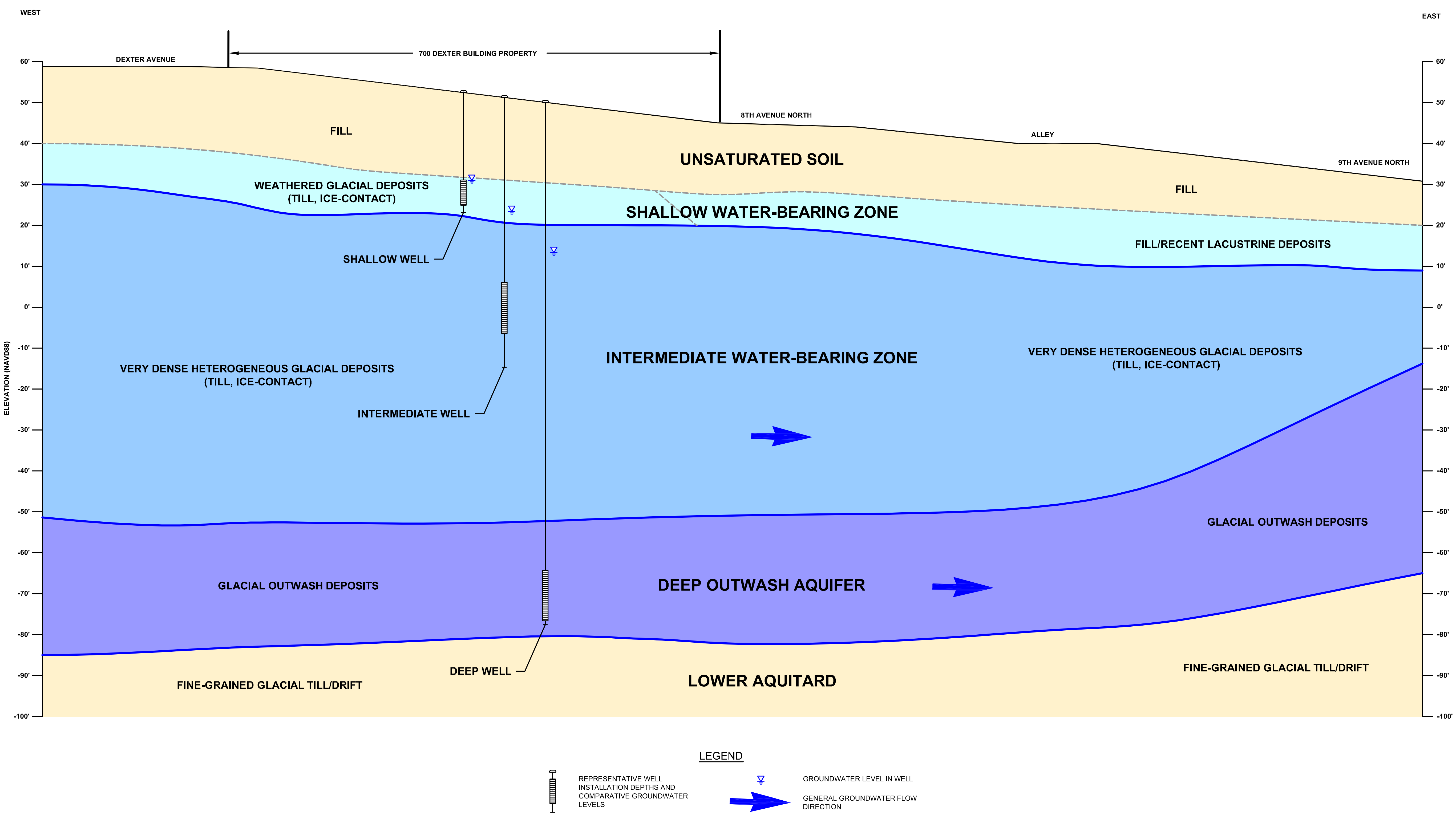
PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:



0 25 50 100
APPROXIMATE HORIZONTAL SCALE IN FEET

FIGURE 10
GEOLOGIC CROSS SECTION B - B'



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 04/10/2013
DRAWN BY: BLR/NAC
CHECKED BY: CCC
CAD FILE: 0797-001_2013FS_ZONES

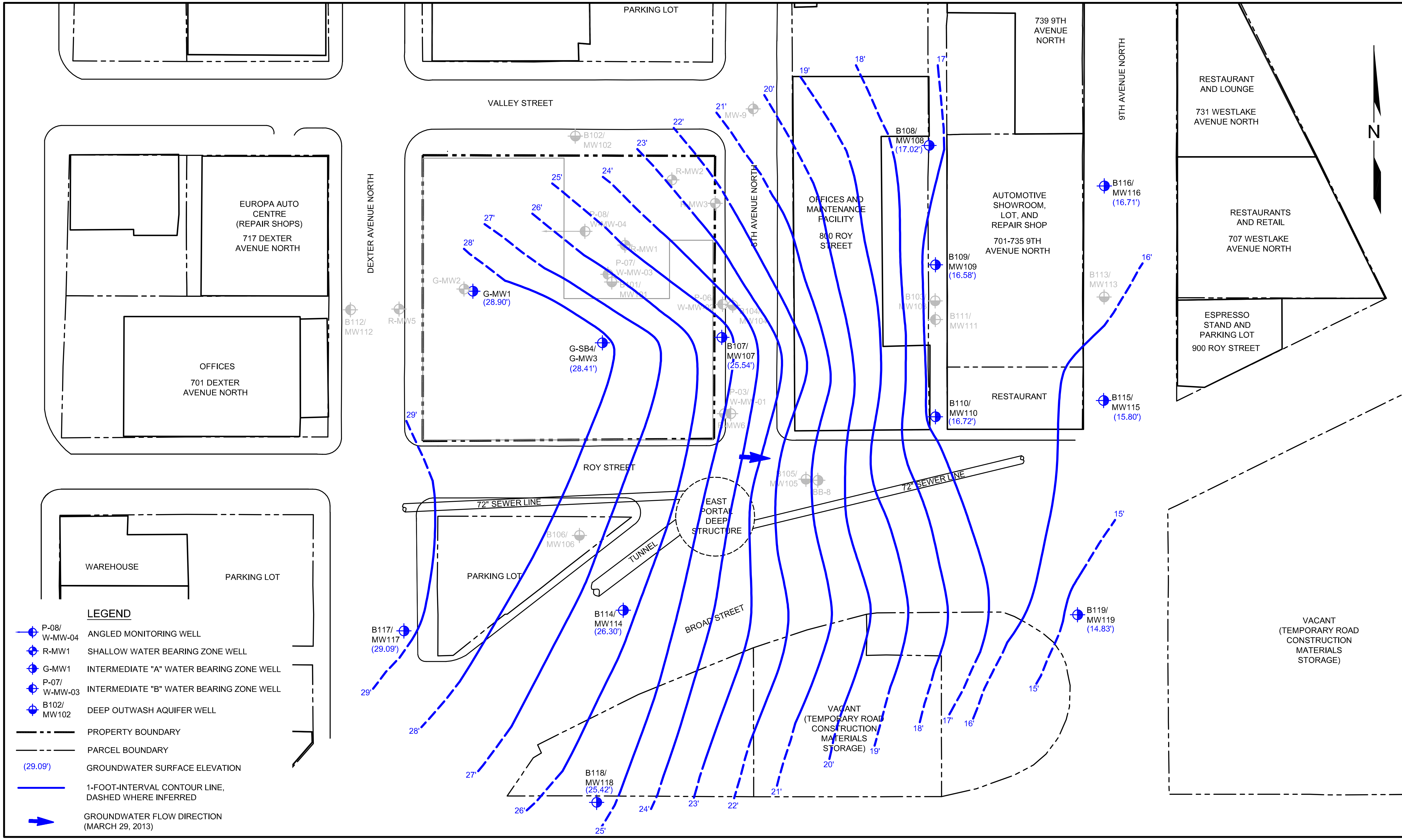
PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100
APPROXIMATE HORIZONTAL SCALE IN FEET

FIGURE 11
CONCEPTUAL MODEL OF SITE WATER-BEARING ZONES

6/18/2013
P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_ZONES.DWG



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

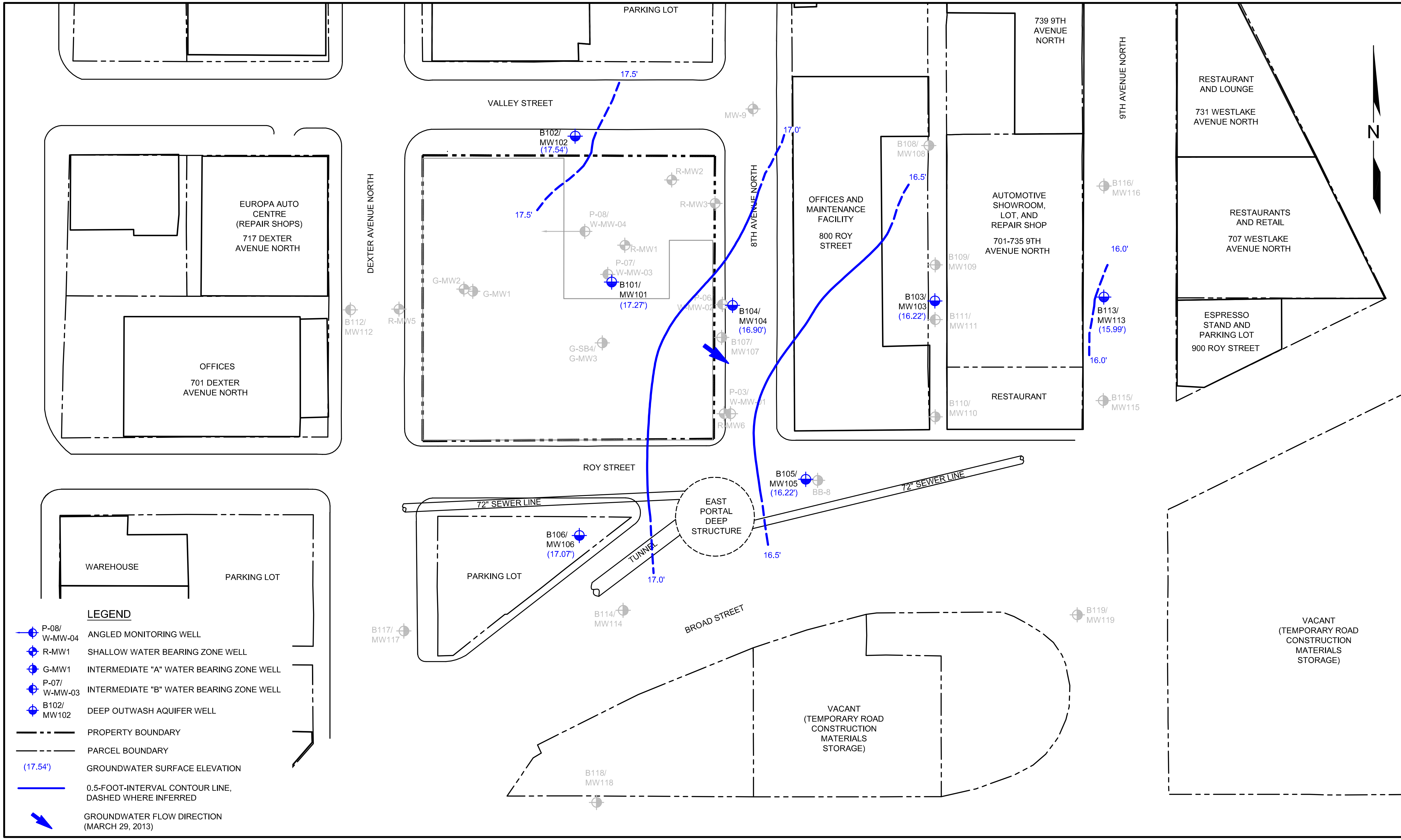
DATE: 04/22/13
DRAWN BY: BLR
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_CM-INTERMED

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 40 80 160
APPROXIMATE SCALE IN FEET

FIGURE 12
GROUNDWATER CONTOUR MAP
INTERMEDIATE "A" WATER-BEARING ZONE
(MARCH 29, 2013)



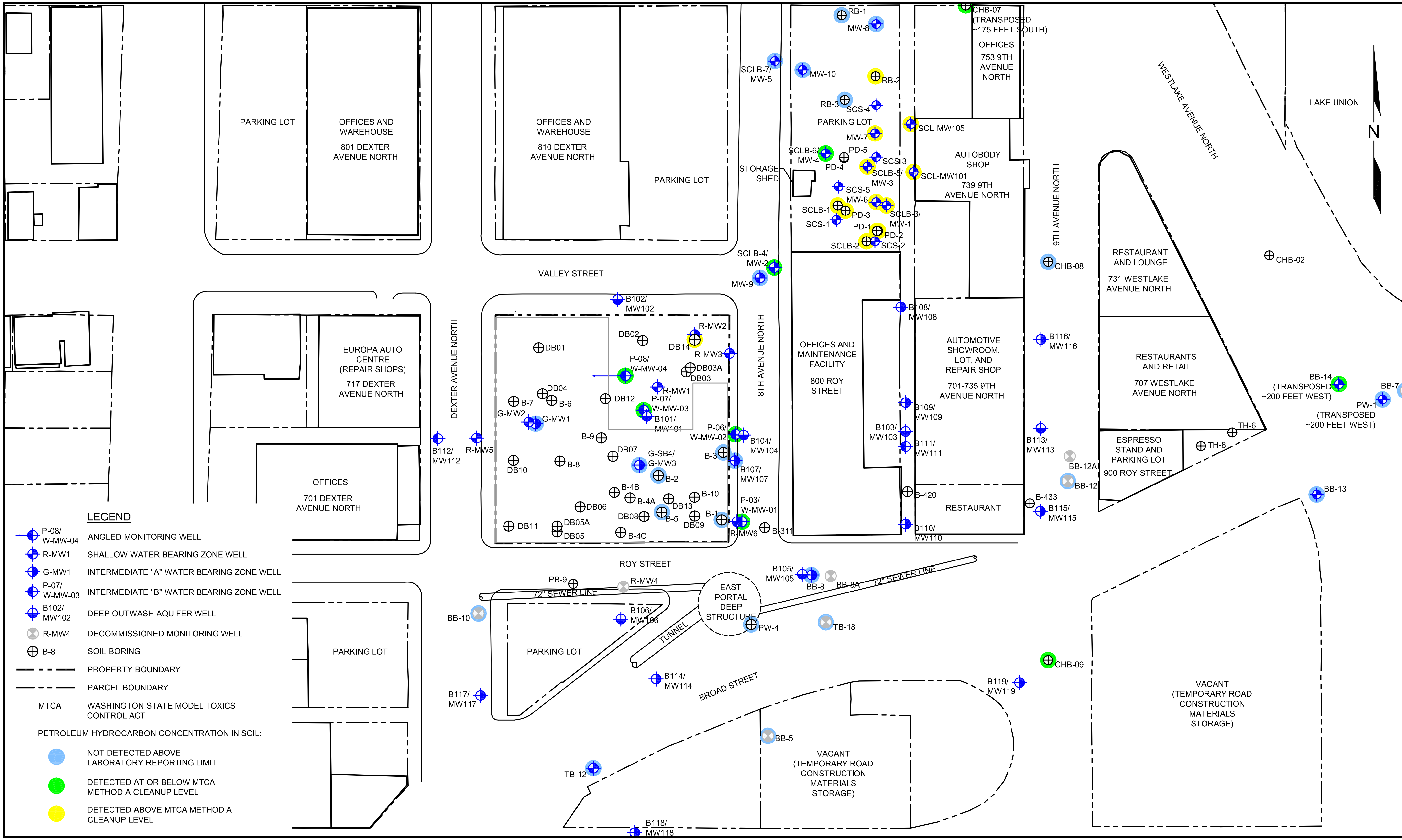
SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 04/22/13
DRAWN BY: BLR
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_CM-DEEP

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

FIGURE 13
GROUNDWATER CONTOUR MAP
DEEP OUTWASH AQUIFER
(MARCH 29, 2013)

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CM-DEEP.DWG
6/10/2013



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

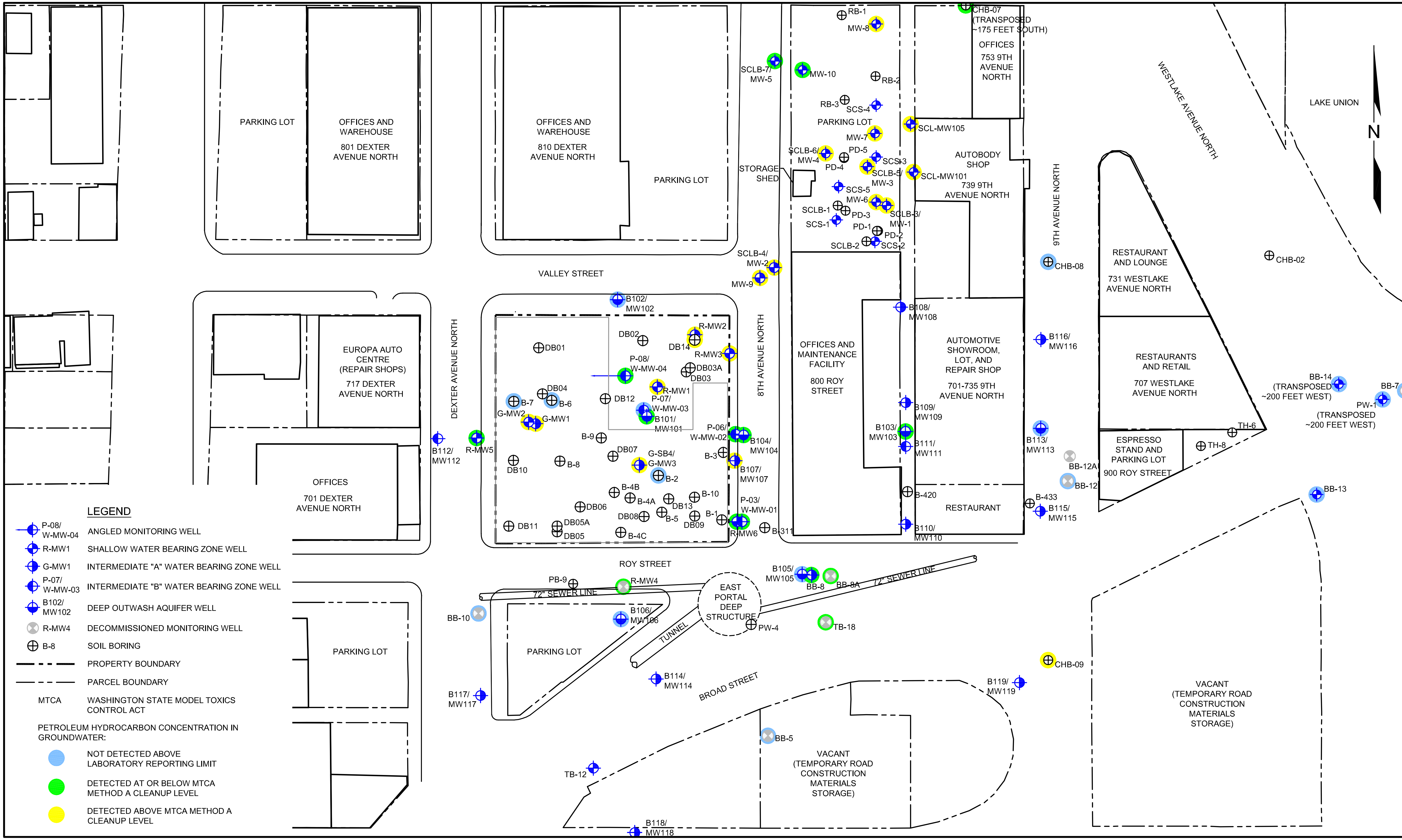
DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_SD_PH

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 14
PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_GD_PH

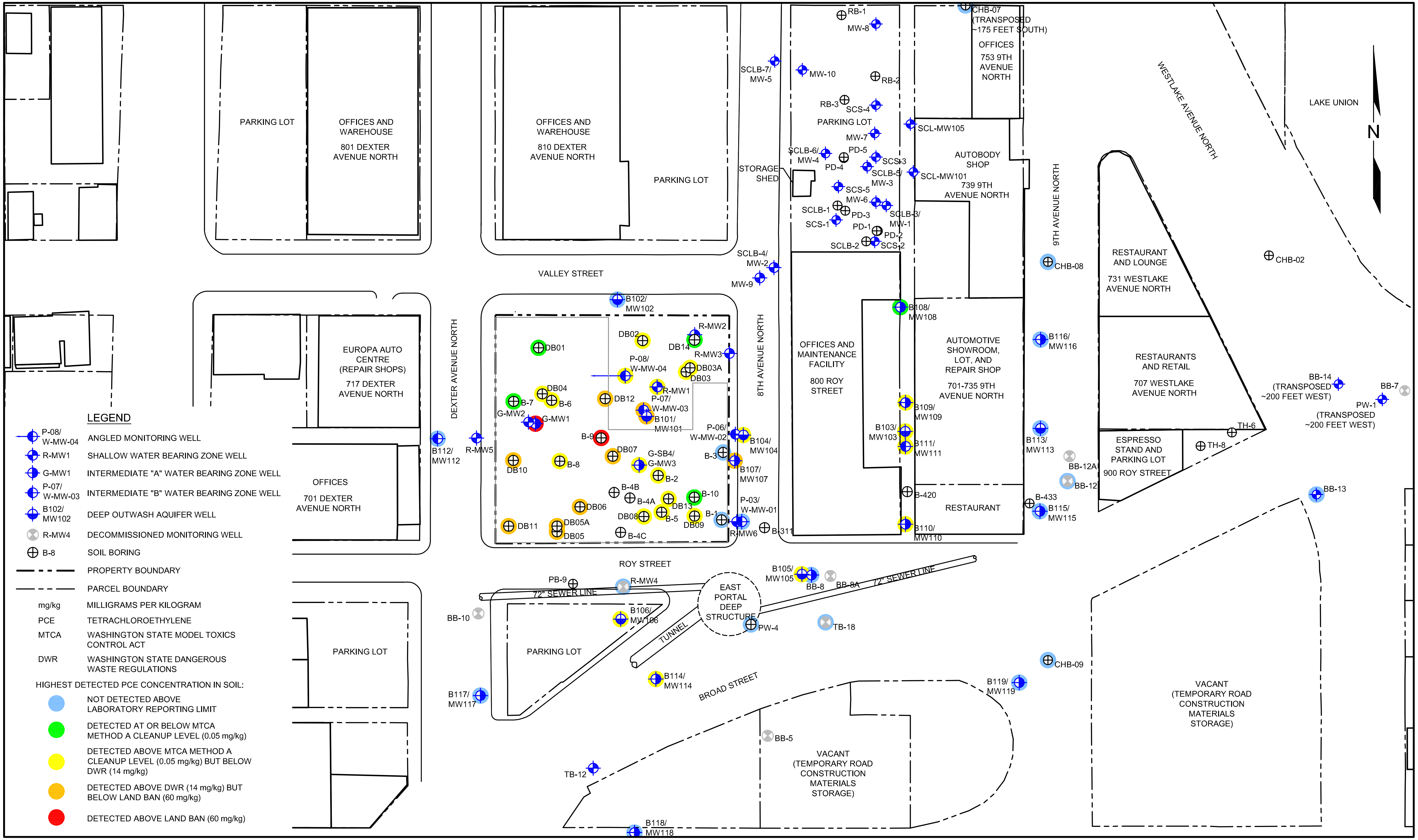
PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 15
PETROLEUM HYDROCARBON CONCENTRATIONS IN GROUNDWATER

6/10/2013
P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_GD_PH.DWG



6/10/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_SD_PCE.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

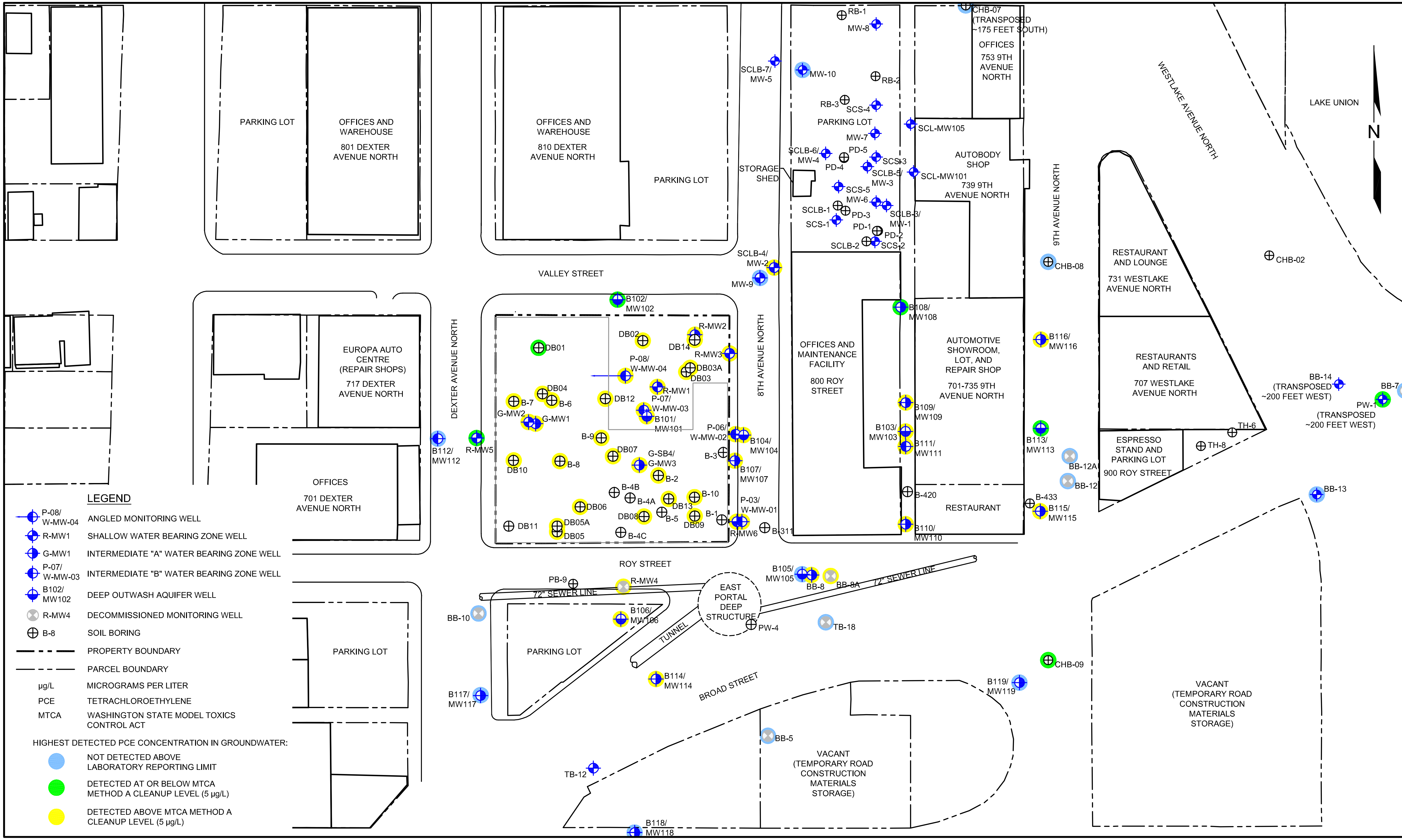
DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_SD_PCE

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 16
PCE CONCENTRATIONS IN SOIL



6/10/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_GD_PCE.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

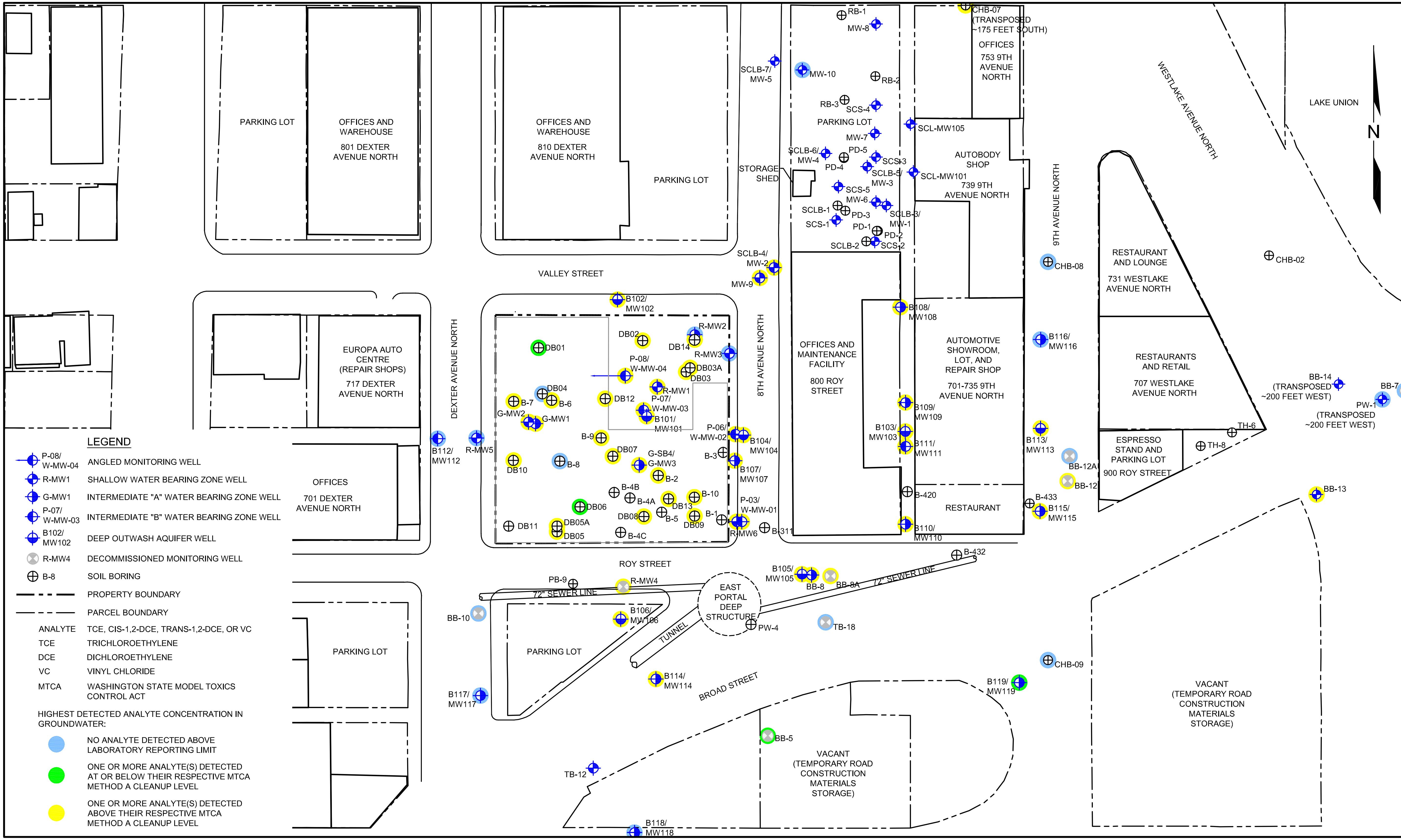
DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_GD_PCE

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 17
PCE CONCENTRATIONS IN GROUNDWATER



6/10/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_GD_ANA.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE:	03/07/13
DRAWN BY:	NAC
CHECKED BY:	DRAFT
CAD FILE:	0797-001_2013FS_GD_ANA

PROJECT NAME:	700 DEXTER PROPERTY
PROJECT NUMBER:	0797-001
STREET ADDRESS:	700 DEXTER AVENUE NORTH
CITY, STATE:	SEATTLE, WASHINGTON

REGION:

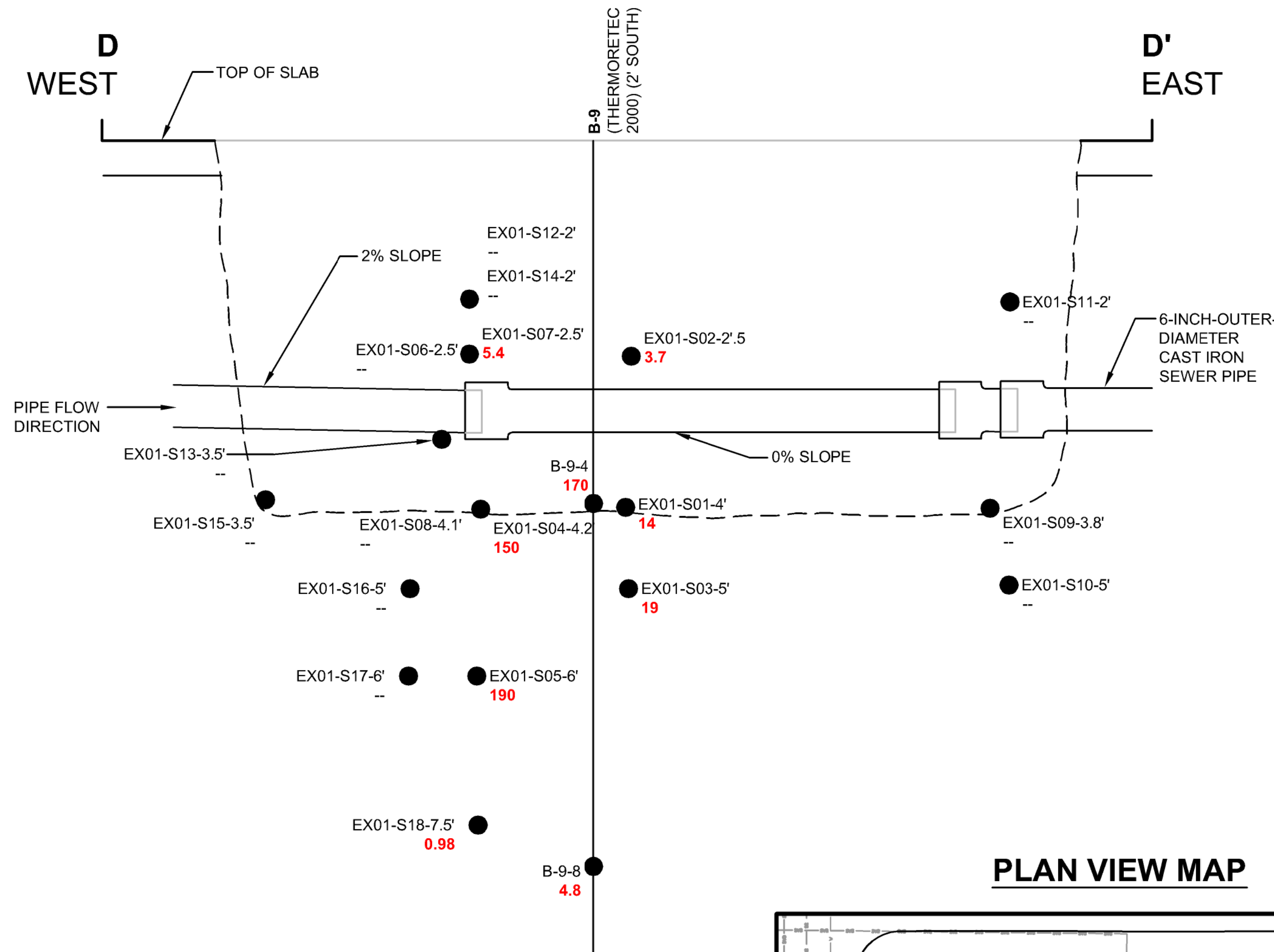
0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 18
TCE, CIS-1,2-DCE, TRANS-1,2-DCE, AND VC CONCENTRATIONS IN GROUNDWATER

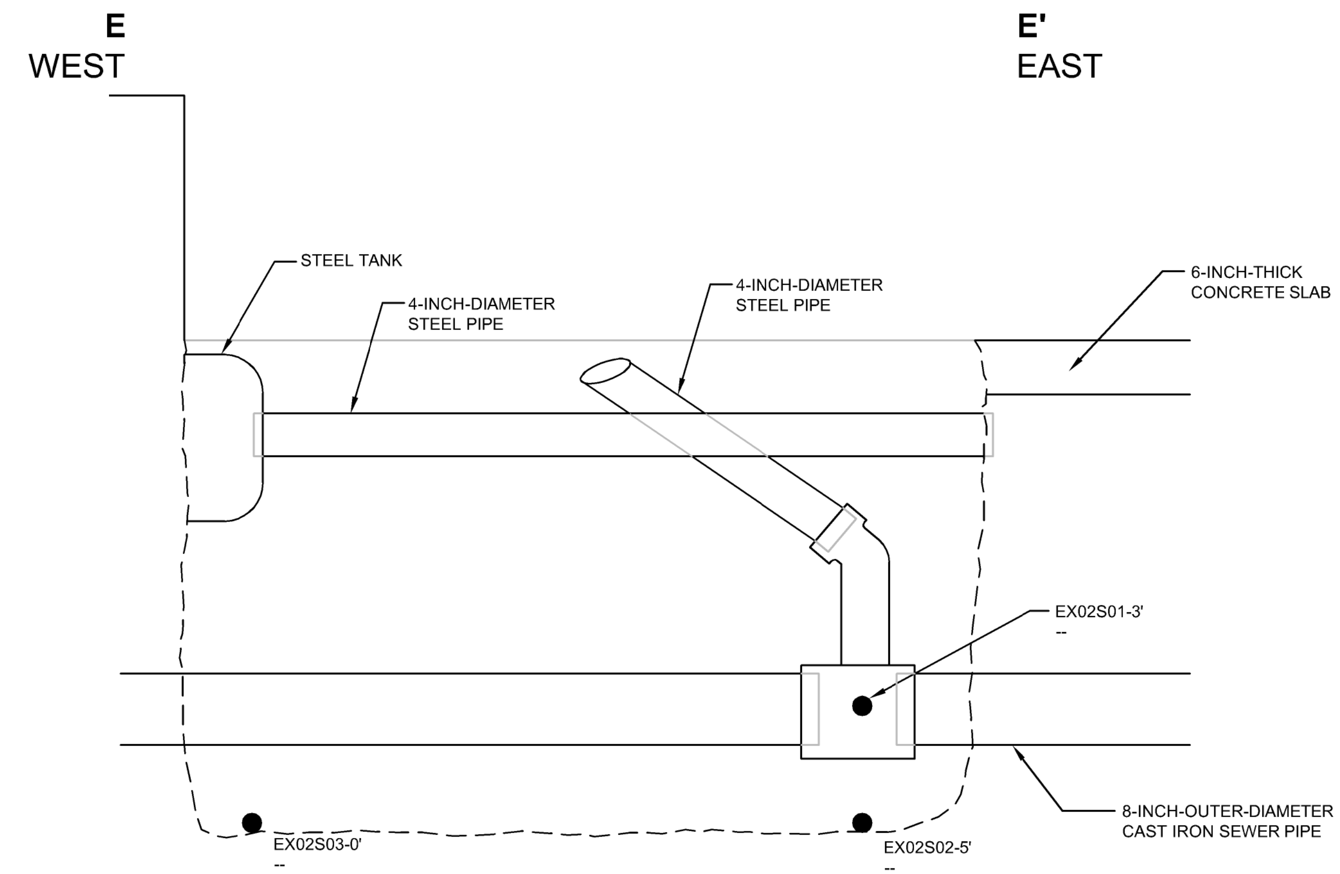
WWW.SOUNDEARTHINC.COM

6/10/2013

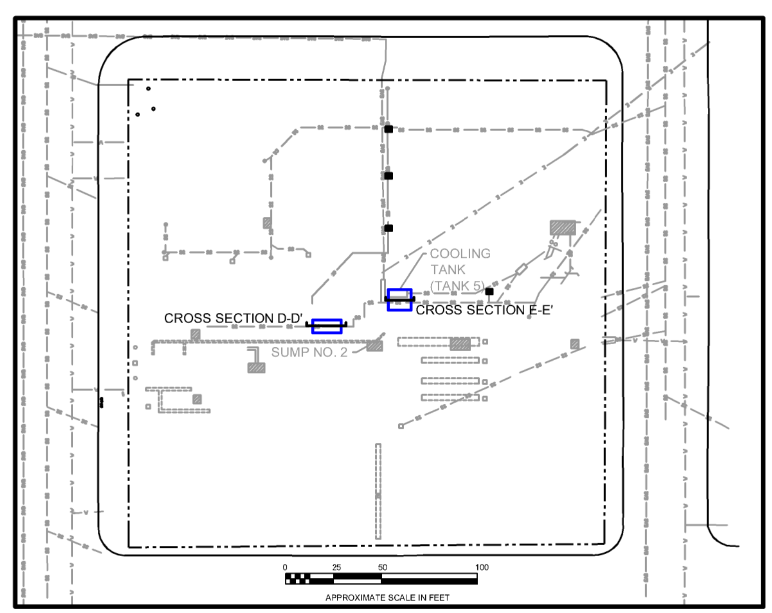
CROSS SECTION D-D'



CROSS SECTION E-E'



PLAN VIEW MAP



LEGEND

● EX01-S04-4'	SOIL SAMPLE NUMBER AND LOCATION (SOUNDEARTH, FEBRUARY AND MARCH, 2012)
5.4	PCE CONCENTRATION IN SOIL(MG/KG)
⊕ B-9	SOIL BORING (THERMORETEC, 2000)
MG/KG	MILLIGRAMS PER KILOGRAM
MTCA	WASHINGTON STATE MODEL TOXICS CONTROL ACT
--	NOT ANALYZED
PCE	TETRACHLOROETHYLENE
RED	REPORTED CONCENTRATION (MG/KG) EXCEEDS MTCA METHOD A CLEANUP LEVEL FOR SOIL

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_SLEX.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

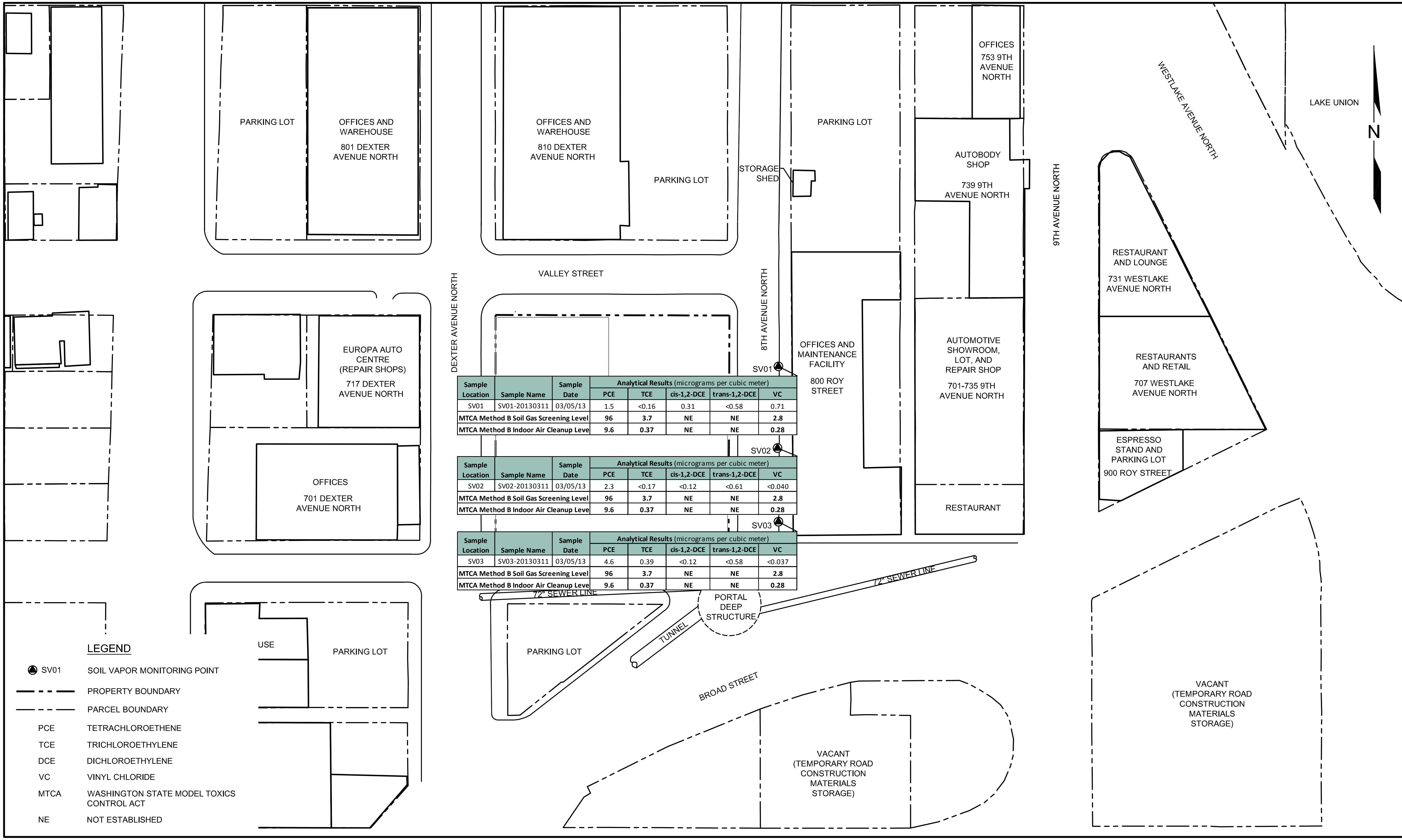
DATE: 05/08/13
DRAWN BY: NAC
CHECKED BY: CCC
CAD FILE: 0797-001_2013FS_SLEX

