# Report
# Feasibility Study
# North Lot Development
# Seattle, Washington

May 23, 2011

Prepared for

**North Lot Development, LLC**
**Seattle, Washington**

LANDAU ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

# EXECUTIVE SUMMARY

This Feasibility Study (FS) report was prepared for the North Lot Property (Property) in Seattle, Washington. North Lot Development (NLD), as prospective purchaser of the Property, has conducted several investigations to characterize soil, soil vapor, and groundwater conditions at the Property as documented in the Remedial Investigation (RI) report (Landau Associates 2011) and supplemented by the data gaps and soil vapor investigations, which are presented in this FS report. The FS develops and evaluates remedial action alternatives and identifies a preferred remedial action alternative that will address the contamination at the Property consistent with the requirements of Washington State Model Toxics Control Act (MTCA; Chapter 173-340 WAC).

Property cleanup, including the RI and this FS, is being accomplished under MTCA. NLD, as the prospective purchaser of the Property, has been in communication with the Washington State Department of Ecology (Ecology) since April 2008 regarding a suitable regulatory mechanism to facilitate Ecology's review of and concurrence on the RI, FS, and Cleanup Action Plan (CAP). NLD submitted a proposal for a Prospective Purchaser Consent Decree (PPCD) to Ecology in May 2008. Pursuant to the letter dated April 22, 2009 from then-Ecology Director Jay Manning, Ecology has proceeded with temporary use of Voluntary Cleanup Program (VCP) staff for completion of the RI, FS, and CAP pending transition to the formal cleanup program and negotiation of the PPCD (Ecology 2009a).

## PROPERTY DESCRIPTION

The Property is known as the "North Lot Development" and is located in Seattle, Washington's south end Central Business District adjacent to Qwest Field, as shown on Figure 1. The Property consists of 3.85 acres currently owned by King County, and is located southeast of the intersection of South King Street and Occidental Avenue South in Seattle, Washington (Figure 2). The Property consists of a paved parking lot, which is used for commuter parking and parking for events at Qwest Field.

## PROPERTY BACKGROUND

The Property was originally undeveloped tideflats of Elliott Bay that, along with other properties in the area, were filled in the late 1890s and early 1900s to allow development in the area. The Property was operated as a rail yard from the late 1800s until the late 1960s. The heterogeneous fill material at the Property was placed over the former tideflat surface and is composed of dredged sediments, wood, and demolition debris including material resulting from the Seattle Fire of 1889, and remnants of the former rail yard operations and construction debris (i.e., brick, metal, and concrete). Prior to the placement of the fill, the area that includes the Property was developed with streets, buildings, and railroad tracks elevated on and supported by pilings. Several sets of railroad tracks were formerly present on the Property. Structures associated with the rail yard included engine maintenance buildings, paint shops, track switching areas, and materials storage areas. In addition, two gasoline stations were formerly located in the northwestern portion of the Property at different times between the late 1930s and approximately 1966. King County purchased the Property in the 1970s to facilitate construction of the Kingdome stadium to the south of the Property and with the vision that the site would ultimately become a mixed-use/mixed-income housing development. The Kingdome was later demolished and replaced with the current Qwest Field development and in 2005 King County initiated a process for the selection of a developer to purchase the property and complete the vision for the Property. The Property has been used as a parking lot since the 1970s (Landau Associates 2007). The current conditions at the Property do not present a risk to Property users because contaminated soil is capped by the existing asphalt pavement and groundwater at the Property is not used.

The Property will be developed by NLD as part of Transit-Oriented Development (TOD) and will encompass two full city blocks with approximately 1.5 million gross square feet ($ft^2$) of buildable area. The planned development will include two podiums (east and west blocks) consisting of two to five floors of above-grade parking and retail uses with residential or commercial uses above the podium levels.

**PROPERTY INVESTIGATIONS**

The investigations conducted to date to characterize soil and groundwater at the Property include the Phase II investigation, the RI field investigation, the supplemental investigation, and the data gaps investigation. An investigation of soil vapor in the northwestern portion of the Property was also conducted as part of the preparation of this FS. The results of the soil vapor investigation are presented in a separate report, which is provided as Appendix A of this FS report.

**PHYSICAL CONDITIONS**

The stratigraphy within the depth range of the explorations at the Property consists primarily of four geologic units identified as: fill, native marine sediments, alluvial deposits, and glacial deposits. The borings and monitoring wells to characterize the nature and extent of soil and groundwater contamination at the Property were focused on the fill unit overlying the native marine sediments. The unconfined water table aquifer beneath the Property is present within the fill. The groundwater flow at the Property is locally affected by a foundation drain system at the King Street Center building at 201 South King Street to the north of the property. The foundation drain system, which is a passive groundwater collection system, creates a low in the elevation of the groundwater table resulting in localized flow toward the building. The groundwater low locally affects groundwater flow in the central and eastern portions of the

Property, with flow from the Property to the northeast, north, or northwest, toward the building, depending on location.

## AREAS THAT REQUIRE REMEDIAL ACTION

Based on the investigations conducted to date, the Property contains areas where the constituent concentrations detected in soil and groundwater are greater than the cleanup levels. However, the analytical data indicate that the extent of impacts to groundwater from the soil contamination at the Property is limited and that contamination in groundwater does not pose a threat to human health or the environment; therefore, groundwater treatment options have not been evaluated and the cleanup action alternatives developed in the FS focus on areas of soil with contaminant concentrations greater than the cleanup levels. The areas where soil contamination will be addressed are:

- Northwestern portion of the Property
- Northeastern portion of the Property
- Property-wide.

The cleanup action alternatives were developed in the context of the nature and extent of the soil contamination as it relates to the conceptual model of the shallow subsurface at the Property (Figure 3). The Property consists of heterogeneous fill that was placed over the native tideflat surface to allow development of the area in the vicinity of the Property. The soil contamination at the Property consists of two distinct, localized areas with contaminant concentrations significantly above the cleanup levels due to historical operations, and Property-wide concentrations above the cleanup levels that are associated with the heterogeneous fill material. The localized areas consist of benzene in soil in the northwestern portion of the Property that is primarily above the water table and the creosote-like material in the northeastern portion of the Property that is present at the base of the fill. The Property-wide contamination includes polycyclic aromatic hydrocarbons (PAHs) and metals that have been detected in various shallow soil samples [0 to 2 feet (ft) below ground surface (BGS)], but that is anticipated to be dispersed throughout the fill.

The discussion of the areas identified for remedial action and the remedial action alternatives in the section below focuses on the Property in anticipation of cleanup under the formal program and under a PPCD. The need for and type of additional remedial action in those areas where contamination may extend beyond the Property boundary will be determined as part of the PPCD process.

## SOIL

The area for soil remedial action in the northwestern portion of the Property has been defined based on the remediation level for benzene in soil that is protective of the vapor intrusion pathway (see below). If soil in the northwestern portion of the Property with benzene concentrations greater than the remediation level were to be excavated or treated , the surface area would be approximately 3,000 $ft^2$ and soil would be addressed from the surface to the water table at approximately 8 ft BGS. The amount of soil excavated for off-Property disposal would include approximately 720 cubic yards ($yd^3$) in addition to the amount removed for the Property-wide excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development.

The area for soil remedial action in the northeastern portion of the Property has been defined based on the extent of the creosote-like material encountered in borings on the Property up to the Property boundary. If the creosote-like material and the associated contaminated soil were to be treated in the northeastern portion of the Property, the surface area would be approximately 8,800 $ft^2$ and soil would be addressed from the surface to an average depth of approximately 20 ft BGS (the average depth of the native marine sediment layer in the northeastern portion of the Property). The volume of soil treated would be approximately 6,010 $yd^3$ in addition to the amount removed for the Property-wide excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development.

If the fill material present over the native marine sediments layer was to be completely removed from the Property, the area requiring removal would be approximately 167,500 $ft^2$, and material would be removed to the depth of the contact with the native marine sediments (approximately 25 ft BGS). The amount of soil excavated for off-Property disposal would include approximately 155,130 $yd^3$ in addition to the amount removed for the Property-wide excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development.

### GROUNDWATER

The extent of impacts to groundwater from soil contamination appears to be limited. There is no evidence of soil contaminants leaching to groundwater, or of contaminants in groundwater migrating off-Property at concentrations greater than the cleanup levels. For this reason, alternatives are evaluated that will provide passive measures for protection of groundwater, such as a cap. The need for long-term groundwater monitoring is also considered part of the assembly and evaluation of the soil cleanup action alternatives.

### SOIL VAPOR

The potential for vapor intrusion based on the soil vapor concentrations observed at the Property was evaluated using the Johnson & Ettinger (J&E) model (Johnson and Ettinger 1991) and using the methodology outlined in the Ecology draft soil vapor guidance document (Ecology 2009b). The results of the soil and soil vapor sampling, and evaluations using the J&E model and methodology in the Ecology guidance document indicate that the benzene concentrations in soil at the Property do not pose a potential vapor intrusion risk. However, in an effort to avoid prolonged technical discussions with Ecology that could impact the schedule for development of the Property, NLD has proposed a remediation level for benzene in soil of 780 micrograms per kilogram (µg/kg).

## DESIGNATION OF POINTS OF COMPLIANCE

The standard point of compliance where soil cleanup levels protective of direct human contact must be met is throughout a site from the ground surface to 15 ft BGS, in accordance with Washington Administrative Code (WAC) 173-340-740(6)(d). The standard point of compliance where soil cleanup levels protective of groundwater must be met is throughout the soil column, in accordance with WAC 173-340-740(6)(b). For the Property, the proposed soil point of compliance will be throughout the soil column throughout the Property.

The standard point of compliance for groundwater is throughout groundwater at the Property. The proposed conditional point of compliance for groundwater for protection of surface water quality is the property boundary or as close to the property boundary as practicable. For a conditional point of compliance [in accordance with WAC 173-340-720(8)(c, d)], there must be a demonstration that it is not practicable to meet the cleanup levels throughout the site in a reasonable restoration timeframe and that all practicable methods of treatment are to be used in the site cleanup. As described in Section 8.2.2, the preferred cleanup action alternative is permanent to the maximum extent practicable, and meets these two criteria. Therefore, the proposed conditional point of compliance is the Property boundary for most of the Property and as close to the Property boundary as practicable in the northeastern portion of the Property where the creosote-like material is present along the Property boundary because it is not feasible to install a compliance monitoring well in the creosote-like material. The compliance monitoring plan, which is included in the CAP, identifies the approach to document groundwater quality at the conditional point of compliance and contingent groundwater treatment is included if the compliance monitoring results indicate the potential for off-Property migration of contaminants.

## REMEDIAL ACTION ALTERNATIVES

Six alternatives that meet regulatory requirements and could be undertaken with the development plans are evaluated in this FS to address contaminated media in the three areas of concern at the Property. The six alternatives incorporate the most viable cleanup action technologies within the general response action categories of containment, source removal (i.e., excavation), treatment, and institutional controls. The six alternatives are:

- Alternative 1: Containment including a Vapor Barrier
- Alternative 2: Hotspot Excavation and Containment
- Alternative 3: Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Containment, and Added Measures to Prevent Contact with Shallow Contaminated Soil Outside the Footprints of the Building Foundations
- Alternative 4: Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Focused Treatment of Creosote Area, and Containment
- Alternative 5: Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Excavation of Fill Material across the property to 5 ft BGS, and Containment
- Alternative 6: Complete Excavation of Fill Material.