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 1 2 4
APPROXIMATE SCALE IN FEET

FIGURE 19
SEWER LINE EXCAVATION EX01



Sample Location	Sample Name	Sample Date	Analytical Results (micrograms per cubic meter)				
			PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
SV01	SV01-20130311	03/05/13	1.5	<0.16	0.31	<0.58	0.71
MTCA Method B Soil Gas Screening Level			**96**	**3.7**	**NE**	**NE**	**2.8**
MTCA Method B Indoor Air Cleanup Leve			**9.6**	**0.37**	**NE**	**NE**	**0.28**

Sample Location	Sample Name	Sample Date	Analytical Results (micrograms per cubic meter)				
			PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
SV02	SV02-20130311	03/05/13	2.3	<0.17	<0.12	<0.61	<0.040
MTCA Method B Soil Gas Screening Level			**96**	**3.7**	**NE**	**NE**	**2.8**
MTCA Method B Indoor Air Cleanup Leve			**9.6**	**0.37**	**NE**	**NE**	**0.28**

Sample Location	Sample Name	Sample Date	Analytical Results (micrograms per cubic meter)				
			PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	VC
SV03	SV03-20130311	03/05/13	4.6	0.39	<0.12	<0.58	<0.037
MTCA Method B Soil Gas Screening Level			**96**	**3.7**	**NE**	**NE**	**2.8**
MTCA Method B Indoor Air Cleanup Leve			**9.6**	**0.37**	**NE**	**NE**	**0.28**

LEGEND

- SV01 — SOIL VAPOR MONITORING POINT
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- PCE — TETRACHLOROETHENE
- TCE — TRICHLOROETHYLENE
- DCE — DICHLOROETHYLENE
- VC — VINYL CHLORIDE
- MTCA — WASHINGTON STATE MODEL TOXICS CONTROL ACT
- NE — NOT ESTABLISHED

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_SG

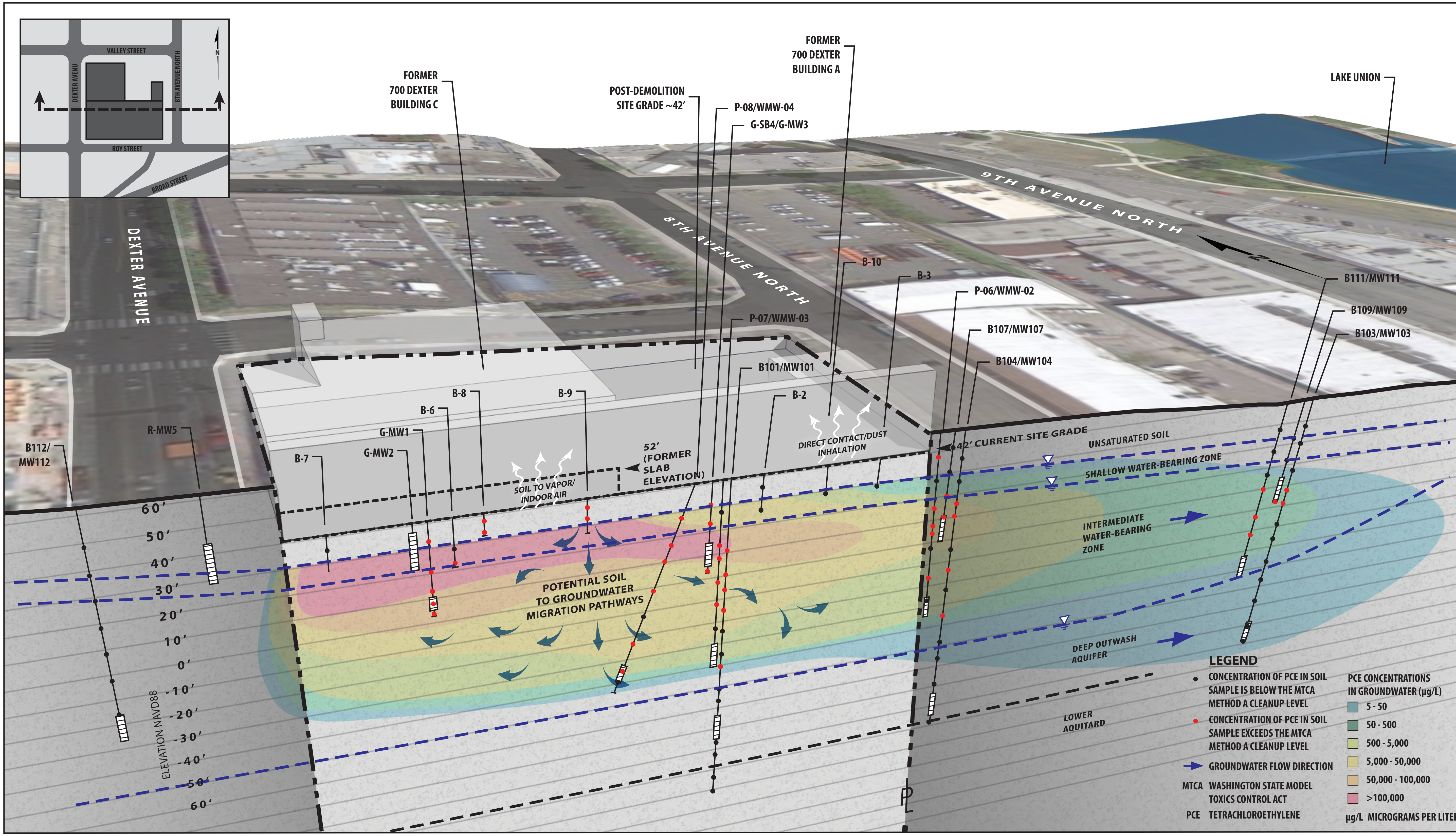
PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 20
SOIL GAS ANALYTICAL RESULTS

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_SG.DWG
6/10/2013



SoundEarth Strategies
www.soundearthinc.com

DATE: 06/03/2013
DRAWN BY: VPB
CHECKED BY: EKR
FILE: 0797-001_CSM-XS

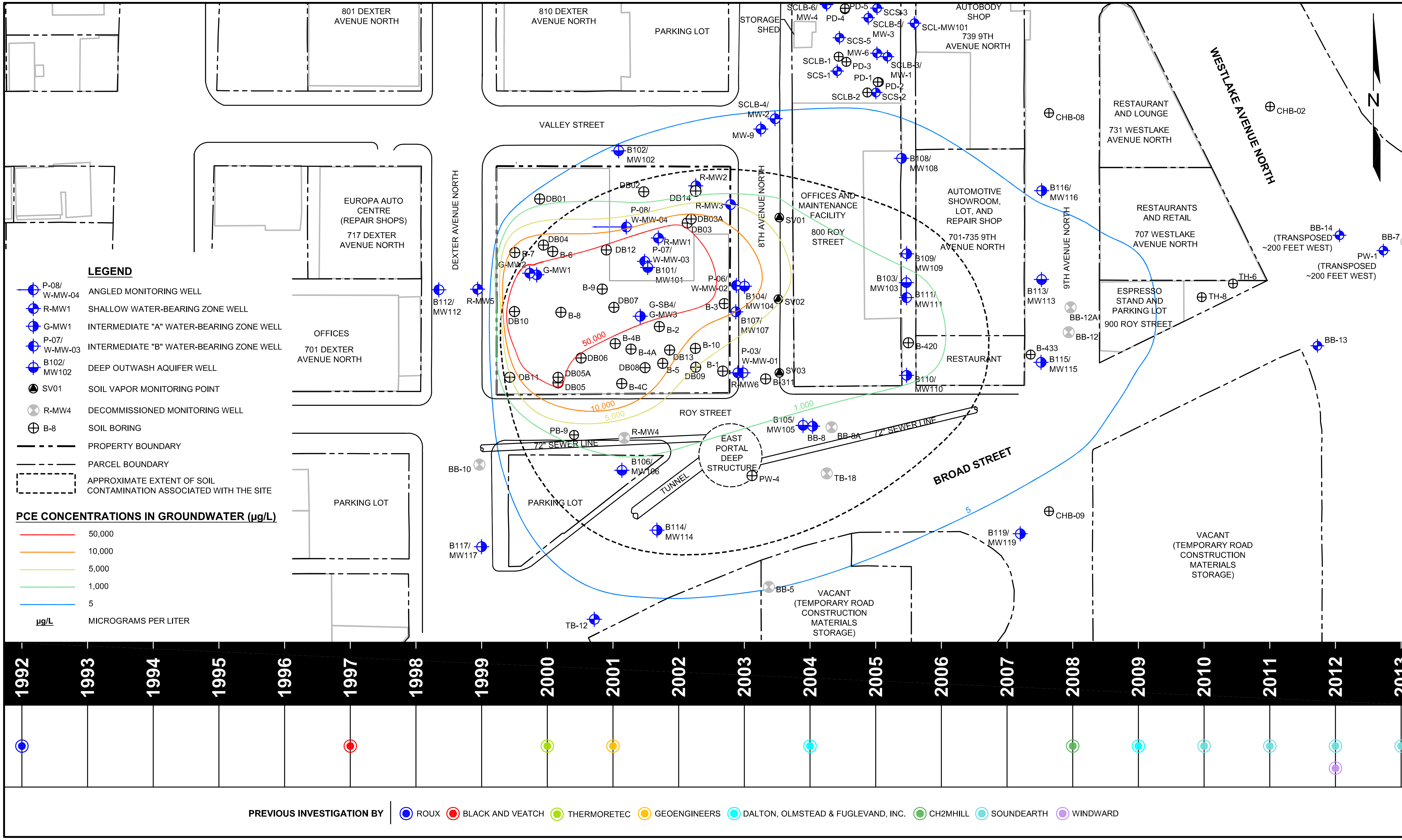
PROJECT NAME: 700 DEXTER PROPERTY
SES PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

NOT TO SCALE

FIGURE 21

CONCEPTUAL SITE MODEL
CROSS-SECTIONAL VIEW



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 03/07/13
DRAWN BY: NAC
CHECKED BY: DRAFT
CAD FILE: 0797-001_2013FS_SBD

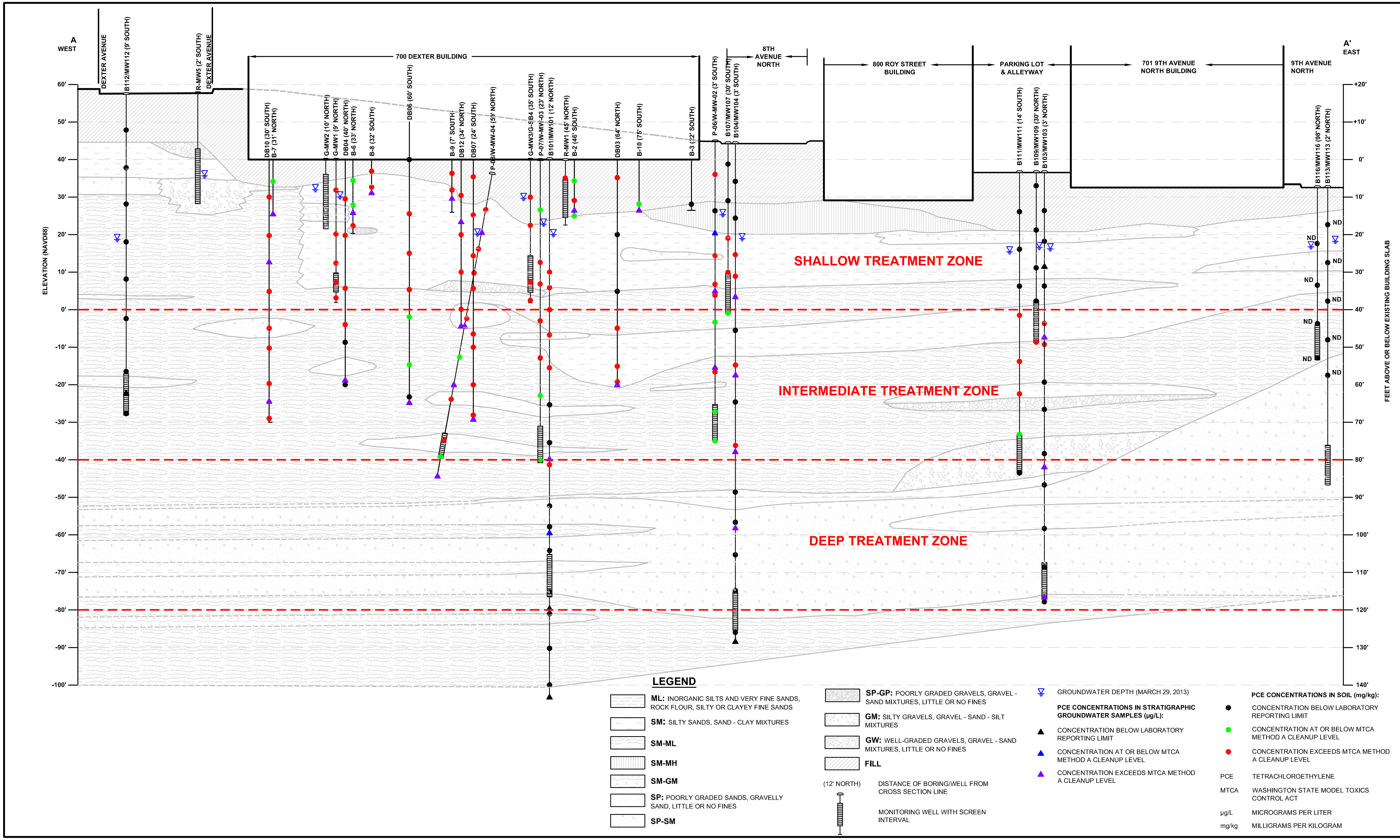
PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 22
CONCEPTUAL SITE MODEL
PLAN VIEW

6/18/2013
P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_SBD.DWG



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

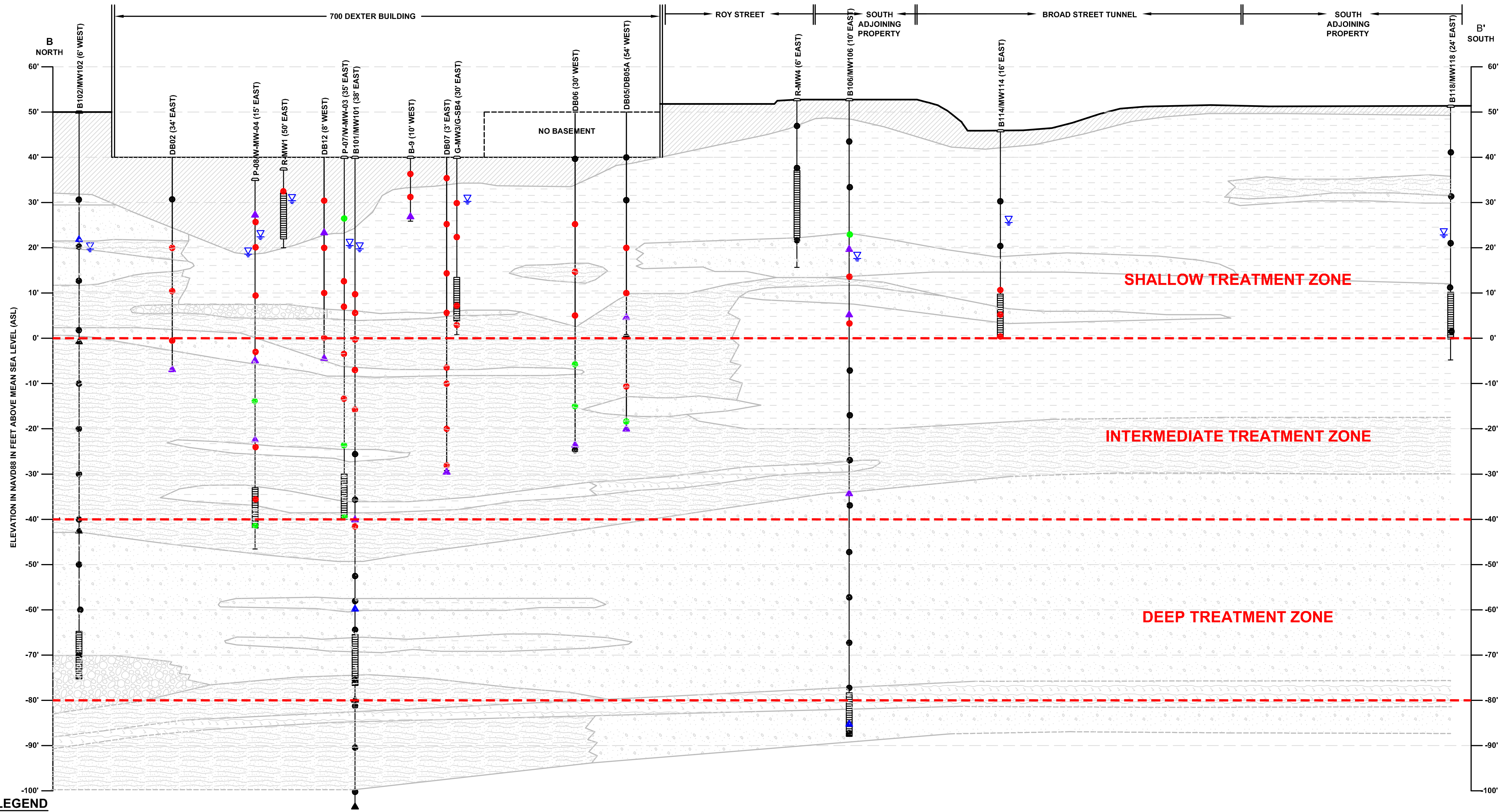
DATE: 05/08/2013
DRAWN BY: BLR/NAC/JQC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_XAA

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100
APPROXIMATE HORIZONTAL SCALE IN FEET

FIGURE 23
CROSS SECTION A - A'
REMEDIATION TREATMENT ZONES



LEGEND

ML: INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS

SM: SILTY SANDS, SAND - CLAY MIXTURES

SM-ML

SM-MH

SM-GM

SP: POORLY GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES

SP-SM

SP-GP: POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES

GM: SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES

GW: WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES

FILL

(12' NORTH) DISTANCE OF BORING/WELL FROM CROSS SECTION LINE

MONITORING WELL WITH SCREEN INTERVAL

GROUNDWATER DEPTH (MARCH 29, 2013)

PCE CONCENTRATIONS IN STRATIGRAPHIC GROUNDWATER SAMPLES (µg/L):

- CONCENTRATION BELOW LABORATORY REPORTING LIMIT
- CONCENTRATION AT OR BELOW MTCA METHOD A CLEANUP LEVEL
- CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVEL

µg/L MICROGRAMS PER LITER

PCE CONCENTRATIONS IN SOIL (mg/kg):

- CONCENTRATION BELOW LABORATORY REPORTING LIMIT
- CONCENTRATION AT OR BELOW MTCA METHOD A CLEANUP LEVEL
- CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVEL

PCE TETRACHLOROETHYLENE

MTCA WASHINGTON STATE MODEL TOXICS CONTROL ACT

mg/kg MILLIGRAMS PER KILOGRAM

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

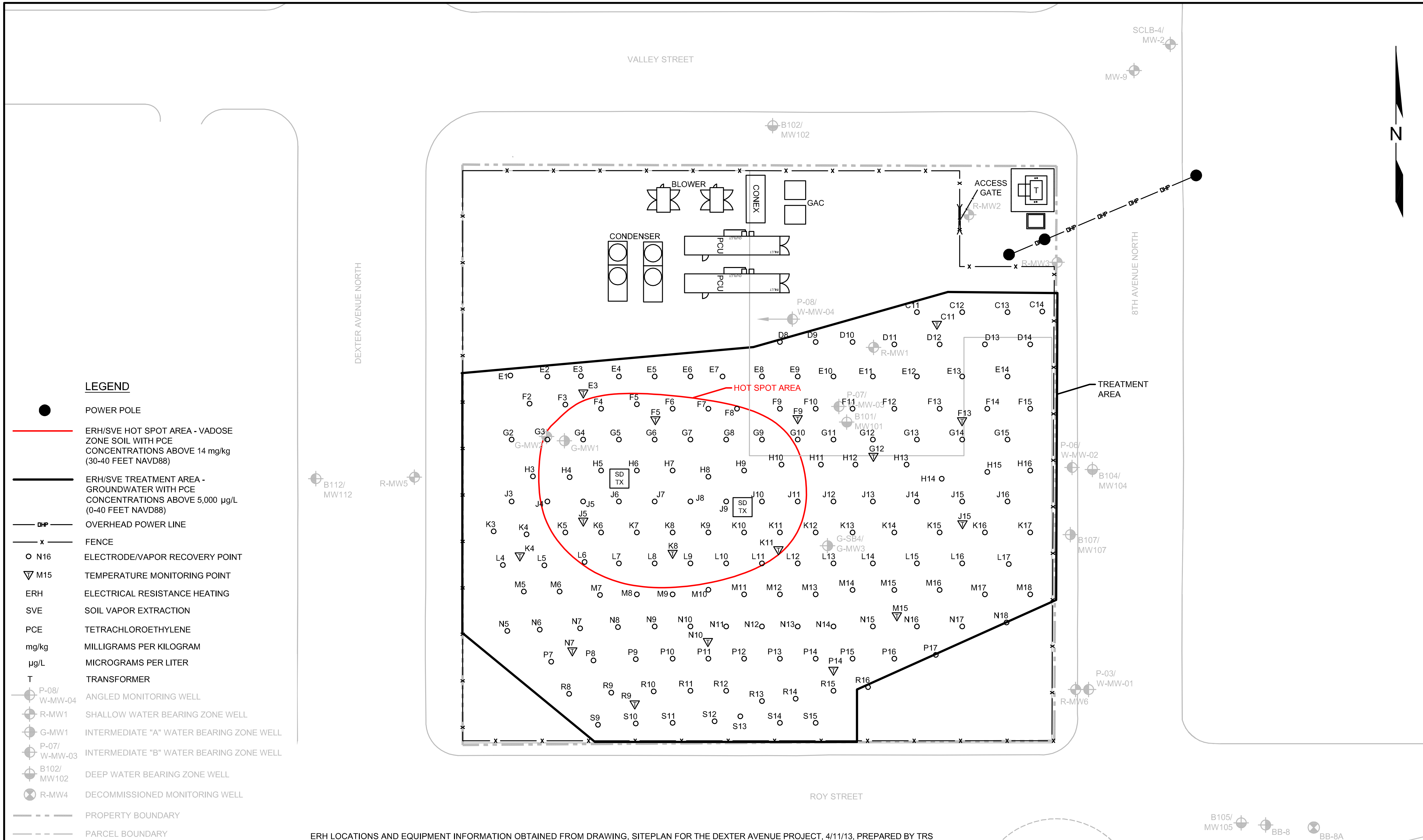
DATE: 05/08/2013
DRAWN BY: BLR/JQC/NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_XBB

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100
APPROXIMATE HORIZONTAL SCALE IN FEET

FIGURE 24
CROSS SECTION B - B'
REMEDIATION TREATMENT ZONES



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_ERH

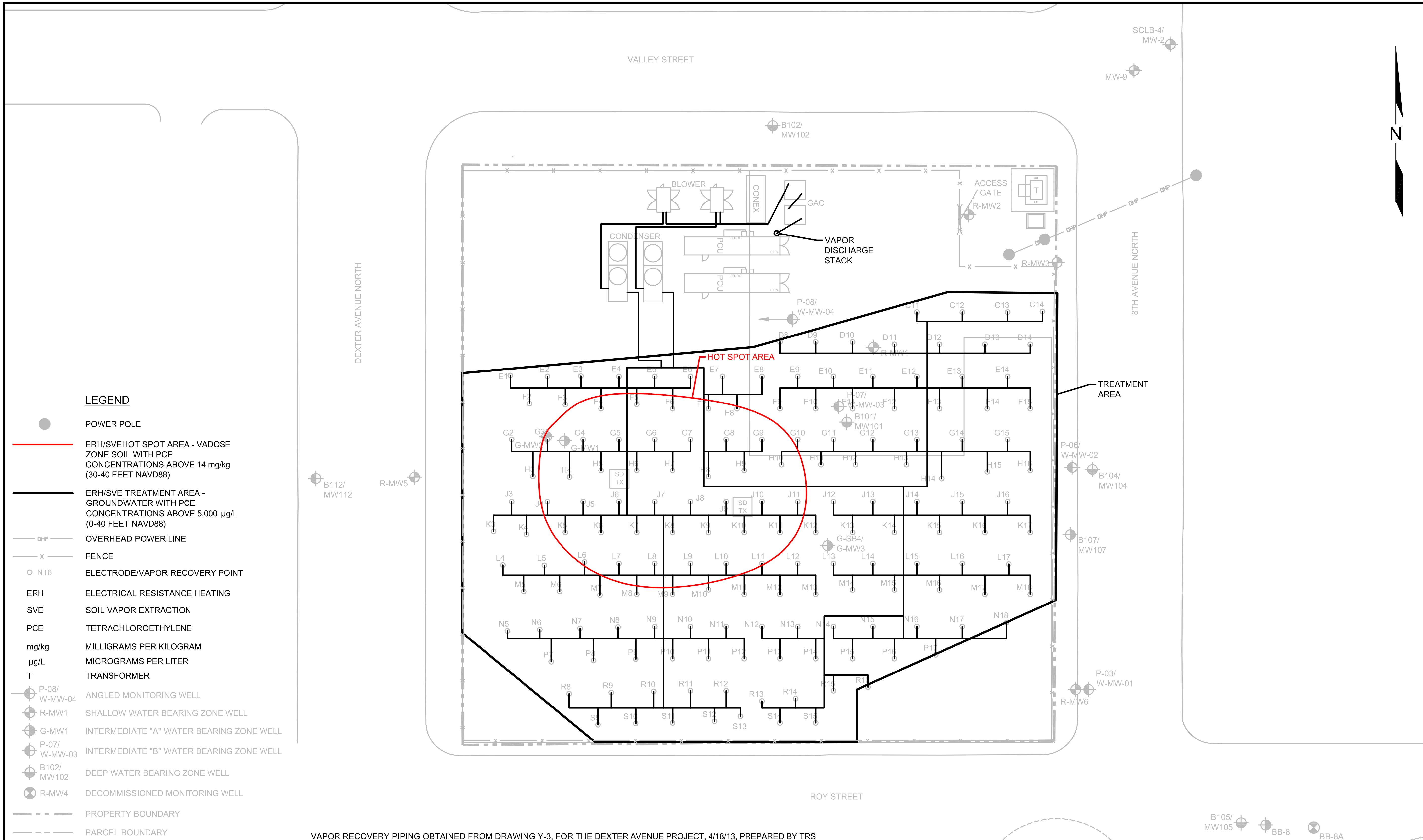
PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 25
CONCEPTUAL SITE LAYOUT FOR ERH AND SVE SYSTEM

6/24/2013
P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_ERH.DWG



VAPOR RECOVERY PIPING OBTAINED FROM DRAWING Y-3, FOR THE DEXTER AVENUE PROJECT, 4/18/13, PREPARED BY TRS

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_SVE

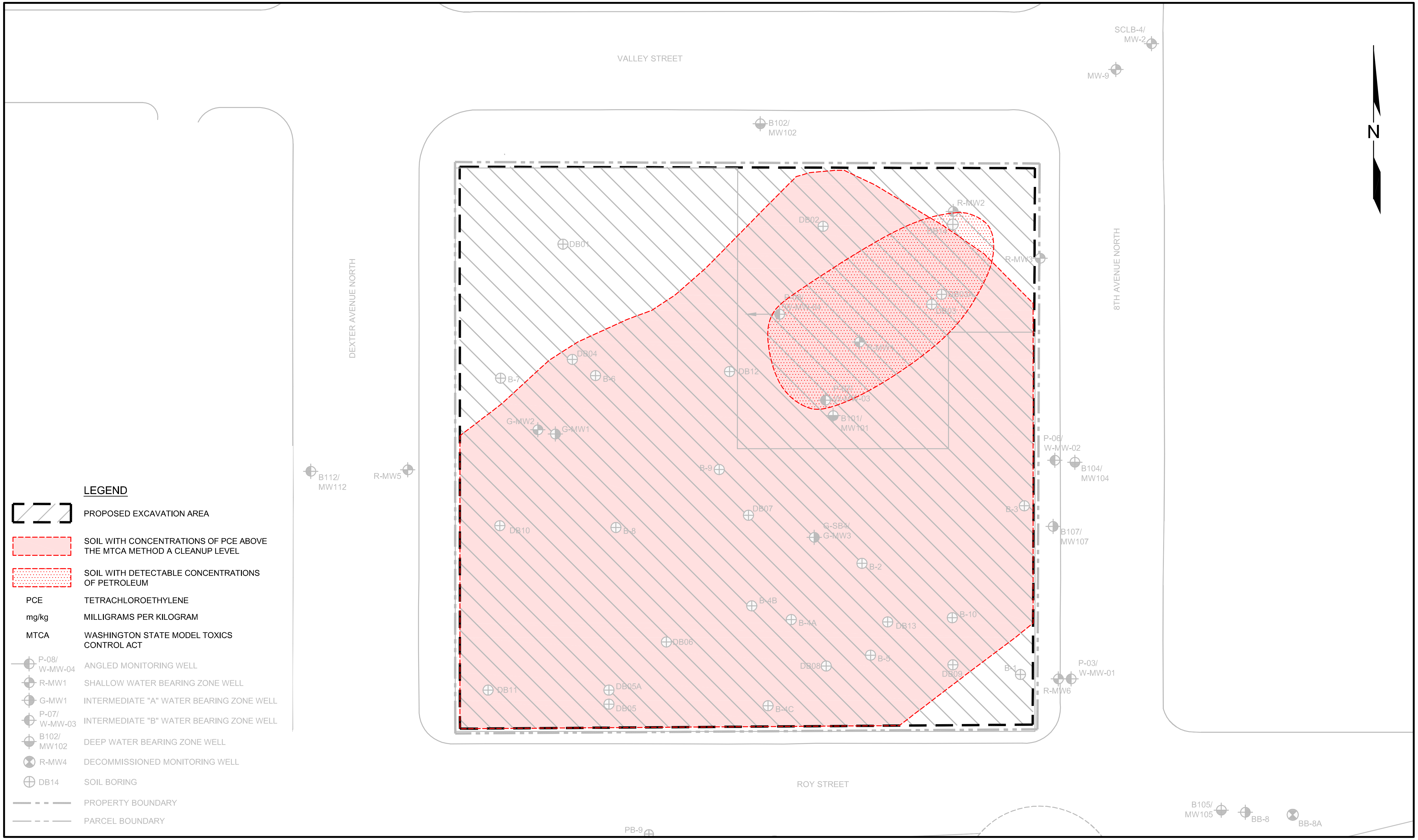
PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 26
CONCEPTUAL SVE SYSTEM PIPING LAYOUT

6/24/2013
P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_SVE.DWG

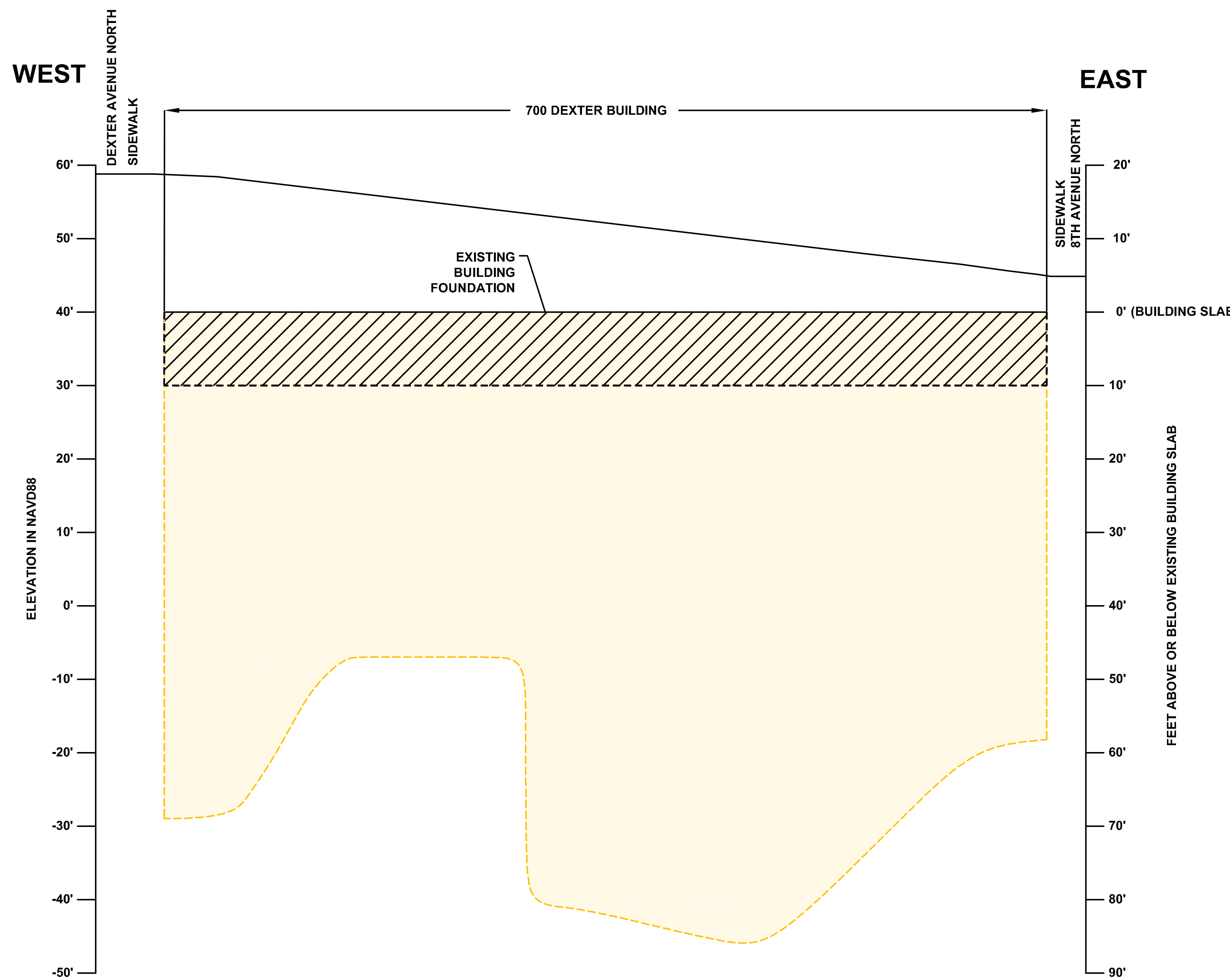


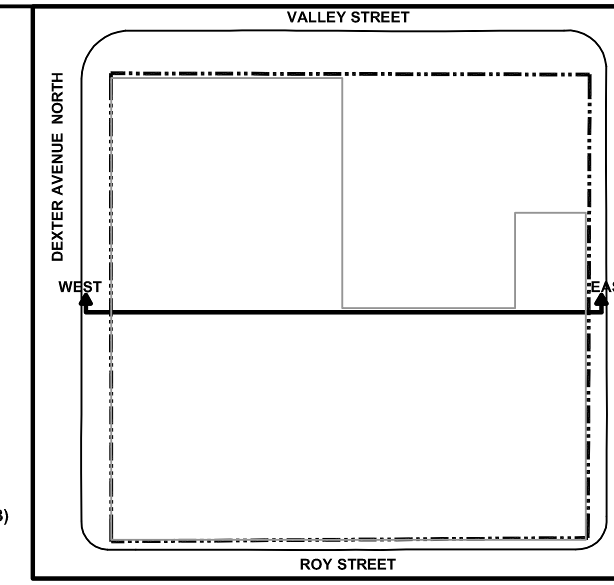
SoundEarth Strategies WWW.SOUNDEARTHINC.COM	DATE: 04/22/13 DRAWN BY: NAC CHECKED BY: SES CAD FILE: 0797-001_2013FS_EXCA	PROJECT NAME: 700 DEXTER PROJECT NUMBER: 0797-001 STREET ADDRESS: 700 DEXTER AVENUE NORTH CITY, STATE: SEATTLE, WASHINGTON	REGION:

0 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 27
REMEDIAL EXCAVATION AREA

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_EXCA.DWG
6/20/2013





LEGEND

PROPOSED EXCAVATION AREA

SOIL WITH CONCENTRATIONS OF PCE ABOVE THE MTCA METHOD A CLEANUP LEVEL

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

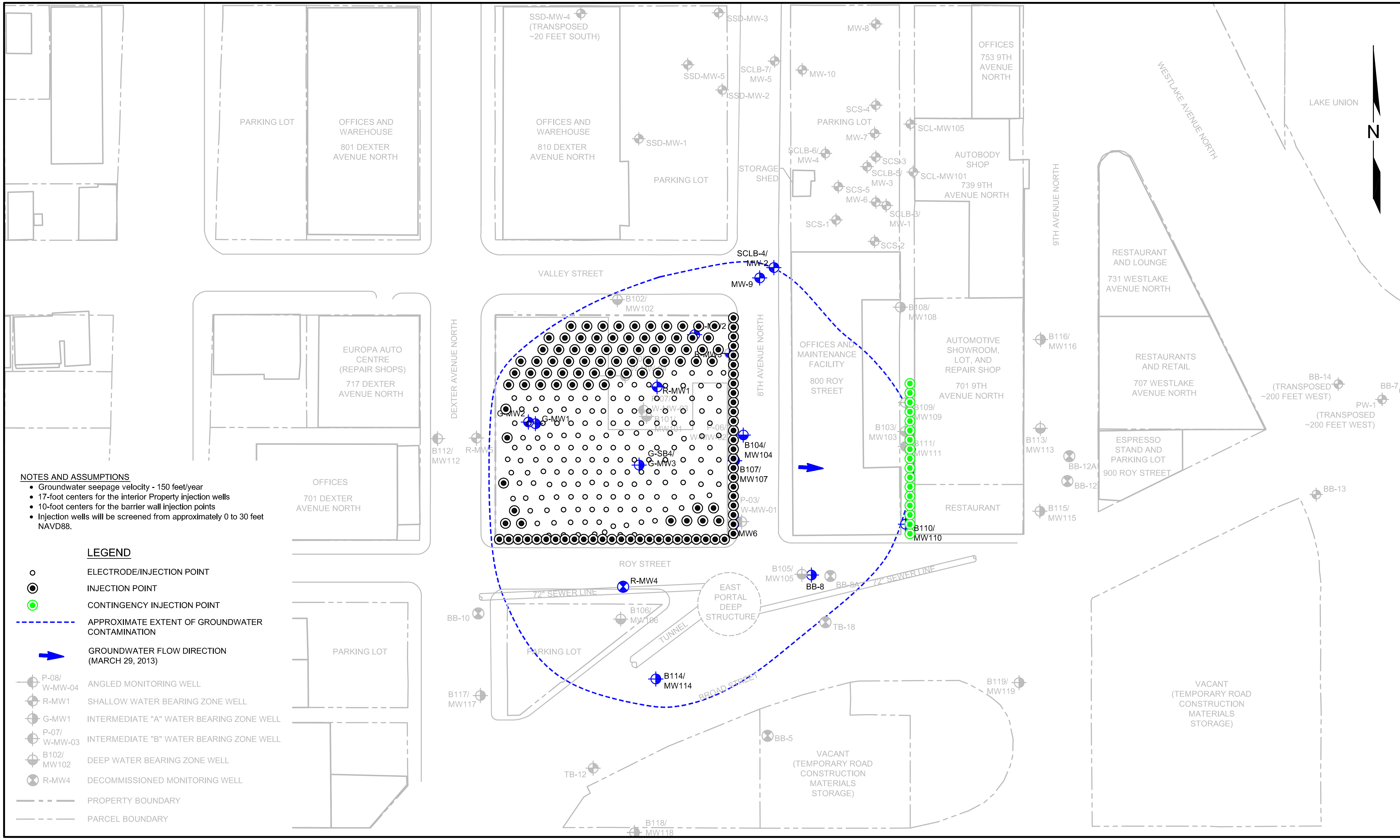
DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_EXCA_XAA

PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 28
CROSS SECTION WEST-EAST'
EXCAVATION AREA



7/15/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA1_A.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA1_A

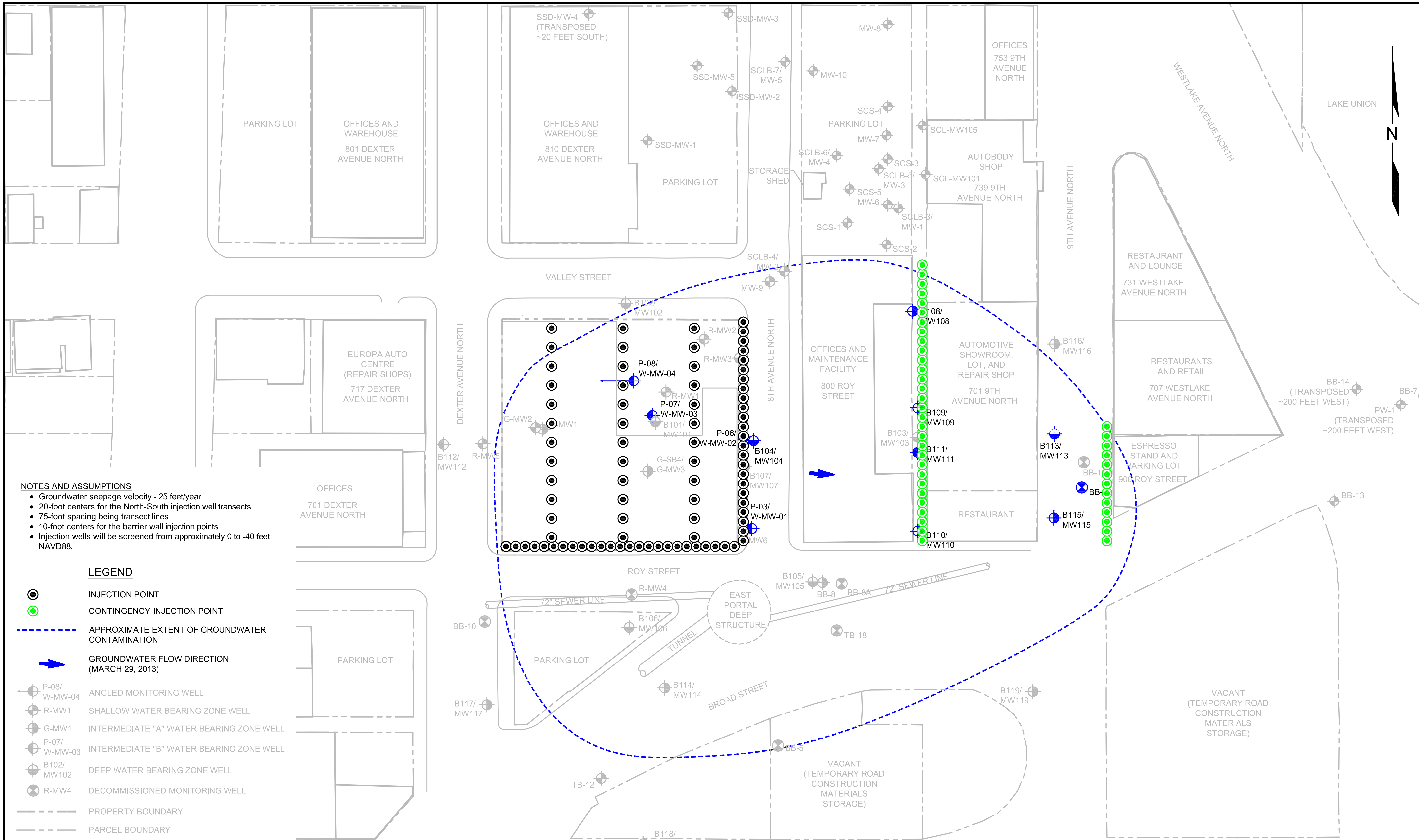
PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 29
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 1
SHALLOW TREATMENT ZONE
IN SITU REDUCTIVE DECHLORINATION