The alternatives were developed with the understanding that the proposed use of the Property includes structures, incorporating commercial/retail, upper-floor office, and upper-floor residential uses, over the entire Property (except for Center Drive Lane). With Alternatives 1, 2, and 4, shallow contaminated soils remain in place. For Alternative 3, shallow contaminated soils would remain in place beneath the building foundations and be removed to 5 ft BGS in landscaped areas or contained beneath concrete in the areas outside the footprints of the building foundations within the Property boundary. For all alternatives except Alternative 6, contaminated soil deeper than 5 ft BGS would remain in place. For Alternative 6, all contaminated soil above the native marine sediments would be removed. Due to the need for removal of the existing surface material at the Property for construction of the planned development, all of the alternatives include removal and appropriate off-Property disposal of the existing asphalt, the associated subgrade, and soil/fill to a depth of approximately 1.5 ft BGS as part of Property development, regardless of the preferred remedial alternative.

## CONSIDERATION OF THE ALTERNATIVES WITH RESPECT TO FUTURE PROPERTY DEVELOPMENT

The Property development by NLD as part of a TOD will encompass two full city blocks with approximately 1.5 million gross $ft^2$ of buildable area. The planned development includes two podiums (east and west blocks) that will consist of first- and second-floor commercial/retail space and parking, third- and fourth-floor parking and residential space as well as parking/office/residential space above the fourth floors.

The planned development project does not include below-grade uses or features such as a basement or an underground garage. As discussed above, construction for Property development will include removal of the existing surface material to a depth of approximately 1.5 ft BGS across the entire Property, including the existing asphalt surface, associated subgrade, and shallow soil, and excavation for the pile caps, elevator pits, and grade beams to prepare the Property for construction of the impervious surfaces and high-rise buildings associated with Property development. Based on current construction estimates, an estimated 16,500 $yd^3$ of existing surface material will be excavated as part of the proposed construction. Excavated material, including shallow contaminated soil, removed during construction will be disposed off-Property consistent with MTCA regulations, as applicable.

The cleanup will be conducted as part of the planned development that will be constructed consistent with the City of Seattle Master Use Permit (MUP) in accordance with market conditions. The west block will be constructed first. The four-story podium structure on the west block will be designed and constructed in anticipation of the construction of future high-rise buildings; therefore, all the physical underground requirements for the high-rise buildings will be built during the initial construction so there is no need for future disturbance of the podium foundation. The construction elements for the podium include underground and ground-level items such as piles, pile caps, grade beams, elevator pits, slab-on-grade foundations and underground utilities. Once the podium is constructed, there will be no need to penetrate below the ground level.

The east block will be developed as market conditions allow and in accordance with the requirements of the MUP. To the east of the Center Drive Lane, the asphalt will be cleaned, repaired, and maintained until development of the east block occurs. The groundwater compliance monitoring plan included in the CAP will be implemented Property-wide following cleanup and development of the west block.

Future construction and maintenance activities at the Property following development will be limited by the cap provided by the concrete pavement and structures associated with Property development. Future construction workers will be made aware of the presence of residual contamination remaining beneath the cap by institutional controls and plan documents, which will restrict access to Property soil. Institutional controls will include, as required, provisions for a soil management plan and health and safety plan for any work, including any post-development activities at the Property such as additional utility installation, requiring disturbance of the cap. An institutional control to prohibit groundwater use at the Property will also be included.

## REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) define the goals of the cleanup that must be achieved to adequately protect human health and the environment. As discussed above, the current conditions at the Property do not present a risk to Property users because contaminated soil is capped by the existing asphalt pavement and groundwater at the Property is not used. For cleanup of the Property, based on the characterization of Property conditions and the identified cleanup levels, the action-specific and media-specific RAOs identified for the Property consist of:

- RAO-1: Prevent direct human contact with soil containing contaminants from the Property at concentrations greater than the direct contact soil cleanup levels.
- RAO-2: Prevent human ingestion of groundwater containing contaminants from the Property at concentrations greater than the groundwater cleanup levels.
- RAO-3: Prevent groundwater containing contaminants from the Property at concentrations greater than the groundwater cleanup levels from migrating off site.
- RAO-4: Prevent human inhalation of volatile petroleum hydrocarbons (including benzene) from Property contaminants at concentrations in indoor air that may cause an incremental increase in risk greater than acceptable levels.

Each of these RAOs can be achieved by preventing exposure to the contaminated media through containment and monitoring, or through treatment or removal of the contaminated media. Each of the six cleanup action alternatives achieves these four RAOs and meets all of the MTCA threshold requirements.

## COMPARATIVE ANALYSIS OF CLEANUP ACTION ALTERNATIVES AND SELECTION OF PREFERRED ALTERNATIVE

A disproportionate cost analysis (DCA) was conducted as part of the comparative analysis of the remedial action alternatives to determine which alternative is permanent to the maximum extent practicable for the Property. Alternative 6 is considered the most permanent alternative developed in this FS per WAC 173-340-360(3)(e)(ii)(B) and is also the most expensive alternative. Alternative 6 consists of excavation of all fill at the Property down to the native marine sediment layer and would remove all contaminated soil, but the DCA shows that the cost of Alternative 6 is significantly disproportionate to the benefit. The complete DCA analysis is presented in Table 1 and the rankings and associated rationale for the various rankings are presented in Table 2. A relative cost and relative benefit analysis was also performed as part of the DCA. The relative cost and benefit analysis is illustrated on Figure 4. The following summarizes the findings and conclusions of the DCA.

- The results of the comparative overall benefit analysis range from 3.4 (Alternative 1) to 8.0 (Alternative 6), with Alternatives 5 and 3 having the next two highest rankings of 6.2 and 5.8, respectively (as shown on Figure 4).
- Alternatives 5 and 3 have the highest relative benefits (78% and 73%, respectively) relative to the most permanent alternative (Alternative 6).
- The relative estimated remedy costs of the highest ranked alternatives are 8.48 (Alternative 6), 1.91 (Alternative 5), and 1.32 (Alternative 3).
- The relative comparative benefit of the highest ranked alternatives are 2.35 (Alternative 6), 1.82 (Alternative 5), and 1.71 (Alternative 3).
- The costs of Alternatives 1, 4, 5, and 6 are considered disproportionate to the incremental benefits.
- Alternatives 2 and 3 are considered permanent to the maximum extent practicable.

- Based on comparative overall benefit (5.8), relative benefits (73%), relative estimated remedy cost (1.32), relative comparative benefit (1.71), and permanence to the maximum extent practicable, Alternative 3 is selected as the preferred alternative for the Property.

As shown in Table 1, Alternative 5 ranks slightly higher in comparative overall benefit (6.2 versus 5.8) than Alternative 3, but has an estimated cost that is 1.4 times greater and the DCA demonstrates that the cost of Alternative 5 is disproportionate to the incremental benefits.

## PREFERRED REMEDIAL ACTION ALTERNATIVE

Based on this FS, including the DCA, the preferred remedial action alternative for the Property is Alternative 3, which consists of hotspot excavation of contaminated soil from the northwestern portion of the Property (former gasoline station area) to the groundwater table, enhanced bioremediation for residual soil/groundwater impacted by gasoline and benzene near the elevation of the water table in the area of hotspot excavation, a surface cap over the entire property, added measures to prevent contact with shallow contaminated soil outside the footprints of the building foundations, institutional controls, and groundwater monitoring. Selection of this alternative over Alternatives 1, 2, 4, 5, and 6 is primarily based on the following:

- Alternative 3 achieves each of the four RAOs and each of the threshold requirements, uses permanent solutions to the maximum extent practicable as described in Section 8.2.3, and provides for a reasonable restoration timeframe as described in Section 8.2.4.
- Focused excavation of contaminated soil to the depth of the groundwater table and focused treatment of residual contamination in soil and groundwater in the northwestern portion of the Property would remove the soil with the highest benzene and gasoline concentrations at the Property. The focused excavation and bioremediation will remove contaminant concentrations that could be a source for groundwater contamination or soil vapor, and would eliminate the need for a soil vapor barrier and installation and operation of a soil vapor control system, as would be needed under Alternative 1.
- Excavation to 5 ft BGS or providing a concrete barrier outside the footprints of the building foundations to mitigate the potential for future exposure to construction workers by either permanently removing additional contaminated soil or providing added physical containment.
- As discussed in Section 8.2.3, Alternative 3 ranks medium to high in all criteria, with the exception of permanence where it ranks medium low for the relative benefits ranking. However, Alternative 3 has a cost that is proportionate to the benefits, and is permanent to the maximum extent practicable.

Alternative 3 is also compatible with the development planned for the Property. Figure 5 shows the conceptual model for the Property following incorporation of the remedial action elements included in Alternative 3 and the planned construction elements associated with Property development (i.e., removal of the existing surface material to approximately 1.5 ft BGS and the planned buildings and physical improvements).

This page intentionally left blank.

# TABLE OF CONTENTS

# FIGURES



# TABLES

# APPENDICES

# LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| ARAR | Applicable or Relevant and Appropriate Requirement |
| BGS | Below Ground Surface |
| BTEX | Benzene, Toluene, Ethylbenzene, and Xylenes |
| CAP | Cleanup Action Plan |
| cPAH | Carcinogenic Polycyclic Aromatic Hydrocarbon |
| DCA | Disproportionate Cost Analysis |
| Ecology | Washington State Department of Ecology |
| FS | Feasibility Study |
| ft | Feet |
| $ft^2$ | Square Feet |
| J&E | Johnson and Ettinger |
| MCL | Maximum Contaminant Level |
| MDL | Method Detection Limit |
| µg/kg | Micrograms per kilogram |
| µg/L | Micrograms per Liter |
| $\mu g/m^3$ | Micrograms per Cubic Meter |
| mg/kg | Milligrams per Kilogram |
| mg/L | Milligrams per Liter |
| MTCA | Washington State Model Toxics Control Act |
| MUP | Master Use Permit |
| NAVD88 | North American Vertical Datum of 1988 |
| ng/kg | Nanograms per Kilogram |
| NLD | North Lot Development |
| NPDES | National Pollutant Discharge Elimination System |
| ORC | Oxygen Release Compound |
| PAH | Polycyclic Aromatic Hydrocarbon |
| PCB | Polychlorinated Biphenyl |
| PPCD | Prospective Purchaser Consent Decree |
| Property | North Lot Property |
| RAO | Remedial Action Objective |
| RCW | Revised Code of Washington |
| RI | Remedial Investigation |
| SWPPP | Stormwater Pollution Prevention Plan |
| TCDD | 2,3,7,8 Tetrachlorodibenzo-p-dioxin |
| TEQ | Toxic Equivalency Quotient |
| TOD | Transit-Oriented Development |
| TPH | Total Petroleum Hydrocarbons |
| TPH-D | Diesel-Range Total Petroleum Hydrocarbons |
| TPH-G | Gasoline-Range Total Petroleum Hydrocarbons |
| TPH-O | Motor Oil-Range Total Petroleum Hydrocarbons |
| VAF | Vapor Attenuation Factor |
| VCP | Voluntary Cleanup Program |
| WAC | Washington Administrative Code |
| $yd^3$ | Cubic Yards |

This page intentionally left blank.

# 1.0 INTRODUCTION

This document presents the results of a feasibility study (FS) conducted for the North Lot Property (Property) in Seattle, Washington. North Lot Development (NLD), as prospective purchaser of the Property, has conducted several investigations to characterize soil and groundwater conditions at the Property as documented in the Remedial Investigation (RI) report (Landau Associates 2011) and supplemented by the results of the data gaps investigation and the soil vapor investigation, which are presented in this FS report. This FS develops and evaluates remedial action alternatives and identifies a preferred remedial alternative that will address the contamination at the Property.

The results of the data gaps investigation are presented in Section 2.0 and include additional groundwater quality and flow data collected in February and April 2010 after completion of the RI report. The results of the soil vapor investigation are documented in the *Focused Soil Vapor Investigation Report, North Lot Development, Seattle, Washington* (Appendix A). A summary of the findings and conclusions presented in the soil vapor report is included in Section 3.0 of this FS report. Section 4.0 of this FS report incorporates the data from the data gaps investigation and the soil vapor investigation with the data presented in the RI to provide a comprehensive summary of the nature and extent of contamination at the Property.