WWW.SOUNDEARTHINC.COM



DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA1_B

PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

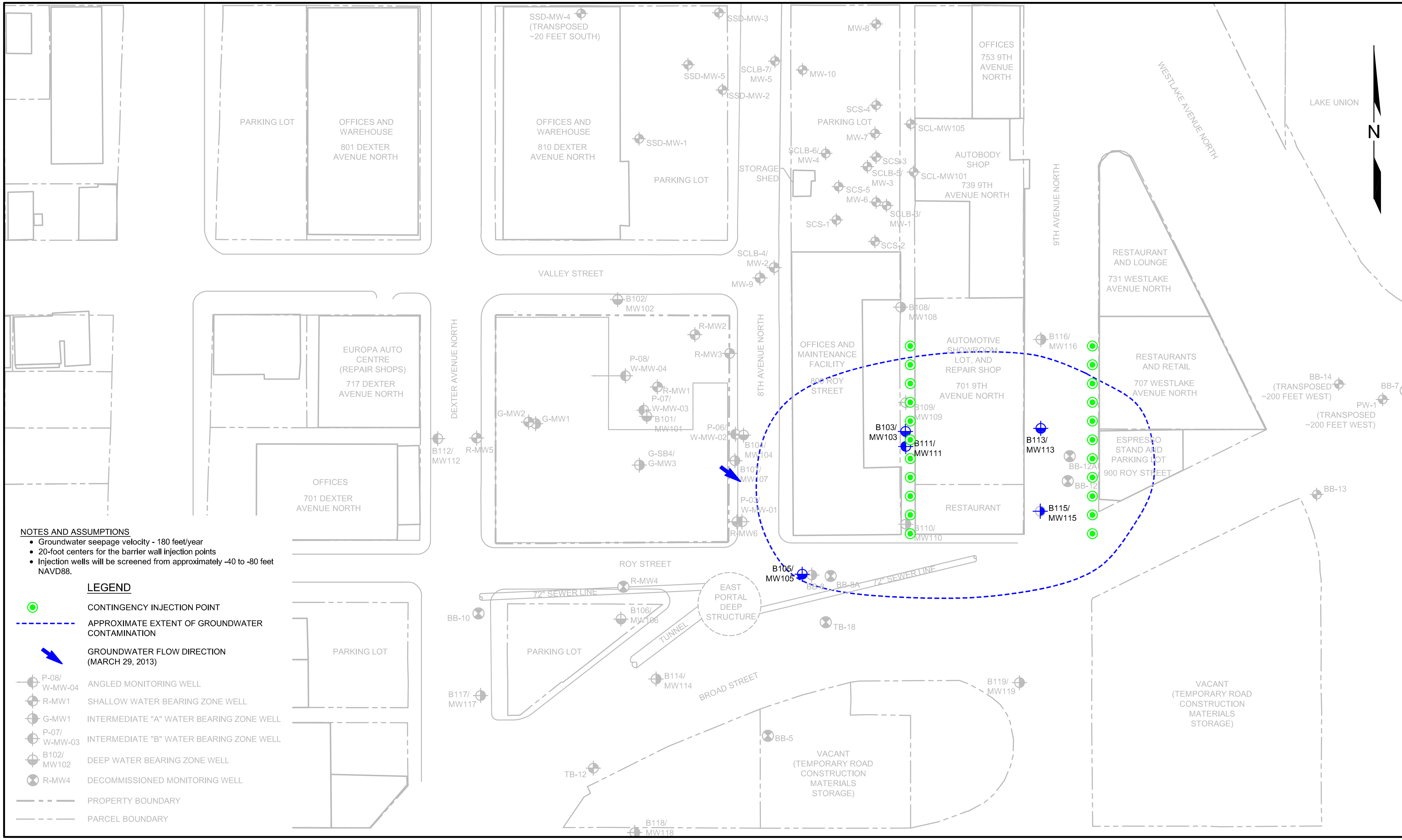
REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 30
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 1
INTERMEDIATE TREATMENT ZONE
IN SITU REDUCTIVE DECHLORINATION

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

7/15/2013
P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA1_B.DWG



DATE:	04/22/13
DRAWN BY:	NAC
CHECKED BY:	SES
CAD FILE:	0797-001_2013FS_CA1_C

PROJECT NAME:	700 DEXTER
PROJECT NUMBER:	0797-001
STREET ADDRESS:	700 DEXTER AVENUE NORTH
CITY, STATE:	SEATTLE, WASHINGTON

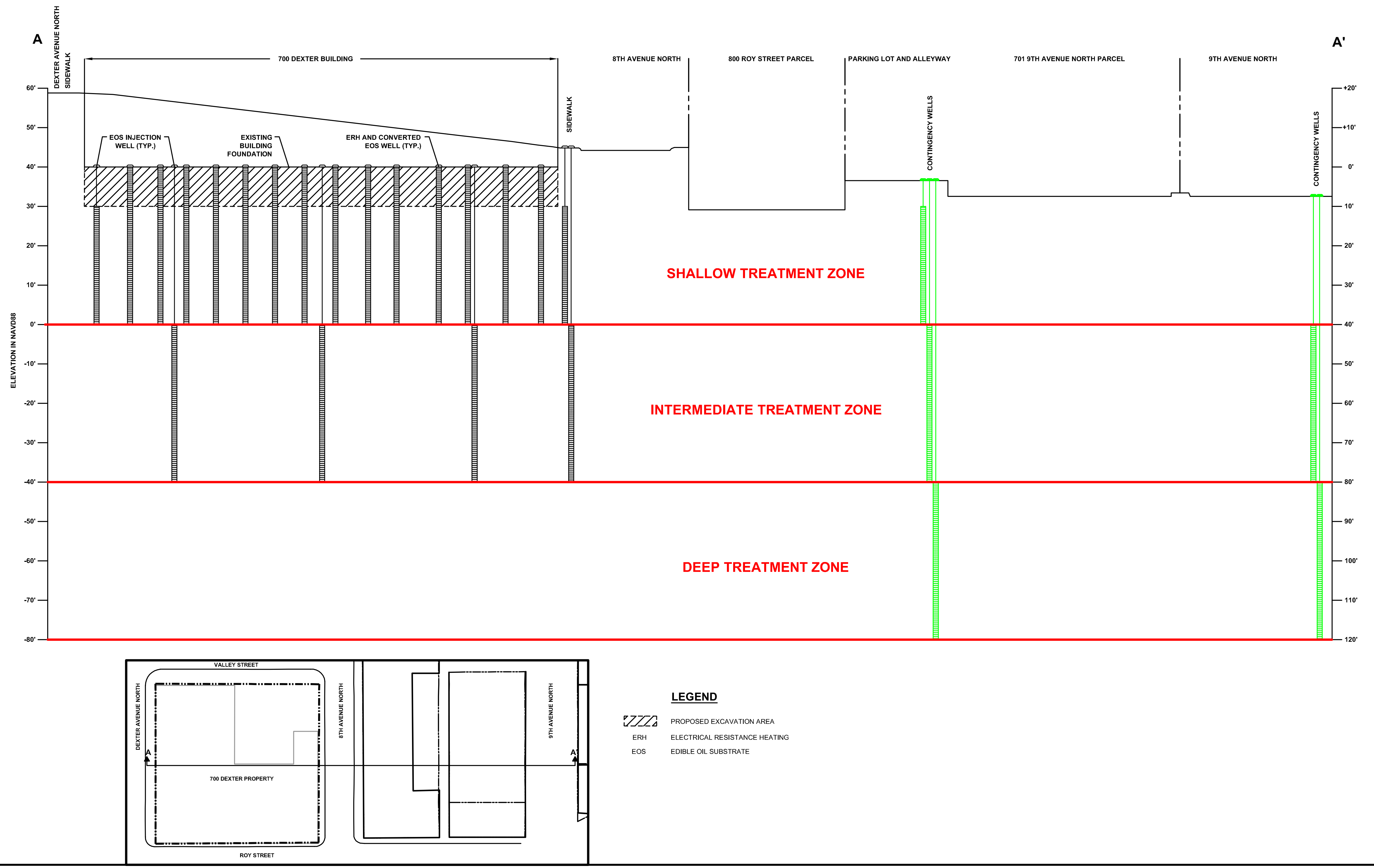
REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 31
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 1
DEEP TREATMENT ZONE
IN SITU REDUCTIVE DECHLORINATION

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

7/15/2013
P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA1_C.DWG



7/15/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA1_XAA.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

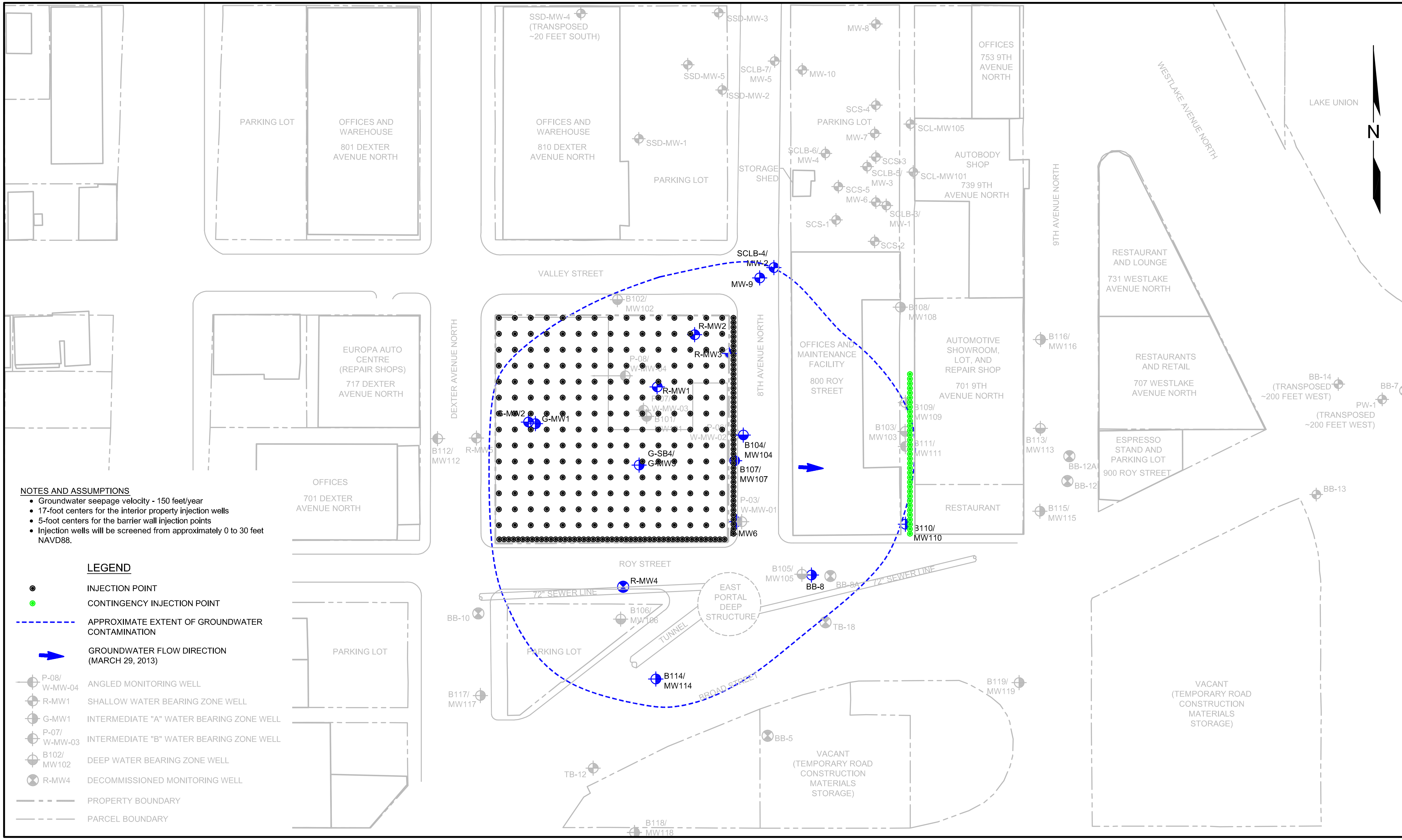
DATE: 05/03/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA1_XAA

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100
APPROXIMATE HORIZONTAL SCALE IN FEET

FIGURE 32
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 1
CROSS SECTION A-A'
IN SITU REDUCTIVE DECHLORINATION



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

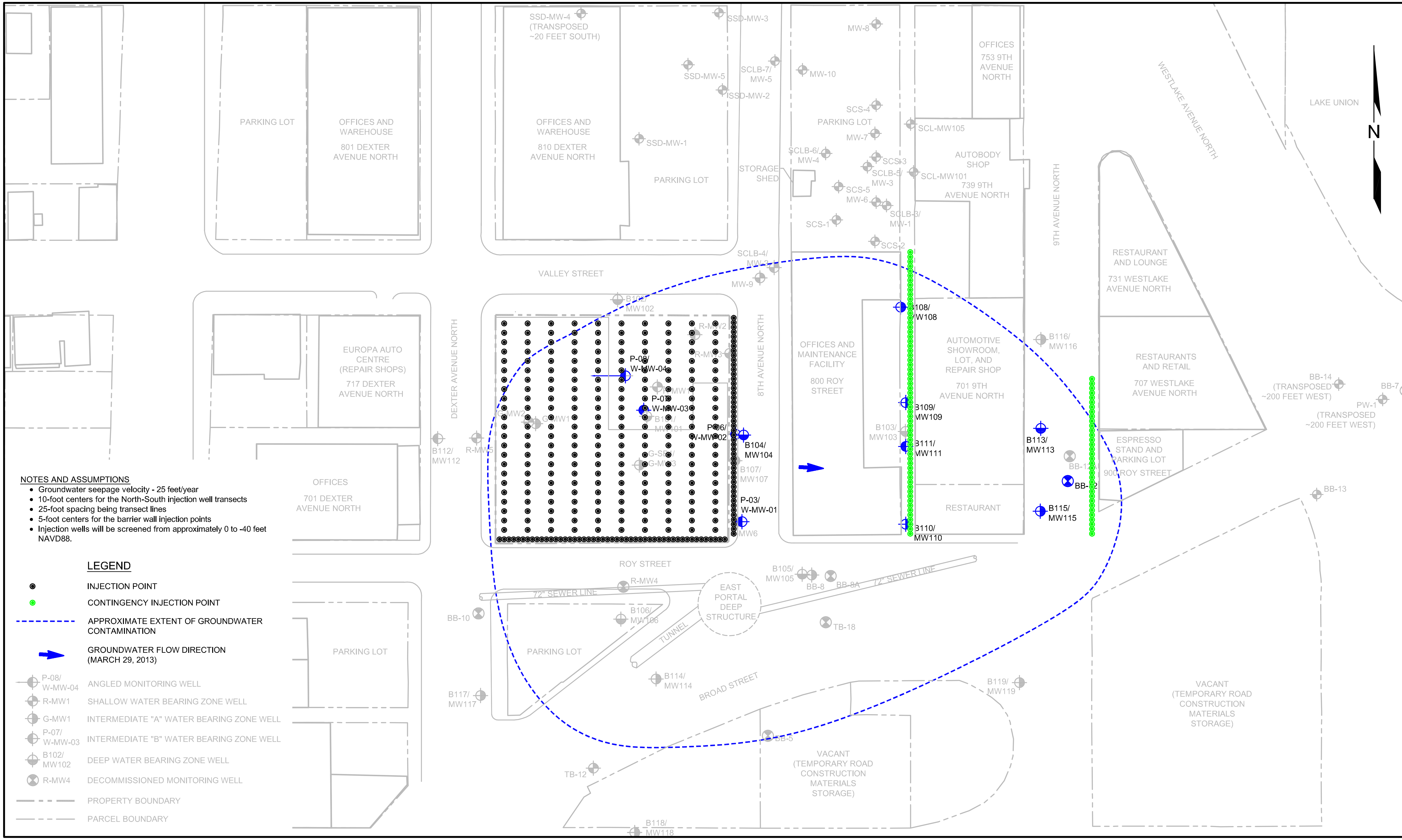
DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA2_A

PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

FIGURE 33

CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 2
SHALLOW TREATMENT ZONE
IN SITU CHEMICAL OXIDATION

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA2_A.DWG 7/15/2013



NOTES AND ASSUMPTIONS

- Groundwater seepage velocity - 25 feet/year
- 10-foot centers for the North-South injection well transects
- 25-foot spacing being transect lines
- 5-foot centers for the barrier wall injection points
- Injection wells will be screened from approximately 0 to -40 feet NAVD88.

LEGEND

- INJECTION POINT
- CONTINGENCY INJECTION POINT
- APPROXIMATE EXTENT OF GROUNDWATER CONTAMINATION
- GROUNDWATER FLOW DIRECTION (MARCH 29, 2013)
- P-08/ W-MW-04 ANGLED MONITORING WELL
- R-MW1 SHALLOW WATER BEARING ZONE WELL
- G-MW1 INTERMEDIATE "A" WATER BEARING ZONE WELL
- P-07/ W-MW-03 INTERMEDIATE "B" WATER BEARING ZONE WELL
- B102/ MW102 DEEP WATER BEARING ZONE WELL
- R-MW4 DECOMMISSIONED MONITORING WELL
- PROPERTY BOUNDARY
- PARCEL BOUNDARY

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA2_B

PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

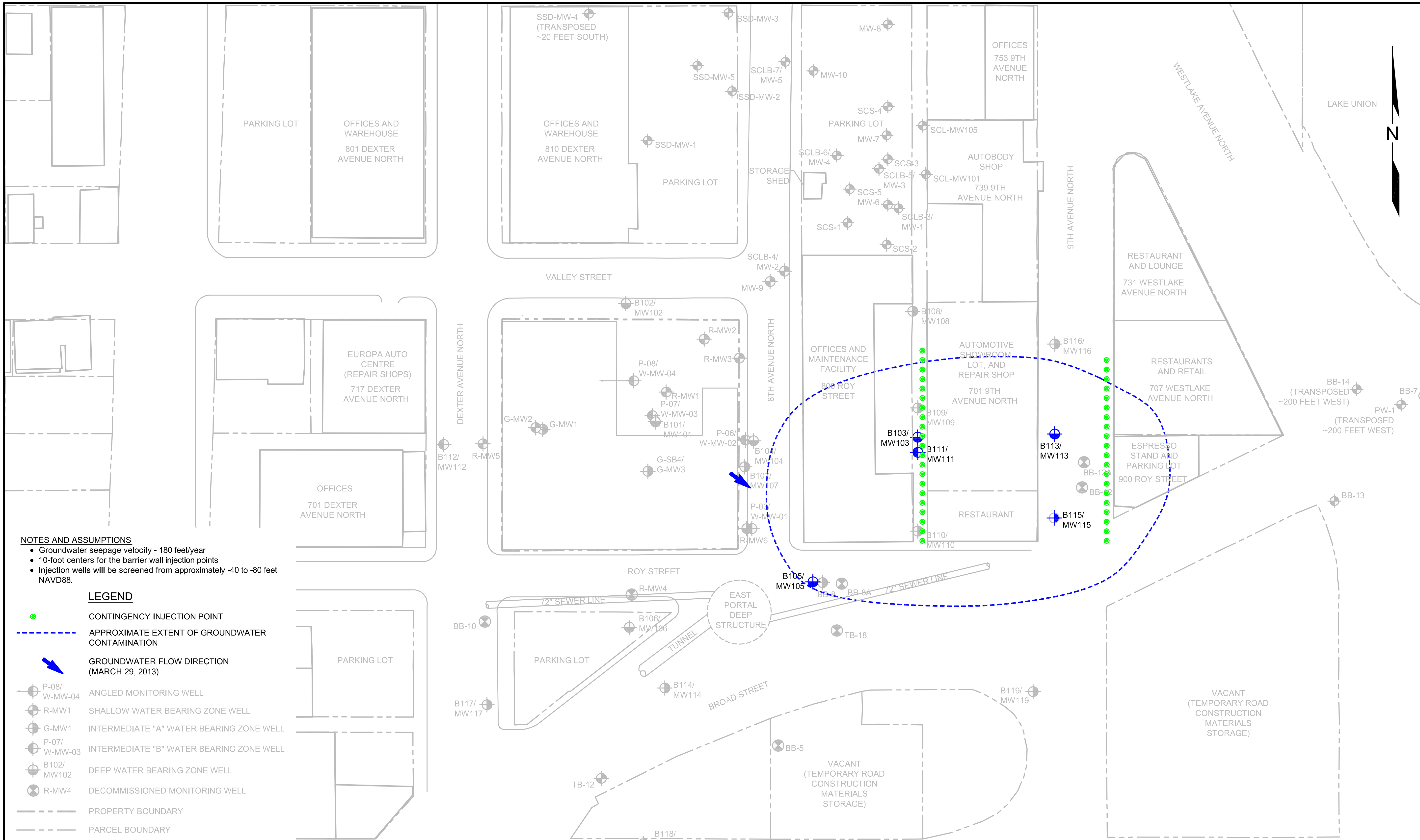
0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 34

CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 2
INTERMEDIATE TREATMENT ZONE
IN SITU CHEMICAL OXIDATION

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA2_B.DWG

7/15/2013



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA2_C

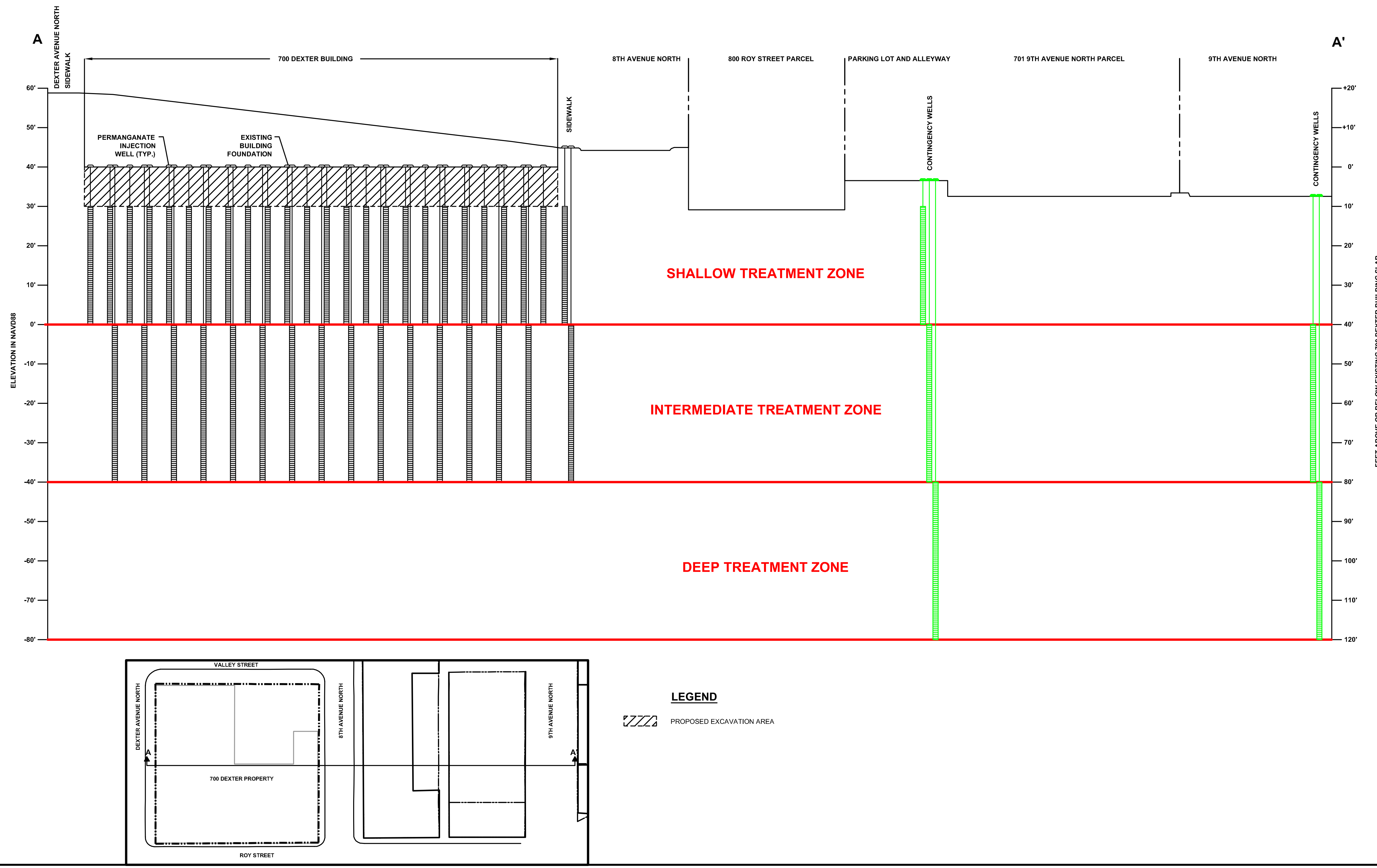
PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 35
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 2
DEEP TREATMENT ZONE
IN SITU CHEMICAL OXIDATION

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA2_C.DWG
7/15/2013



SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

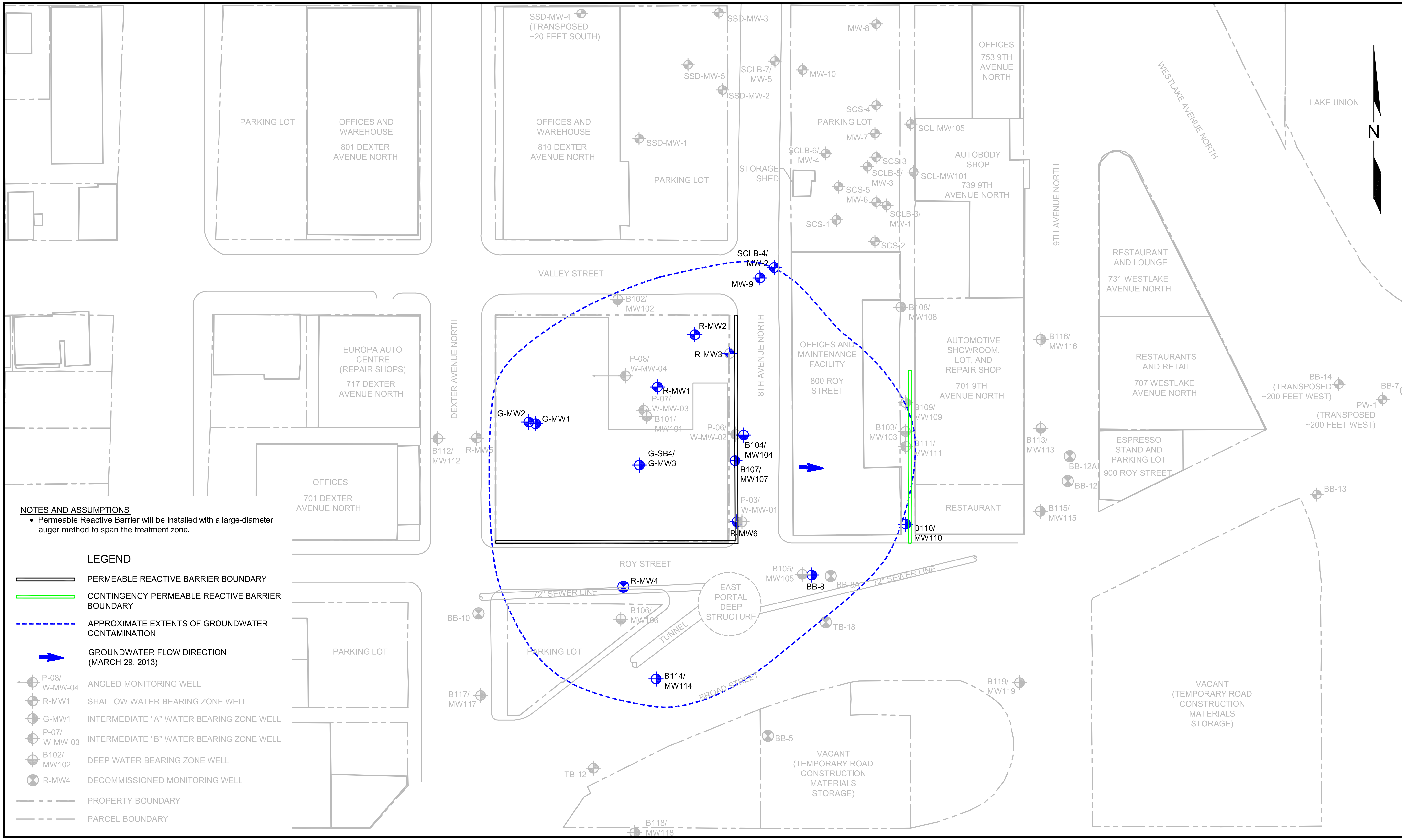
DATE: 05/03/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA2_XAA

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100
APPROXIMATE HORIZONTAL SCALE IN FEET

FIGURE 36
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 2
CROSS SECTION A-A'
IN SITU CHEMICAL OXIDATION



7/15/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA3_A.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

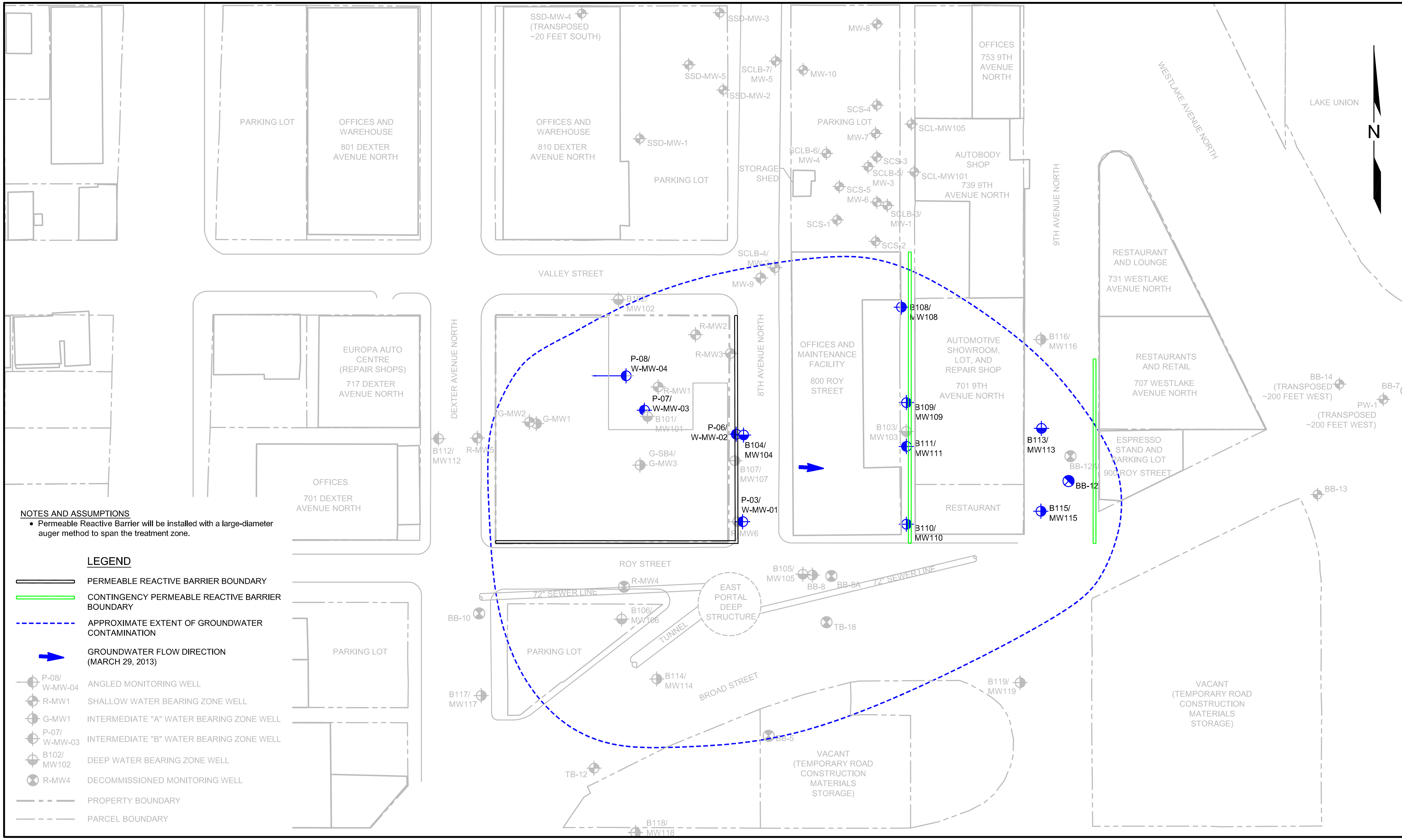
DATE:	04/22/13
DRAWN BY:	NAC
CHECKED BY:	SES
CAD FILE:	0797-001_2013FS_CA3_A

PROJECT NAME:	700 DEXTER
PROJECT NUMBER:	0797-001
STREET ADDRESS:	700 DEXTER AVENUE NORTH
CITY, STATE:	SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 37
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 3
SHALLOW TREATMENT ZONE
PERMEABLE REACTIVE BARRIER



7/15/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA3_B.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

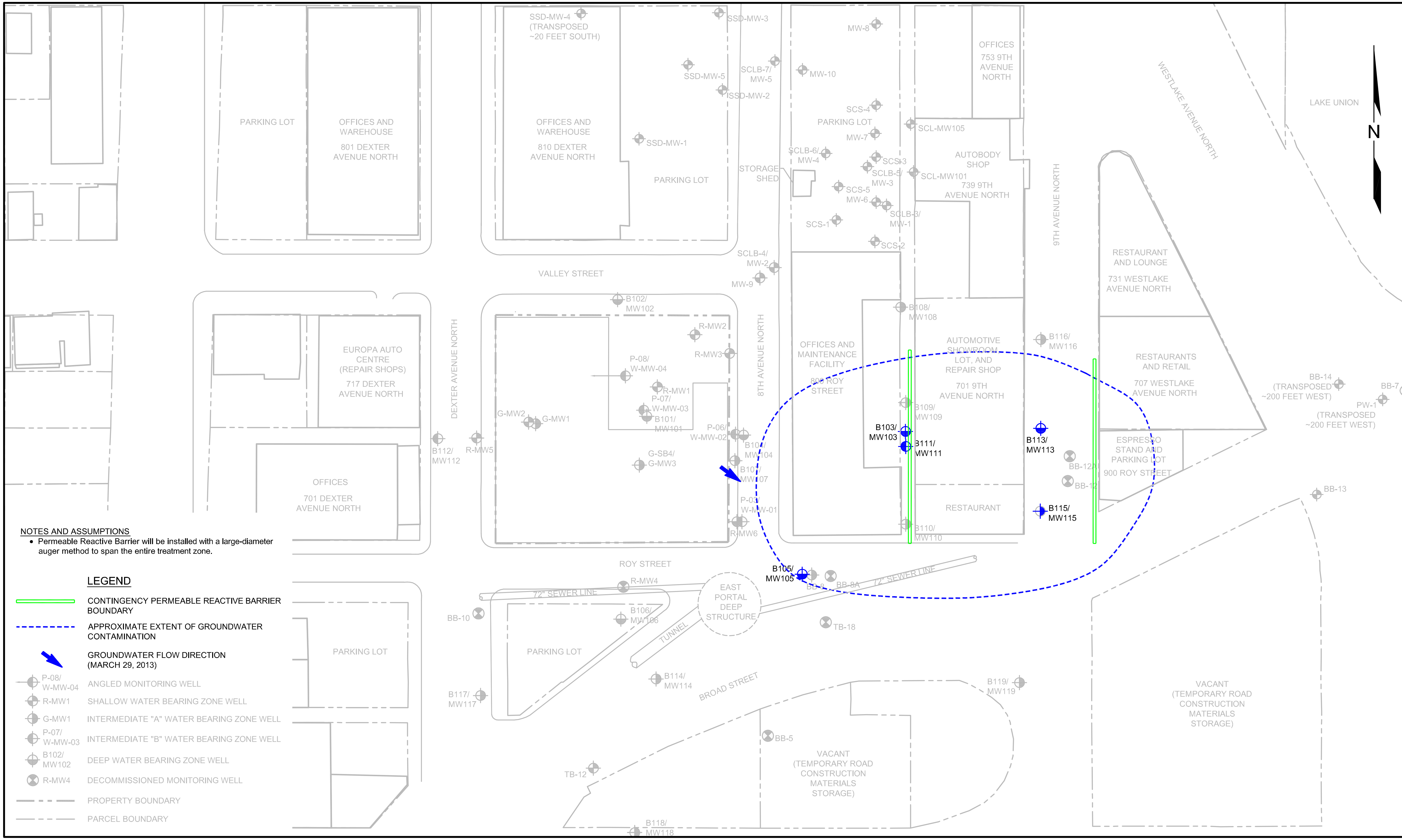
DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA3_B

PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100 200
APPROXIMATE SCALE IN FEET

FIGURE 38
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 3
INTERMEDIATE TREATMENT ZONE
PERMEABLE REACTIVE BARRIER



7/15/2013

P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA3_C.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

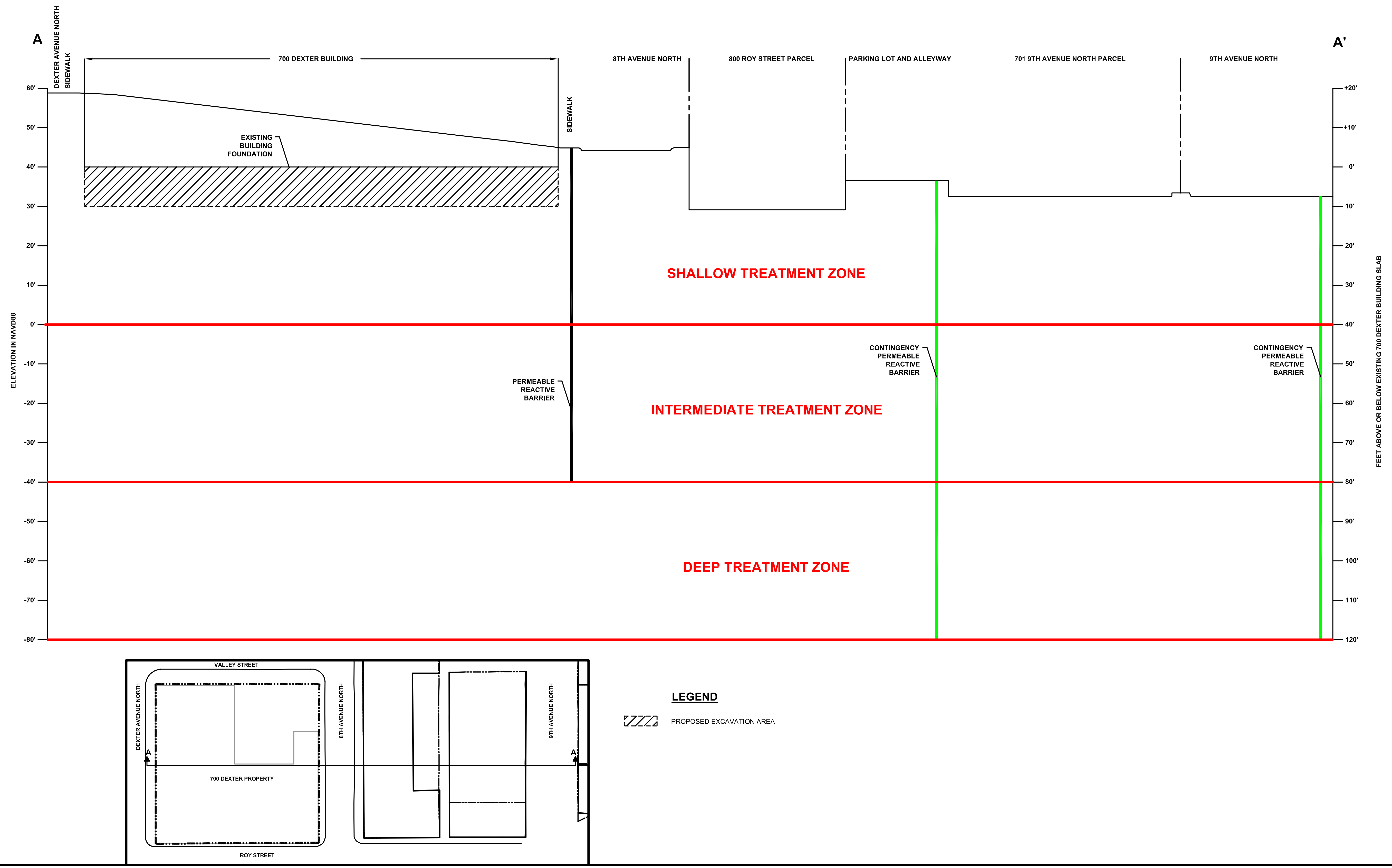
DATE: 04/22/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA3_C

PROJECT NAME: 700 DEXTER
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

FIGURE 39
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 3
DEEP TREATMENT ZONE
PERMEABLE REACTIVE BARRIER

WWW.SOUNDEARTHINC.COM



P:\0797 FRONTIER ENV MGMT\700 DEXTER\TECHNICAL\CAD\2013 FS\0797-001_2013FS_CA3_XAA.DWG

SoundEarth Strategies
WWW.SOUNDEARTHINC.COM

DATE: 05/03/13
DRAWN BY: NAC
CHECKED BY: SES
CAD FILE: 0797-001_2013FS_CA3_XAA

PROJECT NAME: 700 DEXTER PROPERTY
PROJECT NUMBER: 0797-001
STREET ADDRESS: 700 DEXTER AVENUE NORTH
CITY, STATE: SEATTLE, WASHINGTON

REGION:

0 25 50 100
APPROXIMATE HORIZONTAL SCALE IN FEET

FIGURE 40
CONCEPTUAL SITE PLAN
CLEANUP ACTION ALTERNATIVE 3
CROSS SECTION A-A'
PERMEABLE REACTIVE BARRIER

TABLES

SoundEarth Strategies

Table 1
Summary of Groundwater Data
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Date	Sampled By	Sample Interval (Feet Below Top of Casing)	Depth to Groundwater[1]	Groundwater Elevation[2]	Sampling Method	Analytical Results (µg/L)														
							GRPH[3]	DRPH[4]	ORPH[4]	Benzene[5]	Toluene[5]	Ethylbenzene[5]	Total Xylenes[5]	PCE[6]	TCE[6]	cis-1,2-DCE[6]	trans-1,2-DCE[6]	Vinyl Chloride[6]	1,1-DCE[6]	Methylene Chloride[6]	Naphthalene[7]
The Property																					
R-MW1	10/24/92	Roux	4 to 14	7.15	20.96	Unknown	57	1,345	6,000	1	1	<0.5	<0.5	<5	<5	--	<5	100	<5	<5	--
TOC: 28.11 feet	10/24/92	DOF		--	--	Unknown	53	26,000	12,000	0.61	0.83	<0.50	<1.0	4.2	0.82	12[c]	--	170	<1.0	<5.0	--
	10/24/92	Roux		--	--	Unknown	54	290	5,000	0.58	1	<0.5	<0.5	2.3	<2	14	NA	140	NA	NA	NA
	01/29/09	DOF		10.50	17.61	Peristaltic	<50.0	--	--	<0.500	<0.500	<0.500	<1.00	17.1	4.26	1.60	<0.200	0.630	<0.200	<5.00	--
TOC: 37.78 feet	02/19/10	SoundEarth		10.35	27.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/02/11	SoundEarth		7.79	29.99	Peristaltic	<100	1,000[x]	740	<0.35	<1	<1	<3	7.9	2.7	1.9	<1	0.68	<1	<5	--
	02/07/12	Windward		8.98	28.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/05/12	SoundEarth		10.11	27.67	Peristaltic	--	--	--	<0.35	<1	<1	<3	16	3.6	2.1	<1	2.2	<1	<5	--
	12/21/12	SoundEarth		8.44	29.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		6.72	31.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-MW2	10/24/92	Roux	5 to 15	10.04	20.82	Unknown	4,200	34	2,000	684	17	301	403	<5	<5	--	<5	<5	<5	<5	--
TOC: 30.86 feet	10/24/92	DOF		--	--	Unknown	4,000	16,000	25,000	310	<0.50	140	180	--	--	--	--	--	--	--	--
	01/29/09	DOF		12.97	17.89	Peristaltic	657	--	--	<0.500	0.557	0.513	2.08	5.05	<0.200	<0.200	<0.200	<0.200	<0.200	<5.00	--
TOC: 40.53 feet	02/19/10	SoundEarth		12.93	27.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/02/11	SoundEarth		10.52	30.01	Peristaltic	1,700	3,100	290[x]	19	<1	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
TOC: 41.74 feet	02/07/12	Windward		11.61	30.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/04/12	SoundEarth		12.64	29.10	Peristaltic	--	--	--	<0.35	<1	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
	12/21/12	SoundEarth		10.84	30.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		9.85	31.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-MW3	10/24/92	Roux	7 to 17	11.29	20.75	Unknown	87	3,015	1,200	<0.5	<0.5	<0.5	<0.5	<5	<5	--	<5	<5	<5	<5	--
TOC: 32.04 feet	10/24/92	DOF		--	--	Unknown	<50	--	--	<0.50	<0.50	<0.50	<1.0	--	--	--	--	--	--	--	--
	01/29/09	DOF		14.22	17.82	Peristaltic	<50.0	--	--	<0.500	<0.500	<0.500	<1.00	4.26	<0.200	<0.200	<0.200	<0.200	<0.200	<5.00	--
TOC: 41.74 feet	02/19/10	SoundEarth		14.21	27.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/02/11	SoundEarth		11.77	29.97	Peristaltic	<100	240[x]	<250	<0.35	<1	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
	02/07/12	Windward		12.90	28.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/04/12	SoundEarth		14.00	27.74	Peristaltic	--	--	--	<0.35	<1	<1	<3	6.4	<1	<1	<1	<0.2	<1	<5	--
	12/21/12	SoundEarth		12.09	29.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		11.17	30.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-MW4	10/24/92	Roux	15 to 30	21.99	18.95	Unknown	410	201	<1,000	<0.5	2	1	4	814	64	--	<5	<5	<5	<5	ND
TOC: 40.94 feet	10/24/92	DOF		--	--	Unknown	640	--	--	<0.5	1.8	<0.5	3.1	31	2.8	<2.0	NA	<2.0	NA	NA	NA
	Decommissioned before 2009																				
R-MW5	10/28/92	Roux	15 to 30	22.89	24.31	Unknown	93	86	<1,000	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	NA	NA	NA
TOC: 47.20 feet	01/29/09	DOF		22.80	24.40	Peristaltic	<50.0	--	--	<0.500	<0.500	<0.500	<1.00	0.800	<0.200	<0.200	<0.200	<0.200	<0.200	<5.00	--
TOC: 57.01 feet	02/19/10	SoundEarth		21.93	35.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/02/11	SoundEarth		20.48	36.53	Peristaltic	<100	<50	<250	<0.35	<1	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
	02/07/12	Windward		21.61	35.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC: 57.03 feet	09/05/12	SoundEarth		23.72	33.31	Peristaltic	--	--	--	<0.35	<1	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
	12/21/12	SoundEarth		22.55	34.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		21.72	35.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
R-MW6	10/28/92	Roux	12 to 22	17.85	17.54	Unknown	<50	<50	<1,000	<0.5	2	<0.5	2	4,500	920	2,600	NA	240	NA	NA	NA
TOC: 35.39 feet	11/03/92	DOF		--	--	Unknown	--	--	--	--	--	--	--	690	160	620	NA	<40	NA	NA	NA
	01/29/09	DOF		19.15	16.24	Peristaltic	<50.0	--	--	<0.500	<0.500	<0.500	<1.00	1.78	<0.200	2.64	<0.200	2.75	<0.200	<5.00	--
TOC: 45.18 feet	02/19/10	SoundEarth		18.25	26.93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05/03/10	SoundEarth		18.25	26.93	Peristaltic	--	--	--	--	--	--	--	<1	<1	1.2	<1	2.8	<1	<5	--
	06/02/11	SoundEarth		16.22	28.96	Peristaltic	<100	120[x]	<250	<0.35	<1	<1	<3	<1	<1	<1	<1	2.1	<1	<5	--
	02/07/12	Windward		14.11	31.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC: 45.28 feet	09/05/12	SoundEarth		19.38	25.90	Peristaltic	--	--	--	<0.35	<1	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
	12/21/12	SoundEarth		15.27	30.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		17.18	28.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MTCA Cleanup Level							800[a]	500[a]	500[a]	5[a]	1,000[a]	700[a]	1,000[a]	5[a]	5[a]	16[b]	1,600[b]	0.2[a]	4,000[b]	5[a]	160[a]

SoundEarth Strategies

Table 1
Summary of Groundwater Data
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Date	Sampled By	Sample Interval (Feet Below Top of Casing)	Depth to Groundwater[1]	Groundwater Elevation[2]	Sampling Method	Analytical Results (µg/L) GRPH[3]	DRPH[4]	ORPH[4]	Benzene[5]	Toluene[5]	Ethylbenzene[5]	Total Xylenes[5]	PCE[6]	TCE[6]	cis-1,2-DCE[6]	trans-1,2-DCE[6]	Vinyl Chloride[6]	1,1-DCE[6]	Methylene Chloride[6]	Naphthalene[7]
The Property																					
B-2	06/23/00	ThermoRetec	11.5	--	--	Grab	--	--	--	<250	<250	<250	<500	**37,000**	**600**	**4,100**	<250	<250	<250	<500	--
B-6	06/24/00	ThermoRetec	14.5	--	--	Grab	--	--	--	**<50**	<50	<50	<100	**6,800**	**54**	**57**	<50	<50	<50	<100	--
B-7	06/24/00	ThermoRetec	12.5	--	--	Grab	--	--	--	**<50**	<50	<50	<100	**21,000**	**310**	**880**	<50	<50	<50	<100	--
B-8	06/24/00	ThermoRetec	8	--	--	Grab	--	--	--	--	--	--	--	**3,100**	**<50**	**<50**	NA	<50	NA	NA	NA
B-9	06/24/00	ThermoRetec	12	--	--	Grab	--	--	--	--	--	--	--	**120,000**	**210**	**270**	NA	<50	NA	NA	NA
B-10	06/24/00	ThermoRetec	12.5	--	--	Grab	--	--	--	--	--	--	--	**9,100**	**1,100**	**7,600**	NA	**98**	NA	NA	NA
G-MW1	07/24/01	GeoEngineers	30 to 35	10.54	--	Peristaltic	--	--	--	0.449	17.6[E]	0.798	5.52	**85,500**	**1,130**	**23.3[g]**	0.956	**74.5[g]**	77.5[g]	<5.00	--
	01/29/09	DOF		11.25	--	Peristaltic	**41,300[qp]**	--	--	**<20.0**	<20.0	28.6	55.1	**78,400[f]**	**1,160**	**34.4**	1.49	<0.200	60.1	<5.00	--
TOC: 39.01 feet	02/19/10	SoundEarth		10.47	28.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/03/11	SoundEarth		8.15	30.86	Peristaltic	**29,000[x]**	92[x]	<250	--	--	--	--	**78,000**	**1,100**	**22**	--	**33**	--	--	--
	02/07/12	Windward		9.34	29.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/06/12	SoundEarth		11.11	27.90	Peristaltic	--	--	--	<0.35	7.4	<1	1.1	**66,000**	**1,100**	**32**	1.5	**35**	56	<5	--
	09/06/12 (dup)			--	--	Peristaltic	--	--	--	<0.35	7.6	<1	1.0	**64,000**	**1,100**	**30**	1.4	**33**	57	<5	--
	12/21/12	SoundEarth		9.04	29.97	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		10.11	28.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G-MW2	07/24/01	GeoEngineers	8 to 18	9.93	--	Peristaltic	--	--	--	0.375	48.3[E]	2.01	12.88	**176,000**	**237[g]**	**129[g]**	1.02	**0.457**	2.97	<5.00	--
	01/29/09	DOF		10.76	--	Peristaltic	**39,600[qp]**	--	--	**<20.0**	<20.0	<20.0	48.9	**59,000[f]**	**210**	**373**	1.33	<0.200	1.31	<5.00	--
TOC: 38.95 feet	06/02/11	SoundEarth		7.45	31.50	Peristaltic	**59,000[x,y]**	200	<250	**<350**	<1,000	**<1,000**	**<3,000**	**150,000**	**<1,000**	**<1,000**	**<1,000**	**<200**	<1,000	<5,000	--
	02/07/12	Windward		8.49	30.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC: 39.00 feet	09/06/12	SoundEarth		10.53	28.47	Peristaltic	--	--	--	<0.35	12	1.1	4.7	**150,000**	**320**	**260**	1.4	<0.2	1.5	<5	--
	12/21/12			9.63	29.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		8.56	30.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
G-MW3	07/24/01	GeoEngineers	26 to 36	13.05	--	Peristaltic	--	--	--	0.524	6.93[E]	0.459	2.10	**47,700**	**385[g]**	<0.200	3.71	**42.5[g]**	17.0[g]	6.20[g]	--
	12/10/04	DOF		15.30	--	Bailer	--	--	--	<2	7	<2	2	**220,000**	**1,200**	**570**	6	**19**	12	<5	<2
	01/29/09	DOF		13.49	--	Peristaltic	**26,600[qp]**	--	--	<12.5	<12.5	<12.5	<25.0	**64,000[f]**	**1,580**	**4,050**	13.9	<0.200	18.9	<5.00	--
TOC: 39.55 feet	02/19/10	SoundEarth		12.83	26.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/02/11	SoundEarth		11.00	28.55	Peristaltic	**19,000[x,y]**	210[x]	<250	<350	<1,000	<1,000	<3,000	**33,000**	**1,400**	**1,500**	<1,000	**290**	<1,000	<5,000	--
	02/07/12	Windward		10.51	29.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/06/12	SoundEarth		13.14	26.41	Peristaltic	--	--	--	<0.35	1.5	<1	<3	**31,000**	**1,200**	**1,600**	5.9	**290**	9.3	<5	--
	12/21/12	SoundEarth		10.95	28.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		11.14	28.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
W-MW-01	02/02/12*	Windward	70 to 80	21.22	23.66	Bladder	--	--	--	**<20**	0.1[J]	<0.2	<0.6	**46**	3.9	11	<0.2	**0.5**	<0.2	<1.0	--
TOC: 44.88 feet	09/06/12	SoundEarth		23.26	21.62	Peristaltic	--	--	--	<0.35	1.7	<1	<3	<1	<1	2.0	<1	**2.8**	<1	<5	--
	12/21/12	SoundEarth		21.82	23.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		23.63	21.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
W-MW-02	01/30/12	Windward	10 to 20	NA	NA	Grab	--	--	--	<0.2	<0.2	<0.2	<0.6	1.6	1.4	8.0	0.3	**0.3**	<0.2	<1.0	<0.5
			30 to 40			Grab	--	--	--	**<20**	<20	<20	<60	**24,000**	**940**	**1,700**	13[J]	**70**	<20	<100	<50
			50 to 60			Grab	--	--	--	**<20**	<20	<20	<60	**7,200**	**1,300**	**1,800**	<20	**85**	16[J]	<100	<50
TOC: 43.46 feet	2/3/2012*	Windward	70 to 80	17.51	25.95	Bladder	--	--	--	**<20**	<20	<20	<60	**6,900**	**1,700**	**2,000**	<20	**120**	17[J]	<100	<50
	08/13/12	SoundEarth		--	--	Peristaltic	--	--	--	--	--	--	--	**3,000**	**1,300**	**2,200**	4.1	**66**	9.9	<5	--
	09/05/12	SoundEarth		19.95	23.51	Peristaltic	--	--	--	<0.35	1.4	<1	<3	**2,600**	**1,300**	**2,800**	5.0	**69**	10	<5	--
	12/21/12	SoundEarth		17.82	25.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		19.14	24.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
W-MW-03	02/03/12*	Windward	70 to 80	17.73	21.50	Bladder	--	--	--	**<20**	<20	<20	<60	**5,300**	**220**	**160**	<20	**<20**	<20	<100	<500
TOC: 39.23 feet	09/06/12	SoundEarth		18.36	20.87	Peristaltic	--	--	--	<0.35	<1	<1	<3	**13**	2.6	**20**	<1	**120**	<1	<5	--
	12/21/12	SoundEarth		18.19	21.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		18.22	21.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MTCA Cleanup Level							**800[a]**	**500[a]**	**500[a]**	**5[a]**	**1,000[a]**	**700[a]**	**1,000[a]**	**5[a]**	**5[a]**	**16[b]**	**1,600[b]**	**0.2[a]**	**4,000[b]**	**5[a]**	**160[a]**

Table 1
Summary of Groundwater Data
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Date	Sampled By	Sample Interval (Feet Below Top of Casing)	Depth to Groundwater[1]	Groundwater Elevation[2]	Sampling Method	Analytical Results (µg/L) GRPH[3]	DRPH[4]	ORPH[4]	Benzene[5]	Toluene[5]	Ethylbenzene[5]	Total Xylenes[5]	PCE[6]	TCE[6]	cis-1,2-DCE[6]	trans-1,2-DCE[6]	Vinyl Chloride[6]	1,1-DCE[6]	Methylene Chloride[6]	Naphthalene[7]
The Property																					
W-MW-04**	01/28/12	Windward	10 to 20	--	--	Grab	--	--	--	0.7	0.2[J]	<0.2	0.3[J]	**19**[t]	**8.4**	**37**	0.4	**37**	0.1[J]	<1.0	<0.5
			30 to 40			Grab	--	--	--	0.2	0.2[J]	<0.2	0.1[J]	**2,800**[t]	**26**	**47**	0.4	**12**	0.2	<1.0	<0.5
			50 to 60			Grab	--	--	--	0.4	0.6	0.1[J]	0.6[J]	**12,000**[t]	**230**	**270**	0.2	**3.4**	2.8	<1.0	<0.5
TOC: 35.53 feet	02/03/12*	Windward	68 to 77	14.13	22.72	Bladder	--	--	--	**<20**	<20	<20	<60	**5,400**	**160**	**54**	<20	**<20**	<20	<100	<500
	09/06/12	SoundEarth		16.73	20.37	Peristaltic	--	--	--	<0.35	<1	<1	<3	**460**	**440**	**1,900**	4.0	**630**	8.1	<5	--
	12/21/12	SoundEarth		16.69	20.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		16.90	20.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW101 (B101)	07/11/12	SoundEarth	75 to 80	--	--	Grab	--	--	--	--	--	--	--	**32**	<1	2.9	<1	<0.2	<1	<5	--
	7/11/12 (dup)					Grab	--	--	--	--	--	--	--	**150**	**6.1**	**25**	<1	**1.1**	<1	<5	--
	07/12/12	SoundEarth	95 to 100			Grab	--	--	--	--	--	--	--	3.4	<1	<1	<1	<0.2	<1	<5	--
			110 to 120			Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
			134 to 139			Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
MW101	07/20/12	SoundEarth	105 to 115	--	--	Bladder	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
TOC: 39.49 feet	09/06/12	SoundEarth		21.48	18.01	Peristaltic	--	--	--	<0.35	1.4	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
	12/21/12	SoundEarth		21.14	18.35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		22.22	17.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW102 (B102)	07/17/12	SoundEarth	25 to 30	--	--	Grab	--	--	--	--	--	--	--	5.0	2.5	9.0	<1	**0.84**	<1	<5	--
			25 to 30 †			Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
			45 to 50			Grab	--	--	--	--	--	--	--	<1	<1	2.4	<1	0.20	<1	<5	--
			45 to 50 †			Grab	--	--	--	--	--	--	--	<1	<1	1.2	<1	<0.2	<1	<5	--
	07/19/12	SoundEarth	85 to 90			Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
			85 to 90 †			Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
MW102	08/16/12	SoundEarth	115 to 125	--	--	Peristaltic	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
TOC: 49.19 feet	09/05/12	SoundEarth		31.11	18.08	Bladder	--	--	--	<0.35	<1	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
	12/21/12	SoundEarth		30.78	18.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		31.65	17.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW103 (B103)	07/25/12	SoundEarth	20 to 25	--	--	Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
			20 to 25 †			Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
			35 to 40			Grab	--	--	--	--	--	--	--	**1,800**	**860**	**400**	2.4	**42**	2.6	<5	--
			35 to 40 †			Grab	--	--	--	--	--	--	--	**840**	**350**	**140**	<1	**14**	<1	<5	--
	07/26/12	SoundEarth	75 to 80			Grab	--	--	--	--	--	--	--	**320**	**62**	**100**	<1	**3.4**	<1	<5	--
			75 to 80 †			Grab	--	--	--	--	--	--	--	**170**	**50**	**85**	<1	**2.3**	<1	<5	--
MW103	07/31/12	SoundEarth	103.5 to 113.5	--	--	Peristaltic	--	--	--	--	--	--	--	**12**	**25**	**150**	<10	**79**	<10	<50	--
TOC: 35.92 feet	09/05/12	SoundEarth		18.03	17.89	Peristaltic	--	--	--	<0.35	1.6	<1	<3	**8.3**	**22**	**80**	<1	**110**	<1	<5	--
	09/05/12 (dup)			--	--	Peristaltic	--	--	--	<0.35	1.6	<1	<3	**8.1**	**22**	**85**	<1	**120**	<1	<5	--
	12/21/12	SoundEarth		17.38	18.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		19.70	16.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW104 (B104)	07/31/12	SoundEarth	55 to 60	--	--	Grab	--	--	--	0.77	3.4	<1	<3	**900**	**150**	**480**	<1	**17**	1.7	<5	--
			75 to 80			Grab	--	--	--	1.0	2.6	<1	<3	**220**	**45**	**180**	<1	**6.1**	<1	6.3[lc]	--
	08/01/12	SoundEarth	95 to 100			Grab	--	--	--	--	--	--	--	**15**	**5.3**	11	<1	**0.24**	<1	<5	--
MW104	08/16/12	SoundEarth	119 to 129	--	--	Peristaltic	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
TOC: 42.68 feet	09/06/12	SoundEarth		24.72	17.96	Bladder	--	--	--	<0.35	<1	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
	12/21/12	SoundEarth		24.31	18.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		25.78	16.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW105(B105)	08/09/12	SoundEarth	75 to 80 †	--	--	Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
	08/10/12	SoundEarth	95 to 100 †	--	--	Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
MW105	08/16/12	SoundEarth	130 to 140	--	--	Grab	--	--	--	--	--	--	--	<1	<1	<1	<1	**0.32**	<1	<5	--
TOC: 44.69 feet	09/05/12	SoundEarth		26.85	17.84	Peristaltic	--	--	--	<0.35	<1	<1	<3	<1	<1	<1	<1	**0.23**	<1	<5	--
	12/21/12	SoundEarth		26.26	18.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		28.47	16.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MTCA Cleanup Level							800[a]	500[a]	500[a]	5[a]	1,000[a]	700[a]	1,000[a]	5[a]	5[a]	16[b]	1,600[b]	0.2[a]	4,000[b]	5[a]	160[a]

Table 1
Summary of Groundwater Data
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Date	Sampled By	Sample Interval (Feet Below Top of Casing)	Depth to Groundwater[1]	Groundwater Elevation[2]	Sampling Method	Analytical Results (µg/L)														
							GRPH[3]	DRPH[4]	ORPH[4]	Benzene[5]	Toluene[5]	Ethylbenzene[5]	Total Xylenes[5]	PCE[6]	TCE[6]	cis-1,2-DCE[6]	trans-1,2-DCE[6]	Vinyl Chloride[6]	1,1-DCE[6]	Methylene Chloride[6]	Naphthalene[7]
The Property																					
MW106 (B106)	08/14/12	SoundEarth	30 to 35	--	--	Grab	--	--	--	--	--	--	--	8.2	<1	1.0	<1	0.36	<1	<5	--
			45 to 50	--	--	Grab	--	--	--	--	--	--	--	1,100	110	210	<1	20	2.1	<5	--
	08/15/12	SoundEarth	85 to 90	--	--	Grab	--	--	--	--	--	--	--	19	2.3	9.7	<1	0.62	<1	<5	--
MW106	08/22/12	SoundEarth	130 to 140	--	--	Bladder	--	--	--	--	--	--	--	<1	<1	<1	<1	<1	<1	<5	--
TOC: 51.99 feet	09/05/12	SoundEarth		34.09	17.90	Bladder	--	--	--	<0.35	<1	<1	<3	<1	<1	<1	<1	<0.2	<1	<5	--
	03/29/13	SoundEarth		34.92	17.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW107	12/21/12	SoundEarth	35 to 45	17.28	26.54	Peristaltic	240,000[x,y]	190[x]	<250	<3.5	<10	<10	<30	47,000	2,800	5,100	41	200	15	<50	--
TOC: 43.82	12/21/12 (dup)			--	--	Peristaltic	--	--	--	--	--	--	--	50,000	3,000	5,200	44	270	16	<5	--
	03/29/13	SoundEarth		18.28	25.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW108	12/21/12	SoundEarth	40 to 50	13.43	19.35	Peristaltic	--	--	--	--	--	--	--	3.4	1.8	400	2.1	210[pr]	<1	<5	--
TOC: 32.78	03/29/13	SoundEarth		15.76	17.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW109	12/21/12	SoundEarth	35 to 45	15.80	19.17	Peristaltic	--	--	--	--	--	--	--	91	64	18	<1	1.5	<1	<5	--
TOC: 34.97	03/29/13	SoundEarth		18.39	16.58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW110	12/21/12	SoundEarth	35 to 45	20.01	19.66	Bladder	--	--	--	--	--	--	--	1,100	220	470	3.0	33	1.7	<5	--
TOC: 39.67	03/29/13	SoundEarth		22.95	16.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW111	12/21/12	SoundEarth	70 to 80	17.45	19.03	Bladder	--	--	--	--	--	--	--	110	32	37	<1	1.8	<1	5.0[lc]	--
TOC: 36.48	03/29/13	SoundEarth		20.17	16.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW112	12/21/12	SoundEarth	75 to 85	42.45	15.04	Bladder	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
TOC: 57.49	03/29/13	SoundEarth		38.76	18.73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW113	12/21/12	SoundEarth	70 to 80	14.15	18.79	Peristaltic	--	--	--	--	--	--	--	1.3[i]	440	5,500	4.1	150	3.7	<5	--
TOC: 32.94	03/29/13	SoundEarth		16.95	15.99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW114	12/21/12	SoundEarth	35 to 45	16.50	29.34	Peristaltic	--	--	--	--	--	--	--	1,400	290	260	<1	14	3.0	<5	--
TOC: 45.84	03/29/13	SoundEarth		19.54	26.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW115	12/13/12	SoundEarth	35 to 45	--	--	Grab	--	--	--	--	--	--	--	15	1.1	3.0	<1	2.6	<1	<5	--
TOC: 34.14	12/21/12	SoundEarth		15.26	18.88	Peristaltic	--	--	--	--	--	--	--	<1	3.0	38	<1	16	<1	<5	--
	03/29/13	SoundEarth		18.34	15.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW116	12/07/12	SoundEarth	35 to 45	--	--	Grab	--	--	--	--	--	--	--	6.8	<1	<1	<1	<0.2	<1	<5	--
TOC: 31.36	12/21/12	SoundEarth		12.24	19.12	Peristaltic	--	--	--	--	--	--	--	2.7	<1	<1	<1	<0.2	<1	<5	--
	03/29/13	SoundEarth		14.65	16.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW117	02/08/13	SoundEarth	40 to 55	27.46	29.44	Peristaltic	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
TOC: 56.90	03/29/13	SoundEarth		27.81	29.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW118	03/25/13	SoundEarth	40 to 50	27.18	25.73	Peristaltic	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
TOC: 52.91	03/29/13	SoundEarth		27.49	25.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW119	03/25/13	SoundEarth	35 to 45	22.21	15.14	Peristaltic	--	--	--	--	--	--	--	<1	<1	3.3	<1	<0.2	<1	<5	--
TOC: 37.35	03/29/13	SoundEarth		22.52	14.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DB01	03/18/13	SoundEarth	35 to 40	--	--	Grab	--	--	--	--	--	--	--	1.4	<1	2.4	<1	<0.2	<1	<5	--
DB02	03/18/13	SoundEarth	39 to 44	--	--	Grab	--	--	--	--	--	--	--	140	19	14	<1	0.35	<1	<5	--
DB03	03/27/13	SoundEarth	55 to 60	--	--	Grab	--	--	--	--	--	--	--	6,700	420	420	<1	12	5.8	<5	--
DB04	03/22/13	SoundEarth	55 to 60	--	--	Grab	--	--	--	--	--	--	--	15	<1	<1	<1	<0.2	<1	<5	--
DB05	03/26/13	SoundEarth	65 to 70	--	--	Grab	--	--	--	--	--	--	--	1,400	11	1.7	<1	<0.2	<1	<5	--
DB05A	03/28/13	SoundEarth	40 to 45	--	--	Grab	--	--	--	--	--	--	--	230,000	790[ve]	42	<1	1.2	4.8	<5	--
DB06	03/25/13	SoundEarth	75 to 80	--	--	Grab	--	--	--	--	--	--	--	170	4.4	5.0	<1	<0.2	<1	<5	--
DB07	03/28/13	SoundEarth	65 to 70	--	--	Grab	--	--	--	--	--	--	--	15,000	<1,000	<1,000	<1,000	<200	<1,000	<5,000	--
DB08	03/21/13	SoundEarth	55 to 60	--	--	Grab	--	--	--	--	--	--	--	7,300	1,100	1,300	<10	38	<10	<50	--
DB09	03/19/13	SoundEarth	35 to 40	--	--	Grab	--	--	--	--	--	--	--	5,000	400	700	3.1	4.8	2.0	<5	--
			65 to 70	--	--		--	--	--	--	--	--	--	1,900	460	460	<1	2.3	1.3	<5	--
DB10	03/29/13	SoundEarth	35 to 40	--	--	Grab	--	--	--	--	--	--	--	200,000	1,700	<1,000	<1,000	<200	<1,000	<5,000	--
	04/01/13	SoundEarth	65 to 70	--	--	Grab	--	--	--	--	--	--	--	6,900	<100	<100	<100	<20	<100	<500	--
DB12	04/03/13	SoundEarth	10 to 15	--	--	Grab	--	--	--	--	--	--	--	170,000	4,800	3,100	<2,000	<400	<2,000	<10,000	--
			40 to 45	--	--		--	--	--	--	--	--	--	46,000	1,100	<1,000	<1,000	<200	<1,000	<5,000	--
DB13	04/03/13	SoundEarth	10 to 15	--	--	Grab	--	--	--	--	--	--	--	2,500	100	160	1.8	<0.2	<1	<5	--
			40 to 45	--	--		--	--	--	--	--	--	--	8,200	800[ve]	430[ve]	<1	3.0	5.2	<5	--
DB14	04/04/13	SoundEarth	10 to 15	--	--	Grab	7,200	--	--	100	<40	90	130	--	--	--	--	--	--	--	--
			40 to 45	--	--		--	--	--	--	--	--	--	470	210	840	<100	140	<100	<500	--
MTCA Cleanup Level							800[a]	500[a]	500[a]	5[a]	1,000[a]	700[a]	1,000[a]	5[a]	5[a]	16[b]	1,600[b]	0.2[a]	4,000[b]	5[a]	160[a]

Table 1
Summary of Groundwater Data
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Date	Sampled By	Sample Interval (Feet Below Top of Casing)	Depth to Groundwater[1]	Groundwater Elevation[2]	Sampling Method	Analytical Results (µg/L) GRPH[3]	DRPH[4]	ORPH[4]	Benzene[5]	Toluene[5]	Ethylbenzene[5]	Total Xylenes[5]	PCE[6]	TCE[6]	cis-1,2-DCE[6]	trans-1,2-DCE[6]	Vinyl Chloride[6]	1,1-DCE[6]	Methylene Chloride[6]	Naphthalene[7]
Rights-of-Way																					
BB-5	09/05/97	B & V		23.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/09/97	B & V		23.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/17/97	B & V		22.78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/97	B & V		23.40	--	Bailer	<250	<630	<630	ND	ND	ND	ND	ND	ND	1.1	ND	ND	ND	ND	NA
	12/02/97	B & V		22.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	01/21/98	B & V		23.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	02/27/98	B & V	30 to 40	23.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/25/98	B & V		22.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04/24/98	B & V		23.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/05/98	B & V		23.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/08/98	B & V		23.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/27/98	B & V		24.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	08/25/98	B & V		24.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/30/98	B & V		24.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BB-7	06/13/97	B & V		8.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/20/97	B & V		8.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/24/97	B & V		9.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/97	B & V		9.44	--	Bailer	<250	<630	<630	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	12/02/97	B & V		7.78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	01/22/98	B & V		9.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	02/27/98	B & V	25 to 35	9.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/25/98	B & V		8.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04/22/98	B & V		9.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/05/98	B & V		9.39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/08/98	B & V		9.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/27/98	B & V		9.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	08/25/98	B & V		10.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/29/98	B & V		9.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BB-8	06/20/97	B & V		17.49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/24/97	B & V		19.00	--	Bailer	<200	<500	<1,000	1.8	1.3	<1.0	<1.0	**11,000**	**1,500**	**4,200**	14	**280**	ND	ND	NA
	10/06/97	B & V		20.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	01/25/98	B & V		20.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	02/28/98	B & V		20.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/30/98	B & V		20.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04/22/98	B & V		19.99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/04/98	B & V		20.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/27/98	B & V	30 to 40	24.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	01/29/09	DOF		20.08	--	--	499	--	--	0.694	<0.500	<0.500	<1.00	**896[f]**	**258**	**441**	2.45	**1.48**	1.36	<5.00	--
TOC: 44.25 feet	02/19/10	SoundEarth		18.66	25.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05/03/10	SoundEarth		19.90	24.35	Peristaltic	--	--	--	--	--	--	--	**510**	**120**	**110**	<1	**0.27**	<1	<5	--
	06/02/11	SoundEarth		17.64	26.61	Peristaltic	130[x,y]	<50	<250	<0.35	<1	<1	<3	**170**	**59**	**44**	<1	<0.2	<1	<5	<1
	02/07/12	Windward		15.39	28.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC: 44.26 feet	09/05/12	SoundEarth		20.01	24.25	Peristaltic	--	--	--	<0.35	<1	<1	<3	**200**	**41**	**28**	<1	<0.2	<1	<5	<1
	12/21/12	SoundEarth		16.23	28.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/29/13	SoundEarth		18.70	25.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BB-8A	01/29/09	DOF		20.60	--	Peristaltic	669	--	--	<0.500	<0.500	<0.500	<1.00	**1,290[f]**	**285**	**549**	2.96	**3.86**	1.59	<5.00	--
	02/19/10	SoundEarth	Unknown	19.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05/03/10	SoundEarth		19.34	--	Peristaltic	--	--	--	--	--	--	--	**810**	**180**	**140**	1.6	**0.78**	<100	<500	--
	06/02/11	SoundEarth		18.18	--	Peristaltic	380[x,y]	<50	<250	<3.5	<10	<10	<30	**710**	**170**	**170**	<10	**<2**	<10	<50	<10
MTCA Cleanup Level							**800[a]**	**500[a]**	**500[a]**	**5[a]**	**1,000[a]**	**700[a]**	**1,000[a]**	**5[a]**	**5[a]**	**16[b]**	**1,600[b]**	**0.2[a]**	**4,000[b]**	**5[a]**	**160[a]**

Table 1
Summary of Groundwater Data
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Date	Sampled By	Sample Interval (Feet Below Top of Casing)	Depth to Groundwater[1]	Groundwater Elevation[2]	Sampling Method	Analytical Results (µg/L) GRPH[3]	DRPH[4]	ORPH[4]	Benzene[5]	Toluene[5]	Ethylbenzene[5]	Total Xylenes[5]	PCE[6]	TCE[6]	cis-1,2-DCE[6]	trans-1,2-DCE[6]	Vinyl Chloride[6]	1,1-DCE[6]	Methylene Chloride[6]	Naphthalene[7]
Rights-of-Way																					
BB-10	09/05/97	B & V	29 to 39	25.91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/09/97	B & V		25.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/17/97	B & V		25.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/13/97	B & V		25.30	--	Bailer	<250	<630	<630	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
	12/02/97	B & V		25.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	01/21/98	B & V		25.88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	02/27/98	B & V		25.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	03/25/98	B & V		25.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04/23/98	B & V		29.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	06/05/98	B & V		26.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/01/98	B & V		26.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/27/98	B & V		26.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	08/25/98	B & V		27.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/29/98	B & V		27.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BB-12	03/25/98	B & V	35 to 45	14.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04/27/98	B & V		14.97	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05/19/98	B & V		15.01	--	Bailer	<250	<630	<630	ND	ND	ND	ND	ND	ND	**540**	ND	**380**	ND	ND	--
	07/08/98	B & V		15.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/28/98	B & V		15.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	08/25/98	B & V		15.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/29/98	B & V		14.78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC: 34.01 feet	02/19/10	SoundEarth		16.33	17.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05/02/10	SoundEarth		14.52	19.49	Peristaltic	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
BB12A	02/19/11	SoundEarth	Unknown	14.40	19.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC: Unknown	05/02/10	SoundEarth		15.81	17.92	Peristaltic	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
BB-13	03/25/98	B & V	35 to 45	9.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04/23/98	B & V		8.76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05/19/98	B & V		9.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/08/98	B & V		9.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/28/98	B & V		9.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/29/98	B & V		8.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1998	B & V		--	--	Bailer	<250	<630	<630	ND	ND	ND	ND	ND	ND	2.6	ND	**1.1**	ND	ND	--
TOC: 27.65 feet	02/19/10	SoundEarth		9.50	18.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05/02/10	SoundEarth		9.13	18.52	Peristaltic	--	--	--	--	--	--	--	<1	<1	<1	<1	<0.2	<1	<5	--
	02/07/12	Windward		7.56	20.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BB-14	03/25/98	B & V	40 to 60	8.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	04/22/98	B & V		8.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	05/19/98	B & V		8.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/08/98	B & V		7.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	07/28/98	B & V		9.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	08/25/98	B & V		9.49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/29/98	B & V		6.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1998	B & V		--	--	Bailer	<300	<630	<630	--	--	--	--	--	--	--	--	--	--	--	--
TB-18	06/04/98	B & V	93 to 118	30.05	--	Bailer	<250	<630	<630	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
PW-1	1997 (8 hour)	B & V	40 to 60	--	--	Bailer	<250	<630	<630	ND	ND	ND	ND	1.0	ND	ND	ND	ND	ND	ND	NA
	1997 (Final)			--	--	Bailer	<250	<630	<630	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
CHB-07	04/14/08	CH2M HILL	Unknown	--	--	Grab	<250	<250	<500	0.7	<0.2	<0.2	<0.6	<0.2	<0.2	**480**	1.8	**220**	0.3	<0.5	<0.5
CHB-08	04/15/08	CH2M HILL	Unknown	--	--	Grab	<250	<250	<500	<0.2	<0.2	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5
CHB-09	04/16/08	CH2M HILL	Unknown	--	--	Grab	<250	400	**1,400**	0.3	0.3	<0.2	<0.6	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5
MTCA Cleanup Level							**800[a]**	**500[a]**	**500[a]**	**5[a]**	**1,000[a]**	**700[a]**	**1,000[a]**	**5[a]**	**5[a]**	**16[b]**	**1,600[b]**	**0.2[a]**	**4,000[b]**	**5[a]**	**160[a]**

P:\0797 Frontier Env Mgmt\700 Dexter\Technical\Tables\2013\RI\0797-001_2013RI_SD_GW_Sludge_DFER.xlsx

Table 1
Summary of Groundwater Data
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Date	Sampled By	Sample Interval (Feet Below Top of Casing)	Depth to Groundwater[1]	Groundwater Elevation[2]	Sampling Method	Analytical Results (µg/L)														
							GRPH[3]	DRPH[4]	ORPH[4]	Benzene[5]	Toluene[5]	Ethylbenzene[5]	Total Xylenes[5]	PCE[6]	TCE[6]	cis-1,2-DCE[6]	trans-1,2-DCE[6]	Vinyl Chloride[6]	1,1-DCE[6]	Methylene Chloride[6]	Naphthalene[7]
East-Adjoining Properties - 800 Roy Street Parcel																					
RS-20	03/05/93	EPJ	Unknown	≈ 10	--	Grab	**99,000**	--	--	**96**	230	**1,500**	**7,000**	<5	NA	NA	NA	NA	NA	NA	NA
MW-1	03/22/93	EPJ	17.5 to 37.5	--	--	Bailer	**5,100**	<500	<1,000	**10,000**	270	480	427	--	--	--	--	--	--	--	--
	06/17/93	Retec		16.10	--	Unknown	--	--	--	**20,000**	14,000	840	**6,700**	--	--	--	--	--	--	--	--
	Decommissioned on October 12, 1993																				
MW-2	03/22/93	EPJ	27.5 to 37.5	--	--	Bailer	650	<500	<1,000	**100**	42	24	67	--	--	--	--	--	--	--	--
	06/17/93	Retec		15.55	--	Unknown	--	--	--	**28**	7.2	<1	<2	**170**	**1,400**	**9,300**	25	**1,100**	25	<10	--
	Decommissioned on October 12, 1993																				
MW-3	03/22/93	EPJ	17.5 to 37.5	--	--	Bailer	**27,000**	<500	<1,000	**1,500**	**3,300**	690	**3,500**	--	--	--	--	--	--	--	--
	06/17/93	Retec		15.17	--	Unknown	--	--	--	**4,800**	**21,000**	1,900	**12,300**	--	--	--	--	--	--	--	--
	Decommissioned on October 12, 1993																				
MW-4	03/22/93	EPJ	22.5 to 32.5	--	--	Bailer	**940**	<500	<1,000	**82**	390	39	108	--	--	--	--	--	--	--	--
	06/17/93	Retec		15.80	--	Unknown	--	--	--	<1	<1	<1	<2	--	--	--	--	--	--	--	--
	Decommissioned on October 12, 1993																				
MW-5	03/22/93	EPJ	12.5 to 22.5	--	--	Bailer	670	<500	<1,000	**49**	140	9.8	80	--	--	--	--	--	--	--	--
	06/17/93	Retec		14.57	--	Unknown	--	--	--	<1	<1	<1	<2	--	--	--	--	--	--	--	--
	Decommissioned on October 12, 1993																				
MW-6	10/12/93	Retec	7 to 22	--	--	Unknown	**150,000**	--	--	**9,100**	**6,800**	**2,600**	**7,300**	--	--	--	--	--	--	--	--
TOC: 58.76 feet	10/26/93	Retec		16.79	41.97	Unknown	**100,000**	--	--	**17,000**	**14,000**	**1,400**	**11,000**	--	--	--	--	--	--	--	--
	01/25/94	Retec		17.43	41.33	Unknown	**66,000**	--	--	**8,800**	**4,600**	**1,500**	**8,100**	--	--	--	--	--	--	--	--
	04/25/94	Retec		15.75	43.01	Unknown	**120,000**	--	--	**15,000**	**7,200**	**2,600**	**13,300**	--	--	--	--	--	--	--	--
	09/15/94	Retec		16.61	42.15	Unknown	**56,000**	--	--	**15,000**	**2,000**	**1,500**	**7,100**	--	--	--	--	--	--	--	--
	06/20/02	Urban		--	--	Unknown	**8,500**	--	--	**1,900**	14	250	53	--	--	--	--	--	--	--	--
TOC: 38.20 feet	02/07/12	Windward		14.91	23.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-7	10/12/93	Retec	9 to 18.5	--	--	Unknown	**75,000**	--	--	**20,000**	**22,000**	**3,000**	**15,000**	--	--	--	--	--	--	--	--
TOC: 55.82 feet	10/26/93	Retec		14.10	41.72	Unknown	**74,000**	--	--	**8,300**	**7,400**	**1,100**	**8,300**	--	--	--	--	--	--	--	--
	01/25/94	Retec		15.30	40.52	Unknown	**53,000**	--	--	**1,600**	**2,700**	**1,400**	**5,100**	--	--	--	--	--	--	--	--
	04/25/94	Retec		13.40	42.42	Unknown	**140,000**	--	--	**3,900**	**7,400**	**3,100**	**14,100**	--	--	--	--	--	--	--	--
	09/15/94	Retec		14.29	41.53	Unknown	**66,000**	--	--	**3,400**	**2,700**	**1,900**	**7,700**	--	--	--	--	--	--	--	--
	9/15/94 (dup)			--	--	Unknown	**77,000**	--	--	**3,600**	**3,000**	**2,100**	**8,700**	--	--	--	--	--	--	--	--
	06/20/02	Urban		--	--	Unknown	**8,400**	--	--	**650**	37	470	150	--	--	--	--	--	--	--	0.19
TOC: 35.09 feet	02/07/12	Windward		12.56	22.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	10/26/93	Retec	4.5 to 19	12.35	41.37	Unknown	280	--	--	**19**	1	<1	48	--	--	--	--	--	--	--	--
TOC: 53.72 feet	01/25/94	Retec		13.51	40.21	Unknown	230[J]	--	--	**13**	0.7[J]	<1	4.5	--	--	--	--	--	--	--	--
	1/25/94 (dup)			--	--	Unknown	210[J]	--	--	**12**	0.6[J]	<1	3.7	--	--	--	--	--	--	--	--
	04/25/94	Retec		11.80	41.92	Unknown	<250	--	--	2.2	<1	<1	1.7	--	--	--	--	--	--	--	--
	09/15/94	Retec		12.49	41.23	Unknown	210[J]	--	--	<1	0.5[J]	<1	1.6[J]	--	--	--	--	--	--	--	--
	9/15/94 (dup)			--	--	Unknown	250	--	--	<1	0.5[J]	<1	1.7[J]	--	--	--	--	--	--	--	--
	06/21/02	Urban		--	--	Unknown	<50	--	--	<1	<1	<1	<1	--	--	--	--	--	--	--	--
TOC: 33.19 feet	02/07/12	Windward		11.64	21.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-9	10/26/93	Retec	7 to 22	--	--	Unknown	210[J]	--	--	**9.5**	1.3	<1	<2	--	--	--	--	--	--	--	--
TOC: 61.35 feet	01/25/94	Retec		15.51	45.84	Unknown	<250	--	--	**5.7**	1.1	<1	<2	--	--	--	--	--	--	--	--
	04/25/94	Retec		17.09	44.26	Unknown	<250	--	--	<0.001	<1	<1	<2	--	--	--	--	--	--	--	--
	09/15/94	Retec		15.50	45.85	Unknown	<250	--	--	3.5	0.6[J]	<1	<2	--	--	--	--	--	--	--	--
	06/20/02	Urban		18.30	22.51	Unknown	<50	--	--	<1	<1	<1	<2	<1	<1	<1	<1	<1	<1	--	<0.1
TOC: 40.81 feet	06/02/11	SoundEarth		14.89	--	Peristaltic	<100	150[x]	<250	<1	<1	<1	<3	--	--	--	--	--	--	--	--
	02/07/12	Windward		16.39	24.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	09/04/12	SoundEarth		16.84	23.97	Peristaltic	--	--	--	<0.35	<1	<1	<3	<1	<1	<1	<1	**0.61**	<1	<5	--
	12/21/12			15.94	24.87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-10	10/26/93	Retec	7 to 22	--	--	Unknown	<250	--	--	<1	1.3	<1	<2	--	--	--	--	--	--	--	--
TOC: 58.53 feet	01/25/94	Retec		15.09	43.44	Unknown	190[J]	--	--	<1	3.2	<1	<2	--	--	--	--	--	--	--	--
	04/25/94	Retec		16.64	41.89	Unknown	<250	--	--	<1	2.5	<1	<2	--	--	--	--	--	--	--	--
	09/15/94	Retec		16.64	41.89	Unknown	<250	--	--	<1	0.9[J]	<1	<2	--	--	--	--	--	--	--	--
	06/20/02	Urban		16.55	41.98	Unknown	<50	--	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	<0.1
TOC: 37.95 feet	02/07/12	Windward		15.85	22.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MTCA Cleanup Level							**800[a]**	**500[a]**	**500[a]**	**5[a]**	**1,000[a]**	**700[a]**	**1,000[a]**	**5[a]**	**5[a]**	**16[b]**	**1,600[b]**	**0.2[a]**	**4,000[b]**	**5[a]**	**160[a]**

SoundEarth Strategies

Table 1
Summary of Groundwater Data
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Date	Sampled By	Sample Interval (Feet Below Top of Casing)	Depth to Groundwater[1]	Groundwater Elevation[2]	Sampling Method	Analytical Results (µg/L) GRPH[3]	DRPH[4]	ORPH[4]	Benzene[5]	Toluene[5]	Ethylbenzene[5]	Total Xylenes[5]	PCE[6]	TCE[6]	cis-1,2-DCE[6]	trans-1,2-DCE[6]	Vinyl Chloride[6]	1,1-DCE[6]	Methylene Chloride[6]	Naphthalene[7]
East-Adjoining Properties - 800 Roy Street Parcel																					
SCL-B101	06/17/02	Urban	Unknown	--	--	Grab	<50	<250	--	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	--	--
SCL-B102	06/17/02	Urban	Unknown	--	--	Grab	150	360	--	<1	<1	<1	3	<1	<1	<1	<1	<1	<1	--	--
SCL-MW101	06/20/02	Urban	Unknown	--	--	Unknown	**19,000**	--	--	**810**	100	**1,200**	**1,700**	--	--	--	--	--	--	--	--
TOC: 30.46	02/07/12	Windward		7.48	22.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SCL-MW102	10/26/93	Urban	5 to 15	--	--	Unknown	**10,000**	--	--	**970**	200	280	**1,300**	--	--	--	--	--	--	--	--
TOC: --	02/07/12	Windward		7.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SCL-MW103	06/21/02	Urban	Unknown	--	--	Unknown	<50	--	--	<1	<1	<1	<1	--	--	--	--	--	--	--	--
SCL-MW105	06/20/02	Urban	25 to 30	--	--	Unknown	**3,200**	--	--	**390**	43	91	280	--	--	--	--	--	--	--	--
TOC: 31.26	02/07/12	Windward		10.46	20.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SCS-1 TOC: 39.55	02/07/12	Windward	Unknown	17.51	22.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SCS-2 TOC: 39.16	02/07/12	Windward	Unknown	16.56	22.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SCS-3 TOC: 36.73	02/07/12	Windward	Unknown	14.10	22.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SCS-4 TOC: 35.33	02/07/12	Windward	Unknown	12.93	22.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SCS-5 TOC: 39.06	02/07/12	Windward	Unknown	17.81	21.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MTCA Cleanup Level							**800[a]**	**500[a]**	**500[a]**	**5[a]**	**1,000[a]**	**700[a]**	**1,000[a]**	**5[a]**	**5[a]**	**16[b]**	**1,600[b]**	**0.2[a]**	**4,000[b]**	**5[a]**	**160[a]**

NOTES:

Red denotes concentrations exceeding MTCA Cleanup Level.