The RI report concluded that remedial action evaluation was warranted for impacted soil and groundwater at the Property. This FS develops and evaluates remedial action alternatives to address contamination at the Property. This FS also develops proposed soil and groundwater cleanup levels and identifies proposed points of compliance.

## 1.1 STATEMENT OF PURPOSE

The purpose of the FS is to present the analysis needed to select a cleanup action for the North Lot Property. Specifically, the North Lot Property FS:

- Develops and evaluates cleanup action alternatives that protect human health and the environment.
- Identifies a preferred cleanup alternative for the Property.

This document presents the information collected and the evaluations performed to achieve this purpose.

The FS focuses on the Property, as described in Section 1.2, in anticipation of cleanup under the Washington State Department of Ecology (Ecology) formal program and under a Prospective Purchaser /Consent Decree (PPCD) between NLD and Ecology, as discussed in Section 1.3. The need for and type of additional remedial action, if any, in those limited areas where contamination may extend beyond the Property boundaries will be determined as part of the PPCD process. Based on the data developed to date and discussed in Section 4.0, the extent of any off-Property contamination is limited and the preferred alternative includes elements that could, if appropriate, be used to address the limited contamination beyond the Property boundaries.

## 1.2 PROPERTY DESCRIPTION AND BACKGROUND

The Property is known as "North Lot" (King County parcel number 7666204878) located in Seattle, Washington's south end Central Business District adjacent to Qwest Field, as shown on Figure 1. The Property consists of 3.85 acres currently owned by King County, and is located southeast of the intersection of South King Street and Occidental Avenue South in Seattle, Washington (Figure 2). The Property consists of a paved parking lot, which is used for commuter parking and parking for events at Qwest Field. Based on a Phase I Environmental Site Assessment completed by Landau Associates (dated March 28, 2007), the Property was originally undeveloped tideflats of Elliott Bay. The Property was filled in the late 1890s and early 1900s and was operated as a rail yard from the late 1800s until the late 1960s. The heterogeneous fill material underlying the Property that was placed over the former tideflat surface is composed of dredged sediments, wood, and demolition debris including material resulting from the Seattle Fire of 1889, and remnants of the former rail yard operations and construction debris (i.e., brick, metal, and concrete). Prior to filling, the area that includes the Property was initially developed with streets, buildings, and railroad tracks elevated on and supported by pilings. Several sets of railroad tracks were formerly present on the Property. Structures associated with the rail yard included engine maintenance buildings, paint shops, track switching areas, and materials storage areas. In addition, two gasoline stations were formerly located in the northwestern portion of the Property at different times between the late 1930s and approximately 1966. King County purchased the Property in the 1970s to facilitate construction of the Kingdome stadium to the south of the Property and with the vision that the site would ultimately become a mixed-use/mixed-income housing development. The Kingdome was later demolished and replaced with the current Qwest Field development and in 2005 King County initiated a process for the selection of a developer to purchase the property and complete the vision for the Property. The Property has been used as a parking lot since the 1970s (Landau Associates 2007). The Property is served by various utilities including a stormwater drainage system for the parking lot that will be removed as part of the planned development. The King County main storm drain (102 inches in diameter) runs along South King Street to the north of the Property and is immediately adjacent to the north Property boundary for about 200 feet (ft) to the east from the intersection of South King Street and Occidental Avenue South. The King County combined sewer main (also 102 inches in diameter) runs south from the intersection of South King Street and Occidental Avenue South along the center of Occidental Avenue South to the west of the Property. Relevant historical Property features are shown on Figure 6.

Existing Property features include asphalt paving, a stormwater drainage system, and other below-grade utilities on and adjacent to the Property (Figure 7). The current conditions at the Property do not present a risk to Property users because contaminated soil is capped by the existing asphalt pavement and groundwater at the Property is not used.

The Property will be developed by NLD as part of Transit-Oriented Development (TOD) and will encompass two full city blocks with approximately 1.5 million gross square feet ($ft^2$) of buildable area. The planned development will include two podiums (east and west blocks) that will contain first- and second-floor parking and retail space, third- and fourth-floor parking, and residential space, and parking/office/residential space above the fourth floors. Above the podium on the east block will be a single office tower, and the west block will include three high-rise structures with more than 400 units of new housing (including 100 affordable units directly related to the development, at least 30 of which will be constructed at the Property).

## 1.3 REGULATORY FRAMEWORK

Property cleanup, including the RI and this FS, is being accomplished under the Washington State Model Toxics Control Act (MTCA). NLD, as the prospective purchaser of the Property, has been in communication with Ecology since April 2008 regarding a suitable regulatory mechanism to facilitate Ecology's review of and concurrence on the RI, FS, and Cleanup Action Plan (CAP). NLD submitted a proposal for a Prospective Purchaser/Consent Decree (PPCD) to Ecology in May 2008. Pursuant to the letter dated April 22, 2009 from then-Ecology Director Jay Manning, Ecology has proceeded with temporary use of Voluntary Cleanup Program (VCP) staff for completion of the RI, FS, and CAP pending transition to the formal cleanup program and negotiation of the PPCD (Ecology 2009a).

The NLD team submitted an initial VCP application and met with Mr. Bob Warren and Mr. Russ Olsen of Ecology in September 2008. During the meeting, the VCP process was discussed in the context of the NLD team's development schedule and obligations to the current owner (King County). NLD subsequently submitted a revised VCP application with a specific request for Ecology to review the RI Work Plan, which included proposed additional investigation of soil and groundwater at the Property to identify the source(s), nature, and extent of the contamination and potential exposure pathways, and to collect sufficient data to establish cleanup standards and select a cleanup action. The cover letter with the revised application requested a letter from Ecology stating that the proposed remedial action (i.e., pre-cleanup investigation activities) is likely to be sufficient to meet the specific substantive requirements of MTCA, chapter 70.105D RCW and its implementing regulations, chapter 173-340 WAC, for characterizing and addressing the release(s) at the Property. Ecology subsequently provided comments regarding the RI Work Plan via e-mail (Adams 2008). The Ecology comments were incorporated into the field program for the RI Field Investigation and addressed in the Ecology Review Draft Report: *Remedial Investigation/Feasibility Study, North Lot Development, Seattle, Washington* dated February 24, 2009, which was submitted to Ecology for review.

Ecology provided an Opinion Letter dated April 21, 2009 that included its comments regarding the draft RI/FS report. The NLD team met with Ecology on May 28, 2009 to discuss the comments in the Opinion Letter, and a plan to move forward and complete the RI/FS for the Property. Specific responses to the Ecology comments were provided in a letter dated June 12, 2009 (Landau Associates 2009b), which also included a summary of the topics discussed during the May 28 meeting and actions agreed to by NLD.

The NLD team also submitted a Work Plan (initial version dated June 18, 2009 and revised version dated July 7, 2009) detailing the Supplemental Investigation activities that were planned in response to the April 21, 2009 Opinion Letter and agreed to with Ecology. The NLD team, at Ecology's request, also submitted a letter (dated July 7, 2009; Landau Associates 2009c) clarifying how the proposed Supplemental Investigation activities outlined in the Work Plan would address Ecology comments. The July 7, 2009 letter included responses to additional comments received from Ecology via e-mail on June 30, 2009 regarding the Work Plan and responses to Ecology comments regarding the RI portion of the draft RI/FS report. The Work Plan was subsequently revised (and dated July 7, 2009; Landau Associates 2009d) to be consistent with the July 7, 2009 clarification letter (Landau Associates 2009c). The RI report was revised to address Ecology comments and incorporate the data from the Supplemental Investigation conducted in July and August 2009 and the revised RI report was submitted to Ecology on October 19, 2009.

The NLD team met with Ecology staff on February 4, 2010 to discuss Ecology's preliminary comments regarding the revised RI. Ecology subsequently issued an Opinion Letter dated February 25, 2010 to NLD that included its comments regarding the revised RI report (Ecology 2010a). The Opinion Letter stated that "sufficient information has been collected to establish cleanup standards and select a cleanup action." The Opinion Letter also identified data gaps related to the nature and extent of groundwater contamination and groundwater flow direction, and requested additional information regarding the proposed cleanup levels. Subsequent discussions with Ecology during a meeting on March 30, 2010 confirmed Ecology acceptance of the revised RI report, that additional data regarding the nature and extent of groundwater contamination and flow would be collected and included in the FS report (see Section 2.0), and that the additional information requested regarding cleanup levels would be presented in a technical memorandum (Appendix B). The Ecology Review Draft FS report was submitted to Ecology on May 21, 2010.

The May 21, 2010 Ecology Review Draft FS report was revised to address Ecology comments issued in the Opinion Letter dated August 12, 2010 (Ecology 2010b), and a Revised Ecology Review Draft FS report was submitted to Ecology on December 30, 2010. The December 2010 FS report incorporated the data from the soil vapor investigation conducted in October 2010, and the results of significant communications between Ecology and the NLD team between May 2010 and December 2010 including four meetings (June 10, August 31, August 21, and November 18, 2010); NLD submittal of the letter dated September 7, 2010 responding to the August 12, 2010 Opinion Letter (Landau Associates 2010a); NLD submittal of the *Soil Vapor Investigation Work Plan, North Lot Development* (Landau Associates 2010b); NLD submittal of the *Soil Vapor Investigation Report, North Lot Development* (Appendix A); and the Ecology Opinion Letter regarding the Soil Vapor Investigation Report (Ecology 2010c).

Ecology responded to the December 2010 Revised Ecology Review Draft FS report in the Opinion Letter dated February 8, 2011 (Ecology 2011). The February 8, 2011 Opinion Letter stated that *"further action is required for the FS"* and that a draft final FS should be submitted after incorporating various changes to Alternative 3 that are outlined in the Opinion Letter and addressing the technical comments included in Enclosure B of the letter. A draft final FS was developed to address the changes to the December 2010 FS report that were required by Ecology and submitted to Ecology on March 15, 2011. The draft final FS was revised to create this final FS by incorporating the changes requested in the Ecology Opinion Letter dated March 25, 2011, which also included Ecology concurrence on the choice of Alternative 3 and the preferred alternative.

## 1.4 SITE INVESTIGATIONS/DATA COLLECTION

The investigations conducted to date to characterize soil and groundwater at the Property include the Phase II investigation, the RI field investigation, the Supplemental Investigation, and the data gaps investigation. Sampling locations are presented on Figure 8. As noted below, an investigation of soil vapor in the northwestern portion of the Property was also conducted as part of the preparation of this FS. The results of the soil vapor investigation are presented in a separate report (Appendix A) and summarized in Section 3.0 and included in this FS, as appropriate.

The Phase II investigation consisted of soil sampling from direct-push borings at 22 locations (B-1 through B-22) from February 27 through February 29, 2008. Twelve groundwater grab samples were collected from temporary well points installed at selected direct-push boring locations.

The RI field investigation was conducted to fill data gaps remaining from the Phase II investigation. During the RI field investigation, 26 additional direct-push borings were completed for soil sampling (B-23 through B-47, including B-31A and B-31B) between October 7 and October 10, 2008.

Eleven monitoring wells were installed for groundwater sampling during the RI field investigation between November 10 and November 14, 2008 (MW-1 through MW-9, including MW-7S and -7D and MW-9S and -9D).

The Supplemental Investigation was conducted to further characterize the lateral and vertical distribution and concentrations of hazardous substances in soil and groundwater, address Ecology comments regarding the draft RI/FS report, and complete the RI for the property. Twenty-one additional soil borings (B-50 through B-68, including B-50A and B-63A) were completed for soil sampling on July 27 and 28 and August 6, 2009. Eight additional monitoring wells (MW-10 through MW-17D, including MW-15D and MW-16D) were installed on August 3 and August 4, 2009.