TOCs were surveyed relative to an established datum of 521.41 feet prior to 2012. TOCs resurveyed by Axis Survey and Mapping, of Kirkland, Washington on March 16th, 2012, relative to an arbitrary benchmark of 499.89 feet above mean sea level, and by Bush, Roed & Hitchings, Inc. of Seattle, Washington in February, October, and December, 2012, and March 2013, using the North American Vertical Datum 1988.

[1]As measured in feet below a fixed spot on the well casing rim.

[2]Calculated by subtracting the depth to groundwater from the casing elevation. Groundwater elevation in angled monitoring well calculated subtracting the product of the measured depth to groundwater in the angled well by the sine of its angle.

[3]Analyzed by EPA Method 418.1 or 8015-M, NWTPH-HCID, or NWTPH-Gx.

[4]Analyzed by EPA Method 418.1 or 8015-M, NWTPH-HCID, or NWTPH-Dx.

[5]Analyzed by EPA Methods 8015, 8020, 8021B, 8240, 8260B, or 8260C.

[6]Analyzed by Purge and Trap Gas Chromatogram/Mass Spectrometry or EPA Method 601, 8010S, 8240, 8260B, or 8260C.

[7]Analyzed by EPA Methods 8010, 8260B, 8260C, 8270, 8270D, or 8270D-SIM.

[a]MTCA Method A Cleanup Levels, Table 720-1, Section 900, Chapter 173-340 of the WAC, revised November 2007.

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

*Water level measurements collected on February 7, 2012.

**Monitoring well was installed at a 25 degree angle from the vertical point of penetration. Depth to groundwater measurements and sample interval account for angled length of well, not vertical depth. Groundwater elevations corrected to account for angle.

†Samples were field-filtered prior to laboratory analysis.

Laboratory Notes:

[B]Analyte detected in an associated Method Blank.

[d]Result reported as TPH.

[E]Estimated value. The reported range exceeds the calibration range of the analysis.

[f]Analyte was detected in the associated method blank. Analyte concentration in the sample is greater than 10x the concentration found in the method blank.

[g]Estimated value. The reported range exceeds the calibration range of the analysis.

[i]The presence of the analyte indicated may be due to carryover from previous sample injections.

[J] Estimated concentration.

[k]The presence of the compound indicated is likely due to laboratory contamination.

[ip]Hydrocarbon result partly due to individual peak(s) in quantitation range.

[pr]The sample was received with incorrect preservation. The value reported should be considered an estimate.

[t]analyte also detected in trip blank.

[ve]Estimated concentration calculated for an analyte response above valid instrument calibration range; a dilution is required to obtain accurate quantification of the analyte.

[x]The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

[y]The GRPH result in the sample is due to a pattern of peaks that is consistent with the chlorinated volatiles detected by the 8260C analysis.

-- = not analyzed or not measured
< = not detected at a concentration exceeding laboratory reporting limit
µg/L = micrograms per liter
B & V = Black & Veatch
CLARC = cleanup levels and risk calculations
DCE = dichloroethylene
DOF = Dalton, Olmsted & Fuglevand, Inc.
DRPH = diesel-range petroleum hydrocarbons
dup = duplicate
EPA = U.S. Environmental Protection Agency
EPJ = E.P. Johnson Construction Inc., and Environmental
GeoEngineers = GeoEngineers, Inc.
GRPH = gasoline-range petroleum hydrocarbons
MTCA = Washington State Model Toxics Control Act
NA = results not available
ND = not detected at a concentration exceeding laboratory reporting limit; detection limit not provided
NWTPH = northwest total petroleum hydrocarbon
ORPH = oil-range petroleum hydrocarbons
PCE = tetrachloroethylene
Retec = Remediation Technologies, Inc.
Roux = Roux Associates
SoundEarth = SoundEarth Strategies, Inc.
TCE = trichloroethylene
TOC = top of casing
TPH = total petroleum hydrocarbons
Urban = Urban Redevelopment
WAC = Washington Administrative Code
Windward = Windward Environmental LLC

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	Analytical Results (mg/kg)														
							GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
The Property																					
R-MW1	Unknown	10/22/92	Roux	Unknown	5	32.8	NA	NA	NA	NA	NA	NA	NA	**5.8**	**0.35**	NA	<0.005	<0.010	NA	NA	NA
R-MW4	Unknown	10/22/92	Roux	Unknown	5	47.0	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005	NA	<0.005	<0.010	NA	NA	NA
	Unknown			Unknown	15	37.0	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005	NA	<0.005	<0.010	NA	NA	NA
	Unknown			Unknown	30	22.0	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005	NA	<0.005	<0.010	NA	NA	NA
R-MW6	Unknown	10/27/92	Roux	Unknown	6	39.5	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005	NA	<0.005	<0.010	NA	NA	NA
	Unknown			Unknown	11	34.5	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005	NA	<0.005	<0.010	NA	NA	NA
	Unknown			Unknown	16	29.5	NA	NA	NA	NA	NA	NA	NA	<0.005	<0.005	NA	<0.005	<0.010	NA	NA	NA
B-1	B-1-13	06/23/00	ThermoRetec	ARI	13	31.0	--	--	--	<0.0012	<0.0012	<0.0012	<0.0024	<0.0012	<0.0012	0.0021	<0.0012	<0.0012	<0.0012	<0.0035	<0.0059
B-2	B-2-6.5	06/23/00	ThermoRetec	ARI	6.5	35.5	--	--	--	<0.0011	<0.0011	<0.0011	<0.0022	0.017	0.0020	0.011	<0.0011	<0.0011	<0.0011	<0.0033	<0.0055
	B-2-11			ARI	11	31.0	--	--	--	<0.0012	<0.0012	<0.0012	<0.0024	**0.92**	**0.085**	0.64	0.0037	<0.0012	<0.0012	<0.0037	<0.0061
	B-2-16			ARI	16	26.0	--	--	--	<0.0011	<0.0011	<0.0011	<0.0022	0.049	0.0011	0.0075	<0.0011	<0.0011	<0.0011	<0.0032	<0.0054
B-3	B-3-12	06/23/00	ThermoRetec	ARI	12	31.5	--	--	--	<0.0013	<0.0013	<0.0013	<0.0026	<0.0013	<0.0013	0.0016	<0.0013	<0.0013	<0.0013	<0.0039	<0.0064
B-5	B-5-10	06/23/00	ThermoRetec	ARI	10	32.0	--	--	--	<0.0011	<0.0011	<0.0011	<0.0022	0.0051	<0.0011	0.0021	<0.0011	<0.0011	<0.0011	<0.0032	<0.0053
	B-5-11.5			ARI	11.5	30.5	--	--	--	<0.0012	<0.0012	<0.0012	<0.0024	**0.12**	0.0088	0.013	<0.0012	<0.0012	<0.0012	<0.0036	<0.0061
B-6	B-6-6	06/24/00	ThermoRetec	ARI	6	36.0	NA	NA	NA	NA	NA	NA	NA	0.0085	0.0014	0.0021	<0.0012	<0.0012	NA	NA	NA
	B-6-12			ARI	12	30.0	NA	NA	NA	NA	NA	NA	NA	0.0067	0.0026	0.0047	<0.0012	<0.0012	NA	NA	NA
	B-6-18			ARI	18	24.0	NA	NA	NA	NA	NA	NA	NA	**2.3**	0.0078	0.0031	<0.0013	<0.0013	NA	NA	NA
B-7	B-7-6	06/24/00	ThermoRetec	ARI	6	36.0	NA	NA	NA	NA	NA	NA	NA	0.031	0.0029	0.0052	<0.0012	<0.0012	NA	NA	NA
B-8	B-8-4	06/24/00	ThermoRetec	ARI	4	38.0	NA	NA	NA	NA	NA	NA	NA	**0.092**	0.0006	0.0019	<0.0011	<0.0011	NA	NA	NA
	B-8-8			ARI	8	34.0	NA	NA	NA	NA	NA	NA	NA	**1.4**	0.017	0.021	<0.0011	<0.0011	NA	NA	NA
B-9	B-9-4	06/24/00	ThermoRetec	ARI	4	38.0	NA	NA	NA	NA	NA	NA	NA	**170**	**<1.6**	<1.6	<1.6	**<1.6**	NA	NA	NA
	B-9-8			ARI	8	34.0	NA	NA	NA	NA	NA	NA	NA	**4.8**	**0.13**	0.21	0.0022	<0.0012	NA	NA	NA
B-10	B-10-12	06/24/00	ThermoRetec	ARI	12	46.0	NA	NA	NA	NA	NA	NA	NA	0.017	0.0014	0.0061	<0.0011	<0.0011	NA	NA	NA
G-MW1	MW 1-3-8	07/20/01	GeoEngineers	NCA	8	31.0	--	--	--	<0.0190	<0.0180	<0.0190	<0.0540	**19.9**	<0.0230	<0.0260	<0.0130	<0.0130	<0.0140	0.0634[B]	<0.0140
	MW 1-8-20			NCA	20	19.0	--	--	--	<0.0190	<0.0180	<0.0190	<0.0540	**237**	**0.0622**	<0.0260	<0.0130	<0.0130	<0.0140	0.0671[B]	0.0061
	MW 1-11-27.5			NCA	27.5	11.5	--	--	--	<0.0190	<0.0180	<0.0190	<0.0540	**16.4**	**0.0706**[J]	<0.0260	<0.0130	<0.0130	<0.0140	0.0612[B]	<0.0140
	MW 1-13-32.5			NCA	32.5	6.5	--	--	--	<0.0380	<0.0360	<0.0380	<0.1080	**33.1**	**0.394**	<0.0520	<0.0260	<0.0260	<0.0280	0.165[B]	<0.0280
	MW 1-15-37.5			NCA	37.5	1.5	--	--	--	<0.0190	<0.0180	<0.0190	<0.0540	**0.678**	<0.0230	<0.0260	<0.0130	<0.0130	<0.0140	0.0484[B,J]	<0.0140
G-SB4 (G-MW3)	SB4-4-10	07/20/01	GeoEngineers	NCA	10	29.6	--	--	--	<0.0190	<0.0180	<0.0190	<0.0540	**0.528**	<0.0230	<0.0260	<0.0130	<0.0130	<0.0140	0.0793[B]	<0.0140
	SB4-7-17.5			NCA	17.5	22.1	--	--	--	<0.0190	<0.0180	<0.0190	<0.0540	**13.2**	<0.0230	<0.0260	<0.0130	<0.0130	<0.0140	0.0818[B]	<0.0140
	SB4-13-32.5			NCA	32.5	7.1	--	--	--	<0.0190	<0.0180	<0.0190	<0.0540	**5.70**	**0.175**	<0.0260	<0.0130	<0.0130	<0.0140	0.253[B]	<0.0140
	SB4-15-37.5			NCA	37.5	2.1	--	--	--	<0.0190	<0.0180	<0.0190	<0.0540	**0.581**	<0.0230	<0.0260	<0.0130	<0.0130	<0.0140	0.0842[B]	<0.0140
P-03/ W-MW-01	SB-W-03-0160	01/27/12	Windward	ARI	16-16.5	29.1	--	--	--	<0.0010	0.0006[J]	<0.0010	<0.0020	<0.0010	<0.0010	0.0006[J]	<0.0010	<0.0010	<0.0010	0.0027[B]	<0.0048
	SB-W-03-0225			ARI	22.5-23	22.6	--	--	--	<0.0009	0.0007[J]	<0.0009	<0.0018	0.03[B]	0.0018	0.0021	<0.0009	<0.0009	<0.0009	0.0032[B]	<0.00430
	SB-W-03-0315			ARI	31.5-32	13.6	--	--	--	**<0.21**	<0.21	<0.21	<0.42	**16**[B]	**0.59**	0.48	<0.21	<0.21	<0.21	<0.41	<1
	SB-W-03-0450			ARI	45-45.5	-0.4	--	--	--	<0.0007	0.0006[J]	<0.0007	<0.0014	**0.38**[B]	**0.022**	0.041	0.0005[J]	<0.0007	<0.0007	0.0025[B]	<0.0035
	SB-W-03-0550			ARI	55.5-56	-10.4	--	--	--	**<0.045**	<0.045	<0.045	**<0.09**	**1.9**[J]	**0.17**	0.13	<0.045	<0.045	<0.045	<0.091	<0.23
	SB-W-03-0645			ARI	64.5-65	-19.4	--	--	--	<0.0008	<0.0008	<0.0008	<0.0016	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.0098[B]	<0.0041
	SB-W-03-0730			ARI	73-73.5	-27.9	--	--	--	<0.0007	0.0006[J]	<0.0007	<0.0014	**0.1**[B]	0.0081	0.025	<0.0007	<0.0007	<0.0007	0.0020[B]	<0.0036
MTCA Cleanup Level for Soil							**30**[a]	**2,000**[a]	**2,000**[a]	**0.03**[a]	**7**[a]	**6**[a]	**9**[a]	**0.05**[a]	**0.03**[a]	**160**[b]	**1,600**[b]	**0.67**[b]	**4,000**[b]	**0.02**[a]	**5**[a]

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	Analytical Results (mg/kg) GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
The Property																					
P-06/ W-MW-02	SB-W-06-0900	01/29/12	Windward	ARI	9-9.5	34.5	--	--	--	0.0009[J]	<0.0013	<0.0013	<0.0026	**0.058[T]**	0.0081	<0.0013	<0.0013	<0.0013	<0.0013	<0.0027	<0.0067
	SB-W-06-0185			ARI	18.5-19	25.0	--	--	--	0.0008[J]	0.0006[J]	<0.0009	<0.0018	<0.0009[T]	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009	0.0024[B]	<0.0043
	SB-W-06-0305	01/30/12		ARI	30.5-31	13.0	--	--	--	**<0.27**	<0.27	<0.27	<0.34	**18**	**0.41**	0.4	<0.27	<0.27	<0.27	<0.53	<1.3
	SB-W-06-0380			ARI	38-38.5	5.5	--	--	--	**<0.046**	<0.046	<0.046	<0.092	**0.14**	**0.057**	0.52	<0.046	<0.046	<0.046	<0.092	<0.23
	SB-W-06-0405			ARI	40.5-41	3.0	--	--	--	<0.036	<0.036	<0.036	<0.072	**5.2**	**0.2**	0.15	<0.036	<0.036	<0.036	<0.072	<0.18
	SB-W-06-0485			ARI	48.5-49	-5.0	--	--	--	<0.0008	<0.0008	<0.0008	<0.0016	0.033	0.0007[J]	0.0009	<0.0008	<0.0008	<0.0008	0.0018[B]	<0.0040
	SB-W-06-9485			ARI	48.5-49 (DUP)	-5.0	--	--	--	<0.0009	<0.0009	<0.0009	<0.0018	**0.052**	0.0011	0.0010	<0.0009	<0.0009	<0.0009	0.0019[B]	<0.0046
	SB-W-06-0590			ARI	59-59.5	-16.0	--	--	--	**<0.043**	<0.043	<0.043	<0.086	**0.53**	**0.037[J]**	<0.043	<0.043	<0.043	<0.043	<0.086	<0.21
	SB-W-06-0715			ARI	71.5-72	-28.0	--	--	--	<0.0008	<0.0008	<0.0008	<0.0016	0.0009	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0017	<0.0042
	SB-W-06-0790	01/31/12		ARI	79-79.5	-35.5	--	--	--	<0.0009	<0.0009	<0.0009	<0.0018	0.0022	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009	<0.0017	<0.0043
P-07/ W-MW-03	SB-W-07-0135	01/26/12	Windward	ARI	13.5-14	25.8	--	--	--	0.0007[J]	0.0024	<0.0009	0.0008[J]	0.0038	0.0005[J]	0.0008[J]	<0.0009	<0.0009	<0.0009	0.0032[B]	<0.0045
	SB-W-07-0275			ARI	27.5-28	11.8	--	--	--	0.0005[J]	0.0013	<0.0009	<0.0018	**0.12**	0.0053	0.083	0.0013	<0.0009	<0.0009	0.0041[B]	<0.0046
	SB-W-07-0335			ARI	33.5-34	5.8	--	--	--	<0.0008	0.0012	<0.0008	0.0004[J]	**18[B]**	**0.05**	0.011	<0.0008	<0.0008	0.0004[J]	0.0036[B]	<0.0038
	SB-W-07-0430			ARI	43-43.5	-3.7	--	--	--	<0.0008	0.0009	<0.0008	<0.0016	**46[B]**	**0.7**	0.091	0.0009	<0.0008	0.0030	0.0036[B]	<0.0041
	SB-W-07-0530			ARI	53-53.5	-13.7	--	--	--	<0.0008	0.0012	<0.0008	<0.0016	**18[B]**	**1.1**	0.63	0.0009	<0.0008	0.0071	0.0027[B]	<0.0039
	SB-W-07-0630			ARI	63-63.5	-23.7	--	--	--	<0.0010	0.0007[J]	<0.0010	<0.0020	0.0012[B]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0025[B]	<0.0050
	SB-W-07-0780			ARI	78-78.5	-38.7	--	--	--	<0.0008	0.0004[J]	<0.00080	<0.0016	0.0023[B]	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	0.0024[B]	<0.0039
P-08/ W-MW-04**	SB-W-08-0090	01/28/12	Windward	ARI	9-9.5	26.62	--	--	--	**<0.27**	<0.27	<0.27	<0.54	**9.5[T]**	**2.3**	7.3	0.22[J]	**0.71**	<0.27	<0.27	<1.3
	SB-W-08-0155			ARI	15.5-16	20.12	--	--	--	<0.0009	0.0006[J]	<0.0009	<0.0018	**0.38[T]**	**0.11**	0.12	0.0039	0.12	0.0007	0.003[B]	<0.0043
	SB-W-08-0265			ARI	26.5-27	9.12	--	--	--	<0.0009	0.0006[J]	<0.0009	<0.0019	**0.37[T]**	0.0052	0.0043	<0.0009	<0.0009	<0.0009	0.0033[B]	<0.0043
	SB-W-08-0380			ARI	38-38.5	-2.38	--	--	--	<0.0008	<0.0008	<0.0008	<0.0016	**0.48[T]**	0.0019	0.0012	<0.0008	<0.0008	<0.0008	0.0038[B]	<0.0042
	SB-W-08-0480			ARI	48-48.5	-12.38	--	--	--	0.0005[J]	0.0013	<0.0009	<0.0018	0.025[T]	0.0007[J]	0.0009[J]	<0.0009	<0.0009	<0.0009	0.0082[B]	<0.0046
	SB-W-08-9480			ARI	48-48.5 (DUP)	-12.38	--	--	--	0.0004[J]	0.0008[J]	<0.0009	<0.0018	0.016[T]	<0.0009	0.0005[J]	<0.0009	<0.0009	<0.0009	0.0033[B]	<0.0043
	SB-W-08-0590			ARI	59-59.5	-23.38	--	--	--	**<0.13**	<0.13	<0.13	<0.26	**10[T]**	**0.081[J]**	<0.13	<0.13	<0.13	<0.13	<0.13	<0.64
	SB-W-08-0710	01/29/12		ARI	71-71.5	-35.38	--	--	--	**<0.2**	<0.2	<0.2	<0.4	**9.4[T]**	**0.33**	<0.2	<0.2	<0.2	<0.2	<0.2	<0.99
	SB-W-08-0760			ARI	76-76.5	-40.38	--	--	--	<0.0009	<0.0009	<0.0009	<0.0018	0.017[T]	<0.0009	<0.0009	<0.0009	<0.0009	<0.0009	0.0019[B]	<0.0047
B101/MW101	B101-30	07/10/12	SoundEarth	F&BI	30	9.8	--	--	--	--	--	--	--	**24**	**0.12**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-34				34	5.8	--	--	--	--	--	--	--	**8.4**	**0.033**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-40				40	-0.2	--	--	--	--	--	--	--	**20**	**0.28**	0.064	<0.05	<0.05	<0.05	<0.5	--
	B101-47				47	-7.2	--	--	--	--	--	--	--	**7.2**	**0.20**	0.12	<0.05	<0.05	<0.05	<0.5	--
	B101-55				55	-15.2	--	--	--	--	--	--	--	**4.2**	**0.084**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-65				65	-25.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-75	07/11/12			75	-35.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-81				81	-41.2	--	--	--	--	--	--	--	**0.31**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-92	07/12/12			92	-52.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-97				97	-57.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-104				104	-64.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-114.5				114.5	-74.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-120				120	-80.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-131				131	-91.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B101-140				140	-100.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
MTCA Cleanup Level for Soil							**30[a]**	**2,000[a]**	**2,000[a]**	**0.03[a]**	**7[a]**	**6[a]**	**9[a]**	**0.05[a]**	**0.03[a]**	**160[b]**	**1,600[b]**	**0.67[b]**	**4,000[b]**	**0.02[a]**	**5[a]**

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	Analytical Results (mg/kg)														
							GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
The Property																					
B102/MW102	B102-20	07/17/12	SoundEarth	F&BI	20	29.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-30				30	19.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-38				38	11.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-49				49	0.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-60				60	-10.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-70	07/18/12			70	-20.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-80	07/19/12			80	-30.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-90				90	-40.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-100	07/20/12			100	-50.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-110				110	-60.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B102-120	07/23/12			120	-70.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B103/MW103	B103-10	07/25/12	SoundEarth	F&BI	10	29.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B103-18				18	21.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B103-30				30	9.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B103-40				40	-0.2	--	--	--	--	--	--	--	**4.6**	**0.77**	0.12	<0.05	<0.05	<0.05	<0.5	--
	B103-45				45	-5.2	--	--	--	--	--	--	--	**5.3**	**0.48**	0.24	<0.05	<0.05	<0.05	<0.5	--
	B103-55				55	-15.2	--	--	--	--	--	--	--	<0.025	<0.03	0.18	<0.05	<0.05	<0.05	<0.5	--
	B103-62.5	07/26/12			62.5	-22.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B103-75				75	-35.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B103-83				83	-43.2	--	--	--	--	--	--	--	<0.025	<0.03	0.12	<0.05	<0.05	<0.05	<0.5	--
	B103-95				95	-55.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B103-105	07/27/12			105	-65.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B103-113				113	-73.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B104/MW104	B104-10	07/30/12	SoundEarth	F&BI	10	33.1	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B104-20				20	23.1	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B104-30				30	13.1	--	--	--	--	--	--	--	**1.8**	**0.086**	0.14	<0.05	<0.05	<0.05	<0.5	--
	B104-35				35	8.1	--	--	--	--	--	--	--	**7.1**	**0.23**	0.099	<0.05	<0.05	<0.05	<0.5	--
	B104-50				50	-7.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B104-60	07/31/12			60	-17.0	--	--	--	--	--	--	--	**2.1**	**0.21**	0.12	<0.05	<0.05	<0.05	<0.5	--
	B104-69				69	-26.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B104-80				80	-37.0	--	--	--	--	--	--	--	**0.12**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B104-90	08/01/12			90	-47.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B104-100				100	-57.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B104-110				110	-67.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B104-120				120	-77.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B104-130				130	-87.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
MTCA Cleanup Level for Soil							**30[a]**	**2,000[a]**	**2,000[a]**	**0.03[a]**	**7[a]**	**6[a]**	**9[a]**	**0.05[a]**	**0.03[a]**	**160[b]**	**1,600[b]**	**0.67[b]**	**4,000[b]**	**0.02[a]**	**5[a]**

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

SoundEarth Strategies

							Analytical Results (mg/kg)														
Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
The Property																					
B105/MW105	B105-10	08/06/12	SoundEarth	F&BI	10	35.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-20				20	25.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-30				30	15.0	--	--	--	--	--	--	--	**1.3**	**0.16**	0.086	<0.05	<0.05	<0.05	<0.5	--
	B105-40	08/08/12			40	5.0	--	--	--	--	--	--	--	<0.025	<0.03	0.22	<0.05	<0.05	<0.05	<0.5	--
	B105-50				50	-5.0	--	--	--	--	--	--	--	**0.18**	**0.040**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-60	08/09/12			60	-15.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-70				70	-25.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-80				80	-35.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-90	08/10/12			90	-45.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-100				100	-55.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-110				110	-65.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-120				120	-75.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-130				130	-85.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B105-138				138	-93.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B106/MW106	B106-10	08/14/12	SoundEarth	F&BI	10	42.4	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-20				20	32.4	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-30				30	22.4	--	--	--	--	--	--	--	0.038	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-40				40	12.4	--	--	--	--	--	--	--	**3.1**	**0.15**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-50				50	2.4	--	--	--	--	--	--	--	**0.73**	**0.17**	0.11	<0.05	<0.05	<0.05	<0.5	--
	B106-60				60	-7.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-70	08/15/12			70	-17.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-80				80	-27.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-90				90	-37.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-100				100	-47.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-110				110	-57.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-120				120	-67.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-130				130	-77.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B106-140				140	-87.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B107/MW107	B107-05	12/03/12	SoundEarth	F&BI	5	39.2	<2	--	--	<0.03	<0.05	<0.05	<0.15	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B107-15				15	29.2	<2	--	--	<0.03	<0.05	<0.05	<0.15	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B107-25				25	19.2	<2	--	--	<0.03	<0.05	<0.05	<0.15	**0.60**	**0.063**	0.060	<0.05	<0.05	<0.05	<0.5	--
	B107-35				35	9.2	<2	--	--	<0.03	<0.05	<0.05	<0.15	**19**	**0.59**	0.37	<0.05	<0.05	<0.05	<0.5	--
	B107-45				45	-0.8	<2	--	--	<0.03	<0.05	<0.05	<0.15	0.028	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B108/MW108	B108-15	12/14/12	SoundEarth	F&BI	15	18.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B108-25				25	8.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B108-35				35	-1.9	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B108-45				45	-11.9	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B108-50				50	-16.9	--	--	--	--	--	--	--	0.037	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B109/MW109	B109-05	12/04/12	SoundEarth	F&BI	5	30.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B109-15				15	20.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B109-25				25	10.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B109-35				35	0.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B109-45				45	-9.3	--	--	--	--	--	--	--	**1.6**	**0.94**	0.15	<0.05	<0.05	<0.05	<0.5	--
MTCA Cleanup Level for Soil							**30[a]**	**2,000[a]**	**2,000[a]**	**0.03[a]**	**7[a]**	**6[a]**	**9[a]**	**0.05[a]**	**0.03[a]**	**160[b]**	**1,600[b]**	**0.67[b]**	**4,000[b]**	**0.02[a]**	**5[a]**

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	Analytical Results (mg/kg) GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
The Property																					
B110/MW110	B110-15	12/04/12	SoundEarth	F&BI	15	25.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B110-25				25	15.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B110-35				35	5.0	--	--	--	--	--	--	--	**3.4**	**0.21**	0.31	<0.05	<0.05	<0.05	<0.5	--
	B110-45				45	-5.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B111/MW111	B111-10	12/05/12	SoundEarth	F&BI	10	26.8	--	--	--	--	--	--	--	<0.05	<0.06	<0.1	<0.1	<0.1	<0.1	<1	--
	B111-20				20	16.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B111-30				30	6.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B111-38				38	-1.2	--	--	--	--	--	--	--	**0.078**	**0.40**	0.28	<0.05	<0.05	<0.05	<0.5	--
	B111-50				50	-13.2	--	--	--	--	--	--	--	**1.4**	**0.56**	0.11	<0.05	<0.05	<0.05	<0.5	--
	B111-60	12/06/12			60	-23.2	--	--	--	--	--	--	--	**0.085**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B111-70				70	-33.2	--	--	--	--	--	--	--	0.033	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B111-80				80	-43.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B112/MW112	B112-10	12/11/12	SoundEarth	F&BI	10	47.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B112-20				20	37.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B112-30				30	27.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B112-40				40	17.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B112-50				50	7.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B112-60				60	-2.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B112-75				75	-17.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B112-85	12/12/12			85	-27.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B113/MW113	B113-10	12/18/12	SoundEarth	F&BI	10	23.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B113-20				20	13.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B113-30				30	3.2	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B113-40				40	-6.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B113-50				50	-16.8	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B114/MW114	B114-15	12/10/12	SoundEarth	F&BI	15	31.4	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B114-25				25	21.4	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B114-35				35	11.4	--	--	--	--	--	--	--	**8.8**	**0.45**	0.11	<0.05	<0.05	<0.05	<0.5	--
	B114-40				40	6.4	--	--	--	--	--	--	--	**0.59**	**0.071**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B114-45				45	1.4	--	--	--	--	--	--	--	**0.25**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B115/MW115	B115-10	12/13/12	SoundEarth	F&BI	10	24.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B115-15				15	19.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B115-25				25	9.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B115-35				35	-0.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B115-45				45	-10.5	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B116/MW116	B116-15	12/07/12	SoundEarth	F&BI	15	17.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B116-25				25	7.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B116-35				35	-3.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B116-45				45	-13.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B117/MW117	B117-10	02/04/13	SoundEarth	F&BI	10	47.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B117-20				20	37.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B117-30				30	27.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B117-40				40	17.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B117-50				50	7.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
MTCA Cleanup Level for Soil							**30[a]**	**2,000[a]**	**2,000[a]**	**0.03[a]**	**7[a]**	**6[a]**	**9[a]**	**0.05[a]**	**0.03[a]**	**160[b]**	**1,600[b]**	**0.67[b]**	**4,000[b]**	**0.02[a]**	**5[a]**

SoundEarth Strategies

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	Analytical Results (mg/kg)														
							GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
The Property																					
B118/MW118	B118-10	03/21/13	SoundEarth	F&BI	10	43.4	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B118-20				20	33.4	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B118-30				30	23.4	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B118-40				40	13.4	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B118-50				50	3.4	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
B119/MW119	B119-10	03/21/13	SoundEarth	F&BI	10	27.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B119-20				20	17.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B119-30				30	7.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	B119-40				40	-2.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB01	DB01-10	03/18/13	SoundEarth	F&BI	10	32.3	--	--	--	--	--	--	--	0.042	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB01-20				20	22.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB01-30				30	12.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB01-40				40	2.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB02	DB02-10	03/18/13	SoundEarth	F&BI	10	30.9	<2	<50	<250	<0.02	<0.02	<0.02	<0.06	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB02-15				15	25.9	<2	<50	<250	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--
	DB02-20				20	20.9	--	--	--	--	--	--	--	**0.22**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB02-30				30	10.9	--	--	--	--	--	--	--	**0.058**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB02-40				40	0.9	--	--	--	--	--	--	--	**2.0**	**0.060**	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB03	DB03-05	03/27/13	SoundEarth	F&BI	5	35.9	--	--	--	--	--	--	--	**0.061**	<0.06	<0.1	<0.1	<0.1	<0.1	<1	--
	DB03-20				20	20.9	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB03-35				35	5.9	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB03-45				45	-4.1	--	--	--	--	--	--	--	**2.7**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB03-55				55	-14.1	--	--	--	--	--	--	--	**3.6**	**0.11**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB03-60				60	-19.1	--	--	--	--	--	--	--	**3.4**	**0.23**	0.15	<0.05	<0.05	<0.05	<0.5	--
DB04	DB04-10	03/21/13	SoundEarth	F&BI	10	33.2	--	--	--	--	--	--	--	**0.17**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB04-20				20	23.2	--	--	--	--	--	--	--	**4.5**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB04-35				35	8.2	--	--	--	--	--	--	--	**8.0**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB04-45				45	-1.9	--	--	--	--	--	--	--	**0.28**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB04-50	03/22/13			50	-6.9	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB04-60				60	-16.9	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB05	DB05-10	03/26/13	SoundEarth	F&BI	10	36.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB05-20				20	26.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB05-30				30	16.3	--	--	--	--	--	--	--	**3.2**	**0.040**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB05-40				40	6.3	--	--	--	--	--	--	--	**14**	**0.085**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB05-50				50	-3.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB05-60				60	-13.7	--	--	--	--	--	--	--	**0.34**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB05-70				70	-23.7	--	--	--	--	--	--	--	0.033	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB06	DB06-10	03/25/13	SoundEarth	F&BI	10	33.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB06-25				25	18.7	--	--	--	--	--	--	--	**0.98**	**0.033**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB06-35				35	8.7	--	--	--	--	--	--	--	**30**	**0.26**	0.096	<0.05	<0.05	<0.05	<0.5	--
	DB06-45				45	-1.3	--	--	--	--	--	--	--	**1.3**	**0.036**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB06-55				55	-11.3	--	--	--	--	--	--	--	0.027	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB06-65				65	-21.3	--	--	--	--	--	--	--	0.029	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB06-75				75	-31.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
MTCA Cleanup Level for Soil							**30[a]**	**2,000[a]**	**2,000[a]**	**0.03[a]**	**7[a]**	**6[a]**	**9[a]**	**0.05[a]**	**0.03[a]**	**160[b]**	**1,600[b]**	**0.67[b]**	**4,000[b]**	**0.02[a]**	**5[a]**

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	Analytical Results (mg/kg)														
							GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
The Property																					
DB07	DB07-05	03/27/13	SoundEarth	F&BI	5	36.9	--	--	--	--	--	--	--	**2.7**	**0.084**	0.076	<0.05	<0.05	<0.05	<0.5	--
	DB07-15				15	26.9	--	--	--	--	--	--	--	**7.1**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB07-25				25	16.9	--	--	--	--	--	--	--	**9.8**	**0.067**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB07-35	03/28/13			35	6.9	--	--	--	--	--	--	--	**16**	**0.088**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB07-45				45	-3.1	--	--	--	--	--	--	--	**13**	**0.72**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB07-50				50	-8.1	--	--	--	--	--	--	--	**7.3**	**0.19**	0.16	<0.05	<0.05	<0.05	<0.5	--
	DB07-60				60	-18.1	--	--	--	--	--	--	--	**1.5**	**0.92**	0.53	<0.05	<0.05	<0.05	<0.5	--
	DB07-70				70	-28.1	--	--	--	--	--	--	--	**5.0**	**0.96**	0.41	<0.05	<0.05	<0.05	<0.5	--
DB08	DB08-10	03/20/13	SoundEarth	F&BI	10	32.8	--	--	--	--	--	--	--	0.048	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB08-20				20	22.8	--	--	--	--	--	--	--	**4.0**	**0.19**	0.097	<0.05	<0.05	<0.05	<0.5	--
	DB08-35				35	7.8	--	--	--	--	--	--	--	**4.5**	**0.21**	0.94	<0.05	<0.05	<0.05	<0.5	--
	DB08-45				45	-2.2	--	--	--	--	--	--	--	**0.056**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB08-50	03/21/13			50	-7.2	--	--	--	--	--	--	--	**4.2**	**0.25**	0.070	<0.05	<0.05	<0.05	<0.5	--
	DB08-60				60	-17.2	--	--	--	--	--	--	--	**0.51**	**0.20**	0.080	<0.05	<0.05	<0.05	<0.5	--
	DB08-70				70	-27.2	--	--	--	--	--	--	--	**0.41**	**0.040**	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB09	DB09-10	03/19/13	SoundEarth	F&BI	10	33.3	--	--	--	--	--	--	--	0.027	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB09-20				20	23.3	--	--	--	--	--	--	--	**0.15**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB09-30				30	13.3	--	--	--	--	--	--	--	**6.1**	**0.22**	0.25	<0.05	<0.05	<0.05	<0.5	--
	DB09-40				40	3.3	--	--	--	--	--	--	--	**1.3**	**0.28**	0.18	<0.05	<0.05	<0.05	<0.5	--
	DB09-50				50	-6.7	--	--	--	--	--	--	--	**0.14**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB09-60				60	-16.7	--	--	--	--	--	--	--	0.031	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB09-70				70	-26.7	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB10	DB10-10	03/29/13	SoundEarth	F&BI	10	34.4	--	--	--	--	--	--	--	**0.34**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB10-20				20	24.4	--	--	--	--	--	--	--	**23**	**0.11**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB10-35				35	9.4	--	--	--	--	--	--	--	**35**	**0.40**	<0.5	<0.5	<0.5	<0.5	<5	--
	DB10-45				45	-0.6	--	--	--	--	--	--	--	**57**	**<0.3**	<0.5	<0.5	<0.5	<0.5	<5	--
	DB10-50	04/01/13			50	-5.6	--	--	--	--	--	--	--	**52**	**0.26**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB10-60				60	-15.6	--	--	--	--	--	--	--	**2.0**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB10-70				70	-25.6	--	--	--	--	--	--	--	**1.8**	**0.035**	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB11	DB11-15	04/02/13	SoundEarth	F&BI	15	33.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB11-25				25	23.3	--	--	--	--	--	--	--	0.028	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB11-35				35	13.3	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB11-45				45	3.3	--	--	--	--	--	--	--	**15**	**0.12**	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB11-55				55	-6.7	--	--	--	--	--	--	--	**0.16**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB12	DB12-10	04/03/13	SoundEarth	F&BI	10	31.0	--	--	--	--	--	--	--	**0.068**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB12-20				20	21.0	--	--	--	--	--	--	--	**18**	**0.56**	1.6	<0.05	<0.05	<0.05	<0.5	--
	DB12-30				30	11.0	--	--	--	--	--	--	--	**6.7**	**0.032**	0.052	<0.05	<0.05	<0.05	<0.5	--
	DB12-40				40	1.0	--	--	--	--	--	--	--	**11**	**0.060**	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB13	DB13-10	04/03/13	SoundEarth	F&BI	10	32.8	--	--	--	--	--	--	--	**0.12**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB13-20				20	22.8	--	--	--	--	--	--	--	**0.78**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB13-35				35	7.8	--	--	--	--	--	--	--	**2.7**	**0.24**	0.063	<0.05	<0.05	<0.05	<0.5	--
	DB13-45				45	-2.2	--	--	--	--	--	--	--	**0.066**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
DB14	DB14-10	04/04/13	SoundEarth	F&BI	10	31.0	**260**	--	--	**0.059**	0.41	1.2	3.6	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB14-20				20	21.0	**73**	--	--	<0.02	0.078	0.29	1.0	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB14-30				30	11.0	--	--	--	--	--	--	--	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.5	--
	DB14-40				40	1.0	--	--	--	--	--	--	--	0.050	<0.03	0.077	<0.05	<0.05	<0.05	<0.5	--
MTCA Cleanup Level for Soil							**30[a]**	**2,000[a]**	**2,000[a]**	**0.03[a]**	**7[a]**	**6[a]**	**9[a]**	**0.05[a]**	**0.03[a]**	**160[b]**	**1,600[b]**	**0.67[b]**	**4,000[b]**	**0.02[a]**	**5[a]**

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	Analytical Results (mg/kg) GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
Rights-of-Way																					
BB-5	S-6	09/03/97	B & V	Unknown	15-17	34	<22	<54	<108	ND	ND	ND	ND	--	--	--	--	--	--	--	NA
	S-10				25-27	24	<22	<56	<112	--	--	--	--	--	--	--	--	--	--	--	NA
BB-7	S-4	06/04/97	B & V	Unknown	10-12	17.0	<26	<66	<132	--	--	--	--	--	--	--	--	--	--	--	NA
BB-8	S-8	06/06/97	B & V	Unknown	20-22	23.6	<20	<50	<100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
BB-10	S-6	08/29/97	B & V	Unknown	15-17	42.0	<27	<54	<109	--	--	--	--	--	--	--	--	--	--	--	NA
BB-12	S-3	03/18/98	B & V	Unknown	15-16.5	18.8	<29	<58	<120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
	S-14				45-46.5	-11.2	<29	<58	<120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
BB-13	S-10	03/19/98	B & V	Unknown	25-27.5	1.9	<34	<68	<140	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.10	NA
	S-16				40-41.5	-13.1	<30	<61	<120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
BB-14	S-2	03/03/98	B & V	Unknown	5-6.5	21.3	<32	<64	<130	--	--	--	--	--	--	--	--	--	--	--	NA
	S-5			Unknown	12.5-14	21.3	<31	<62	<120	--	--	--	--	--	--	--	--	--	--	--	NA
	S-9			Unknown	22.5-24	21.3	<31	<62	<120	--	--	--	--	--	--	--	--	--	--	--	NA
	S-12			Unknown	30-31.5	21.3	<27	54	120	--	--	--	--	--	--	--	--	--	--	--	NA
TB-12	16	08/01/97	B & V	Unknown	62-63	-24.5	<24	<60	<119	--	--	--	--	--	--	--	--	--	--	--	NA
TB-18	S-2	03/17/98	B & V	Unknown	5-6.5	38.3	<27	<55	<110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
	S-8				20-21.5	38.3	<28	<56	<110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.59	NA
	S-21				57.5-59	38.3	<28	<56	<110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
PW-1	Composite	1998	B & V	Unknown	--	--	<31	<63	<130	--	--	--	--	--	--	--	--	--	--	--	NA
PW-4	Composite	05/13/98	B & V	Unknown	--	--	<27	<53	<110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
CHB-07	CHB-07-5.0-7.0	04/14/08	CH2M Hill	ARI	5-7	23.5	<5	<5.9	<12	--	--	--	--	--	--	--	--	--	--	--	--
	CHB-07-12.5-13.5				12.5-13.5	16.5	<7.2	<6.5	<13	0.0015	<0.0011	<0.0011	<0.0022	<0.0011	<0.0011	1.1	0.0083	0.027	<0.0011	<0.0022	<0.0054
CHB-08	CHB-08-15.0-16.0	04/15/08	CH2M Hill	ARI	15-16	16.3	<5.6	<5.9	<12	<0.0008	<0.0008	<0.0008	<0.0016	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008	<0.0016	<0.0041
CHB-09	CHB-09-20.0-21.5	04/16/08	CH2M Hill	ARI	20-21.5	17.5	<6.2	11	23	--	--	--	--	--	--	--	--	--	--	--	--
	CHB-09-25.0-26.5				25-26.5	12.5	<6.1	36	130	<0.0012	<0.0012	<0.0012	<0.0024	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0012	<0.0024	<0.0012
East-Adjoining Properties - 800 Roy Street Parcel																					
SCLB-1	RS1-2.5/RS-1 7.5 (Composite)	3/12/1993	EPJ	OnSite	2.5-7.5	--	<20	290	>100	--	--	--	--	--	--	--	--	--	--	--	--
	RS1-12.5/RS1-17.5 (Composite)				12.5-17.5	--	**310**	--	--	**2.0**	0.66	5.0	**25.2**[E]	--	--	--	--	--	--	--	--
	RS-1 17.5				17.5	21.0	--	<25	--	--	--	--	--	--	--	--	--	--	--	--	--
	RS1-22.5/RS-27.5 (Composite)				22.5-27.5	--	30[J]	--	--	**0.089**[J]	0.14	0.31	1.53	--	--	--	--	--	--	--	--
	RS1-32.5				32.5	6.0	**77**	--	--	**0.18**	0.35	0.96	4.8	--	--	--	--	--	--	--	--
	RS1-37.5				37.5	1.0	<5	--	--	**<0.050**	<0.050	<0.050	<1.00	--	--	--	--	--	--	--	--
MTCA Cleanup Level for Soil							**30**[a]	**2,000**[a]	**2,000**[a]	**0.03**[a]	**7**[a]	**6**[a]	**9**[a]	**0.05**[a]	**0.03**[a]	**160**[b]	**1,600**[b]	**0.67**[b]	**4,000**[b]	**0.02**[a]	**5**[a]