The data gaps investigation was conducted in February and April 2010 to collect the additional information requested by Ecology to further document and confirm groundwater quality and flow conditions. On February 24, 2010, groundwater samples were collected from MW-5, MW-9D, MW-9S, MW-15D, and MW-17D and analyzed for selected constituents of concern, and an additional round of groundwater elevation measurements were collected from the on- and off-Property wells and wells at the Union Station site to the east of the Property. In April 2010, one additional downgradient, off-Property monitoring well (MW-18D) was installed to the north of the Property, groundwater samples were collected from MW-5, MW-6, MW-7D, MW-9D, MW-15D, MW-16D, MW-17D, and MW-18D and analyzed for selected constituents of concern, and groundwater elevation measurements were collected from the on- and off-Property wells and the wells at the Union Station site.

The soil vapor investigation was conducted on October 15, 2010 to collect data to document benzene concentrations in soil vapor at selected locations in the northwest portion of the Property in the area formerly occupied by the historical gasoline stations and where benzene and gasoline have been detected in soil. The soil vapor investigation activities were conducted in accordance with the Soil Vapor Investigation Work Plan (Landau Associates 2010b). Soil and soil vapor samples were collected from three 2008 sampling locations (B-23, B-26, and B-17) to evaluate the relationship between contaminant concentrations in soil and soil vapor and to support the selection of a remediation level for benzene in soil that is protective of the vapor intrusion pathway.

Groundwater elevations have been measured Property-wide six times (November 24, 2008; January 16, 2009; June 3, 2009; August 25, 2009; February 24, 2010; and April 22, 2010). Groundwater elevations at wells located at the Union Station site to the east of the Property were also collected during the June 3, 2009, February 24, 2010, and April 22, 2010 monitoring events. In February 2010, information from the King Street Center building located at 201 South King Street (immediately to the north of the Property) verified the presence of a foundation drain system at the building. The drain system passively collects groundwater along the building foundation. The water that collects in the drain system is pumped to the sanitary sewer system for disposal. Based on the information confirming the presence of the foundation drain system that is collecting groundwater, the groundwater elevation contours for all six monitoring events were redrawn. The revised groundwater contours, which account for the withdrawal of groundwater at King Street Center, are presented on Figures 9 through 14.

## 1.5 REPORT ORGANIZATION

Section 2.0 of this report presents a summary of the data gaps investigation, which included collection of additional data regarding groundwater quality and flow in February and April 2010 after completion of the RI report. Section 3.0 presents a summary of the soil vapor investigation, which included collection of soil and soil vapor samples in the northwestern portion of the property. Section 4.0 describes the nature and extent of Property contamination using all data collected to date. Section 5.0 identifies areas or volumes of media that require remedial action. Section 6.0 discusses identification and screening of technologies. Section 7.0 describes the development of remedial action alternatives. Section 8.0 provides a detailed analysis of the remedial action alternatives. Section 9.0 provides recommendations for the cleanup action. Section 10.0 discusses the limitations on use of this report, and Section 11.0 provides references.

# 2.0 DATA GAPS INVESTIGATION

The data gaps investigation was conducted in February and April 2010 to address Ecology concerns regarding groundwater quality in areas where analytes had been previously detected in groundwater at concentrations greater than the preliminary MTCA cleanup levels identified in the RI report, and to further document groundwater flow. The specific purposes of the data gaps investigation were:

- To verify groundwater flow direction;
- To evaluate whether PAHs and volatile compounds are migrating off-Property in groundwater passing over and through the area of creosote-like material present at depth in the northeastern portion of the Property; and
- To evaluate whether arsenic concentrations in groundwater are declining at monitoring well MW-5, and if not, to document whether the arsenic concentrations are migrating off-Property.

The data gaps investigation included the installation of one additional off-Property monitoring well (MW-18D), sampling and selected laboratory analysis of groundwater samples from selected on- and off-Property wells (five wells during February and eight wells during April) and the measurement of groundwater elevations at the on- and off-Property wells (19 during the February monitoring and 20 during the April monitoring) and eight wells at the Union Station site. The groundwater samples collected from wells MW-5, MW-6, MW-15D, MW-16D, MW-17D, and MW-18D were analyzed for dissolved arsenic, the samples collected from wells MW-7D, MW-9S, MW-9D, and MW-16D were analyzed for diesel-range petroleum hydrocarbons (TPH-D), gasoline-range petroleum hydrocarbons (TPH-G), and benzene, toluene, ethylbenzene, and xylenes (BTEX), and the samples collected from wells MW-7D, MW-9D, MW-16D, and MW-18D were analyzed for polycyclic aromatic hydrocarbons (PAHs).

The dissolved arsenic results are included on Figure 25 in Appendix C. The TPH-D data are included on Figure 24 in Appendix C, and the TPH-G and benzene data are included on Figure 27 in Appendix C. The PAH data are included on Figure 26 in Appendix C. The analytical results for the groundwater samples collected and submitted for laboratory analysis are provided in Table D-2 in Appendix D. The groundwater elevation data collected in February and April 2010 are presented on Figures 13 and 14. Copies of the laboratory reports for the data collected in February and April 2010 are provided in Appendix E.

# 3.0 SOIL VAPOR INVESTIGATION

The soil vapor investigation was conducted on October 15, 2010 to collect data to document benzene concentrations in soil vapor at selected locations in the northwest portion of the Property in the area formerly occupied by the historical gasoline stations and where benzene and gasoline have been detected in soil. The soil vapor investigation activities were conducted in accordance with the Soil Vapor Investigation Work Plan (Landau Associates 2010b). The specific purposes of the soil vapor investigation were to:

- Document and evaluate the relationship between benzene concentrations in soil and associated soil vapor;
- Evaluate the potential for the benzene concentrations detected in soil and soil vapor to present a vapor intrusion risk; and
- Support the selection of a remediation level for benzene in soil that is protective of the vapor intrusion pathway.
- Evaluate the accuracy of the Johnson & Ettinger (J&E) model in predicting benzene concentrations in soil vapor.

Soil and soil vapor samples were collected from three 2008 sampling locations (B-23, B-26, and B-17). Two of the sample locations were located close to (i.e., within 1 ft of) the two previous soil boring/sampling locations that indicated the highest detected benzene concentrations in soil at the Property in 2008, B-23 and B-26, as requested by Ecology. The third soil sample location was located close to the 2008 soil boring/sample location (B-17) where the benzene concentration detected in soil in 2008 was close to the remediation level proposed in the May 2010 Draft FS. The soil samples were analyzed for TPH-G and benzene; a soil sample was also collected at each boring location and analyzed for physical parameters, including total organic carbon, porosity, wet and dry bulk density, and grain size, to document Property-specific soil conditions. The soil vapor samples were analyzed for benzene.

The potential for vapor intrusion to result in benzene concentrations in indoor air greater than the MTCA modified Method B indoor air cleanup level was evaluated based on the data collected and the results are detailed in the Soil Vapor Investigation Report (Appendix A). The analytical results for the soil samples are presented in Table 1 of Appendix A and the analytical results for the soil vapor samples are presented in Table 2 of Appendix A.

The potential for vapor intrusion based on the concentrations of benzene in soil vapor observed at the Property were evaluated using the J&E model (Johnson and Ettinger 1991) and using the methodology outlined in the Ecology draft soil vapor guidance document (Ecology 2009b). If the J&E model is used to predict indoor air benzene concentrations based on the benzene concentrations detected in soil vapor at the Property, the corresponding risks associated with vapor intrusion in an occupational worker scenario would be acceptable, so no active remedial action would be warranted for the Property.

Using a soil vapor screening level developed in accordance with Ecology's draft soil vapor guidance document with a vapor attenuation factor (VAF) of 0.01 modified from the default value of 0.1 based on the planned commercial use of the lower two floors of the development planned for the Property, all of the benzene soil vapor concentrations detected at the Property are less than the screening level, also indicating that no remedial action is warranted.

As detailed in Appendix A, the results of the soil and soil vapor sampling and the evaluations using the J&E model and methodology in the Ecology guidance document indicate that the benzene concentrations in soil at the Property do not pose a potential vapor intrusion risk. However, in an effort to avoid prolonged technical discussions with Ecology that could impact the schedule for development of the Property, NLD proposed a remediation level for benzene in soil of 780 micrograms per kilogram (µg/kg) based on the overly conservative soil vapor screening level [14 micrograms per cubic meter ($\mu g/m^3$), as calculated using the default VAF of 0.1] established in the Ecology draft soil vapor intrusion guidance document. Development of the remediation level for benzene is discussed in more detail in Section 4.2.1.

# 4.0 NATURE AND EXTENT OF CONTAMINATION

The nature and extent of contamination were characterized during the RI and are described in detail in Section 4.2 of the RI report. For reference, the soil and groundwater investigation locations are shown on Figure 8. The data presented in the RI were supplemented by the information developed during the data gaps investigation, and the soil vapor investigation, and the nature and extent of impacts to soil and groundwater were evaluated by developing cleanup levels for soil and groundwater and comparing these cleanup levels to analytical results for the soil and groundwater samples. This section provides additional detail regarding the areas with media that have concentrations of contaminants greater than the cleanup levels.

The nature and extent of contamination at the Property is discussed in the RI report and in this FS report by area based on the operational history of the Property and the analytical results for the soil and groundwater samples collected for the RI. The areas are: 1) the Northwestern Portion of the Property, which is the former location of the historical gasoline stations and where gasoline-related constituents have been detected; 2) the Northeastern Portion of the Property, which is where the creosote-like material was encountered at the base of the fill material, and where creosote-related constituents have been detected; and 3) Property-Wide where various constituents have been detected that are interpreted to be related to the presence of the fill placed over the native tideflat surface during the development of the area or may be related to activities that occurred Property-wide, such as the rail yard operations.

## 4.1 GEOLOGY AND HYDROGEOLOGY

The stratigraphy within the depth range of the explorations at the Property consists primarily of four geologic units identified as: fill, native marine sediments, alluvial deposits, and glacial deposits. The borings and monitoring wells to characterize the nature and extent of soil and groundwater contamination at the Property were focused on the fill unit overlying the native marine sediments. The unconfined water table aquifer beneath the Property is present within the fill. The groundwater flow at the Property was clarified during the data gaps investigation by the verification of the presence of a foundation drain system at the King Street Center building at 201 South King Street. The foundation drain system, which is a passive groundwater collection system, creates a low in the elevation of the groundwater table resulting in localized flow toward the building. The groundwater low locally affects groundwater flow in the central and eastern portions of the Property, with flow from the Property to the northeast, north, or northwest, toward the building depending on location (Figures 9 through 14).

The geologic information for the Property was obtained from the *Geologic Map of Seattle* (Troost et al. 2005), *Preliminary Geotechnical Evaluation* (Terra Associates 2008), *Driven Piles for Safeco Field*

(Miner and Gurtowski 2001), and from soil borings completed at the Property during the Phase II investigation, the RI field investigation, and the Supplemental Investigation. Cross sections have been prepared and evaluated for the Property and are provided on Figures 10 through 14 of the RI report (Appendix C). The ground surface of the Property is generally level and is at an average elevation of 18 ft [North American Vertical Datum of 1988 (NAVD88)] (Pacific Geomatic Services 2008).

A discussion of hydrogeology at the Property is provided in Section 3.2 of the RI report; however, as noted above, the recent verification of the presence of the foundation drain system at the King Street Center building at 201 South King Street provides additional information to clarify the groundwater flow conditions that are described in the RI report.

## 4.2 SOIL QUALITY

Soil quality was evaluated in the RI based on three general Property areas, as discussed in Section 3.0: the northwestern portion of the Property, the northeastern portion of the Property, and Property-wide. Constituents of concern identified in the RI include: total petroleum hydrocarbons (TPH), BTEX, PAHs, and metals. The areas where constituents have been detected in soil at concentrations greater than the cleanup levels are shown on Figure 15. The specific detected constituents and analyte concentrations greater than the cleanup levels in soil are presented on RI Figures 15 through 22, which are included in Appendix C. A summary of the detections of these constituents in soil at the three identified areas of the Property is provided below:

- **Northwestern Portion of the Property**: The laboratory analytical and field-screening data indicate that shallow soil [less than 15 ft below ground surface (BGS)] has been impacted by releases resulting from the former gasoline station operations. The soil contamination appears to be primarily near the top of the groundwater table, but extends to a depth of at least 17 ft BGS locally. Due to the presence of benzene in shallow soil in the northwestern portion of the Property, the potential for vapor intrusion was evaluated during the soil vapor investigation (Section 3.0), and is addressed in this FS report.
- **Northeastern Portion of the Property**: Deeper soil (greater than 15 ft BGS) has been impacted by petroleum hydrocarbons and PAHs. Based on the field screening, observations during drilling, and analytical data, the soil contamination appears to be primarily associated with the creosote-like material observed at the base of the fill. Based on the occurrence of the creosote-like material at the base of the fill material, and the lack of evidence of contamination within the fill at shallower depths, the creosote-like material appears to be from a distinct source and likely predates placement of the overlying fill.
- **Property-wide**: PAHs, including primarily carcinogenic polycyclic aromatic hydrocarbons (cPAHs), were detected at concentrations greater than the preliminary cleanup levels in most of the soil samples collected across the southern portion of the Property. Arsenic and motor-oil-range petroleum hydrocarbons (TPH-O) were also detected at concentrations greater than the preliminary cleanup levels in soil samples collected in the west-central portion of the Property. The occurrence of these analytes in shallow surface soil suggests a source within the fill material placed over the native marine sediment layer. Off-Property borings to the

northwest of the Property were generally clean and bounded the extent of the contaminants of concern in soil.

The development of soil cleanup levels and the volume(s) of soil with analyte concentrations greater than the cleanup levels are discussed below.

### 4.2.1 DEVELOPMENT OF SOIL CLEANUP LEVELS

The current conditions at the Property do not present a risk to Property users because contaminated soil is capped by the existing asphalt pavement and groundwater in the Property area is not used as a potable water source. However, as discussed in the RI report, preliminary Method B soil cleanup levels (or for lead and TPH, the MTCA Method A cleanup levels for soil, which are appropriate for these analytes) were identified for the detected constituents. MTCA Method B soil cleanup levels were developed based on the most stringent of the constituent concentrations in soil protective of groundwater as drinking water and marine surface water, and protection of human health based on direct contact (Method B standard formula values for carcinogens and non-carcinogens). MTCA Method A soil cleanup levels were used for lead, TPH-G, TPH-D, and TPH-O. Cleanup levels for arsenic, copper, and mercury were adjusted upward to the natural background concentration. Cleanup levels for non-carcinogens were evaluated based on total Property risk and were adjusted downward, where necessary, in order to achieve a total Property hazard index of 1. Adjustment of cleanup levels for carcinogens for total Property risk was not necessary. The preliminary soil cleanup levels, considered to be final cleanup levels proposed for Ecology approval, are provided in Table 3. The cleanup levels presented in Table 3 include revisions made based on the February 25, 2010 Ecology Opinion Letter and follow-up discussions with Ecology staff, and are as outlined in the *Response to Comments: North Lot Development Cleanup Levels* technical memorandum (Appendix B). The remediation level for benzene in soil based on the potential for vapor intrusion is provided in Table 4. Additional information regarding cleanup level development is provided in Appendix F.

As discussed in Section 3.0, the soil vapor investigation was conducted to evaluate the potential for the benzene concentrations detected in soil in the northwestern portion of the Property to pose a threat via the vapor intrusion pathway, and to identify a remediation level for benzene in soil that is protective of the vapor intrusion pathway. The soil and soil vapor samples were collected within 1 ft of the soil borings completed in 2008 that indicated the highest benzene concentrations in soil, and the 2008 and 2010 data were compared to evaluate the relationship between the benzene concentrations in soil and soil vapor. Although the benzene concentrations detected in soil were much lower in the samples collected in 2010 than in those collected in 2008, the close proximity of the soil vapor sample locations to the 2008 soil sample locations allows for a direct correlation between the 2008 benzene concentrations in soil and the 2010 benzene concentrations in soil vapor. Even though the soil concentrations measured in 2010 were lower than the concentrations measured in 2008, the soil vapor samples were collected close enough to the 2008 sample locations that the higher contaminant concentrations in soil would be expected to influence the soil vapor samples.

Based on the evaluation, a benzene concentration of 780 µg/kg in soil is protective of the vapor intrusion pathway, and was proposed as the remediation level for benzene in soil in the Soil Vapor Investigation Report (Appendix A). Ecology subsequently documented its concurrence with this benzene remediation level in the Opinion Letter dated December 21, 2010 (Ecology 2010c). The benzene remediation level is lower than the benzene soil cleanup level protective of direct human contact (18,000 µg/kg ) and is greater than the soil cleanup level protective of groundwater as drinking water and surface water (4.5 µg/kg). As discussed below, benzene has not been detected in groundwater at a concentration greater than the cleanup level in the northwestern portion of the Property.

### 4.2.2 COMPARISON OF SOIL ANALYTICAL RESULTS TO CLEANUP LEVELS

A comparison of the concentrations of detected constituents in soil, including detected and non-detected constituents, with the final cleanup levels is presented in Table 5. Comprehensive analytical data tables are provided in Appendix D. Figures 15 through 23 of the RI show the concentrations of constituents detected in soil and identify analyte concentrations greater than the cleanup levels; these figures are presented in Appendix C of this FS. Below is a discussion of the analyte concentrations detected in the northwestern portion of the Property, the northeastern portion of the Property, and Property-wide compared with the final cleanup levels and the remediation level for benzene.

#### 4.2.2.1 Northwestern Portion of the Property

The detected concentrations of TPH-G, and one or more BTEX constituents (at most locations), were greater than the cleanup levels in the soil samples collected from 13 borings at depths ranging from about 5 to 8 ft BGS (Figure 21 in Appendix C), which was near the depth of the groundwater table at the time of drilling. Concentrations of TPH-G, benzene, toluene, and ethylbenzene were also greater than the cleanup levels in four (B-26-17.0, B-50A-15-16, B-51-15-15, and B-52-15-16) of the seven deeper soil samples collected from this area (Figure 22 in Appendix C). The soil contamination appears to primarily be present near the elevation of the groundwater table, but extends to a depth of at least 17 ft BGS locally. However, as noted below, TPH-G was detected at a concentration greater than the cleanup level in only 1 of 10 groundwater samples collected from eight locations (four temporary wells set in borings and four permanent wells) in this area (Figure 27 in Appendix C). The single TPH-G concentration greater than the cleanup level was detected in one of the temporary well samples. No BTEX constituents were detected at concentrations greater than the cleanup levels in any of the groundwater samples from this area. As shown on Figure 15, the area of soil with benzene and gasoline concentrations greater than MTCA Method B cleanup levels is slightly larger than the area with benzene concentrations greater than the remediation level.

#### 4.2.2.2 Northeastern Portion of the Property

The drilling, and soil sampling and analysis in the northeastern portion of the Property focused on evaluation of the extent of the creosote-like material that was first encountered in boring B-2 at the base of the fill at the contact with the underlying marine sediments layer. The RI field investigation included the drilling of 11 borings in the area around B-2; soil samples were selected for laboratory analysis from near the contact with the marine sediments layer where the creosote-like material was encountered. The creosote-like material was encountered in nine borings at depths of about 18 to 23 ft BGS and varied from about 1 to 3 ft in thickness. The analytical results for the two samples collected of the creosote-like material for laboratory analysis are discussed in Section 4.4.

The analytes detected in soil in the northeastern portion of the Property at concentrations greater than the cleanup levels were all in samples collected from greater than 15 ft BGS and consisted of:

- PAHs (B-36, B-38, B-39, B-40, B-41)
- cPAHs (B-38, B-39, B-40, B-47, MW-17D-15.5-16.5)
- TPH-D (B-2, B-36)
- TPH-O (B-2)
- TPH-G (B-36, B-38, B-41)
- BTEX (B-38, B-41, B-47).

Based on the field screening, observations during drilling, and analytical data, the soil contamination appears to be associated with the creosote-like material at the base of the fill.

#### 4.2.2.3 Property-wide

Carcinogenic PAHs (cPAHs) were detected at concentrations greater than the cleanup levels based on direct contact in soil samples collected across the Property, as shown on Figures 19 and 20 in Appendix C. In the shallow soil, cPAHs were detected at concentrations above the cleanup level primarily in the western portion of the Property, although some cPAH concentrations greater than the cleanup level were identified in the eastern portion of the Property as well (B-66 and B-67). The highest concentrations of cPAHs in the shallow soil were in the sample from 4.6 ft BGS at boring B-23, which is the location of monitoring well MW-8. In the deeper soil, concentrations of cPAHs were detected above the cleanup level at 10 of the 15 locations across the Property where samples were collected and analyzed.

The occurrence of the cPAHs in soil at various depths throughout the Property (ranging from less than 1 ft to about 17 ft BGS on the western side of the Property to greater than 20 ft BGS on the eastern side) suggest the presence of a source within the fill material placed over the native marine sediments and/or impacts due to the Seattle Fire in 1889, and that similar concentrations are likely present on properties in the area that were filled during the same time period.

Property-wide concentrations of the metals arsenic and mercury greater than the cleanup levels were identified in soil during the RI field investigation and the Supplemental Investigation. Arsenic was detected in shallow soils Property-wide. The concentrations were greater than the cleanup level based on Puget Sound region background concentrations at four of 13 locations, with the highest concentration in the samples collected from 1 to 2 ft BGS at B-65 [30 milligrams per kilogram (mg/kg)]. In the deeper soils, arsenic exceeded the cleanup level in only the sample from off-Property location MW-17D (8 mg/kg). Because the only concentration detected above the cleanup level was from an off-Property location, there is no evidence that the source of the arsenic is related to the Property, and the detected concentration is likely indicative of area background concentrations or an off-Property source.

The mercury concentrations were greater than the cleanup level protective of groundwater at 10 of 13 locations across the Property (9 in shallow soil collected primarily from 2 ft BGS or less, 1 in deeper soil), with the highest concentration of 1.88 mg/kg at B-33 from 17.5 to 18.5 ft BGS. These Property-wide detections of metals suggest that their presence is not related to specific historical operations at the Property, but is likely due to a source within the fill material placed over the native marine sediments. As described in Section 4.3.2.3, mercury was not detected in any groundwater samples, indicating that the existing concentrations are protective of groundwater.

Dioxins and furans were detected in two shallow soil samples (collected from less than 2 ft BGS) from the western and eastern halves of the Property at borings B-62 and B-65, respectively. The total toxic equivalent concentration (TEQ) of 2, 3, 7, 8 tetrachlorodibenzodioxin (TCDD) at B-62 was 0.0922 nanograms per kilogram (ng/kg), and the TEQ at B-65 was 34.4 ng/kg. Dioxins and furans may be formed during combustion of organic compounds in the presence of chloride. Typical sources include combustion of saltwater-soaked wood, waste incineration including home burn barrels, and some types of chemical manufacturing. Various studies have evaluated the background concentrations of dioxin in soil. Ecology found dioxin/furan concentrations (as 2, 3, 7, 8 TCDD TEQ) ranging from 0.13 ng/kg to 19 ng/kg in urban soil statewide (Ecology 1999); a recent study of dioxins/furans in soil from residential and undeveloped areas of Port Angeles found 2, 3, 7, 8 TCDD TEQ concentrations ranging from 0.49 ng/kg to 76 ng/kg (Ecology & Environment 2009). The dioxin concentrations found in soil at the Property are within or lower than the range of available background concentrations and are likely the result of the combustion of wood during historical activities, including the Seattle Fire of 1889, in the area prior to the Property being paved.