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	Analytical Results (mg/kg)														
							GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
SCLB-2	RS2-2.5/RS-2 7.5 (Composite)	3/12/1993	EPJ	OnSite	2.5-7.5	--	**110**	610	>100	--	--	--	--	--	--	--	--	--	--	--	--
	RS2-12.5/RS2-17.5 (Composite)				12.5-17.5	--	**1,800**	--	--	**4.0**	**24**	**23**	**115[E]**	--	--	--	--	--	--	--	--
	RS2-17.5				17.5	21.0	--	240	--	--	--	--	--	--	--	--	--	--	--	--	--
	RS2-22.5/RS2-27.5 (Composite)				22.5-27.5	--	**59**	--	--	**0.8**	1.1	0.85	3.9	--	--	--	--	--	--	--	--
	RS2-32.5				32.5	6.0	**94**	<25	--	**1.5**	2.7	1.4	6.8	--	--	--	--	--	--	--	--
	RS2-37.5				37.5	1.0	9.8	--	--	**0.74**	<0.05	0.11	1.34	--	--	--	--	--	--	--	--
East-Adjoining Properties - 800 Roy Street Parcel																					
SCLB-3/MW-1	RS3-2.5	3/15/1993	EPJ	OnSite	2.5	37.5	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--
	RS3-7.5				7.5	32.5	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--
	RS3-17.5				17.5	22.5	**210**	--	--	**10**	**7.3**	3.7	**15.8**	--	--	--	--	--	--	--	--
	RS3-22.5/RS3-27.5 (Composite)				22.5-27.5	--	**42**	--	--	**3.9**	0.8	0.76	2.49	--	--	--	--	--	--	--	--
	RS3-32.5				32.5	7.5	<5	--	--	**0.15**	<0.050	<0.050	<1.00	--	--	--	--	--	--	--	--
	RS3-37.5				37.5	2.5	<5	--	--	**<0.050**	<0.050	<0.050	<1.00	--	--	--	--	--	--	--	--
SCLB-4/MW-2	RS4-2.5	3/15/1993	EPJ	OnSite	2.5	37.5	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--
	RS4-7.5				7.5	32.5	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--
	RS4-12.5/RS4-17.5 (Composite)				12.5 - 17.5	--	<5	--	--	**<0.050**	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--
	RS4-22.5/RS4-27.5 Composite				22.5-27.5	--	<5	--	--	**<0.050**	<0.050	<0.050	0.096[J]	--	--	--	--	--	--	--	--
	RS4-37.5				37.5	2.5	6.6[J]	--	--	**<0.050**	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--
SCLB-5/MW-3	RS5-2.5/RS5-7.5 (Composite)	3/16/1993	EPJ	OnSite	2.5-7.5	--	<20	<50	400	--	--	--	--	--	--	--	--	--	--	--	--
	RS5-12.5/RS5-17.5 (Composite)				12.5-17.5	--	**46**	--	--	**0.88**	0.28	0.97	1.37	--	--	--	--	--	--	--	--
	RS5-17.5				17.5	21.5	--	430	--	--	--	--	--	--	--	--	--	--	--	--	--
	RS5-22.5				22.5	16.5	17[J]	--	--	**0.2**	0.099[J]	0.33	0.446	--	--	--	--	--	--	--	--
	RS5-32.5				32.5	6.5	7.2[J]	--	<25	**0.056[J]**	<0.050	0.061	0.15	--	--	--	--	--	--	--	--
	RS5-37.5				37.5	1.5	<5	--	--	**<0.050**	<0.050	<0.050	<1.00	--	--	--	--	--	--	--	--
SCLB-6/MW-4	RS6-2.5	03/17/93	EPJ	OnSite	2.5	37.5	<20	<50	770	--	--	--	--	--	--	--	--	--	--	--	--
	RS6-7.5				7.5	32.5	<20	<50	770	--	--	--	--	--	--	--	--	--	--	--	--
	RS6-12.5				12.5	27.5	<20	<50	190	--	--	--	--	--	--	--	--	--	--	--	--
	RS6-17.5/RS6-22.5 (Composite)				17.5-22.5	--	<5.0	--	--	**<0.050**	<0.050	<0.050	0.092[J]	--	--	--	--	--	--	--	--
	RS6-27.5				27.5	12.5	<5.0	--	--	**<0.050**	<0.050	<0.050	<1.00	--	--	--	--	--	--	--	--
SCLB-7/MW-5	RS7-2.5	03/17/93	EPJ	OnSite	2.5	37.5	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--
	RS7-7.5				7.5	32.5	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--
	RS7-12.5				12.5	27.5	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--
	RS7-17.5				17.5	22.5	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--
	RS7-22.5				22.5	17.5	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	MW6-25	10/11/93	Retec	ARI	25	13.2	19	--	--	**3.5**	0.23	0.44	0.93	--	--	--	--	--	--	--	--
MW-7	MW7-16.5	10/11/93	Retec	ARI	16.5	18.6	**4,100**	--	--	**7.1**	**160**	**54**	**300**	--	--	--	--	--	--	--	--
	MW7-18.5		Retec	ARI	18.5	16.6	**840**	--	--	**2.2**	**30**	**12**	**62**	--	--	--	--	--	--	--	--
MTCA Cleanup Level for Soil							**30[a]**	**2,000[a]**	**2,000[a]**	**0.03[a]**	**7[a]**	**6[a]**	**9[a]**	**0.05[a]**	**0.03[a]**	**160[b]**	**1,600[b]**	**0.67[b]**	**4,000[b]**	**0.02[a]**	**5[a]**

Table 2
Soil Analytical Results for Petroleum Hydrocarbons and Chlorinated Volatile Organic Compounds
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Approximate Sample Elevation[1] (feet)	Analytical Results (mg/kg)														
							GRPH[2]	DRPH[3]	ORPH[3]	Benzene[4]	Toluene[4]	Ethylbenzene[4]	Total Xylenes[4]	PCE[5]	TCE[5]	cis 1,2-DCE[5]	trans 1,2-DCE[5]	Vinyl Chloride[5]	1,1-DCE[5]	Methylene Chloride[5]	Naphthalene[6]
MW-8	MW8-20	10/18/93	Retec	AAL	20	13.2	<5.0	--	--	**<0.059**	<0.059	<0.059	<0.12	--	--	--	--	--	--	--	--
MW-9	MW9-17.5	10/18/93	Retec	AAL	17.5	23.6	<5.0	--	--	**<0.068**	<0.068	<0.068	<0.14	--	--	--	--	--	--	--	--
MW10	MW10-17.5	10/19/93	Retec	AAL	17.5	20.5	<5.0	--	--	**<0.068**	<0.068	<0.068	<0.14	--	--	--	--	--	--	--	--
RB1	RB1-17.5	10/18/93	Retec	AAL	17.5	18.4	<5.0	--	--	**<0.063**	<0.063	<0.063	<0.13	--	--	--	--	--	--	--	--
RB2	RB2-12.5	10/18/93	Retec	AAL	12.5	23.6	<5.0	--	--	**<0.062**	<0.062	<0.062	<0.012	--	--	--	--	--	--	--	--
	RB2-17.5		Retec	AAL	17.5	18.6	<5.0	--	--	0.045[J]	<0.062	0.058[J]	0.18	--	--	--	--	--	--	--	--
RB3	RB3-17.5	10/18/93	Retec	AAL	17.5	20.5	<5.0	--	--	**<0.061**	<0.061	<0.061	<0.12	--	--	--	--	--	--	--	--
SCL-B100	B-100, S1	06/10/02	Urban	F&BI	NA	--	<1	<50	--	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
	B-100, S2				NA	--	<1	<50	--	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
SCL-B101	B-101- S1&2	06/17/02	Urban	F&BI	NA	--	2	140	--	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
	B101-S3				NA	--	<1	<50	--	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
East-Adjoining Properties - 800 Roy Street Parcel																					
SCL-B102	B102-S2	06/17/02	Urban	F&BI	NA	--	<1	<50	--	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
	B102-S1				NA	--	6	430	--	0.03	0.09	0.04	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
SCL-MW101	MW101-S3	06/14/02	Urban	F&BI	NA	--	<1	--	--	0.07	<0.02	0.04	0.05	--	--	--	--	--	--	--	--
SCL-MW102	MW-102, S1	06/10/02	Urban	F&BI	NA	--	99	--	--	0.67	0.47	1.0	2.5	--	--	--	--	--	--	--	--
	MW-102, S2				NA	--	2	--	--	0.05	<0.02	0.12	0.07	--	--	--	--	--	--	--	--
SCL-MW103	MW103-S1&S2	06/14/02	Urban	F&BI	NA	--	<1	--	--	<0.02	<0.02	<0.02	<0.02	--	--	--	--	--	--	--	--
SCL-MW105	MW-105, S2	06/10/02	Urban	F&BI	NA	--	650	--	--	2.1	1.5	11	24	--	--	--	--	--	--	--	--
	MW-105, S4				NA	--	<1	--	--	0.05	<0.02	<0.02	0.03	--	--	--	--	--	--	--	--
MTCA Cleanup Level for Soil							**30[a]**	**2,000[a]**	**2,000[a]**	**0.03[a]**	**7[a]**	**6[a]**	**9[a]**	**0.05[a]**	**0.03[a]**	**160[b]**	**1,600[b]**	**0.67[b]**	**4,000[b]**	**0.02[a]**	**5[a]**

NOTES:

RED indicates concentration exceeds MTCA Method A and/or B cleanup level.
Black indicates laboratory reporting limit is above MTCA Cleanup Level.

[1]Sample elevations calculated by subtracting the sample depth from the top of monument elevation, as surveyed by Bush, Roed & Hitchings, Inc. of Seattle, Washington, in February, October, and December 2012 and March 2013, using the North American Vertical Datum 1988. For historical sample locations not surveyed in 2012 or 2013, the elevations were estimated using City of Seattle's GIS 2-foot interval topographic contours.
[2]Analyzed by Method WTPH-HCID, EPA Method 8020, EPA Method 8015M, or NWTPH-Gx.
[3]Analyzed by Method WTPH-HCID, EPA Method 8015M, ORPH analyzed by EPA Method WTPH-HCID, or Method 418.1.
[4]Analyzed by EPA Methods 8020, 8021B, 8260B, 624/8240, or 8260C.
[5]Analyzed by EPA Methods 8010, 8260B, or 8260C.
[6]Analyzed by EPA Methods 8010, 8260B, 8260C, 8270, 8270D, or 8270D-SIM.
[a]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 740-1 Method A Cleanup Levels for Soil, revised November 2007.
[b]MTCA Cleanup Regulation, CLARC, Soil, Method B, Non-Carcinogen, Standard Formula Value, CLARC Website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
[c]Result reported as total petroleum hydrocarbons.

Laboratory Notes:
[E]Estimated value. The reported range exceeds the calibration range of the analysis.
[J]Estimated concentration.
[T]Analyte also detected in trip blank.

-- = not analyzed or not measured
< = not detected at a concentration exceeding laboratory reporting limit
> = concentration of analyte is greater than the laboratory detection limit, but not quantified
AAL = Alden Analytical Laboratories, Inc., of Seattle, Washington
ARI = Analytical Resources, Inc.
B & V = Black & Veatch
bgs = below ground surface
CLARC = cleanup levels and risk calculations
DCE = dichloroethylene
DRPH = diesel-range petroleum hydrocarbons
DUP = duplicate
EPA = U.S. Environmental Protection Agency
EPJ = E.P. Johnson Construction, Inc. & Environmental
F&BI = Friedman & Bruya, Inc., of Seattle, Washington
GeoEngineers = GeoEngineers, Inc.
GRPH = gasoline-range petroleum hydrocarbons
mg/kg = milligrams per kilogram
MTCA = Washington State Model Toxics Control Act

NA = results not available
NCA = North Creek Analytical, of Bothell, Washington
ND = not detected above laboratory reporting limit; reporting limit not available
NWTPH = northwest total petroleum hydrocarbon
OnSite = OnSite Environmental Inc., of Redmond, Washington
ORPH = oil-range petroleum hydrocarbons
PCE = tetrachloroethylene
Retec = Remediation Technologies, Inc.
Roux = Roux Associates
SoundEarth = SoundEarth Strategies, Inc.
TCE = trichloroethylene
ThermoRetec = ThermoRetec Corporation
Urban = Urban Redevelopment LLC
WAC = Washington State Administrative Code
Windward = Windward Environmental LLC

Table 3
Excavation Soil Analytical Results
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Analytical Results (mg/kg) GRPH[1]	DRPH[2]	ORPH[2]	Benzene[3]	Toluene[3]	Ethylbenzene[3]	Total Xylenes[3]	PCE[4]	TCE[4]	cis 1,2-DCE[4]	trans 1,2-DCE[4]	Vinyl Chloride[4]	1,1-DCE[4]	Methylene Chloride[4]	Napthalene[5]	Total PAHs[6,7]
The Property																					
Sump No. 4	Sump4_Soil_01	07/22/11	SoundEarth	F&BI	1	--	--	--	<0.03	<0.05	<0.05	<0.15	19	0.037	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
Excavation 1	EX01-S01-04	02/09/12	SoundEarth	F&BI	4	--	--	--	--	--	--	--	14	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
	EX01-S02-02.5				2.5	--	--	--	--	--	--	--	3.7	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
	EX01-S03-05				5	--	--	--	--	--	--	--	19	0.052	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
	EX01S04-4.2[ht]	02/10/12			4.2	--	--	--	--	--	--	--	150	0.44	<0.05	<0.05	<0.05	<0.05	0.92[lc]	--	--
	EX01S05-6[ht]				6	--	--	--	--	--	--	--	190	0.38	0.23	<0.05	<0.05	<0.05	0.51[lc]	--	--
	EX01S07-2.5[ht]				2.5	--	--	--	--	--	--	--	5.4	<0.03	<0.05	<0.05	<0.05	<0.05	0.52[lc]	--	--
	EX01-S18-07.5	03/21/12			7.5	--	--	--	--	--	--	--	0.98	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05	--	--
Tank 1 Excavation	Tank1-SSW06	03/22/13	SoundEarth	F&BI	6	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
	Tank1-WSW06				6	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
	Tank1-F08				8	--	120[x]	340	--	--	--	--	--	--	--	--	--	--	--	--	--
Tank 2 Excavation	Tank2-NSW06	03/22/13	SoundEarth	F&BI	6	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
	Tank2-F08				8	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
Tank 3 Excavation	Tank3-ESW05	03/22/13	SoundEarth	F&BI	5	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
	Tank3-SSW05				5	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
	Tank3-F08				8	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
Tank 4 Excavation	Tank4-NSW08	03/22/13	SoundEarth	F&BI	8	--	460[x]	360	--	--	--	--	--	--	--	--	--	--	--	--	--
	Tank4-F10				10	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
Tank 5 Excavation	Tank5-ESW02	03/22/13	SoundEarth	F&BI	2	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
	Tank5-WSW02				2	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
	Tank5-F03				3	--	<50	<250	--	--	--	--	--	--	--	--	--	--	--	--	--
East-Adjoining Properties - 753 9th Avenue North Parcel																					
Tank 1 and 2 Excavation	T12-SPLS-1	07/22/92	GeoTech	OnSite	7	3,000[M]	--	--	<0.25	1	22	111	--	--	--	--	--	--	--	--	--
	T12-B-1	07/22/92	GeoTech	OnSite	14	80	--	--	0.6	0.06	0.92	2.24	--	--	--	--	--	--	--	--	--
	T12-CL-1	07/22/92	GeoTech	OnSite	4	<50	--	--	<0.05	<0.05	<0.05	<0.10	--	--	--	--	--	--	--	--	--
Tank 3 Excavation	T3-SPLS-2	07/22/92	GeoTech	OnSite	7.5	1,700[M]	--	--	<0.05	1.6	4.6	9.5	--	--	--	--	--	--	--	--	--
	T3-CL-1	07/22/92	GeoTech	OnSite	4	<50	--	--	<0.05	<0.05	<0.05	<0.10	--	--	--	--	--	--	--	--	--
East-Adjoining Properties - 800 Roy Street Parcel																					
RS-01	RS-1	03/01/93	EPJ	OnSite	3	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-02	RS-2	03/01/93	EPJ	OnSite	6	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-04	RS-4	03/03/93	EPJ	OnSite	7	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-05	RS-5	03/03/93	EPJ	OnSite	9	1,700	--	--	<0.25	1.5	8.3	29.2	--	--	--	--	--	--	--	--	--
RS-06	RS-6	03/03/93	EPJ	OnSite	8	88	--	--	<0.05	< 0.05	< 0.05	0.31	--	--	--	--	--	--	--	--	--
RS-07	RS-7	03/03/93	EPJ	OnSite	7	1,500	--	--	<0.25	1.4	9.6	69	--	--	--	--	--	--	--	--	--
RS-08	RS-8	03/03/93	EPJ	OnSite	8	3,400	--	--	<0.25	1.2	21	71	--	--	--	--	--	--	--	--	--
RS-09	RS-9	03/03/93	EPJ	OnSite	7	24	--	--	<0.05	<0.05	0.066	20.8	--	--	--	--	--	--	--	--	--
RS-10	RS-10	03/03/93	EPJ	OnSite	13	140	--	--	2.3	0.32	1.1	2.49	--	--	--	--	--	--	--	--	--
RS-11	RS-11	03/03/93	EPJ	OnSite	8	60	--	--	0.15	0.0088	0.18	0.5	--	--	--	--	--	--	--	--	--
RS-12	RS-12	03/03/93	EPJ	OnSite	10	3,800	--	--	2.5	1.4	14	20.8	--	--	--	--	--	--	--	--	--
RS-13	RS-13	03/03/93	EPJ	OnSite	9	3,100	--	--	4.1	1.4	27	26	--	--	--	--	--	--	--	--	--
RS-14	RS-14	03/03/93	EPJ	OnSite	8	1,100	--	--	0.69	2.2	7.3	33	--	--	--	--	--	--	--	--	--
RS-15	RS-15	03/03/93	EPJ	OnSite	4	1,900	--	--	5.1	1.7	28	279	--	--	--	--	--	--	--	--	--
RS-16	RS-16	03/03/93	EPJ	OnSite	4	15,000	--	--	100	260	170	460	--	--	--	--	--	--	--	--	--
RS-17	Stockpile	03/04/93	EPJ	OnSite	--	18,000[B,E]	--	--	170[E]	300[B,E]	200[E]	530[E]	--	--	--	--	--	--	--	--	--
RS-18	Stockpile	03/04/93	EPJ	OnSite	--	1,700[B]	--	--	1.5	7.4	4.8	41	--	--	--	--	--	--	--	--	--
RS-19	Stockpile - Sludge from cleaning out USTs 1 and 2	03/10/93	EPJ	OnSite	--	120,000[E]	--	--	1,700[E]	2,200[E]	1,200[E]	3,200[E]	--	--	--	--	--	--	--	--	--
RS-21	RS-21	03/05/93	EPJ	OnSite	20	3,700	--	--	3	79[E]	45[E]	226[E]	<0.050	<0.050	--	<0.050	<0.050	<0.050	<0.050	--	--
RS-22	RS-22	03/05/93	EPJ	OnSite	10	6,900	--	--	<0.25	1.1	16	73[E]	<0.040	<0.040	--	<0.040	<0.040	<0.040	<0.040	--	--
RS-23	Stockpile	03/05/93	EPJ	OnSite	--	4,600	--	--	0.88	18	42[E]	199[E]	--	--	--	--	--	--	--	--	--
MTCA Cleanup Level for Soil						30[a]	2,000[a]	2,000[a]	0.03[a]	7[a]	6[a]	9[a]	0.05[a]	0.03[a]	160[b]	1,600[b]	0.67[b]	4,000[b]	0.02[a]	5[a]	0.1[a,d]

Table 3
Excavation Soil Analytical Results
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Analytical Results (mg/kg) GRPH[1]	DRPH[2]	ORPH[2]	Benzene[3]	Toluene[3]	Ethylbenzene[3]	Total Xylenes[3]	PCE[4]	TCE[4]	cis 1,2-DCE[4]	trans 1,2-DCE[4]	Vinyl Chloride[4]	1,1-DCE[4]	Methylene Chloride[4]	Napthalene[5]	Total PAHs[6,7]
East-Adjoining Properties - 800 Roy Street Parcel																					
RS-24	Stockpile	03/05/93	EPJ	OnSite	--	15	--	--	<0.050	<0.050	0.070	0.32	--	--	--	--	--	--	--	--	--
RS-25	Stockpile	03/05/93	EPJ	OnSite	--	2,600	--	--	<0.25	7.4	18	129[E]	--	--	--	--	--	--	--	--	--
RS-26	RS-26	03/08/93	EPJ	OnSite	20	3,700[B]	--	--	6.3	76[B,E]	50[E]	216[E]	--	--	--	--	--	--	--	--	--
RS-26A	Pit #3	03/16/93	EPJ	OnSite	20	1,100	--	--	2.5	25	15	76[E]	--	--	--	--	--	--	--	--	--
RS-27	RS-27	03/08/93	EPJ	OnSite	6	15[B,J]	--	--	<0.050	0.33[B]	0.19	0.95[B]	--	--	--	--	--	--	--	--	--
RS-28	RS-28	03/08/93	EPJ	OnSite	6	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-29	RS-29	03/08/93	EPJ	OnSite	20	2,000[B]	--	--	0.86	24[B]	33	168[B,E]	--	--	--	--	--	--	--	--	--
RS-30	Stockpile	03/09/93	EPJ	OnSite	--	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-31	Stockpile	03/09/93	EPJ	OnSite	--	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-32	Stockpile	03/09/93	EPJ	OnSite	--	<20	<50	<100	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-33	Stockpile	03/09/93	EPJ	OnSite	--	<20	<50	220	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-34	Stockpile	03/09/93	EPJ	OnSite	--	<20	<50	220	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-35	Stockpile	03/09/93	EPJ	OnSite	--	<20	<50	220	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-36	Stockpile	03/09/93	EPJ	OnSite	--	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RS-37	Stockpile	03/09/93	EPJ	OnSite	--	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PD-1	PD-1	06/28/93	Retec	AAL	19	3,300	--	--	17	45	39	221	--	--	--	--	--	--	--	--	--
PD-2	PD-2	06/28/93	Retec	AAL	10	<19	--	--	<0.25	<20	<10	<10.0	--	--	--	--	--	--	--	--	--
PD-3	PD-3	06/28/93	Retec	AAL	17	1,700	--	--	7.5	<20	12	60	--	--	--	--	--	--	--	--	--
PD-4	PD-4	06/28/93	Retec	AAL	17	<19	--	--	<0.25	<20	<10	<10.0	--	--	--	--	--	--	--	--	--
PD-5	PD-5	06/28/93	Retec	AAL	10	<19	--	--	<0.25	<20	<10	<10.0	--	--	--	--	--	--	--	--	--
TS1	TS1-17	09/27/93	Retec	ARI	17	110	--	--	0.29	1.8	2.1	11	--	--	--	--	--	--	--	--	--
TS2	TS2-15	09/27/93	Retec	ARI	15	41	--	--	0.14	<0.064	0.46	0.67	--	--	--	--	--	--	--	--	--
TS4	TS4-25	10/04/93	Retec	ARI	25	1,400	--	--	8.2	51	22	120	--	--	--	--	--	--	--	--	--
TS5	TS5-10	10/04/93	Retec	ARI	10	1,200	--	--	<0.58	9.3	10	68	--	--	--	--	--	--	--	--	--
TS6	TS6-19	10/04/93	Retec	ARI	19	1,300	--	--	7.7	43	22	120	--	--	--	--	--	--	--	--	--
TS7	TS7-15	10/04/93	Retec	ARI	15	<5.0	--	--	<0.056	<0.056	<0.056	<0.11	--	--	--	--	--	--	--	--	--
TS8	TS8-25	10/04/93	Retec	ARI	25	560	--	--	3.5	20	9.1	50	--	--	--	--	--	--	--	--	--
TS9	TS9-25	10/04/93	Retec	ARI	25	1,600	--	--	2.9	7.6	24	110	--	--	--	--	--	--	--	--	--
TS10	TS10-15	10/06/93	Retec	ARI	15	37	--	--	0.1	0.82	0.82	4.3	--	--	--	--	--	--	--	--	--
TS11	TS11-10	10/06/93	Retec	ARI	10	<5.0	--	--	<0.056	<0.056	<0.056	<0.113	--	--	--	--	--	--	--	--	--
TS12	TS12-10	10/06/93	Retec	ARI	10	<5.0	--	--	<0.056	<0.056	<0.056	<0.113	--	--	--	--	--	--	--	--	--
TS13	TS13-18	10/06/93	Retec	ARI	18	360	--	--	4.8	4.6	4.6	27	--	--	--	--	--	--	--	--	--
TS15	TS15-15	10/14/93	Retec	AAL	15	1,500	--	--	3.3	28	23	130	--	--	--	--	--	--	--	--	--
SP-1	SP-1 (S-1)	06/11/02	Urban	F&BI	NA	7	2,400	--	--	--	--	--	--	--	--	--	--	--	--		0.18
	SP-1 (S-2)				NA	2	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-2	SP-2 (S-1)	06/11/02	Urban	F&BI	NA	<1	740	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SP-2 (S-2)				NA	<1	230	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-3	SP-3 (S-1)	06/11/02	Urban	F&BI	NA	--	670	--	--	--	--	--	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--		0.18
SP-4	SP-4 (S-1)	06/11/02	Urban	F&BI	NA	--	320	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-5	SP-5 (S-1)	06/11/02	Urban	F&BI	NA	--	280	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-6	SP-6 (S-1)	06/11/02	Urban	F&BI	NA	--	190	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SP-6 (S-2)				NA	<1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-7	SP-7 (S-1)	06/11/02	Urban	F&BI	NA	--	210	--	--	--	--	--	--	--	--	--	--	--	--	NA	0.14
SP-8	SP-8 (S-1)	06/11/02	Urban	F&BI	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-9	SP-9 (S-1)	06/11/02	Urban	F&BI	NA	32	1,800	--	0.14	0.17	0.13	0.47	--	--	--	--	--	--	--	--	--
	SP-9 (S-2)				NA	500	--	--	0.94	1.7	3.3	5.1	--	--	--	--	--	--	--	--	--
SP-10	SP-10 (S-2)	06/11/02	Urban	F&BI	NA	3,400	--	--	9.6	11	60	240	--	--	--	--	--	--	--	--	--
SP-11	SP-11 (S-1)	06/11/02	Urban	F&BI	NA	<1	--	--	<0.02	<0.02	<0.02	<0.02	--	--	--	--	--	--	--	--	--
SP-12	SP-12 (S-1)	06/11/02	Urban	F&BI	NA	9	--	--	0.10	0.07	0.04	0.06	--	--	--	--	--	--	--	--	--
SP-13	SP-13 (S-1)	06/11/02	Urban	F&BI	NA	26	--	--	0.34	0.17	0.03	0.15	--	--	--	--	--	--	--	--	--
SP-14	SP-14 (S-1)	06/11/02	Urban	F&BI	NA	600	--	--	0.81	3.3	9.7	36	--	--	--	--	--	--	--	--	--
MTCA Cleanup Level for Soil						30[a]	2,000[a]	2,000[a]	0.03[a]	7[a]	6[a]	9[a]	0.05[a]	0.03[a]	160[b]	1,600[b]	0.67[b]	4,000[b]	0.02[a]	5[a]	0.1[a,d]

Table 3
Excavation Soil Analytical Results
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Analytical Results (mg/kg) GRPH[1]	DRPH[2]	ORPH[2]	Benzene[3]	Toluene[3]	Ethylbenzene[3]	Total Xylenes[3]	PCE[4]	TCE[4]	cis 1,2-DCE[4]	trans 1,2-DCE[4]	Vinyl Chloride[4]	1,1-DCE[4]	Methylene Chloride[4]	Napthalene[5]	Total PAHs[6,7]
East-Adjoining Properties - 800 Roy Street Parcel																					
SP-15	SP-15 (S-6)	06/11/02	Urban	F&BI	NA	<1	--	--	<0.02	<0.02	<0.02	<0.02	--	--	--	--	--	--	--	--	--
SP-16	SP16 (S1 & S2)	06/12/02	Urban	F&BI	NA	--	650	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SP16 (S-5)				NA	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SP16 (S-6)				NA	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	SP16 (S-7)				NA	--	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-17	SP 17 (S-2)	06/12/02	Urban	F&BI	NA	**530**	--	--	**2.6**	**24**	**15**	**66**	--	--	--	--	--	--	--	--	--
	SP 17 (S-3)				NA	11	--	--	**0.04**	0.07	0.29	0.26	--	--	--	--	--	--	--	--	--
SP-18	SP 18 (S-2)	06/12/02	Urban	F&BI	NA	**2,600**	--	--	**12**	**83**	**74**	**320**	--	--	--	--	--	--	--	--	--
SP-19	SP 19 (S-1)	06/12/02	Urban	F&BI	NA	**85**	570	--	**2.2**	1.0	1.9	3.6	--	--	--	--	--	--	--	--	--
	SP 19 (S-2)				NA	**4,100**	--	--	**16**	**120**	**110**	**500**	--	--	--	--	--	--	--	--	--
SP-20	SP20 (S-2-5')	06/12/02	Urban	F&BI	NA	5	--	--	**0.14**	0.03	0.15	0.26	--	--	--	--	--	--	--	--	--
	SP20 (S-2-8')				NA	<1	--	--	**0.07**	<0.02	<0.02	0.05	--	--	--	--	--	--	--	--	--
SP-21	SP-21 (S-1)	06/12/02	Urban	F&BI	NA	25	350	--	**0.84**	0.23	0.17	0.17	--	--	--	--	--	--	--	--	--
	SP-21 (S-2)				NA	**1,200**	--	--	**3.5**	**12**	**19**	**52**	--	--	--	--	--	--	--	--	--
MTCA Cleanup Level for Soil						**30[a]**	**2,000[a]**	**2,000[a]**	**0.03[a]**	**7[a]**	**6[a]**	**9[a]**	**0.05[a]**	**0.03[a]**	**160[b]**	**1,600[b]**	**0.67[b]**	**4,000[b]**	**0.02[a]**	**5[a]**	**0.1[a,d]**

NOTES:

All samples analyzed by U.S. Environmental Protection Agency Method 8260B.

RED indicates concentration exceeds MTCA Method A and/or B cleanup level.

Black indicates laboratory reporting limit is above MTCA Cleanup Level.

[1]Analyzed by Method WTPH-HCID, EPA Method 8020, EPA Method 8015M, or NWTPH-Gx.

[2]Analyzed by Method WTPH-HCID, EPA Method 8015M, ORPH analyzed by EPA Method WTPH-HCID, or Method 418.1.

[3]Analyzed by EPA Methods 8020, 8021B, 8260B, 624/8240, or 8260C.

[4]Analyzed by EPA Methods 8010, 8260B, or 8260C.

[5]Analyzed by EPA Methods 8010, 8260B, 8260C, 8270, 8270D, or 8270D-SIM.

[6]Analyzed by EPA Method 8270D-SIM.

[7]When determining the total toxic equivalent concentration (TEC) of benzo(a)pyrene for a sample, the concentrations of each of the seven carcinogenic PAHs listed in table 708-2 is multiplied by its corresponding total equivalency factor (TEF). The sum of these seven factors equal the total TEC. When the analytical result for any individual cPAH is reported as less than the LRL, half of the LRL is used as the concentrations for the calculation. The resultant total TEC concentration is then compared to the cleanup level for benzo(a)pyrene.

[a]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 740-1 Method A Cleanup Levels for Soil, revised November 2007.

[b]MTCA Cleanup Regulation, CLARC, Soil, Method B, Non-Carcinogen, Standard Formula Value, CLARC Website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

[d]The cleanup level for carcinogenic PAHs is based on direct contact using Equation 740-2 under WAC 173-340-740. When establishing and determining compliance with cleanup levels for mixtures of carcinogenic PAHs, the mixture of carcinogenic PAHs is considered a single hazardous substance. Benzo(a)pyrene's cleanup level is used as the cleanup level for the mixture.

Laboratory Notes:

[B]Analyte detected in an associated Method Blank.

[E]Estimated value. The reported range exceeds the calibration range of the analysis.

[J]Estimated concentration.

[M]Headspace present in sample.

[S]Indicates an estimated value of analyte found and confirmed by analyst, but with low spectral match parameters.

[x]The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

-- = not analyzed or not measured
< = not detected at a concentration exceeding laboratory reporting limit
AAL = Alden Analytical Laboratories, Inc., of Seattle, Washington
ARI = Analytical Resources, Inc.
bgs = below ground surface
CLARC = cleanup levels and risk calculations
DCE = dichloroethylene
DRPH = diesel-range petroleum hydrocarbons
EPA = U.S. Environmental Protection Agency
EPJ = E.P. Johnson Construction, Inc. & Environmental
F&BI = Friedman and Bruya, Inc., of Seattle, Washington
GeoTech = GeoTech Consultants, Inc.
GRPH = gasoline-range petroleum hydrocarbons
LRL = laboratory reporting limit
mg/kg = milligrams per kilogram
MTCA = Washington State Model Toxics Control Act
NA = results not available
ND = not detected above laboratory reporting limit. Reporting limit not available
NWTPH = northwest total petroleum hydrocarbon
OnSite = OnSite Environmental Inc., of Redmond, Washington
ORPH = oil-range petroleum hydrocarbons
PAHs = polycyclic aromatic hydrocarbons
PCE = tetrachloroethylene
Retec = Remediation Technologies, Inc.
SoundEarth = SoundEarth Strategies, Inc.
TCE = trichloroethylene
TEC = toxicity equivalent concentration
TEF = total equivalency factor
Urban = Urban Redevelopment LLC
UST = underground storage tank
WAC = Washington State Administrative Code

Table 4
Soil Analytical Results for Metals
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Laboratory	Sample Depth (feet bgs)	Analytical Results (milligrams per kilogram)							
						Arsenic[1]	Barium[1]	Cadmium[1]	Chromium[1]	Lead[1]	Mercury[2]	Selenium[1]	Silver[1]
The Property													
Tank 2 Excavation	Tank2-F08	03/22/13	SoundEarth	F&BI	8	1.81	39.4	<1	10.8	6.94	0.28	<1	<1
East-Adjoining Properties - 800 Roy Street Parcel													
RS-05	RS-5	03/03/93	EPJ	SAS	9	--	--	--	--	32	--	--	--
RS-10	RS-10	03/03/93	EPJ	SAS	13	--	--	--	--	71	--	--	--
RS-15	RS-15	03/03/93	EPJ	SAS	4	--	--	--	--	**480**	--	--	--
RS-16	RS-16	03/03/93	EPJ	SAS	4	--	--	--	--	80	--	--	--
RS-17 & RS-24	RS-17/RS-24	03/03-04/93	EPJ	SAS	--	<4.2	260	1.4	24	120	0.33	<4.2	0.79
SCL-B100	B-100, S1	06/10/02	Urban	F&BI	NA	<10	50	<1.0	25	4.5	<0.200	<10	<10
	B-100, S2				NA	<10	45	<1.0	24	4.1	<0.200	<10	<10
SP-1	SP-1 (S-1)	06/11/02	Urban	F&BI	NA	<10	170	<1.0	24	140	1.28	<10	<10
SP-2	SP-2 (S-2)	06/11/02	Urban	F&BI	NA	<10	83	1.7	18	44	<0.200	<10	<10
SP-3	SP-3 (S-1)	06/11/02	Urban	F&BI	NA	<10	120	<1.0	20	230	1.32	<10	<10
SP-7	SP-7 (S-1)	06/11/02	Urban	F&BI	NA	16	230	1.0	18	**410**	**2.81**	<10	<10
SP-16	SP16 (S1 & S2)	06/12/13	Urban	F&BI	NA	<10	400	<1.0	30	220	0.247	<10	<10
SCL-B101	B-101- S1&2	06/17/02	Urban	F&BI	NA	<10	170	<1.0	18	230	NA	<10	<10
	B101-S3				NA	<10	82	<1.0	27	5.3	NA	<10	<10
SCL-B102	B102-S2	06/17/02	Urban	F&BI	NA	<10	59	<1.0	28	9.9	NA	<10	<10
	B102-S1				NA	<10	210	<1.0	24	440	NA	<10	<10
SCL-MW-101	MW101-S3	06/14/02	Urban	F&BI	NA	<10	27	<1.0	16	3.6	NA	<10	<10
SCL-MW-103	MW103-S1&S2	06/14/02	Urban	F&BI	NA	<10	35	<1.0	33	4.5	NA	<10	<10
MTCA Cleanup Level						**20[a]**	**16,000[b]**	**2[a]**	**2,000[a]**	**250[a]**	**2[a]**	**400[b]**	**400[b]**

NOTES:

RED indicates concentration exceeds MTCA Cleanup Level for soil.

[1]Analyzed by EPA Methods 200.8 or 6010.

[2]Analyzed by EPA Method 1631E or 7471.

[a]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 740-1 Method A Cleanup Levels for Soil, revised November 2007.

[b]MTCA Cleanup Regulation, CLARC, Soil, Method B, Non-Carcinogen, Standard Formula Value, CLARC Website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

-- = not analyzed or not measured
< = not detected at a concentration exceeding laboratory reporting limit
bgs = below ground surface
CLARC = cleanup levels and risk calculations
EPA = U.S. Environmental Protection Agency
EPJ = E.P. Johnson Construction, Inc. & Environmental
F&BI = Friedman and Bruya, Inc., of Seattle, Washington
MTCA = Washington State Model Toxics Control Act
NA = results not available
SAS = SoundAnalytical Services, Inc., of Tacoma, Washington
SoundEarth = SoundEarth Strategies, Inc.
Urban = Urban Redevelopment LLC
WAC = Washington State Administrative Code

Table 5
Metal Toxicity Characteristic Leaching Procedure Results
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Sample Depth (feet bgs)	Analytical Results (milligrams per liter)							
					Arsenic[1]	Barium[1]	Cadmium[1]	Chromium[1]	Lead[1]	Mercury[2]	Selenium[1]	Silver[1]
East-Adjoining Properties - 800 Roy Street Parcel												
RS-19	Stockpile - Sludge from cleaning out USTs 1 and 2	03/10/93	EPJ	--	0.20	0.42	0.50	0.01	2.8	<0.002	<0.14	<0.01
RS-25	Stockpile	03/05/93	EPJ	--	<0.10	1.0	<0.005	<0.01	0.29	<0.002	<0.15	<0.01
Dangerous Waste Characteristics[3]					**5.0**	**100**	**1.0**	**5.0**	**5.0**	**0.2**	**1.0**	**5**

NOTES:

Laboratory analyses conducted by SoundAnalytical Services, Inc., of Tacoma, Washington.
[1]Analyzed by EPA Method 6010.
[2]Analyzed by EPA Method 7471.
[3]Washington State Dangerous Waste Maximum Concentration of Contaminants for the Toxicity Characteristic, Chapter 173-303-090 of the Washington Administrative Code.

-- = not analyzed or not measured
< = not detected at a concentration exceeding laboratory reporting limit
bgs = below ground surface
EPA = U.S. Environmental Protection Agency
EPJ = E.P. Johnson Construction, Inc. & Environmental
USTs = underground storage tank

Table 6
Chlorinated Volatile Organic Compound Toxicity Characteristic Leaching Procedure Results
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sampled By	Sample Depth (feet bgs)	Analytical Results[1] (milligrams per liter)							
					PCE	**TCE**	**1,1-DCE**	**Vinyl Chloride**	**EDC**	**MEK (2-Butanone)**	**Carbon Disulfide**	**Chloroform**
The Property												
G-MW1	MW-1-8-20	07/20/01	GeoEngineers	20	**99.3**[B]	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800
G-SB4/G-MW3	SB4-7-17.5	07/20/01	GeoEngineers	17.5	0.182[B]	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800
Dangerous Waste Characteristics[2]					**0.7**	**0.5**	**0.7**	**0.2**	**0.5**	**200**	**NE**	**6**

NOTES:

Laboratory analyses conducted by North Creek Analytical, Inc. of Bothell, Washington.

RED indicates concentration exceeds Washington State's Dangerous Waste Characteristics.

[1]Samples analyzed by U.S. Environmental Protection Agency Method 1311/8260B.

[2]Washington State Dangerous Waste Maximum Concentration of Contaminants for the Toxicity Characteristic, Chapter 173-303-090 of the Washington Administrative Code.

Laboratory Note:

[B]Analyte detected in an associated Method Blank.

< = not detected at a concentration exceeding laboratory reporting limit
bgs = below ground surface
DCE = dichloroethylene
EDC = 1,2-dichloroethane
GeoEngineers = GeoEngineers, Inc.
MEK = methyl ethyl ketone
NE = not established
PCE = tetrachloroethylene
TCE = trichloroethylene

Table 7
Groundwater Analytical Results for Polycyclic Aromatic Hydrocarbons
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Date	Sampled By	Laboratory	Analytical Results[1] (µg/L)																
				Acenaphthene	Acenaphthylene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(g,h,i) perylene	Pentachlorophenol	Benzo(a) anthracene TEF: 0.1	Chrysene TEF: 0.01	Benzo(a)pyrene TEF: 1	Benzo(b) fluoranthene TEF: 0.1	Benzo(k) fluoranthene TEF: 0.1	Indeno(1,2,3- TEF: 0.1	Dibenz(a,h) TEF: 0.1	Total TEC[2]
East-Adjoining Properties - 800 Roy Street Parcel																				
MW-7	06/20/02	Urban	F&BI	1.4	0.1	1.5	2.8	0.5	0.4	0.6	0.5	<0.3	0.1	0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
MW-9	06/20/02	Urban	F&BI	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
MW-10	06/20/02	Urban	F&BI	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
MTCA Cleanup Level				**960[b]**	**NE**	**640[b]**	**NE**	**4,800[b]**	**640[b]**	**480[b]**	**NE**	**0.22[c]**	**12[c]**	**0.012[c]**	**0.1[a]**	**0.12[c]**	**1.2[c]**	**0.12[c]**	**0.012[c]**	**0.1[a,d]**

NOTES:

[a]MTCA Method A Cleanup Levels, Table 720-1, Section 900, Chapter 173-340 of the WAC, revised November 2007.

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

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

[d]The cleanup level for cPAHs is based on direct contact using Equation 740-2 under WAC 173-340-740. When establishing and determining compliance with cleanup levels for mixtures of cPAHs, the mixture of cPAHs is considered a single hazardous substance. Benzo(a)pyrene's cleanup level is used as the cleanup level for the mixture.

[1]Samples Analyzed by U.S. Environmental Protection Agency Method 8270D.

[2]When determining the total TEC of benzo(a)pyrene for a sample, the concentrations of each of the seven carcinogenic PAHs listed in table 708-2 is multiplied by its corresponding TEF. The sum of these seven factors equal the total TEC. When the analytical result for any individual cPAH is reported as less than the LRL, half of the LRL is used as the concentrations for the calculation. When analytical results for all seven carcinogenic PAHs are less than the LRL, the LRL for benzo(a)pyrene is reported as the TEC. The resultant total TEC concentration is then compared to the cleanup level for benzo(a)pyrene.