## 4.3 GROUNDWATER QUALITY

Groundwater quality was evaluated in the RI based on the three general Property areas described in Section 3.0: the northwestern portion of the Property, the northeastern portion of the Property, and Property-wide. The evaluation of impacts to groundwater at the Property is based on a comparison of analytical results for groundwater samples collected during the RI, the Supplemental Investigation, and the data gaps investigation from 17 monitoring wells located on the Property and from 3 wells installed off-Property (MW-16D, MW-17D, and MW-18D) to the final groundwater cleanup levels. The Property-specific groundwater cleanup levels are discussed in detail in Section 4.3.1 below and shown in Table 6. Concentrations of detected constituents greater than the cleanup levels in groundwater are presented in Table 7.

Overall, only arsenic has been detected in groundwater at concentrations greater than the cleanup level(s) at multiple locations, and these are in the eastern portion of the Property, which, as discussed below, is impacted by off-Property sources to the east. Arsenic concentrations in the samples from wells in the eastern portion of the Property have been greater than the cleanup levels [i.e., 5 micrograms per liter (μg/L) established for the western portion of the Property and 21.3 μg/L established for the eastern portion of the Property due to the effect of off-Property sources], which are discussed below. In addition, there have been localized detections of analytes at concentrations greater than the cleanup levels (i.e., TPH-G, TPH-D, TPH-O, BTEX, and PAHs) in the former gasoline station and creosote areas of the Property. However, there is no evidence of migration of any analytes at concentrations greater than the cleanup levels across, or off, the Property.

### 4.3.1 DEVELOPMENT OF GROUNDWATER CLEANUP LEVELS

As noted above, groundwater in the Property area is not used as a potable water source and the City of Seattle will require connection to the City system as part of Property development. However, the MTCA Method B groundwater cleanup levels based on drinking water use and discharge to marine surface water, or the MTCA Method A cleanup levels for groundwater, were used to identify groundwater cleanup levels for detected constituents. The MTCA Method B groundwater cleanup levels were developed based on the most stringent of the federal or state maximum contaminant levels (MCLs), state primary and secondary MCLs, protection of marine surface water, and MTCA Method B standard formula values. The MTCA Method A groundwater cleanup levels were used for TPH-G, TPH-D, and TPH-O. The preliminary groundwater cleanup levels, considered to be final cleanup levels proposed for

Ecology approval, are presented in Table 6. The cleanup levels presented in Table 6 include revisions made based on the February 25, 2010 Ecology Opinion Letter and subsequent discussions with Ecology staff, as outlined in the *Response to Comments: North Lot Development Cleanup Levels* technical memorandum (Appendix B). Cleanup levels for non-carcinogens were evaluated based on total Property risk and were adjusted downward, where necessary, to achieve a hazard index for the Property equal to or less than 1. Adjustment of cleanup levels for carcinogens for total Property risk was not necessary. Total risk adjustment tables are provided in Appendix F.

Cleanup levels for arsenic in groundwater were re-evaluated as outlined in the *Response to Comments: North Lot Development Cleanup Levels* technical memorandum submitted to Ecology (Appendix B). Two cleanup levels will be used for arsenic in groundwater to account for differing conditions in the western and eastern portions of the Property including the presence of arsenic in groundwater east of the Property and local groundwater flow in the central and eastern portions of the Property toward the King Street Center due to the presence of the foundation drain system. A cleanup level for arsenic of 5 µg/L, based on background and equal to the MTCA Method A groundwater cleanup level, will be used for the western portion of the Property. A cleanup level of 21.3 µg/L will be used for arsenic in groundwater in the eastern portion of the Property, including the area of monitoring wells MW-5 and MW-15D, due to the effect of upgradient sources to the east.

The groundwater data set for the Union Station site, which is located to the east of the Property, shows a wide range of arsenic concentrations across the site and over time. A background concentration of 21.3 µg/L was calculated for arsenic, based on the $90^{th}$ percentile of arsenic results from all of the wells at the Union Station site for the last eight sampling events. Therefore, 21.3 µg/L is being used as the background-based cleanup level for arsenic in groundwater in the eastern portion of the NLD Property.

### 4.3.2 Comparison of Groundwater Analytical Results to Cleanup Levels

A comparison of the concentrations of detected constituents in groundwater at the Property with the final cleanup levels is presented in Table 7. Comprehensive groundwater analytical data tables are presented in Appendix D. Figures 24 through 27 of Appendix C show the constituent concentrations detected and identify groundwater concentrations greater than the cleanup levels. Below is a discussion of the constituent concentrations detected in the northwestern portion of the Property, the northeastern portion of the Property, and Property-wide compared to the final cleanup levels. The data indicate that there is no off-Property migration of groundwater with constituent concentrations greater than the cleanup levels.

#### 4.3.2.1 Northwestern Portion of the Property

The groundwater sampling identified minimal impact to groundwater quality in the vicinity of the former gasoline stations (northwestern portion of the Property). The only constituent that was detected in groundwater at a concentration greater than the cleanup level in the northwestern portion of the Property was TPH-G, which was detected in the groundwater sample collected from the temporary well at direct-push boring B-18 at a concentration of 1.3 milligrams per liter (mg/L), as shown on Figure 27 in Appendix C. The localized impact to groundwater appears to be the result of releases from former gasoline USTs and/or the associated piping and pump dispensers. No other constituents of concern were detected at concentrations greater than the cleanup levels in the groundwater samples collected in this area of the Property.

#### 4.3.2.2 Northeastern Portion of the Property

Based on the analytical data, constituents of concern were detected at concentrations greater than the cleanup levels at the following locations in the northeastern portion of the Property:

- MW-9D (TPH-D and TPH-G, benzene, ethylbenzene, naphthalene, 2-methylnaphthalene, cPAHs)
- B-38 (TPH-D, TPH-O, and TPH-G)
- B-41 (TPH-D)
- B-2 (benzene).

The presence of these constituents is likely the result of the creosote-like material identified at the fill/marine sediments interface in this area (see Section 4.2). Three of the four sampling locations were temporary wells. Monitoring well MW-9D was screened from 15 ft to 20 ft BGS, just at or above the top of where the creosote-like material was identified. Constituents of concern were not detected at concentrations greater than the cleanup levels in the groundwater samples collected from MW-9S, which is located in the immediate vicinity of MW-9D and was screened from 5 ft to 15 ft BGS. Groundwater samples were also collected from MW-9S and MW-9D as part of the data gaps investigation, and the samples were analyzed for TPH-D, TPH-G, and BTEX. The analytical results for these samples were consistent with the results for previous samples from these two wells; no analytes were detected at concentrations greater than the laboratory reporting limits in the sample from MW-9S, and concentrations detected in the sample from MW-9D were similar to those previously detected. In addition, no constituent concentrations greater than the cleanup levels have been detected in the samples from wells MW-16D and MW-18D, which are located downgradient of MW-9D.

The analytical results for the groundwater samples collected from monitoring wells and temporary wells installed in soil borings in other areas of the Property support the conclusion that the groundwater impacts from PAHs and from TPH-D and TPH-O are localized in the northeastern portion of the Property. Groundwater impacts from TPH-G and BTEX compounds in this area do not appear to be related to the former gasoline station operations in the northwestern portion of the Property because the groundwater samples collected from several locations between the northeastern and northwestern portions of the Property (MW-7S, MW-7D, B-3, MW-12, B-14, MW-11, B-27) did not contain reported concentrations of these constituents, with the exception of toluene, which was detected at a concentration slightly greater than the reporting limit (0.5 µg/L) in the groundwater sample collected from MW-7D. In addition, the groundwater sample from off-Property well MW-16D located to the north did not contain reported concentrations of TPH-G or BTEX constituents, and the sample from off-Property well MW-18D, which is located just west of MW-16D, did not contain BTEX at concentrations greater than the laboratory reporting limits, and the reported concentration of TPH-G (0.26 µg/L) was only slightly greater than the laboratory reporting limit of 0.25 µg/L (and well below the cleanup level).

The concentrations of cPAHs reported for the groundwater samples from off-Property wells MW-16D and MW-18D were less than the cleanup level for cPAHs. The concentration of cPAHs in the groundwater sample collected from off-Property well MW-17D, located to the northeast, was slightly greater than the cleanup level for cPAHs; however, because the creosote-like material was not encountered at MW-17D (or at MW-16D or MW-18D) and the well is not downgradient of the location of the creosote-like material , the cPAH concentration at MW-17D is likely not related to the creosote-like material encountered at the on-Property locations.

#### 4.3.2.3 Property-wide

Arsenic and lead were detected at concentrations greater than their groundwater cleanup levels in some samples as described below.

Arsenic was detected at concentrations greater than 5 µg/L in grab samples from borings/ temporary wells B-1, B-2, B-3, B-7, and B-9; in only the first of the samples collected from monitoring wells MW-1, MW-4, MW-6, MW-7S, MW-8, MW-9S, MW-9D, and MW-16D; in two of three samples from MW-15D; in all three samples from MW-17D; and in all four of the samples from MW-5. In most cases, the concentrations in grab samples from borings/temporary wells were not duplicated in the samples from nearby monitoring wells. Temporary wells do not allow for proper development and, therefore, the sample results from these locations are considered valuable for screening purposes but are not considered representative of Property groundwater quality.

The arsenic detected in monitoring wells does not appear to be from on-Property sources because arsenic is present in groundwater east (upgradient) of the Property and concentrations decrease from east to northwest across the Property. The highest concentrations of arsenic in groundwater were in the samples collected from the eastern portion of the property as shown on Figure 25 in Appendix C, including monitoring wells MW-5 (17 µg/L to 58 µg/L), MW-15D (<0.50 µg/L to 16.8 µg/L), and offsite monitoring well MW-17D (6.6 µg/L to 13.5 µg/L). Arsenic was also found in upgradient groundwater including samples from the Union Station site, east of the Property. As described in Section 4.3.1, and discussed below, a background-based cleanup level of 21.3 µg/L was developed for the eastern portion of the Property. Although the arsenic concentration in some samples from MW-5 is greater than 21.3 µg/L, the arsenic is likely to be from off-Property sources, based on the wide range of arsenic concentrations measured during groundwater monitoring at the Union Station site over time. In addition, organic material (wood debris) was observed in soil borings advanced across the Property. The presence of organic material including TPH, which is known to be present in groundwater hydraulically upgradient of the Property, has a significant potential to cause reducing conditions in groundwater, increasing arsenic solubility.

Based on the recent groundwater flow data (Figure 14) and the arsenic concentrations detected in the groundwater samples from the on- and off-Property wells, the groundwater in the eastern portion of the Property is impacted by arsenic from off-Property sources. However, the concentrations detected in the groundwater samples from the on-Property wells located hydraulically downgradient of MW-5 and MW-15D do not indicate concentrations of arsenic greater than the cleanup level of 21.3 µg/L, indicating that the elevated concentrations are not due to on-Property sources.

Lead was detected at a concentration greater than the groundwater cleanup level only in the sample from boring/temporary well B-3. As described above, samples from borings/temporary wells are not considered representative of groundwater quality. Lead was either not detected or was detected at concentrations less than the lead cleanup level in the groundwater samples collected from the monitoring wells. Consequently, lead is not considered to be a contaminant for Property groundwater.

As discussed in Section 4.2.2.3, mercury was detected in some soil samples Property-wide at concentrations above the cleanup level based on protection of groundwater. Mercury was not detected in any of the groundwater samples collected during either the RI or the Supplemental Investigation, demonstrating that the low concentrations of mercury detected across the Property are not mobile and are not affecting groundwater quality.