< = not detected at a concentration exceeding laboratory reporting limit
µg/L = micrograms per liter
CLARC = cleanup levels and risk calculations
cPAH = carcinogenic polycyclic aromatic hydrocarbon
F&BI = Friedman & Bruya, Inc. of Seattle, Washington
MTCA = Washington State Model Toxics Control Act
NE = not established
TEC = toxicity equivalent concentration
TEF = total equivalency factor
Urban = Urban Redevelopment LLC
WAC = Washington Administrative Code

Table 8
Sludge Sample Analytical Results
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Sample Depth	Analytical Results[1] (milligrams per kilogram)										
				Benzene	Toluene	Ethylbenzene	Total xylenes	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1-DCE	Methylene Chloride
Sump 2	Sump 2	04/26/11	--	<0.03	**12**	<0.05	3.3	15	0.11	0.10	<0.05	<0.05	<0.05	<0.05
Sump 3	Sump 3	05/02/11	--	<0.03	0.074	<0.05	0.12	<0.025	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05
Sump 4	Sump 4	04/26/11	--	<3	**35**	<5	**17**[J]	**85,000**	**520**	**410**	<5	<5	<5	<5
	SUMP4_B_20110629	06/29/11	--	<0.3	<0.5	<0.5	<1.03	**560**	5.4	27	<0.5	<0.5	<0.5	<0.5
	SUMP4_C_20110629	06/29/11	--	<30	<50	<50	<150	**24,000**	**140**	**170**	<50	<50	<50	<50
Sump 5	Sump 5	05/04/12	--	**0.60**	4.6	1.6	2.6	**1,200**	**180**	**880**	12	**31**	2.6	<0.2
Cleanout 1	Cleanout 1 S-1/S-2 (composite)	04/26/11	--	<0.03	<0.05	<0.05	<0.15	**5.5**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05
Cleanout 2	Clean out 2	05/02/11	--	**0.38**	6.0	1.7	**11.9**	**2.6**	0.14	1.0	<0.05	<0.05	<0.05	<0.05
Trench 1	01_Floor Trench	07/22/11	--	<0.03	<0.05	<0.05	<0.15	**0.10**	<0.03	<0.05	<0.05	<0.05	<0.05	<0.05
MTCA Cleanup Level for Soil				**0.03**[a]	**7**[a]	**6**[a]	**9**[a]	**0.05**[a]	**0.03**[a]	**160**[b]	**1,600**[b]	**0.67**[b]	**4,000**[b]	**0.02**[a]
Dangerous Waste Criteria[2]				**NE**	**NE**	**NE**	**NE**	**14**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Universal Treatment Standard[3]				**10**	**10**	**10**	**30**	**6**	**6**	**NE**	**30**	**6**	**6**	**30**

NOTES:

RED indicates concentration exceeds MTCA cleanup level for soil.

Chemical analyses conducted by Freidman Bruya Inc., of Seattle, Washington.

[1]Analyzec indicates concentration is 10 times the Universal Treatment Standard and qualifies as land ban material.

[2]Washington State Dangerous Waste Maximum Concentration of Contaminants for the Toxicity Characteristic, Chapter 173-303-090 of the WAC.

[3]Nonwastewater Standards, table titled "Universal Treatment Standards," Title 40, Part 268, Supbpart D, of the Code of Federal Regulations.

[a]MTCA Cleanup Regulation, Chapter 173-340-900 of WAC, Table 740-1 Method A Cleanup Levels for Soil, revised November 2007.

[b]MTCA Cleanup Regulation, CLARC, Soil, Method B, Non-Carcinogen, Standard Formula Value, CLARC Website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

< = not detected at a concentration exceeding laboratory reporting limit
CLARC = cleanup levels and risk calculations
DCE = dichloroethylene
MTCA = Washington State Model Toxics Control Act
NE = not established
PCE = tetrachloroethylene
TCE = trichloroethylene
WAC = Washington Administrative Code

Laboratory Note:

[J]Estimated concentration.

Table 9
Process Water Analytical Results
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample ID	Sample Date	Analytical Results[1] (micrograms per liter)											
			pH[2]	Benzene	Toluene	Ethylbenzene	Total xylenes	PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride	1,1-DCE	Methylene Chloride
Sump 4	SUMP4_A_20110629	06/29/11	--	<35	<100	<100	<300	**20,000**	450	**47,000**	<100	<20	<100	<500
Effluent 1	Effluent1_20120104	01/04/12	5.76	--	--	--	--	**260**	49	32	<1	0.37	<1	<5
Poly Tank	Polytank1_20120823	08/23/13	--	--	--	--	--	**270**	<1	<1	<1	<0.2[pr]	<1	<5
	Tank-20130201	02/01/13	--	--	--	--	--	240	<1	<1	<1	<0.2	<1	<5
	Tank-20130205	02/05/13	--	--	--	--	--	5.3	<1	<1	<1	<0.2	<1	<5
King County Discharge Criteria			**5.5<pH>12[a]**	**70[b]**	**1,400[b]**	**1,700[b]**	**2,200[b]**	**240[b]**	**500[b]**	**2,000[b]**	**2,000[b]**	**12[b]**	**3[b]**	**4,100[b]**

NOTES:

Chemical analyses conducted by Freidman Bruya Inc., of Seattle, Washington.

RED indicates concentration exceeds King County's Discharge Criteria.

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

[2]Analyzed be EPA Method 9040C.

[a]King County Industrial Waste Local Discharge Permits, Daily Minimum and Maximum Limits for Corrosive Substances, Section 6.1.5 of PUT-13-1 (PR), Effective September 15, 2008.

[b]King County Industrial Waste Discharge Screening Levels for Volatile Organic Compounds, September 22, 2009.

-- = not analyzed or not measured

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

DCE = dichloroethylene

EPA = U.S. Environmental Protection Agency

PCE = tetrachloroethylene

TCE = trichloroethylene

Laboratory Note:

[pr]The sample was received with incorrect preservation. The value reported should be considered an estimate.

SoundEarth Strategies

Table 10
2013 Remedial Investigation Boring and Well Details
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location ID	Location Type	Location on Site/Location in Relation to Property	Purpose of Sample Location	Date(s) Advanced	Water-Bearing Zone	Total Depth (feet bgs)	Total Well Depth (feet bgs)	TOC Elevation[1] (in Feet)	Well Screen Depth (feet bgs) Top	Well Screen Depth (feet bgs) Bottom	Well Screen Elevation Top	Well Screen Elevation Bottom	Well Diameter	Drill Rig Type	Conductor Casing Depth (feet bgs)
MW101/B101	Monitoring Well	Central portion of the Property	To further evaluate the vertical extent of PCE contamination in soil and groundwater as previously encountered in boring P-07/well W-MW-03 and to assess the validity of the Windward data	07/10/12 07/11/12 07/12/12	Deep Outwash Aquifer	140	115	39.49	105	115	-65.51	-75.51	2	Sonic	40 & 80
MW102/B102	Monitoring Well	Southern sidewalk of Valley Street ROW, north-adjacent the Property	To evaluate if PCE contamination extended off-Property to the north	07/17/12 through 07/23/12	Deep Outwash Aquifer	125	125	49.19	115	125	-65.81	-75.81	2	Sonic	--
MW103/B103	Monitoring Well	Alleyway between 8th And 9th Avenues North, east of Property	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property	07/25/12 07/26/12 07/27 12	Deep Outwash Aquifer	115	114	35.92	103.5	113.5	-67.58	-77.58	2	Sonic	--
MW104/B104	Monitoring Well	8th Avenue North ROW, east of Property	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property and to assess the validity of Windward Data	07/30/12 07/31/12 08/01/12	Deep Outwash Aquifer	130	129	42.68	119	129	-76.32	-86.32	2	Sonic	--
MW105/B105	Monitoring Well	Roy Street ROW, southeast of the Property	To assess the vertical extent of PCE impacts in groundwater observed in well BB-8	08/06/12 through 08/10/12	Deep Outwash Aquifer	140	140	44.69	130	140	-85.31	-95.31	2	Sonic	--
MW106/B106	Monitoring Well	South-Adjoining Property	To evaluate current groundwater conditions in the vicinity of former monitoring well R-MW4.	08/14 /12 08/15/12	Deep Outwash Aquifer	140	140	51.99	130	140	-78.01	-88.01	2	Sonic	--
MW107/B107	Monitoring Well	8th Avenue North ROW, east of Property	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property and to assess the validity of Windward Data	12/03/12	Intermediate "A"	45.5	45	43.82	35	45	8.82	-1.18	2	HSA	--
MW108/B108	Monitoring Well	Alley east of 800 Roy Street Parcel	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property	12/14/12	Intermediate "A"	50.5	50	32.78	40	50	-7.22	-17.22	2	HSA	--
MW109/B109	Monitoring Well	Alley east of 800 Roy Street Parcel	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property	12/04/12	Intermediate "A"	45.5	45	34.97	35	45	-0.03	-10.03	2	HSA	--
MW110/B110	Monitoring Well	Alley east of 800 Roy Street Parcel	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property	12/04/12	Intermediate "A"	45.5	45	39.67	35	45	4.67	-5.33	2	HSA	--
MW111/B111	Monitoring Well	Alley east of 800 Roy Street Parcel	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property	12/05/12 12/06/12	Intermediate "B"	80.5	80	36.48	70	80	-33.52	-43.52	2	HSA	50
MW112/B112	Monitoring Well	Dexter Avenue ROW, West of the Property	To evaluate if PCE contamination extended off-Property to the west	12/11/12 12/12/12	Intermediate "B"	85.5	85	57.49	75	85	-17.51	-27.51	2	HSA	--
MW113/B113	Monitoring Well	9th Avenue North ROW, East of the Property	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property	12/18/12	Deep Outwash Aquifer	80	80	32.94	70	80	-37.06	-47.06	2	HSA	--
MW114/B114	Monitoring Well	Broad Street ROW, South of the Property	To evaluate current groundwater conditions in the vicinity of former monitoring well R-MW4.	12/10/12	Intermediate "A"	45.5	45	45.84	35	45	10.84	0.84	2	HSA	--
MW115/B115	Monitoring Well	9th Avenue North ROW, East of the Property	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property	12/13/12	Intermediate "A"	46	45	34.14	35	45	-0.86	-10.86	2	HSA	--
MW116/B116	Monitoring Well	9th Avenue North ROW, East of the Property	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property	12/07/12	Intermediate "A"	46.5	45	31.36	35	45	-3.64	-13.64	2	HSA	--
MW117/B117	Monitoring Well	Eastern sidewalk of the Dexter Avenue ROW, south of the Property	To evaluate PCE impacts in groundwater inferred as hydrologically upgradient from the Property	02/04/13	Intermediate "A"	55.5	55	56.90	40	55	16.90	1.90	2	HSA	--
MW118/B118	Monitoring Well	Mercer Street ROW, south of the Property	To evaluate PCE impacts in groundwater inferred as hydrologically upgradient from the Property	03/21/13	Intermediate "A"	55.5	50	52.91	40	50	12.91	2.91	2	HSA	--
MW119/B119	Monitoring Well	9th Avenue North ROW, southeast of the Property	To evaluate the lateral and vertical extents of PCE contamination in soil and groundwater downgradient of the Property	03/21/13	Intermediate "A"	46	45	37.35	35	45	2.35	-7.65	2	HSA	--

SoundEarth Strategies

Table 10
2013 Remedial Investigation Boring and Well Details
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location ID	Location Type	Location on Site/Location in Relation to Property	Purpose of Sample Location	Date(s) Advanced	Water-Bearing Zone	Total Depth (feet bgs)	Total Well Depth (feet bgs)	TOC Elevation[1] (in Feet)	Well Screen Depth (feet bgs)		Well Screen Elevation		Well Diameter	Drill Rig Type	Conductor Casing Depth (feet bgs)
									Top	Bottom	Top	Bottom			
DB01	Soil Boring	Northwest portion of the Property	Delineate PCE contamination on the Property	03/18/13	Intermediate "A"	41	--	--	--	--	--	--	--	HSA	--
DB02	Soil Boring	Northern portion of the Property	Delineate PCE contamination on the Property	03/18/13	Intermediate "A"	45.5	--	--	--	--	--	--	--	HSA	--
DB03	Soil Boring	Northeast portion of the Property	Delineate PCE contamination on the Property	03/27/13	Intermediate "A"	60.5	--	--	--	--	--	--	--	HSA	--
DB04	Soil Boring	Northwest portion of the Property	Delineate PCE contamination on the Property	03/21/13 03/24/13	Intermediate "A"	60	--	--	--	--	--	--	--	HSA	--
DB05	Soil Boring	Southwest portion of the Property	Delineate PCE contamination on the Property	03/26/13	Intermediate "B"	70.5	--	--	--	--	--	--	--	HSA	--
DB06	Soil Boring	Southern portion of the Property	Delineate PCE contamination on the Property	03/25/13	Intermediate "B"	80.5	--	--	--	--	--	--	--	HSA	--
DB07	Soil Boring	South-central portion of the Property	Delineate PCE contamination on the Property	03/27/13 03/28/13	Intermediate "B"	90.5	--	--	--	--	--	--	--	HSA	--
DB08	Soil Boring	Southeast portion of the Property	Delineate PCE contamination on the Property	03/20/13 03/21/13	Intermediate "B"	70.5	--	--	--	--	--	--	--	HSA	--
DB09	Soil Boring	Southeast portion of the Property	Delineate PCE contamination on the Property	03/19/13	Intermediate "B"	70.5	--	--	--	--	--	--	--	HSA	--
DB10	Soil Boring	Western portion of the Property	Delineate PCE contamination on the Property	03/29/13 04/01/13	Intermediate "B"	71.5	--	--	--	--	--	--	--	HSA	--
DB11	Soil Boring	Southwest corner of the Property	Delineate PCE contamination on the Property	04/02/13	Intermediate "A"	55	--	--	--	--	--	--	--	HSA	--
DB12	Soil Boring	North-central portion of the Property	Delineate PCE contamination on the Property	04/03/13	Intermediate "A"	45.5	--	--	--	--	--	--	--	HSA	--
DB13	Soil Boring	Southwest portion of the Property	Delineate PCE contamination on the Property	04/03/13	Intermediate "A"	45.5	--	--	--	--	--	--	--	HSA	--
DB14	Soil Boring	Northeast portion of the Property	Delineate PCE contamination on the Property	04/04/13	Intermediate "A"	45.5	--	--	--	--	--	--	--	HSA	--
SV01	Soil Gas Monitoring Point	Eastern sidewalk of the 8th Avenue North ROW, adjacent to 800 Roy Street Parcel	To evaluate if vapor intrusion from PCE-contaminated groundwater beneath the 800 Roy Street Parcel had impacted indoor air quality in the basement.	03/11/13	Shallow	12.25	--	--	--	--	--	--	--	Push Probe	--
SV02	Soil Gas Monitoring Point	Eastern sidewalk of the 8th Avenue North ROW, adjacent to 800 Roy Street Parcel	To evaluate if vapor intrusion from PCE-contaminated groundwater beneath the 800 Roy Street Parcel had impacted indoor air quality in the basement.	03/11/13	Shallow	11.75	--	--	--	--	--	--	--	Push Probe	--
SV03	Soil Gas Monitoring Point	Eastern sidewalk of the 8th Avenue North ROW, adjacent to 800 Roy Street Parcel	To evaluate if vapor intrusion from PCE-contaminated groundwater beneath the 800 Roy Street Parcel had impacted indoor air quality in the basement.	03/11/13	Shallow	12.75	--	--	--	--	--	--	--	Push Probe	--

NOTE:
[1]TOCs were surveyed relative to an arbitrary benchmarks prior to 2012. TOCs were resurveyed by Bush, Roed & Hitchings, Inc. of Seattle, Washington, in February, October, and December 2012 and March 2013, using the North American Vertical Datum 1988.

bgs = below ground surface
HSA = hollow-stem auger
PCE = tetrachloroethylene
ROW = right-of-way
SoundEarth = SoundEarth Strategies, Inc.
TOC = top of casing
Windward = Windward Environmental LLC

Table 11
Soil Gas Analytical Results
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Sample Location	Sample Name	Sample Location	Sample Date	Analytical Results[1] (micrograms per cubic meter)				
				PCE	**TCE**	**cis-1,2-DCE**	**trans-1,2-DCE**	**Vinyl Chloride**
SV01	SV01-20130311	SV01	03/05/13	1.5	<0.16	0.31	<0.58	0.71
SV02	SV02-20130311	SV02	03/05/13	2.3	<0.17	<0.12	<0.61	<0.040
SV03	SV03-20130311	SV03	03/05/13	4.6	0.39	<0.12	<0.58	<0.037
MTCA Method B Soil Gas Screening Level[2]				**96**	**3.7**	**NE**	**NE**	**2.8**
MTCA Method B Indoor Air Cleanup Level[3]				**9.6**	**0.37**	**NE**	**NE**	**0.28**

NOTES:

Laboratory analyses conducted by Air Toxics Ltd. of Folsom, California.

[1]Analyzed by U.S. Environmental Protection Agency Method Modified TO-15 Low Level Analysis.

[2]Calculated by dividing the indoor air cleanup level by an attenuation factor of 0.1, for soil gas just beneath a building, as specified in Table B-1, Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State, October 2009.

[3]MTCA Method B Indoor Air Cleanup Level, Carcinogen, CLARC database, September 2012.

< = not detected at a concentration exceeding laboratory reporting limit
CLARC = cleanup levels and risk calculations
DCE = dicholorethylene
MTCA = Washington State Model Toxics Control Act
NE = not established
PCE = tetrachloroethylene
TCE = trichloroethylene

SoundEarth Strategies

Table 12
Remedial Component Screening Matrix
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Component Group	Component Options	Retained for Inclusion in Cleanup Action Alternatives? Shallow Treatment Zone (0 to 40 feet NAVD88)	Intermediate Treatment Zone (0 to -40 feet NAVD88)	Deep Treatment Zone (-40 to -80 feet NAVD88)	Rationale for Inclusion or Exclusion
Institutional Controls					
	No Further Action with Environmental Covenant	No	No	No	Not retained because it is not protective of human health and environment and not compatible with Property redevelopment plans or schedule.
Engineering Controls					
	Containment Cap	Yes	No	No	Retained as a component of new construction on the Property to prevent vapor intrusion.
	Passive Vapor Barrier	Yes	No	No	Retained as a component of new construction on the Property to prevent vapor intrusion.
	Active Vapor Barrier	No	No	No	Not considered necessary if source removal is completed and a passive vapor barrier is implemented.
	Pump and Treat	No	No	No	Not compatible with Property redevelopment plans and schedule.
Passive Remediation					
	Monitored Natural Attenuation	Yes	Yes	Yes	Not retained as the sole remedy in the absence of other technologies, but as complementary to other engineered remedies.
	Permeable Reactive Barrier	Yes	Yes	Yes	Not retained as the sole remedy in the absence of other technologies, but as complementary to other engineered remedies.
In Situ Physical Treatment					
	Soil Vapor Extraction	Yes	No	No	Not retained as the sole remedy in the absence of other technologies, but combined with in situ resistive thermal.
	Air Sparging	No	No	No	Not compatible with the Property redevelopment plan due to the slow nature of the technology that requires Property access after year 1.
	Biosparging	No	No	No	Not effective for COCs; not compatible with Property redevelopment plan.
	Surfactant Washing	No	No	No	COCs are more effectively remediated through SVE; surfactant flushing could mobilize COCs in soil and groundwater.
	Cosolvent Washing	No	No	No	COCs are more effectively remediated through SVE; solvent flushing could mobilize COCs in soil and groundwater.
	Dual-Phase Extraction	No	No	No	Effective technology for COCs, but not compatible with Property redevelopment plans and schedule.
In Situ Thermal					
	Resistive Thermal with SVE	Yes	No	No	More costly when compared with other in situ treatment technologies; however, retained for its effectiveness and because it would be more easily implemented than other thermal components.
	Conductive Thermal with SVE	No	No	No	Not cost competitive to electric resistivity technology for the Site.
	Steam Injection with SVE and Groundwater Extraction	No	No	No	Not compatible with Property redevelopment plan due to the slow nature of the technology that requires access after year 1.
	Hot Air Injection with SVE	No	No	No	Not compatible with Property redevelopment plan due to the slow nature of the technology that requires access after year 1.
	Hot Water Injection with SVE and Groundwater Extraction	No	No	No	Not compatible with Property redevelopment plan due to the slow nature of the technology that requires access after year 1.
Source Removal					
	Excavation Dewatering	Yes	No	No	The majority of the excavation associated with the Property redevelopment is above the groundwater table; however the overexcavation for PCS to a depth of 20 feet NAVD88 would require limited dewatering.
	Excavation with Shoring	Yes	No	No	Retained as mandatory for proposed Property redevelopment excavation.
Source Removal combined with Ex Situ Treatment, Storage, and Disposal					
	Surfactant Washing	No	No	No	Ex situ treatment not cost effective for excavated soil.
	Neutralization	No	No	No	Ex situ treatment not cost effective for excavated soil.
	Land Farming	No	No	No	Ex situ treatment not cost effective for excavated soil.
	Cosolvent Washing	No	No	No	Ex situ treatment not cost effective for excavated soil.
	Chemical Oxidation	No	No	No	Ex situ treatment not cost effective for excavated soil.
	Air Stripping	Yes	No	No	Ex situ treatment not cost effective for excavated soil.
	Thermal Desorption	No	No	No	Ex situ treatment not cost effective for excavated soil.
	Incineration	No	No	No	Ex situ treatment not cost effective for excavated soil.
	Landfill Disposal	Yes	No	No	Retained for remedial excavation across the Property and is compatible with Property redevelopment plans and schedule.

SoundEarth Strategies

Table 12
Remedial Component Screening Matrix
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Component Group	Component Options	Retained for Inclusion in Cleanup Action Alternatives? Shallow Treatment Zone (0 to 40 feet NAVD88)	Intermediate Treatment Zone (0 to -40 feet NAVD88)	Deep Treatment Zone (-40 to -80 feet NAVD88)	Rationale for Inclusion or Exclusion
In Situ Chemical Oxidation					
	Activated Sodium Persulfate	No	No	No	Permanganate considered a better oxidant for COCs.
	Hydrogen Peroxide	No	No	No	Limited effectiveness for in-situ soil treatment.
	Fenton's Reagent	No	No	No	Fast reaction rate limits its effectiveness.
	Permanganate	Yes	Yes	Yes	Retained for groundwater treatment.
Containment/Immobilization					
	Bituminization	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Emulsified Asphalt	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Modified Sulfur Cement	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Polyethylene Extrusion	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Pozzolan/Portland Cement	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Vitrification/Molten Glass	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Slurry Wall Containment	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Sheet Pile Wall Containment	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Pump and Treat for Hydraulic Containment	No	No	No	Not anticipated to be being necessary for remediation or the Property redevelopment.
Phytoremediation					
	Hydraulic Control	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Phyto-Degradation	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Phyto-Volatilization	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Phyto-Accumulation	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Phyto-Stabilization	No	No	No	Not compatible with Property redevelopment plans and schedule.
	Enhanced Rhizosphere Biodegradation	No	No	No	Not compatible with Property redevelopment plans and schedule.
In Situ Bioremediation					
	Aerobic Bioremediation	No	No	No	Effective for treatment of vinyl chloride if necessary, but not retained because implementation is not compatible with Property redevelopment plans.
	Anaerobic Bioremediation	Yes	Yes	Yes	Retained for groundwater treatment.

NOTES:
COC = chemical of concern
SVE = soil vapor extraction

Table 13
Feasibility Level Cost Estimate
Cleanup Action Alternative 1
ERH/SVE, Excavation of Soil, and In Situ
Reductive Dechlorination of Groundwater
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

CAPITAL COST ITEM	QTY	UNIT	UNIT PRICE	COST	TOTALS
Permitting (excludes labor)					
Right-of-way permit fees	1	per permit	$ 10,500	$ 10,500	
Sidewalk and lane closure fees	1	per permit	$ 15,000	$ 15,000	
Utility Permit and Power Upgrade for ERH System	1	per permit	$ 100,000	$ 100,000	
National Barricade Traffic Control Plan	1	per plan	$ 1,500	$ 1,500	
Puget Sound Clean Air Authority	1	per permit	$ 2,500	$ 2,500	
UIC Registration	1	per permit	$ 1,100	$ 1,100	
Subtotal				*$ 130,600*	
Site Work					
ERH and SVE Treatment System on the Property					
Utility Clearing and Concrete Coring	174	per well	$ 155	$26,970	
Drill Electrodes	165	each	$ 3,000	$495,000	
Drill Temperature Monitoring Points	9	each	$ 3,000	$27,000	
Treatment and Disposal of soil cuttings as Hazardous Waste	265	ton	$ 250	$66,250	
ERH Vendor Labor, Equipment and Materials (volume based on treatment area)	55,560	bcy	$ 65	$3,611,400	
Power	9,987,500	kWhr	$ 0.08	$799,000	
Vapor and Water Treatment System	1	each	$ 55,000	$55,000	
Carbon Treatment and Disposal	1	each	$ 25,000	$25,000	
System Decommissioning	1	each	$ 36,000	$36,000	
Monitoring Well and Electrode Decommissioning	174	each	$ 1,600	$ 278,400	
Subtotal				*$ 5,420,020*	
Remedial Excavation on Property					
Excavation to Elevation 30 feet NAVD88 and Limited Area to Elevation 20 feet NAVD88 - Incremental Disposal Cost for Contaminated Soil as Contained-Out	32,000	ton	$ 80	$ 2,560,000	
Excavation Dewatering and Treatment	1	each	$ 12,500	$ 12,500	
Installation of Vertical and Horizontal Vapor Barrier	72,500	sf	$ 8.50	$ 616,250	
Subtotal				*3,188,750*	
Site-Wide Groundwater Treatment					
Utility Clearing	317	each	$ 50	$ 15,850	
Drilling Contractor					
Injection Wells for Shallow Treatment Zone: 0 to 40 feet NAVD88	141	each	$ 3,000	$ 423,000	
Injection Wells for Intermediate Treatment Zone: 0 to -40 feet NAVD88	129	each	$ 6,000	$ 774,000	
Injection Wells in the Deep Treatment Zone: -40 to -80 feet NAVD88	22	each	$ 9,000	$ 198,000	
Disposal of Soil Cuttings					
Subtitle C (14<PCE<60 mg/kg)	40	ton	$ 225	$ 9,000	
Subtitle D - Contained Out	360	ton	$ 100	$ 36,000	
Edible Oil Injection	1	lump sum	$ 150,000	$ 150,000	
Injection Well Decommissioning	292	each	$ 500	$ 146,000	
Subtotal				*$ 1,751,850*	
Labor and Other Direct Costs					
Professional Labor	1	lump sum	$ 435,372	$ 435,372	
Other Direct Costs (reprographics, courier services)	1	lump sum	$ 2,500	$ 2,500	
Equipment (H&S and field equipment)	1	lump sum	$ 144,875	$ 144,875	
Analytical Costs	1	lump sum	$ 100,673	$ 100,673	
Subtotal				*$ 683,420*	
CLEANUP ACTION SUBTOTAL					$ 11,174,600
Mobilization, Contingencies, and Demobilization					
Mobilization (1% of construction subtotal)				$ 111,746	
Engineering Design and Bid (10% of construction subtotal)				$ 1,117,460	
Cleanup and Demobilization (1% of construction subtotal)				$ 111,746	
Subtotal				*$ 1,340,952*	
CLEANUP ACTION TOTAL CAPITAL COST					**$ 12,515,600**

Table 13
Feasibility Level Cost Estimate
Cleanup Action Alternative 1
ERH/SVE, Excavation of Soil, and In Situ
Reductive Dechlorination of Groundwater
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

COMPLIANCE MONTORING	ANNUAL COST[1]	Present Worth Cost of Annual Monitoring Real Discount Rate = 0.9%	
		n = 10 years	
Quarterly Groundwater Monitoring and Reporting (10 years)	$ 45,000	$ 219,050	
Well Decommissioning (13 wells)		$ 15,600	
TOTAL PRESENT WORTH MONITORING COST			**$ 234,700**
TOTAL PRESENT WORTH COST OF CLEANUP ACTION ALTERNATIVE 1			**$ 12,750,000**

NOTE:

[1]Annual cost is 2013 year cost.

bcy = bank cubic yards
ERH = electrical resistance heating
H&S = health and safety
kWhr = kilowatt hours
mg/kg = milligrams per kilogram
n = number of years of operation and maintenance
PCE = tetrachloroethylene
QTY = quantity
sf = square feet
SVE = soil vapor extraction

SoundEarth Strategies

Table 14
Feasibility Level Cost Estimate
Cleanup Action Alternative 2
ERH/SVE, Excavation of Soil, and In Situ
Chemical Oxidation of Groundwater
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

CAPITAL COST ITEM	QTY	UNIT	UNIT PRICE	COST	TOTALS
Permitting (excludes labor)					
Right-of-way permit fees	1	per permit	$ 10,500	$ 10,500	
Sidewalk and lane closure fees	1	per permit	$ 15,000	$ 15,000	
Utility Permit and Power Upgrade for ERH System	1	per permit	$ 100,000	$ 100,000	
National Barricade Traffic Control Plan	1	per plan	$ 1,500	$ 1,500	
Puget Sound Clean Air Authority	1	per permit	$ 2,500	$ 2,500	
UIC Registration	1	per permit	$ 1,100	$ 1,100	
Subtotal				*$ 130,600*	
Site Work					
ERH and SVE Treatment System on the Property					
Utility Clearing and Concrete Coring	174	per well	$ 155	$26,970	
Drill Electrodes	165	each	$ 3,000	$495,000	
Drill Temperature Monitoring Points	9	each	$ 3,000	$27,000	
Treatment and Disposal of soil cuttings as Hazardous Waste	265	ton	$ 250	$66,250	
ERH Vendor Labor, Equipment and Materials (volume based on treatment area)	55,560	bcy	$ 65	$3,611,400	
Power	9,987,500	kWhr	$ 0.08	$799,000	
Vapor and Water Treatment System	1	each	$ 55,000	$55,000	
Carbon Treatment and Disposal	1	each	$ 25,000	$25,000	
System Decommissioning	1	each	$ 36,000	$36,000	
Monitoring Well and Electrode Decommissioning	174	each	$ 1,600	$ 278,400	
Subtotal				*$ 5,420,020*	
Remedial Excavation on Property					
Excavation to Elevation 30 feet NAVD88 and Limited Area to Elevation 20 feet NAVD88 - Incremental Disposal Cost for Contaminated Soil as Contained-Out	32,000	ton	$ 80	$ 2,560,000	
Excavation Dewatering and Treatment	1	each	$ 12,500	$ 12,500	
Installation of Vertical and Horizontal Vapor Barrier	72,500	sf	$ 8.50	$ 616,250	
Subtotal				*3,188,750*	
Site-Wide Groundwater Treatment					
Utility Clearing	1233	each	$ 155	$ 191,115	
Drilling Contractor				$ -	
Injection Wells for Shallow Treatment Zone: 0 to 40 feet NAVD88	341	each	$ 3,000	$ 1,023,000	
Injection Wells for Intermediate Treatment Zone: 0 to -40 feet NAVD88	421	each	$ 6,000	$ 2,526,000	
Injection Wells in the Deep Treatment Zone: -40 to -80 feet NAVD88	41	each	$ 9,000	$ 369,000	
Disposal of Soil Cuttings					
Subtitle C (14<PCE<60 mg/kg)	110	ton	$ 225	$ 24,750	
Subtitle D - Contained Out	990	ton	$ 100	$ 99,000	
Bulk Permanganate Including Freight	9,742,000	lb	$ 4	$ 38,968,000	
Mixing Equipment	1	lump sum	$ 75,000	$ 75,000	
Injection Well Decommissioning	803	each	$ 500	$ 401,500	
Subtotal				*$ 43,677,365*	
Labor and Other Direct Costs					
Professional Labor	1	lump sum	$ 1,321,452	$ 1,321,452	
Other Direct Costs (reprographics, courier services)	1	lump sum	$ 2,500	$ 2,500	
Equipment (H&S and field equipment)	1	lump sum	$ 955,115	$ 955,115	
Analytical Costs	1	lump sum	$ 100,673	$ 100,673	
Subtotal				*$ 2,379,740*	
CLEANUP ACTION SUBTOTAL					$ 54,796,500
Mobilization, Contingencies, and Demobilization					
Mobilization (1% of construction subtotal)				$ 547,965	
Engineering Design and Bid (10% of construction subtotal)				$ 5,479,650	
Cleanup and Demobilization (1% of construction subtotal)				$ 547,965	
Subtotal				*$ 6,575,580*	
CLEANUP ACTION TOTAL CAPITAL COST					**$ 61,372,100**

Table 14
Feasibility Level Cost Estimate
Cleanup Action Alternative 2
ERH/SVE, Excavation of Soil, and In Situ
Chemical Oxidation of Groundwater
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

COMPLIANCE MONTORING	ANNUAL COST[1]	Present Worth Cost of Annual Monitoring Real Discount Rate = 0.9%	
		n = 10 years	
Quarterly Groundwater Monitoring and Reporting (10 years)	$ 45,000	$ 428,504	
Well Decommissioning (13 wells)		$ 15,600	
TOTAL PRESENT WORTH MONITORING COST			**$ 444,100**
TOTAL PRESENT WORTH COST OF CLEANUP ACTION ALTERNATIVE 1			**$ 61,816,000**

NOTE:

[1]Annual cost is 2013 year cost.

bcy = bank cubic yards
ERH = electrical resistance heating
H&S = health and safety
kWhr = kilowatt hours
lb = pound(s)
mg/kg = milligrams per kilogram
n = number of years of operation and maintenance
PCE = tetrachloroethylene
QTY = quantity
sf = square feet
SVE = soil vapor extraction

Table 15
Feasibility Level Cost Estimate
Cleanup Action Alternative 3
ERH/SVE, Excavation of Soil, and Permeable Reactive
Barrier Wall for Groundwater
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

CAPITAL COST ITEM	QTY	UNIT	UNIT PRICE	COST	TOTALS
Permitting (excludes labor)					
Right-of-way permit fees	1	per permit	$ 10,500	$ 10,500	
Sidewalk and lane closure fees	1	per permit	$ 15,000	$ 15,000	
Utility Permit and Power Upgrade for ERH System	1	per permit	$ 100,000	$ 100,000	
National Barricade Traffic Control Plan	1	per plan	$ 1,500	$ 1,500	
Puget Sound Clean Air Authority	1	per permit	$ 2,500	$ 2,500	
Subtotal				*$ 129,500*	
Site Work					
ERH and SVE Treatment System on Property					
Utility Clearing and Concrete Coring	174	per well	$ 155	$26,970	
Drill Electrodes	165	each	$ 3,000	$495,000	
Drill Temperature Monitoring Points	9	each	$ 3,000	$27,000	
Treatment and Disposal of soil cuttings as Hazardous Waste	265	ton	$ 250	$66,250	
ERH Vendor Labor, Equipment and Materials (volume based on treatment area)	55,560	bcy	$ 65	$3,611,400	
Power	9,987,500	kWhr	$ 0.08	$799,000	
Vapor and Water Treatment System	1	each	$ 55,000	$55,000	
Carbon Treatment and Disposal	1	each	$ 25,000	$25,000	
System Decommissioning	1	each	$ 36,000	$36,000	
Monitoring Well and Electrode Decommissioning	174	each	$ 1,600	$ 278,400	
Subtotal				*$ 5,420,020*	
Remedial Excavation on Property					
Excavation to Elevation 30 feet NAVD88 and Limited Area to Elevation 20 feet NAVD88 - Incremental Disposal Cost for Contaminated Soil as Contained-Out	32,000	ton	$ 80	$ 2,560,000	
Excavation Dewatering and Treatment	1	each	$ 12,500	$ 12,500	
Installation of Vertical and Horizontal Vapor Barrier	72,500	sf	$ 8.50	$ 616,250	
Subtotal				*3,188,750*	
Site-Wide Groundwater Treatment					
Utility Clearing	1	lump sum	$ 45,000	$ 45,000	
Geotechnical Services	1	event	$ 25,000	$ 25,000	
Driller Mob/Demob	1	event	$ 25,000	$ 25,000	
Drilling Contractor- Wall Installation- 4 foot wide diameter borings	510	boring	$ 4,000	$ 2,040,000	
Mixing System	10,500	cy	$ 35	$ 367,500	
Sand Fill (75%)	7,898	cy	$ 15	$ 118,474	
Iron Fill (25%)	2,090	cy	$ 2,200	$ 4,597,450	
Disposal of Soil Cuttings					
Subtitle C (14<PCE<60 mg/kg)	1,800	ton	$ 225	$ 405,000	
Subtitle D - Contained Out	16,200	ton	$ 100	$ 1,620,000	
Site Restoration - Patch asphalt and concrete surfaces	1	lump sum	$ 75,000	$ 75,000	
Subtotal				*$ 9,318,424*	
Labor and Other Direct Costs					
Professional Labor	1	lump sum	$ 122,092	$ 122,092	
Other Direct Costs (reprographics, courier services)	1	lump sum	$ 2,500	$ 2,500	
Equipment (H&S and field equipment)	1	lump sum	$ 18,595	$ 18,595	
Analytical Costs	1	lump sum	$ 106,825	$ 106,825	
Subtotal				*$ 250,012*	
CLEANUP ACTION SUBTOTAL					$ 18,306,700
Mobilization, Contingencies, and Demobilization					
Mobilization (1% of construction subtotal)				$ 183,067	
Engineering Design and Bid (10% of construction subtotal)				$ 1,830,670	
Cleanup and Demobilization (1% of construction subtotal)				$ 183,067	
Subtotal				*$ 2,196,804*	
CLEANUP ACTION TOTAL CAPITAL COST					**$ 20,503,500**

Table 15
Feasibility Level Cost Estimate
Cleanup Action Alternative 3
ERH/SVE, Excavation of Soil, and Permeable Reactive
Barrier Wall for Groundwater
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

COMPLIANCE MONTORING	ANNUAL COST[1]	Present Worth Cost of Annual Monitoring Real Discount Rate = 0.9%	
		n = 15 years	
Quarterly Groundwater Monitoring and Reporting (15 years)	$ 45,000	$ 628,782	
Well Decommissioning (13 wells)		$ 15,600	
TOTAL PRESENT WORTH MONITORING COST			**$ 644,400**
TOTAL PRESENT WORTH COST OF CLEANUP ACTION ALTERNATIVE 1			**$ 21,148,000**

NOTE:
[1]Annual cost is 2013 year cost.

bcy = bank cubic yards
cy = cubic yard
ERH = electrical resistance heating
H&S = health and safety
kWhr = kilowatt hours
mg/kg = milligrams per kilogram
n = number of years of operation and maintenance
PCE = tetrachloroethylene
QTY = quantity
sf = square feet
SVE = soil vapor extraction

CHARTS

Chart 1
Cost and Relative Ranking of Cleanup Action Alternatives
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

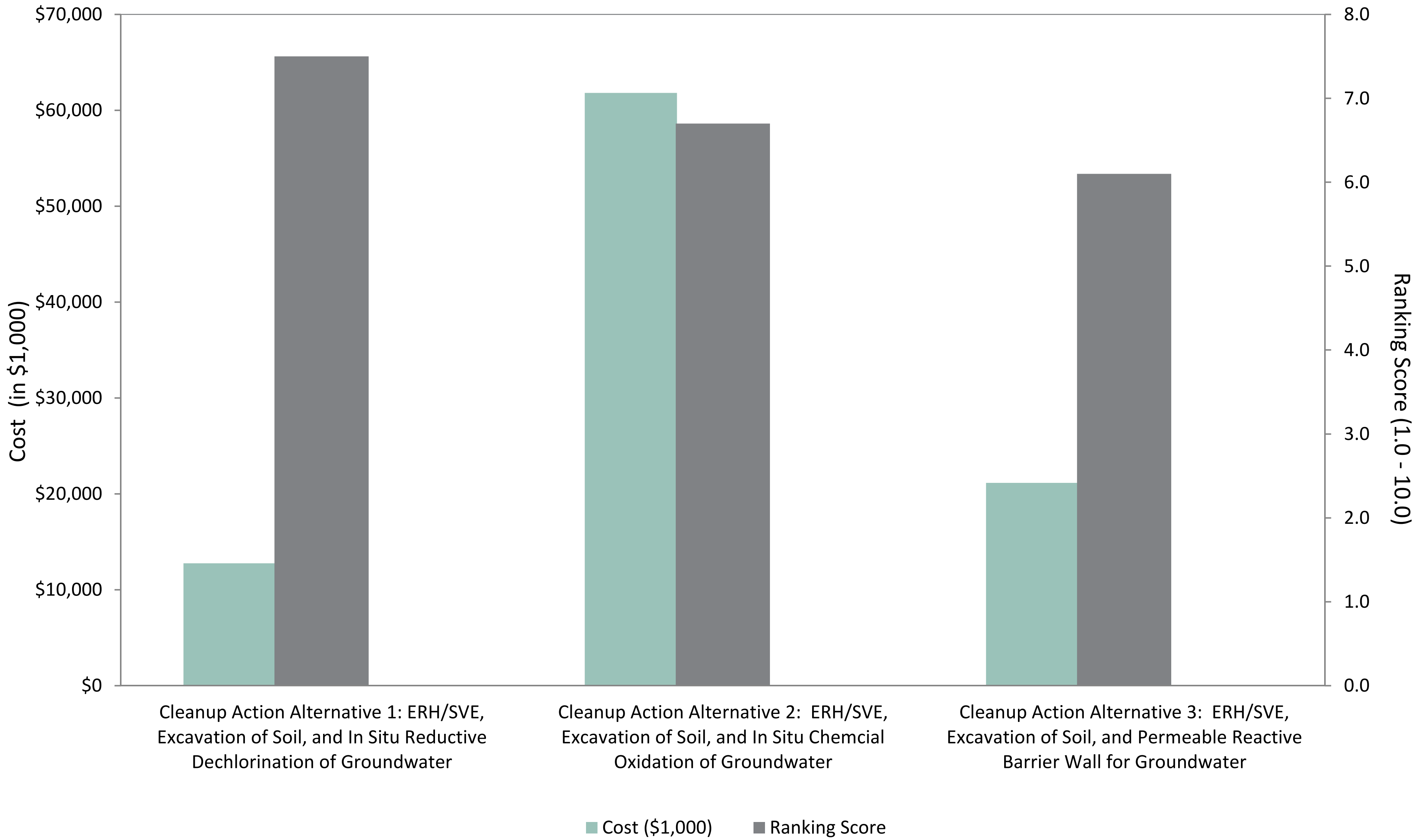
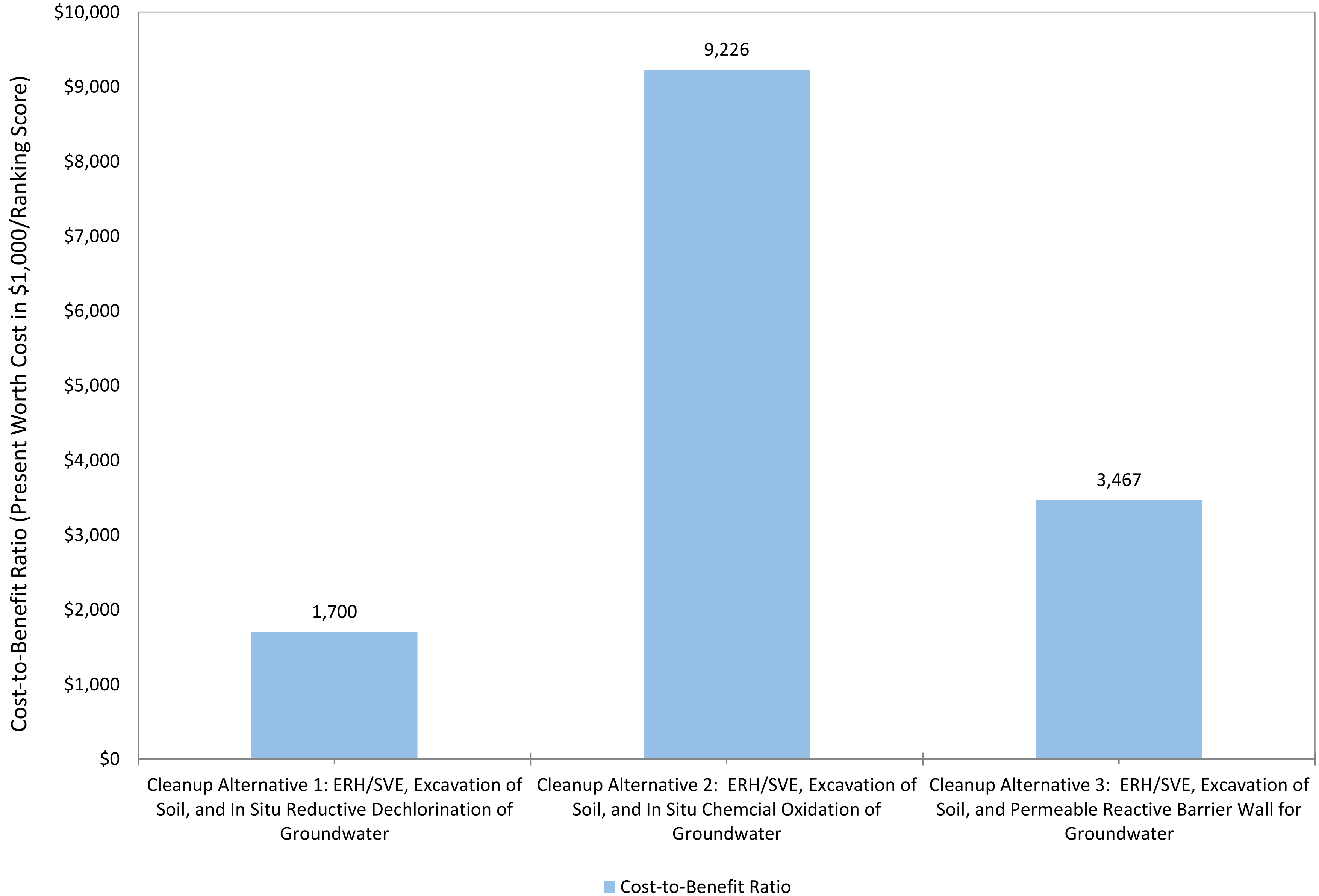


Chart 2
Cost-to-Benefit Ratio for Cleanup Action Alternatives
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington



APPENDIX A
IN SITU REDUCTIVE DECHLORINATION DESIGN WORKSHEET

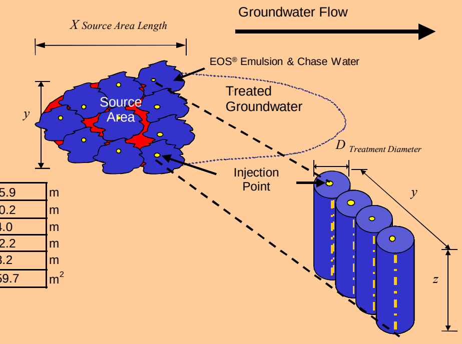
EOS® SOURCE AREA & DNAPL DESIGN WORKSHEET

EOS Remediation, Inc.

U.S. Version 2.1e, Rev. Date: February 6, 2008
www.EOSRemediation.com

Help

Site Name:	Source Zone
Location:	700 Dexter Property - On Property Source
Project No.:	0-40 foot A zone



Step 1: Select a Substrate from the EOS® Family of Bioremediation Products

Substrate Selected (pick from drop down list) — EOS® 598B42 (Preferred for Chlorinateds)
For Product Literature Click Here

Step 2: EOS® Consumption During Contaminant Biodegradation / Biotransformation

Section A: Source Area Dimensions

Length of treatment area parallel to groundwater flow, "x"	249	ft	75.9	m
Width of treatment area perpendicular to groundwater flow, "y"	263	ft	80.2	m
Minimum depth to contamination	13	ft	4.0	m
Maximum depth of contamination	40	ft	12.2	m
Treatment thickness, "z"	27	ft	8.2	m
Treatment zone cross-sectional area, A = y * z	7,101	ft^2	659.7	m^2

Section B: Groundwater Flow Rate / Site Data

Soil Characteristics

Nominal Soil Type (pick from drop down list)	Sand			
Total Porosity (accept default or enter n)	0.38	(decimal)		
Effective Porosity (accept default or enter n_e)	0.23	(decimal)		
Soil bulk density; (1-n)*2.65 g/cc (accept calculated or enter dry bulk density)	1.64	g/cc	103	lbs / ft^3
Fraction of organic carbon: foc	0.0050	range: 0.0001 to 0.01		

Hydraulic Characteristics

Hydraulic Conductivity (accept default or enter K)	1	ft/day	3.5E-04	cm/sec
Hydraulic Gradient (accept default or enter i)	0.02	ft/ft		

Note: Since the hydraulic gradient $(i = dh/dx)$ is negative, we ask you to enter $-i$ in the EOS® Design Tool so that you can enter a positive number for convenience.

Non-reactive Transport Velocity, $V_x = -(K \times i) / n_e$	0.09	ft/day	0.027	m/day
Groundwater flow rate through treatment zone, $Q = -KiA$	1062.31	gallons/day	4,021.56	L/day

Section C: Calculated Contact Length

Contact time (τ) between oil and contaminants (accept default or enter τ)	60	typical values 60 to 180 days, see comment		
Calculated Contact Length $(x) = \tau * V_x$	5.2	ft	1.6	m
Treatment zone volume	1,768,149	ft^3	50,068	m^2
Treatment zone groundwater volume (volume * porosity)	5,025,787	gallons	19,025,994	L

Section D: Design Lifespan For One Application

Section D: Design Lifespan For One Application	20	year(s)	typical values 5 to 10 years	
Estimated total groundwater volume treated over design life	12,780,647	gallons	48,383,371	L

Section E: Electron Acceptors

Dissolved Phase Electron Donor Demand

Inputs	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e^- equiv./ mole	Stoichiometry *Contaminant/ H_2 (wt/wt H_2)*	Hydrogen Demand *(g H_2)*
Dissolved Oxygen (DO)	0 to 8	1	32.0	4	7.94	6095.928545
Nitrate Nitrogen (NO_3^- - N)	1 to 10	2	62.0	5	12.30	7864.797715
Sulfate (SO_4^{2-})	10 to 500	20	96.1	8	11.91	81227.26294
Tetrachloroethene (PCE), C_2Cl_4		2	165.8	8	20.57	4705.003759
Trichloroethene (TCE), C_2HCl_3		1	131.4	6	21.73	2226.927826
cis-1,2-dichloroethene (c-DCE), $C_2H_2Cl_2$		0.005	96.9	4	24.05	10.06059172
Vinyl Chloride (VC), C_2H_3Cl		0.05	62.5	2	31.00	78.02658228
Carbon tetrachloride, CCl_4			153.8	8	19.08	
Chloroform, $CHCl_3$			119.4	6	19.74	
sym- tetrachloroethane, $C_2H_2Cl_4$			167.8	8	20.82	
1,1,1-Trichloroethane (TCA), CH_3CCl_3			133.4	6	22.06	
1,1-Dichloroethane (DCA), CH_2CHCl_2			99.0	4	24.55	
Chloroethane, C_2H_5Cl			64.9	2	32.18	
Perchlorate, ClO_4^-			99.4	8	12.33	
Hexavalent Chromium, Cr[VI]			52.0	3	17.20	
User added						
User added						
User added						

Sorbed Phase Electron Donor Demand

The concentration of the sorbed contaminant can be estimated by: $C_{SOIL} = K_{OC} \times f_{oc} \times C_{WATER}$

Where: K_{oc} is partition coefficient with respect to organic carbon.
f_{oc} (fraction organic carbon) is the mass of organic matter in soil divided by the total mass of soil
C_{WATER} is the concentration of the contaminant in the groundwater

Default values for Koc taken from: US EPA, Superfund Section, APPENDIX K, Soil Organic Carbon (Koc) / Water (Kow) Partition Coefficients (Average Value Used)

Inputs Adjust Koc as necessary to provide site specific estimates or enter sediment concentration (C_{SOIL})	K_{oc} (L/kg)	C_{SOIL} (mg/Kg)	Mass (g)	Hydrogen Demand *(g H_2)*
Tetrachloroethene (PCE), C_2Cl_4	272	2.72	223753.96	10879.39
Trichloroethene (TCE), C_2HCl_3	97	0.49	39897.31	1836.34
cis-1,2-dichloroethene (c-DCE), $C_2H_2Cl_2$	38	0.00	78.15	3.25
Vinyl Chloride (VC), C_2H_3Cl	241	0.06	4956.31	159.86
Carbon tetrachloride, CCl_4	158			
Chloroform, $CHCl_3$	53			
sym- tetrachloroethane, $C_2H_2Cl_4$	79			
1,1,1-Trichloroethane (TCA), CH_3CCl_3	139			
1,1-Dichloroethane (DCA), CH_2CHCl_2	54			
User added				
User added				
User added				

Section F: Additional Hydrogen Demand and Carbon Losses

Generation (Potential Amount Formed)	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e^- equiv./ mole	Stoichiometry *Contaminant / H_2*	Hydrogen Demand *(g H_2)*	DOC Released *(moles)*
Estimated Amount of $Fe2^+$ Formed	10 to 100	50	55.8	1	55.41	43661.56288	
Estimated Amount of Manganese (Mn^{2+}) Formed		5	54.9	2	27.25	8876.478864	
Estimated Amount of CH_4 Formed	5 to 20	10	16.0	8	1.99	243180.5297	
Target Amount of DOC to Release	60 to 100	100	12.0				402825.50

Design Safety Factor: 2.0 typical values 1 to 3

Calculations assume:
1.) all reactions go to completion during passage through emulsified edible oil treated zone; and,
2.) perfect reaction stoichiometry.

EOS® Requirement Calculations Based on Hydrogen Demand and Carbon Losses

Stoichiometric Hydrogen Demand	1,809.7	pounds
DOC Released	45,996.2	pounds

EOS® Requirement Based on Hydrogen Demand and Carbon Loss
54,243 lbs

Step 3: EOS® Requirement Based on Attachment by Aquifer Material

Soil Characteristics

Effective treatment thickness, "z_e" (typically less than 40%) — 0.25
For Additional Information on Effective Thickness, Click Here

Weight of sediment to be treated — 45,339,380 lbs

Adsorptive Capacity of Soil (accept default or enter site specific value) — 0.0010 lbs EOS® / lbs sediment

EOS® Attachment by Aquifer Material[1]
- Fine sand with some clay 0.001 to 0.002 lbs EOS® / lbs soil
- Sand with higher silt/clay content 0.002 to 0.004 lbs EOS® / lbs soil

[1]Default values provided based on laboratory studies completed by NCSU
For Additional Data, Click Here

EOS® Requirement Based on Oil Entrapment by Aquifer Material
45,339 lbs

Summary – How much EOS® do you need?

Suggested Quantity of EOS® for Your Project — 130 drums

†Exclusive license agreement with Solutions-IES under U.S. Patent # 6,398,960, European Union Patent # EP 1 315 675 and several other pending international patents.
††EOS® is a registered trademark of EOS Remediation, Inc.

EOS Remediation, Inc.

EOS® BARRIER DESIGN WORKSHEET

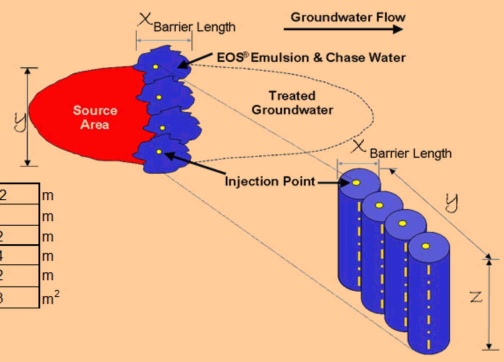
U.S. Version 2.1e, Rev. Date: February 6, 2008
www.EOSRemediation.com

Help

Site Name:	1231 feet
Location:	700 Dexter Property - On Property EOS Treatment
Project No.:	40-80 zone b

Step 1: Select a Substrate from the EOS® Family of Bioremediation Products

Substrate Selected (pick from drop down list): EOS® 598B42 (Preferred for Chlorinateds)
For Product Literature Click Here



Step 2: EOS® Consumption During Contaminant Biodegradation / Biotransformation

Section A: Treatment Area Dimensions

Length of treatment area parallel to groundwater flow, "x"	1231	ft	375.2	m
Width of treatment area perpendicular to groundwater flow, "y"	20	ft	6.1	m
Minimum depth to contamination	40	ft	12.2	m
Maximum depth of contamination	80	ft	24.4	m
Treatment thickness, "z"	40	ft	12.2	m
Treatment zone cross-sectional area, A = $y * z$	800	ft^2	74.3	m^2

Section B: Groundwater Flow Rate / Site Data

Soil Characteristics

Nominal Soil Type (pick from drop down list)	Sand			
Total Porosity (accept default or enter n)	0.38	(decimal)		
Effective Porosity (accept default or enter n_e)	0.23	(decimal)		
Soil bulk density; (1-n)*2.65 g/cc (accept calculated or enter dry bulk density)	1.64	g/cc	103	lbs / ft^3

Hydraulic Characteristics

Hydraulic Conductivity (accept default or enter K)	1	ft/day	3.5E-04	cm/sec
Hydraulic Gradient (accept default or enter i)	0.005	ft/ft		

Note: Since the hydraulic gradient ($i = dh/dx$) is negative, we ask you to enter $-i$ in the EOS® Design Tool so that you can enter a positive number for convenience.

Non-reactive Transport Velocity, $V_x = -(K \times i) / n_e$	0.02	ft/day	0.007	m/day
Groundwater flow rate through treatment zone, $Q = -KiA$	29.92	gallons/day	113.27	L/day

Section C: Calculated Contact Length

Contact time (τ) between oil and contaminants (accept default or enter τ)	60	typical values 60 to 180 days, see comment		
Calculated Contact Length (x) = $\tau * V_x$ — **Suggested Minimum**	5.0	ft	1.5	m
Treatment zone volume	984,800	ft^3	27,886.4	m^2
Treatment zone groundwater volume (volume * effective porosity)	1,694,250	gallons	6,413,879	L

Section D: Design Lifespan For One Application

Section D: Design Lifespan For One Application	10	year(s)	typical values 5 to 10 years	
Estimated total groundwater volume treated over design life	1,803,458	gallons	6,827,305	L

Section E: Electron Acceptors

Inputs		Typical Value	GW Conc. (mg/L)	MW (g/mole)	e^- equiv./ mole	Stoichiometry *Contaminant/H_2* *(wt/wt H_2)*	Hydrogen Demand *(g H_2)*
Dissolved Oxygen (DO)		0 to 8	5	32.0	4	7.94	4300.936716
Nitrate Nitrogen (NO_3^- - N)		1 to 10	10	62.0	5	12.30	5548.949107
Sulfate (SO_4^{2-})		10 to 500	50	96.1	8	11.91	28654.64342
Tetrachloroethene (PCE), C_2Cl_4			5	165.8	8	20.57	1659.790077
Trichloroethene (TCE), C_2HCl_3			1.5	131.4	6	21.73	471.3576734
cis-1,2-dichloroethene (c-DCE), $C_2H_2Cl_2$			0.5	96.9	4	24.05	141.9635024
Vinyl Chloride (VC), C_2H_3Cl			0.1	62.5	2	31.00	22.02042823
Carbon tetrachloride, CCl_4				153.8	8	19.08	
Chloroform, $CHCl_3$				119.4	6	19.74	
sym- tetrachloroethane, $C_2H_2Cl_4$				167.8	8	20.82	
1,1,1-Trichloroethane (TCA), CH_3CCl_3				133.4	6	22.06	
1,1-Dichloroethane (DCA), CH_2CHCl_2				99.0	4	24.55	
Chloroethane, C_2H_5Cl				64.9	2	32.18	
Perchlorate, ClO_4^-				99.4	8	12.33	
Hexavalent Chromium, Cr[VI]				52.0	3	17.20	
User added							
User added							
User added							

Section F: Additional Hydrogen Demand and Carbon Losses

Generation (Potential Amount Formed)	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e^- equiv./ mole	Stoichiometry *Contaminant / H_2* *(wt/wt H_2)*	Hydrogen Demand *(g H_2)*	DOC Released *(moles)*
Estimated Amount of Fe^{2+} Formed	10 to 100	50	55.8	1	55.41	6161.017719	
Estimated Amount of Manganese (Mn^{2+}) Formed		5	54.9	2	27.25	1252.546633	
Estimated Amount of CH_4 Formed	5 to 20	10	16.0	8	1.99	34314.84019	
Target Amount of DOC to Release	60 to 100	100	12.0				56842.10

Design Safety Factor: 3.0 typical values 1 to 3

Calculations assume:
1.) all reactions go to completion during passage through emulsified edible oil treated zone; and,
2.) perfect reaction stoichiometry.

EOS® Requirement Calculations Based on Hydrogen Demand and Carbon Losses

Stoichiometric Hydrogen Demand	545.3	pounds
DOC Released	9,735.7	pounds

EOS® Requirement Based on Hydrogen Demand and Carbon Loss
12,221 lbs

Step 3: EOS® Requirement Based on Attachment by Aquifer Material

Soil Characteristics

Effective treatment thickness, "z_e" (typically less than 40%): 0.25
For Additional Information on Effective Thickness, Click Here

Weight of sediment to be treated: 25,252,522 lbs

Adsorptive Capacity of Soil (accept default or enter site specific value): 0.0010 lbs EOS® / lbs sediment

EOS® Attachment by Aquifer Material[1]
- Fine sand with some clay 0.001 to 0.002 lbs EOS® / lbs soil
- Sand with higher silt/clay content 0.002 to 0.004 lbs EOS® / lbs soil

[1]Default values provided based on laboratory studies completed by NCSU
For Additional Data, Click Here

EOS® Requirement Based on Oil Entrapment by Aquifer Material
25,253 lbs

Summary – How much EOS® do you need?

Suggested Quantity of EOS® for Your Project: 61 drums

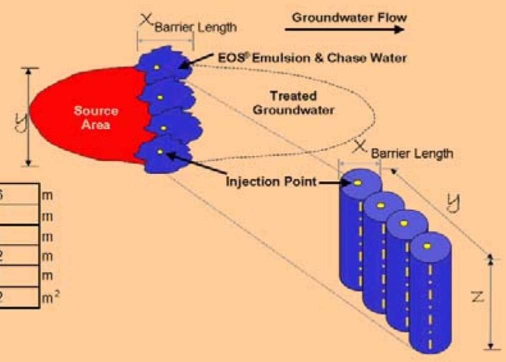
EOS® BARRIER DESIGN WORKSHEET

U.S. Version 2.1e, Rev. Date: February 6, 2008
www.EOSRemediation.com

EOS Remediation, Inc.

Help

Site Name:	171 feet
Location:	700 Dexter Property - Off Property EOS Treatment
Project No.:	0-40 zone a



Step 1: Select a Substrate from the EOS® Family of Bioremediation Products

Substrate Selected (pick from drop down list) — EOS® 598B42 (Preferred for Chlorinateds)

For Product Literature Click Here

Step 2: EOS® Consumption During Contaminant Biodegradation / Biotransformation

Section A: Treatment Area Dimensions

Length of treatment area parallel to groundwater flow, "x"	176	ft	53.6	m
Width of treatment area perpendicular to groundwater flow, "y"	20	ft	6.1	m
Minimum depth to contamination	13	ft	4.0	m
Maximum depth of contamination	40	ft	12.2	m
Treatment thickness, "z"	27	ft	8.2	m
Treatment zone cross-sectional area, A = y * z	540	ft^2	50.2	m^2

Section B: Groundwater Flow Rate / Site Data

Soil Characteristics

Nominal Soil Type (pick from drop down list)	Sand			
Total Porosity (accept default or enter *n*)	0.38	(decimal)		
Effective Porosity (accept default or enter n_e)	0.23	(decimal)		
Soil bulk density; (1-n)*2.65 g/cc (accept calculated or enter dry bulk density)	1.64	g/cc	103	lbs / ft^3

Hydraulic Characteristics

Hydraulic Conductivity (accept default or enter *K*)	1	ft/day	3.5E-04	cm/sec
Hydraulic Gradient (accept default or enter *i*)	0.005	ft/ft		

Note: Since the hydraulic gradient ($i = dh/dx$) is negative, we ask you to enter $-i$ in the EOS® Design Tool so that you can enter a positive number for convenience.

Non-reactive Transport Velocity, $V_x = -(K \times i) / n_e$	0.02	ft/day	0.007	m/day
Groundwater flow rate through treatment zone, $Q = -KiA$	20.20	gallons/day	76.46	L/day

Section C: Calculated Contact Length

Contact time (τ) between oil and contaminants (accept default or enter τ)	60	typical values 60 to 180 days, see comment		
Calculated Contact Length (x) = $\tau * V_x$ — **Suggested Minimum**	5.0	ft	1.5	m

Treatment zone volume	95,040	ft^3	2,691.2	m^3
Treatment zone groundwater volume (volume * effective porosity)	163,507	gallons	618,984	L

Section D: Design Lifespan For One Application

Section D: Design Lifespan For One Application	10	year(s)	typical values 5 to 10 years	
Estimated total groundwater volume treated over design life	237,222	gallons	898,046	L

Section E: Electron Acceptors

Inputs	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e⁻ equiv./ mole	Stoichiometry *Contaminant/H₂ (wt/wt H₂)*	Hydrogen Demand *(g H₂)*
Dissolved Oxygen (DO)	0 to 8	5	32.0	4	7.94	565.7341529
Nitrate Nitrogen (NO_3^- - N)	1 to 10	10	62.0	5	12.30	729.8944927
Sulfate (SO_4^{2-})	10 to 500	50	96.1	8	11.91	3769.158091
Tetrachloroethene (PCE), C_2Cl_4		5	165.8	8	20.57	218.3245174
Trichloroethene (TCE), C_2HCl_3		1.5	131.4	6	21.73	62.00117594
cis-1,2-dichloroethene (c-DCE), $C_2H_2Cl_2$		0.5	96.9	4	24.05	18.67351395
Vinyl Chloride (VC), C_2H_3Cl		0.1	62.5	2	31.00	2.89651049
Carbon tetrachloride, CCl_4			153.8	8	19.08	
Chloroform, $CHCl_3$			119.4	6	19.74	
sym-tetrachloroethane, $C_2H_2Cl_4$			167.8	8	20.82	
1,1,1-Trichloroethane (TCA), CH_3CCl_3			133.4	6	22.06	
1,1-Dichloroethane (DCA), CH_3CHCl_2			99.0	4	24.55	
Chloroethane, C_2H_5Cl			64.9	2	32.18	
Perchlorate, ClO_4^-			99.4	8	12.33	
Hexavalent Chromium, Cr[VI]			52.0	3	17.20	
User added						
User added						
User added						

Section F: Additional Hydrogen Demand and Carbon Losses

Generation (Potential Amount Formed)	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e⁻ equiv./ mole	Stoichiometry *Contaminant / H₂ (wt/wt H₂)*	Hydrogen Demand *(g H₂)*	DOC Released *(moles)*
Estimated Amount of Fe^{2+} Formed	10 to 100	50	55.8	1	55.41	810.4044236	
Estimated Amount of Manganese (Mn^{2+}) Formed		5	54.9	2	27.25	164.7567623	
Estimated Amount of CH_4 Formed	5 to 20	10	16.0	8	1.99	4513.685815	
Target Amount of DOC to Release	60 to 100	100	12.0				7476.86

Design Safety Factor: 3.0 typical values 1 to 3

Calculations assume:
1.) all reactions go to completion during passage through emulsified edible oil treated zone; and,
2.) perfect reaction stoichiometry.

EOS® Requirement Calculations Based on Hydrogen Demand and Carbon Losses

Stoichiometric Hydrogen Demand	71.7	pounds
DOC Released	1,280.6	pounds

EOS® Requirement Based on Hydrogen Demand and Carbon Loss

1,607 lbs

Step 3: EOS® Requirement Based on Attachment by Aquifer Material

Soil Characteristics

Effective treatment thickness, "z_e" (typically less than 40%) — 0.25

For Additional Information on Effective Thickness, Click Here

Weight of sediment to be treated — 2,437,043 lbs

Adsorptive Capacity of Soil (accept default or enter site specific value) — 0.0010 lbs EOS® / lbs sediment

EOS® Attachment by Aquifer Material[1]

- Fine sand with some clay 0.001 to 0.002 lbs EOS® / lbs soil
- Sand with higher silt/clay content 0.002 to 0.004 lbs EOS® / lbs soil

[1]Default values provided based on laboratory studies completed by NCSU

For Additional Data, Click Here

EOS® Requirement Based on Oil Entrapment by Aquifer Material

2,437 lbs

Summary – How much EOS® do you need?

Suggested Quantity of EOS® for Your Project — 6 drums

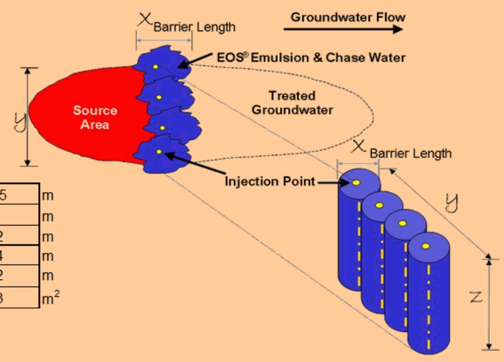
†Exclusive license agreement with Solutions-IES under U.S. Patent # 6,398,960, European Union Patent # EP 1 315 675 and several other pending international patents.
††EOS® is a registered trademark of EOS Remediation, Inc.

EOS® BARRIER DESIGN WORKSHEET

U.S. Version 2.1e, Rev. Date: February 6, 2008
www.EOSRemediation.com

Help

Site Name:	425 feet
Location:	700 Dexter Property - Off Property EOS Treatment
Project No.:	40-80 zone b



Step 1: Select a Substrate from the EOS® Family of Bioremediation Products

Substrate Selected (pick from drop down list) — EOS® 598B42 (Preferred for Chlorinateds)
For Product Literature Click Here

Step 2: EOS® Consumption During Contaminant Biodegradation / Biotransformation

Section A: Treatment Area Dimensions

Length of treatment area parallel to groundwater flow, "x"	425	ft	129.5	m
Width of treatment area perpendicular to groundwater flow, "y"	20	ft	6.1	m
Minimum depth to contamination	40	ft	12.2	m
Maximum depth of contamination	80	ft	24.4	m
Treatment thickness, "z"	40	ft	12.2	m
Treatment zone cross-sectional area, A = y * z	800	ft^2	74.3	m^2

Section B: Groundwater Flow Rate / Site Data

Soil Characteristics

Nominal Soil Type (pick from drop down list)	Sand			
Total Porosity (accept default or enter *n*)	0.38	(decimal)		
Effective Porosity (accept default or enter n_e)	0.23	(decimal)		
Soil bulk density; (1-n)*2.65 g/cc (accept calculated or enter dry bulk density)	1.64	g/cc	103	lbs / ft^3

Hydraulic Characteristics

Hydraulic Conductivity (accept default or enter *K*)	1	ft/day	3.5E-04	cm/sec
Hydraulic Gradient (accept default or enter *i*)	0.005	ft/ft		

Note: Since the hydraulic gradient ($i = dh/dx$) is negative, we ask you to enter $-i$ in the EOS® Design Tool so that you can enter a positive number for convenience.

Non-reactive Transport Velocity, $V_x = -(K \times i) / n_e$	0.02	ft/day	0.007	m/day
Groundwater flow rate through treatment zone, $Q = -KiA$	29.92	gallons/day	113.27	L/day

Section C: Calculated Contact Length

Contact time (τ) between oil and contaminants (accept default or enter τ)	60	typical values 60 to 180 days, see comment		
Calculated Contact Length (x) = $\tau * V_x$ — **Suggested Minimum**	5.0	ft	1.5	m

Treatment zone volume	340,000	ft^3	9,627.7	m^3
Treatment zone groundwater volume (volume * effective porosity)	584,936	gallons	2,214,377	L

Section D: Design Lifespan For One Application

Design Lifespan For One Application	10	year(s)	typical values 5 to 10 years	
Estimated total groundwater volume treated over design life	694,144	gallons	2,627,803	L

Section E: Electron Acceptors

Inputs	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e^- equiv./ mole	Stoichiometry Contaminant/H_2 (wt/wt H_2)	Hydrogen Demand (g H_2)
Dissolved Oxygen (DO)	0 to 8	5	32.0	4	7.94	1655.413959
Nitrate Nitrogen (NO_3^- - N)	1 to 10	10	62.0	5	12.30	2135.769117
Sulfate (SO_4^{2-})	10 to 500	50	96.1	8	11.91	11029.06177
Tetrachloroethene (PCE), C_2Cl_4		5	165.8	8	20.57	638.8468011
Trichloroethene (TCE), C_2HCl_3		1.5	131.4	6	21.73	181.4237511
cis-1,2-dichloroethene (c-DCE), $C_2H_2Cl_2$		0.5	96.9	4	24.05	54.6412047
Vinyl Chloride (VC), C_2H_3Cl		0.1	62.5	2	31.00	8.475577925
Carbon tetrachloride, CCl_4			153.8	8	19.08	
Chloroform, $CHCl_3$			119.4	6	19.74	
sym-tetrachloroethane, $C_2H_2Cl_4$			167.8	8	20.82	
1,1,1-Trichloroethane (TCA), CH_3CCl_3			133.4	6	22.06	
1,1-Dichloroethane (DCA), CH_3CHCl_2			99.0	4	24.55	
Chloroethane, C_2H_5Cl			64.9	2	32.18	
Perchlorate, ClO_4^-			99.4	8	12.33	
Hexavalent Chromium, Cr[VI]			52.0	3	17.20	
User added						
User added						
User added						

Section F: Additional Hydrogen Demand and Carbon Losses

Generation (Potential Amount Formed)	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e^- equiv./ mole	Stoichiometry Contaminant / H_2 (wt/wt H_2)	Hydrogen Demand (g H_2)	DOC Released (moles)
Estimated Amount of Fe^{2+} Formed	10 to 100	50	55.8	1	55.41	2371.351966	
Estimated Amount of Manganese (Mn^{2+}) Formed		5	54.9	2	27.25	482.1003696	
Estimated Amount of CH_4 Formed	5 to 20	10	16.0	8	1.99	13207.64968	
Target Amount of DOC to Release	60 to 100	100	12.0				21878.31

Design Safety Factor: 3.0 typical values 1 to 3

Calculations assume:
1.) all reactions go to completion during passage through emulsified edible oil treated zone; and,
2.) perfect reaction stoichiometry.

EOS® Requirement Calculations Based on Hydrogen Demand and Carbon Losses

Stoichiometric Hydrogen Demand	209.9	pounds
DOC Released	3,747.2	pounds

EOS® Requirement Based on Hydrogen Demand and Carbon Loss
4,704 lbs

Step 3: EOS® Requirement Based on Attachment by Aquifer Material

Soil Characteristics

Effective treatment thickness, "z_e" (typically less than 40%) — 0.25
For Additional Information on Effective Thickness, Click Here

Weight of sediment to be treated — 8,718,377 lbs

Adsorptive Capacity of Soil (accept default or enter site specific value) — 0.0010 lbs EOS® / lbs sediment

EOS® Attachment by Aquifer Material[1]
- Fine sand with some clay 0.001 to 0.002 lbs EOS® / lbs soil
- Sand with higher silt/clay content 0.002 to 0.004 lbs EOS® / lbs soil

[1]Default values provided based on laboratory studies completed by NCSU
For Additional Data, Click Here

EOS® Requirement Based on Oil Entrapment by Aquifer Material
8,718 lbs

Summary – How much EOS® do you need?

Suggested Quantity of EOS® for Your Project — 21 drums

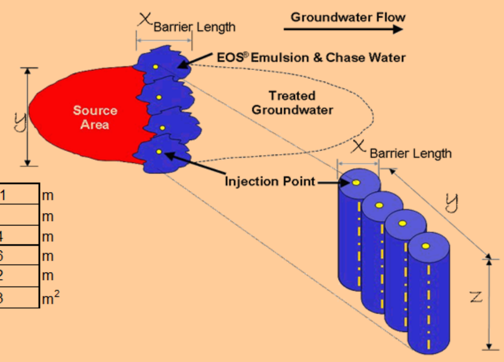
EOS Remediation, Inc.

EOS® BARRIER DESIGN WORKSHEET

U.S. Version 2.1e, Rev. Date: February 6, 2008
www.EOSRemediation.com

Help

Site Name:	430 ft
Location:	700 Dexter Property - Off Property EOS Treatment
Project No.:	80-110 Deep Zone



Step 1: Select a Substrate from the EOS® Family of Bioremediation Products

Substrate Selected (pick from drop down list) — EOS® 598B42 (Preferred for Chlorinateds)
For Product Literature Click Here

Step 2: EOS® Consumption During Contaminant Biodegradation / Biotransformation

Section A: Treatment Area Dimensions

Length of treatment area parallel to groundwater flow, "x"	430	ft	131.1	m
Width of treatment area perpendicular to groundwater flow, "y"	20	ft	6.1	m
Minimum depth to contamination	80	ft	24.4	m
Maximum depth of contamination	120	ft	36.6	m
Treatment thickness, "z"	40	ft	12.2	m
Treatment zone cross-sectional area, A = y * z	800	ft^2	74.3	m^2

Section B: Groundwater Flow Rate / Site Data

Soil Characteristics

Nominal Soil Type (pick from drop down list)	Sand			
Total Porosity (accept default or enter n)	0.38	(decimal)		
Effective Porosity (accept default or enter n_e)	0.23	(decimal)		
Soil bulk density; (1-n)*2.65 g/cc (accept calculated or enter dry bulk density)	1.64	g/cc	103	lbs / ft^3

Hydraulic Characteristics

Hydraulic Conductivity (accept default or enter K)	1	ft/day	3.5E-04	cm/sec
Hydraulic Gradient (accept default or enter i)	0.005	ft/ft		

Note: Since the hydraulic gradient ($i = dh/dx$) is negative, we ask you to enter $-i$ in the EOS® Design Tool so that you can enter a positive number for convenience.

Non-reactive Transport Velocity, $V_x = -(K \times i) / n_e$	0.02	ft/day	0.007	m/day
Groundwater flow rate through treatment zone, $Q = -KiA$	29.92	gallons/day	113.27	L/day

Section C: Calculated Contact Length

Contact time (τ) between oil and contaminants (accept default or enter τ)	60	typical values 60 to 180 days, see comment		
Calculated Contact Length (x) = $\tau * V_x$ — **Suggested Minimum**	5.0	ft	1.5	m
Treatment zone volume	344,000	ft^3	9,741.0	m^2
Treatment zone groundwater volume (volume * effective porosity)	591,818	gallons	2,240,429	L

Section D: Design Lifespan For One Application

Design lifespan	10	year(s)	typical values 5 to 10 years	
Estimated total groundwater volume treated over design life	701,026	gallons	2,653,855	L

Section E: Electron Acceptors

Inputs	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e⁻ equiv./ mole	Stoichiometry Contaminant/H_2 (wt/wt H_2)	Hydrogen Demand (g H_2)
Dissolved Oxygen (DO)	0 to 8	5	32.0	4	7.94	1671.825391
Nitrate Nitrogen (NO_3^- - N)	1 to 10	10	62.0	5	12.30	2156.94269
Sulfate (SO_4^{2-})	10 to 500	50	96.1	8	11.91	11138.40161
Tetrachloroethene (PCE), C_2Cl_4		5	165.8	8	20.57	645.1801961
Trichloroethene (TCE), C_2HCl_3		1.5	131.4	6	21.73	183.2223486
cis-1,2-dichloroethene (c-DCE), $C_2H_2Cl_2$		0.5	96.9	4	24.05	55.1829063
Vinyl Chloride (VC), C_2H_3Cl		0.1	62.5	2	31.00	8.559603051
Carbon tetrachloride, CCl_4			153.8	8	19.08	
Chloroform, $CHCl_3$			119.4	6	19.74	
sym- tetrachloroethane, $C_2H_2Cl_4$			167.8	8	20.82	
1,1,1-Trichloroethane (TCA), CH_3CCl_3			133.4	6	22.06	
1,1-Dichloroethane (DCA), CH_2CHCl_2			99.0	4	24.55	
Chloroethane, C_2H_5Cl			64.9	2	32.18	
Perchlorate, ClO_4^-			99.4	8	12.33	
Hexavalent Chromium, Cr[VI]			52.0	3	17.20	
User added						
User added						
User added						

Section F: Additional Hydrogen Demand and Carbon Losses

Generation (Potential Amount Formed)	Typical Value	GW Conc. (mg/L)	MW (g/mole)	e⁻ equiv./ mole	Stoichiometry Contaminant / H_2 (wt/wt H_2)	Hydrogen Demand (g H_2)	DOC Released (moles)
Estimated Amount of $Fe2^+$ Formed	10 to 100	50	55.8	1	55.41	2394.861058	
Estimated Amount of Manganese (Mn^{2+}) Formed		5	54.9	2	27.25	486.8798129	
Estimated Amount of CH_4 Formed	5 to 20	10	16.0	8	1.99	13338.58759	
Target Amount of DOC to Release	60 to 100	100	12.0				22095.20

Design Safety Factor: **3.0** typical values 1 to 3

Calculations assume:
1.) all reactions go to completion during passage through emulsified edible oil treated zone; and,
2.) perfect reaction stoichiometry.

EOS® Requirement Calculations Based on Hydrogen Demand and Carbon Losses

Stoichiometric Hydrogen Demand	212.0	pounds
DOC Released	3,784.4	pounds

EOS® Requirement Based on Hydrogen Demand and Carbon Loss
4,750 lbs

Step 3: EOS® Requirement Based on Attachment by Aquifer Material

Soil Characteristics

Effective treatment thickness, "z_e" (typically less than 40%) — 0.25
For Additional Information on Effective Thickness, Click Here

Weight of sediment to be treated — 8,820,946 lbs

Adsorptive Capacity of Soil (accept default or enter site specific value) — 0.0010 lbs EOS® / lbs sediment

EOS® Attachment by Aquifer Material[1]
- Fine sand with some clay 0.001 to 0.002 lbs EOS® / lbs soil
- Sand with higher silt/clay content 0.002 to 0.004 lbs EOS® / lbs soil

[1]Default values provided based on laboratory studies completed by NCSU
For Additional Data, Click Here

EOS® Requirement Based on Oil Entrapment by Aquifer Material
8,821 lbs

Summary – How much EOS® do you need?

Suggested Quantity of EOS® for Your Project — 22 drums

APPENDIX B
PNOD ANALYTICAL RESULTS

Carus Remediation Technologies
Remediation Report

31 August 2012

Customer: Sound Earth Strategies
2811 Fairview Ave East Suite 2000
Seattle, WA 98102

Attention: Charles Cacek, Brian Dixon

From: Kelly Frasco

TECH # 12-134

Subject: RemOx® S ISCO Reagent Permanganate Natural Oxidant Demand

Summary
The overall average RemOx® S ISCO reagent permanganate natural oxidant demand (PNOD) at 48 hours for the soil sample was determined to be 18.328 g/kg. The demands ranged from 18.018 g/kg to 18.916 g/kg. These values are calculated on a weight as potassium permanganate ($KMnO_4$) per dry weight of soil.

Background
One soil sample was received from Sound Earth Strategies from the 700 Dexter project on August 24, 2012. The soil sample designation was Comp1. The sample was analyzed for permanganate natural oxidant demand. The measurement of the permanganate natural oxidant demand is used to estimate the concentration of permanganate that will be consumed by the natural reducing agents during a given time period of 48 hours.

Experimental
The sample was analyzed for permanganate natural oxidant demand following ASTM D7262-07 Test Method A. A brief summary is as follows:

To determine the PNOD, the soil was baked at 105°C for 24 hours then allowed to cool to room temperature. The soil was then blended and passed through a U.S. 10 sieve (2 mm). Reactors were loaded with 50 grams of soil and 100 mL of 20 g/L $KMnO_4$ for an initial dose of 40 g/kg $KMnO_4$ on a dry soil weight basis at a 1:2 soil to aqueous reagent ratio. Each soil dose is performed in triplicate. The reaction vessels were inverted once to mix the reagents. Residual permanganate (MnO_4^-) was determined at 48 hours. The demands were calculated on a dry weight basis.

Results
The permanganate demand is the amount of permanganate consumed in a given amount of time. It should be noted that in a soil or groundwater sample, the oxidation of any compound by permanganate is dependent on the initial dose of permanganate and the reaction time available. As the permanganate dose is increased, the reaction rate and oxidant consumption may also

increase. Some compounds that are not typically oxidized by permanganate under low doses can become reactive with permanganate at higher concentrations.
The 48-hour PNOD results can be seen in Table 1 (on a dry soil basis).

Table 1: 48-Hour PNOD *

Soil Sample Identification	Average and Standard Deviation (g/kg)	Replicate 1 (g/kg)	Replicate 2 (g/kg)	Replicate 3 (g/kg)
Comp1	18.328 ± 0.510	18.018	18.050	18.916
Overall Average	18.328			

*Demands were calculated on a weight $KMnO_4$/dry soil weight basis from an initial dose of 40.0 g/kg $KMnO_4$ initial dose at a 1:2 soil to aqueous solution ratio

Conclusions

For this application the amount of permanganate needed will be dependent on the reaction time allowed. On average, the soil sample had a 48-hour permanganate demand value of 18.328 g/kg. The demands ranged from 18.018 g/kg to 18.916 g/kg. Generally, remediation sites with a soil demand of less than 20.0 g/kg at the time of interest are favorable for *in situ* chemical oxidation with permanganate (see Table 2 for additional information).

Table 2: Correlation of Permanganate Natural Oxidant Demand Results*

PNOD (g/kg)	**Rank**	Comment
<10	Low	ISCO with MnO_4^- is recommended. Soil contribution to MnO_4^- demand is low.
10-20	Moderate	ISCO with MnO_4^- is recommended. Soil contribution to MnO_4^- demand is moderate. Economics should be considered.
>20	High	ISCO with MnO_4^- is technically feasible. Other technologies may provide lower cost alternatives.

*Dry Weight Basis

APPENDIX C
PERMANGANATE DOSE CALCULATIONS

Appendix C
Permanganate Dose Calculations
700 Dexter Property
700 Dexter Avenue North
Seattle, Washington

Calculate the amount of $KMnO_4$ required to treat impacted soil on Property:

Area of impacted soil =	49,000.0	ft^2	revised area for just the property and then 15 ft around barrier walls
Depth of impacted soil =	67.0	ft	
Volume of impacted soil =	3,283,000.0	ft^3	(Volume = Area x Depth)
	121,592.6	bcy	
Density of impacted soil:	3,250	lb/bcy	(Reference: Caterpillar Performance Handbook 416C)
	1,477	kg/yd^3 Bank	(Reference: Caterpillar Performance Handbook 416C)
Natural oxidant demand =	18.9	g/kg $KMnO_4$	(Reference: Carus Remediation Report, October 27, 2011)
Mass of soil =	179,625,421	kg	(Density x Volume)
Required $KMnO_4$ for On-Property Treatment =	3,394,920,455	g	(Mass x Natural Oxidant Demand)
	3,394,920	kg	
	3,742.3	**tons**	**Subtotal for On Property Treatment**

Calculate the amount of $KMnO_4$ required to treat impacted soil off Property:

Shallow Treatment Zone	209.0		
Intermediate Treatment Zone	562.0		
Deep Treatment Zone	357.4		
	1,128.4	**tons**	**Subtotal for Off Property Treatment**

Calculate the amount of $KMnO_4$ required to treat impacted groundwater:

Area of impacted groundwater =	280,000.0	ft^2
Depth of impacted groundwater =	85.0	ft
Porosity =	20%	
Volume of impacted groundwater =	3.560E+07	gallons
Volume of impacted groundwater =	2.399E+07	liter (l)
Molecular weight of $KMnO_4$ =	158.034	g/g-mol

Groundwater contaminants	Vinyl Chloride	cis-1-2-DCE	TCE	PCE		
Average concentration of contaminant within plume	36	375	298	13,322	ug contaminant/l groundwater	
molecular weight	62.5	97	131.4	165.8	g/g-mol	(Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Groundwater, 2nd Edition, January 2005)
Mole ratio of $KMnO_4$ to oxidize contaminant	3.33	2.67	2.00	1.33	mol KMnO4/mol contaminant	
Amount of KMnO4 to oxidize contaminant	7212.78	39,074.48	17172.20	406181.31	g $KMnO_4$	(ug contaminant/l groundwater)(g/10^6ug)(1/molecular weight of contaminant)(volume of groundwater)(mol KMnO4/mol contaminant)(molecular weight of KMnO4)

$KMnO_4$ required to treat average contaminant mass in groundwater =	469,640.8	g $KMnO_4$	
	1,034.45	lbs KMnO4	
	0.52	**tons**	**Subtotal for Site Groundwater**

Amount of KMnO4 required to treat soil and groundwater 4,871.14 tons TOTAL