## 4.4 FORENSIC ANALYSIS

During the Phase II investigation, one soil sample was collected from the zone of creosote-like material observed in the northeastern portion of the Property and analyzed by the laboratory as a product sample due to the presence of free-phase petroleum in the sample (Sample ID: B-21-20-23). The sample was analyzed for TPH (using Method NWTPH-HCID) and for TPH-D, TPH-O, total metals, polychlorinated biphenyls (PCBs) and PAHs.  TPH-D (77,000 mg/kg), TPH-O (36,000 mg/kg), chromium (5.4 mg/kg), lead (7 mg/kg), and PAHs [120,000 micrograms per kilogram (µg/kg) to 19,000,000 µg/kg] were detected in the product sample at concentrations greater than the laboratory reporting limits.  TPH-G and PCBs were not detected in the sample at concentrations greater than the reporting limits; however, the reporting limits for TPH-G were elevated.

During the RI field investigation, an additional sample of the creosote-like material was collected for forensic analysis by Friedman & Bruya, Inc.  A hydrocarbon fuel scan was conducted by analyzing the sample using a gas chromatograph with a flame ionization detector.  In addition, the sample was analyzed for parent and alkylated PAHs and sulfur.  Based on the analytical results, Friedman & Bruya, Inc. identified the material as coal tar, or a coal tar-based material such as creosote.

# 5.0 IDENTIFICATION OF AREAS OR VOLUMES OF MEDIA THAT REQUIRE REMEDIAL ACTION

As discussed in Section 2.0, the Property contains areas where the constituent concentrations detected in soil and groundwater are greater than the cleanup levels. However, as discussed in the RI and below, the analytical data indicate that the extent of impacts to groundwater from the soil contamination at the Property is limited and that contamination in groundwater does not pose a threat to human health or the environment; therefore, groundwater treatment options have not been evaluated and the cleanup action alternatives developed in this FS focus on areas of soil with contaminant concentrations greater than the cleanup levels. The areas where soil contamination will be addressed are summarized below.

- Northwestern portion of the Property
- Northeastern portion of the Property
- Property-wide.

The cleanup action alternatives were developed in the context of the nature and extent of the soil contamination as it relates to the conceptual model of the shallow subsurface at the Property (Figure 3). As discussed in the RI and in Section 4.0, the Property consists of heterogeneous fill that was placed over the native tideflat surface to allow development of the area in the vicinity of the Property. The soil contamination at the Property, as discussed below, consists of two distinct, localized areas with contaminant concentrations significantly above the cleanup levels due to historical operations, and Property-wide concentrations above the cleanup levels that are associated with the heterogeneous fill material. The localized areas consist of benzene in soil in the northwestern portion of the Property that is primarily above the water table and the creosote-like material in the northeastern portion of the Property that is present at the base of the fill. The Property-wide contamination includes PAHs and metals that have been detected in various shallow soil samples (0 to 2 ft BGS), but that is anticipated to be dispersed throughout the fill.

The discussion of the areas identified for remedial action and the remedial action alternatives in the section below focus on the Property in anticipation of cleanup under the formal program and under a PPCD. The need for and type of additional remedial action in those areas where contamination may extend beyond the Property boundary will be determined as part of the PPCD process.

## 5.1 SOIL

To estimate the volume of soil with constituent concentrations greater than the cleanup levels that requires remedial action, the extent of contamination in the northwestern and northeastern portions of the Property was considered. The area for soil remedial action in the northwestern portion of the Property has been defined based on the remediation level for benzene in soil that is protective of the vapor intrusion pathway based on the soil vapor investigation and evaluation discussed in Sections 3.0 and 4.2.1. If soil in the northwestern portion of the Property with benzene concentrations greater than the remediation level were to be excavated or treated, the surface area would be approximately 3,000 $ft^2$ and soil would be addressed from the surface to the water table at approximately 8 ft BGS. The amount of soil excavated for off-Property disposal would include approximately 720 cubic yards ($yd^3$) after the Property-wide excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development.

The area for soil remedial action in the northeastern portion of the Property has been defined based on the extent of the creosote-like material encountered in borings on the Property up to the Property boundary (creosote-like material was not encountered at off-Property well MW-16D). If the creosote-like material and the associated contaminated soil in the northeastern portion of the Property were to be treated, the surface area would be approximately 8,800 $ft^2$ and soil would be addressed from the surface to an average depth of approximately 20 ft BGS (the average depth of the native marine sediment layer in the northeastern portion of the Property). The amount of soil treated would include approximately 6,010 $yd^3$ after the Property-wide excavation to approximately1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development.

If the fill material present over the native marine sediments layer was to be completely removed from the Property, the area requiring removal would be approximately 167,500 $ft^2$, and material would be removed to the depth of the contact with the native marine sediments (approximately 25 ft BGS across the Property). The amount of soil excavated for off-Property disposal would include approximately 155,130 $yd^3$ after the Property-wide excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development.

## 5.2 GROUNDWATER

As described in the RI report and summarized above, the extent of impacts to groundwater from soil contamination appears to be limited. There is no evidence of soil contaminants leaching into groundwater, or of contaminants in groundwater at concentrations greater than the cleanup levels migrating off-Property. For this reason, alternatives are evaluated that will provide passive measures for protection of groundwater, such as a cap. The need for long-term groundwater monitoring is also considered part of the assembly and evaluation of the soil cleanup action alternatives.

## 5.3 SOIL VAPOR

As described in Section 3.0, the potential for vapor intrusion based on the benzene concentrations in soil vapor observed at the Property was evaluated using the J&E model (Johnson and Ettinger 1991) and using the methodology outlined in the Ecology draft soil vapor guidance document (Ecology 2009b). The results of the soil and soil vapor sampling and the evaluation using the J&E model and methodology in the Ecology guidance document indicate that the benzene concentrations in soil at the Property do not pose a potential vapor intrusion risk. However, in an effort to avoid prolonged technical discussions with Ecology that could impact the schedule for development of the Property, NLD proposed a remediation level for benzene in soil of 780 µg/kg, as discussed in Section 4.2.1.

## 5.4 DESIGNATION OF POINTS OF COMPLIANCE

Under MTCA, the point of compliance is the point or points where the cleanup levels must be attained. The standard point of compliance where soil cleanup levels protective of direct human contact must be met is throughout a site from the ground surface to 15 ft below the ground surface, in accordance with WAC 173-340-740(6)(d). The standard point of compliance where soil cleanup levels protective of groundwater must be met is throughout the soil column, in accordance with WAC 173-340-740(6)(b). For this Property, the proposed soil point of compliance will be throughout the soil column throughout the Property.

The standard point of compliance for groundwater is throughout groundwater at the Property. The proposed conditional point of compliance for groundwater for protection of surface water quality is the property boundary or as close to the property boundary as practicable. For a conditional point of compliance [in accordance with WAC 173-340-720(8)(c, d)], there must be a demonstration that it is not practicable to meet the cleanup levels throughout the site in a reasonable restoration timeframe and that all practicable methods of treatment are to be used in the site cleanup. As described in Section 8.2.2, the preferred cleanup action alternative is permanent to the maximum extent practicable, and meets these two criteria. Therefore, the proposed conditional point of compliance is the Property boundary for most of the Property and as close to the Property boundary as practicable in the northeastern portion of the Property where the creosote-like material is present along the Property boundary because it is not feasible to install a compliance monitoring well in the creosote-like material. The compliance monitoring plan included in the CAP identifies the approach to document groundwater quality at the conditional point of compliance.

# 6.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

To identify and select appropriate remedial technologies and alternatives for the Property, remedial action objectives (RAOs) need to be defined and laws applicable to the potential cleanup actions need to be identified. Also in this section, applicable remedial technologies are identified and screened on the basis of effectiveness, implementability, and cost.

## 6.1 REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) define the goals of the cleanup that must be achieved to adequately protect human health and the environment. As discussed above, the current conditions at the Property do not present a risk to Property users because contaminated soil is capped by the existing asphalt pavement and groundwater at the Property is not used. For cleanup of the Property, the RAOs must address all affected media, and a cleanup alternative must achieve all RAOs to be considered a viable cleanup action. RAOs can be either action-specific or media-specific. Action-specific RAOs are based on actions required for environmental protection that are not intended to achieve specific chemical criteria. Media-specific RAOs incorporate the cleanup levels developed in Appendix F. Based on the characterization of Property conditions presented in Section 4.0 and the cleanup levels developed in Appendix F, the action-specific and media-specific RAOs identified for the Property consist of:

- RAO-1: Prevent direct human contact with soil containing contaminants from the Property at concentrations greater than the direct contact soil cleanup levels. RAO-1 applies to soil contamination between 0 to 15 ft BGS in the northwestern and western portion of the Property. Soil contamination in the northeastern portion of the Property is below 15 ft and is below the depth for soil cleanup levels protective of direct human contact, in accordance with WAC 173-340-740(6)(d). Therefore, RAO-1 does not apply to soil in the northeastern portion of the Property. No other areas of the Property have contaminant concentrations in soil that are greater than the direct contact cleanup levels.
- RAO-2: Prevent human ingestion of groundwater containing contaminants from the Property at concentrations greater than the groundwater cleanup levels. RAO-2 is applicable primarily in the northeastern and eastern portions of the Property. Except for one groundwater grab sample from a temporary well/boring location in the northwestern portion of the Property, no other samples indicated contaminant concentrations in groundwater that were greater than the groundwater cleanup levels.
- RAO-3: Prevent groundwater containing contaminants from the Property at concentrations greater than the groundwater cleanup levels from migrating off site. RAO-3 is applicable at the conditional point of compliance, which is the Property boundary.
- RAO-4: Prevent human inhalation of volatile petroleum hydrocarbons from Property contaminants at concentrations in indoor air that may cause an incremental increase in risk greater than acceptable levels. RAO-4 is applicable for future buildings on the Property.

Each of these RAOs can be achieved by preventing exposure to the contaminated media through containment and monitoring, or through treatment or removal of the contaminated media (soil or groundwater). Each of the cleanup action alternatives described in Section 7.0 achieve these four RAOs and meet all of the MTCA threshold requirements (described in Section 8.1.1); each alternative is therefore a viable cleanup alternative for the Property under MTCA. The degree to which each cleanup action alternative meets the threshold requirements and other requirements listed in WAC 173-340-360(2) will be determined by applying the specific evaluation criteria identified in MTCA (Sections 8.1 and 8.2).

## 6.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In accordance with MTCA, all cleanup actions must comply with applicable state and federal laws [WAC 173-340-710(1)]. MTCA defines applicable state and federal laws to include legally applicable requirements and those requirements that are relevant and appropriate. Collectively, these requirements are referred to as applicable or relevant and appropriate requirements (ARARs). This section provides a brief overview of potential ARARs for the Property cleanup. The primary ARAR is the MTCA cleanup regulation (Chapter 173-340 WAC), which outlines requirements for the development of cleanup standards, and procedures for development and implementation of a cleanup under MTCA. The other ARARs that may be applicable to the cleanup action include the following:

- Washington Hazardous Waste Management Act (Chapter 70.105 RCW) and its implementing regulations: Dangerous Waste Regulations (Chapter 173-303 WAC). These regulations establish a comprehensive statewide framework for the planning, regulation, control, and management of dangerous waste. The regulations designate those solid wastes that are dangerous or extremely hazardous to human health and the environment. The management of excavated contaminated soil from the Property would be conducted in accordance with these regulations to the extent that any dangerous wastes are discovered or generated during the cleanup action.
- Washington Solid Waste Management Act (Chapter 70.95 RCW) and its implementing regulation: Criteria for Municipal Solid Waste Landfills (Chapter 173-351 WAC). These regulations establish a comprehensive statewide program for solid waste management including proper handling and disposal. The management of any contaminated soil removed from the Property would be conducted in accordance with these regulations to the extent that this soil could be managed as solid waste instead of dangerous waste.
- Hazardous Waste Operations (Chapter 296-843 WAC). Establishes safety requirements for workers conducting investigation and cleanup operations at sites containing hazardous materials. These requirements would be applicable to onsite cleanup activities and would be addressed in a site health and safety plan prepared specifically for these activities.
- Federal Clean Water Act National Pollutant Discharge Elimination System (NPDES) Permit and State Construction Stormwater General Permit. Construction activities that disturb one or more acres of land typically need to obtain an NPDES Construction Stormwater General Permit from Ecology. A substantive requirement would be to prepare a stormwater pollution prevention plan (SWPPP) prior to the earthwork activities. The SWPPP would document planned procedures designed to prevent stormwater pollution by controlling erosion of exposed soil and by containing soil stockpiles and other materials that could contribute pollutants to stormwater.

## 6.3 SCREENING OF TECHNOLOGIES

Potential general response actions and remedial technologies were identified based on the known site conditions, media impacted, contaminant types, and best professional judgment of applicable remedial technologies. The identified remedial technologies are screened in this section of the FS on the basis of effectiveness, implementability, and cost. Remedial technologies not screened out are included in the cleanup action alternatives and are further evaluated in the next section.

### 6.3.1 INSTITUTIONAL CONTROLS

Institutional controls are legal or administrative measures to restrict or prohibit activities that could result in exposure to contaminants that are above acceptable health risk levels or interfere with the integrity of a cleanup action. Institutional controls are commonly used at sites where contaminants are expected to remain at concentrations above cleanup levels for an extended period of time. A restrictive covenant is a common type of institutional control that restricts the use of a property and is binding for all current and future owners of the property. Another common institutional control is a local ordinance or state regulation that limits installation of groundwater wells or requires special permits before excavating or drilling in contaminated soil. Requirements for long-term monitoring (for example, periodic groundwater monitoring or inspections of engineering controls) are another form of institutional control and can be used to verify that protection of human health and the environment is maintained.

Institutional controls would not likely be an acceptable cleanup action alternative on their own because they are considered unlikely to achieve the site RAOs without additional engineering controls. However, environmental covenants are effective and implementable in combination with engineering and other institutional controls where the covenant requires maintenance of the protective barriers that keep humans and ecological receptors from contacting contaminated soil. If contaminated soil is left in place at a depth less than 15 ft, then a restrictive covenant could be employed to require special procedures for future subgrade work. Institutional controls would require long-term monitoring to ensure that the Property conditions remain as required to achieve the RAOs. Institutional controls are retained for further evaluation.

### 6.3.2 CONTAINMENT

Containment as a general response action typically involves an engineered control that can be designed to keep contaminated media from migrating off site, prevent human or ecological contact with the contaminated media, prevent the migration of volatile contaminants into indoor air, and/or prevent the leaching of contaminants into groundwater or surface water. An engineered surface cap is the most common containment method for contaminated soil. Where volatile contaminants are a concern, a vapor barrier can be spray-applied while installing the foundation of a new building. A cleanup action alternative that employs a cap or a vapor barrier typically includes institutional controls that would provide long-term monitoring of the physical condition of the cap, would place restrictions on construction activities that would compromise the integrity of the cap or vapor barrier, and would require that any necessary repairs of the cap or barrier are conducted.

Capping would consist of placing a layer, or multiple layers, of material over the contaminated soil in locations where human contact is anticipated. If the cap is made of or contains an impermeable material, then it would act to prevent infiltration of rainwater that could contact the contaminated soil and potentially result in leaching of contaminants to groundwater. The use of an impermeable layer would require that additional drainage features be incorporated into the cap design.

The installation of a cap for the Property is considered to be an effective cleanup action technology that will achieve the RAOs. A cap requires long-term institutional controls and monitoring, and the associated costs need to be considered in project planning. The buildings and concrete pavement included in the proposed development plans for the Property will provide a barrier to contact with the underlying soil; therefore, a cap for contaminant containment could cost-effectively be integrated into the final plans for development of the Property. The cap would require an ongoing level of effort for periodic inspection and repair. Because of the potential effectiveness, the ability to be implemented at the Property, and the reasonable projected costs, use of a cap is retained for further evaluation.

### 6.3.3 REMOVAL (EXCAVATION)

Removal of soil by excavation is considered to be an effective technology to permanently eliminate the risk of exposure to contaminants at the Property. Excavation is implementable because the Property is currently mostly open and accessible, the depth to groundwater is about 6 to 8 ft below grade, and extensive development is planned.

Excavation would consist of excavating contaminated soil and transporting the soil to an appropriate, licensed, off-Property disposal facility. Excavation would prevent long-term human contact with contaminated soil and prevent future leaching of contaminants to groundwater through removal of the material.

Excavation is considered to be very effective because it includes removal of contaminated soil from the Property and disposal at a controlled facility. Excavation would be readily implementable at the Property because there are available, qualified local contractors, and licensed offsite solid waste (Subtitle D) and hazardous waste (Subtitle C) disposal facilities are located in the region. While excavation can have a high initial (capital) cost, the resulting source removal will reduce the future annual effort and expense associated with engineering and institutional controls. Because of the effectiveness in achieving the RAOs, the ability to be implemented to the depth of the groundwater, and the potential elimination of long-term environmental management and associated costs, excavation is retained for further evaluation.

### 6.3.4 TREATMENT

General response actions for onsite treatment of soil and groundwater can include biological or chemical treatment, soil vapor extraction, and thermal treatment. Treatment consists of the biological or chemical destruction of contaminants or transformation of contaminants to less toxic or non-toxic forms, the removal of contaminants, or the stabilization of contaminants through physical (other than excavation; i.e., cementation) or physically driven processes such as volatilization and/or thermal desorption.

Treatment options such as permanent treatment systems and thermal treatment are not considered to be viable treatment options for the Property due to the substantial time required for treatment and their incompatibility with the planned Property development. The planned future use of this urban Property provides for substantial public benefit that precludes the unnecessary delays associated with treatment; therefore, there is a preference for only minimal permanent or temporary facilities as part of the remedial action. Any long-term treatment system(s) would have to be integrated into the design and/or construction of the planned development with consideration for long-term operation and maintenance, and would therefore likely be more expensive and less effective than excavation.

Bioremediation is an applicable treatment option for the area of gasoline and benzene contamination in the northwestern portion of the Property. Bioremediation could be applied to soil near the groundwater table to either aerobically or anaerobically degrade contaminants *in situ*. Some form of bioremediation combined with soil excavation or removal could be implemented within a timeframe and in a manner that considers both the Property development schedule and the Property's specific needs discussed above.

Soil and contaminant stabilization would be an effective treatment option for the area of creosote contamination in the northeastern portion of the Property. Soil stabilization can be performed using large soil mixing augers that would inject a concrete slurry mix into the soil at the depth identified for treatment. Creosote contamination in the northeastern portion of the Property is below 15 ft BGS and is therefore below the depth/point of compliance for the direct contact pathway, per WAC 173-340-740 (6)(d); however, stabilization/cementation of the creosote layer would minimize the potential for future migration of the contaminants. The effectiveness of the soil auger mixing methodology may be limited if obstructions are present in the area of implementation.

Based on the above rationale, the soil treatment options retained for further evaluation consist of bioremediation in the northwestern portion of the Property to treat residual gasoline/benzene, and soil stabilization in the northeastern portion of the Property to treat the creosote-containing soil.

# 7.0 DEVELOPMENT OF REMEDIAL ACTION ALTERNATIVES

Six alternatives that meet regulatory and development requirements are evaluated in this FS to address contaminated media in the three areas of concern at the Property:

- Northwestern portion of Property (soil)
- Northeastern portion of Property (soil)
- Property-wide (soil).

Each of the alternatives discussed below was developed to be protective of human health and the environment, consistent with the MTCA regulations, and suitable for integration into the proposed development plan for the Property. Therefore, each alternative must be comprehensive and consider the Property and its future use as a whole, but may include the use of separate cleanup action technologies for the different areas of concern. The six alternatives incorporate the most viable cleanup action technologies within the general response action categories of containment, source removal (i.e., excavation), treatment, and institutional controls. The six alternatives are:

- Alternative 1: Containment including a Vapor Barrier
- Alternative 2: Hotspot Excavation and Containment
- Alternative 3: Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Containment, and Added Measures to Prevent Contact with Shallow Contaminated Soil Outside the Footprints of the Building Foundations
- Alternative 4: Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Focused Treatment of Creosote Area, and Containment
- Alternative 5: Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Excavation of Fill Material across the property to 5 ft BGS, and Containment
- Alternative 6: Complete Excavation of Fill Material.

The alternatives were developed with the understanding that the proposed use of the Property includes structures, incorporating commercial/retail, office, and upper-floor residential uses, over the entire Property (except for Center Drive Lane), which will be paved with concrete. For Alternatives 1, 2, and 4, shallow contaminated soils remain in place. For Alternative 3, shallow contaminated soils would remain in place beneath the building foundations and be removed to 5 ft BGS in landscaped areas or contained beneath concrete in the areas outside the footprints of the building foundations within the Property boundary. For all alternatives except Alternative 6, contaminated soil deeper than 5 ft BGS would remain in place. For Alternative 6, all contaminated soil above the native marine sediments would be removed. Due to the need for removal of the existing surface material at the Property for construction of the planned development, all of the alternatives will include removal and appropriate off-Property disposal of the existing asphalt, the associated subgrade, and soil/fill to a depth of approximately 1.5 ft BGS across the Property, in addition to excavation for pile caps, elevator pits, and grade beams. The costs associated with this excavation for development construction and the off-Property disposal of the excavated soil are included in the cost estimates for each alternative. The estimated soil volumes presented in the discussions of Remedial Alternatives 1 through 4 in the sections below are the amounts of soil that will be removed in addition to the excavation volumes for development construction (which include excavation of approximately 1.5 ft of surface material Property-wide plus excavation for pile caps, elevator pits, and grade beams) that will be removed and disposed of off-Property as part of development of the Property. The excavation volumes for development construction are included in the discussions of Alternatives 5 and 6, as these alternatives constitute Property-wide excavations and therefore encompass the same excavation area (i.e., to the Property boundary) as the construction development excavation. The volumes of soil to be removed as part of Property development are discussed in Section 7.1. The implementation of the preferred alternative will be coordinated with the plans for, and timing of, development of the Property and, therefore, may be completed in phases.

Any excavation or grading, or subsurface building or utility construction on the Property that could disturb contaminated soils will require that those soils be properly managed and disposed of off-Property at appropriate facilities. Property development considerations are discussed below in Section 7.1. The alternatives described below address only the remedial actions that will be conducted prior to or in conjunction with construction for the planned development of the Property. The proposed alternatives do not include the removal, handling, and off-Property disposal of material encountered as part of construction for development of the Property or the potential future costs associated with disturbance of the cap or the underlying contaminated soil once the initial development at the Property is complete. However, depending on the timing for remedial action and construction for Property development, any soil removal required as part of construction for Property development can be coordinated with the cleanup action and the cleanup action may be completed in phases.

The discussions below include an estimate for the amount of soil to be removed as part of each alternative in addition to the volume of soil (to a depth of approximately 1.5 ft BGS and associated with the pile caps, elevator pits, and grade beams) that will be removed as part of construction for Property development. A detailed description of each alternative is presented below.

## 7.1 CONSIDERATION OF THE ALTERNATIVES WITH RESPECT TO FUTURE PROPERTY DEVELOPMENT

As discussed above, the Property will be developed by NLD as part of a Transit-Oriented Development (TOD) that will encompass two full city blocks with approximately 1.5 million gross $ft^2$ of buildable area. The planned development includes two podiums (east and west blocks) that will consist of first- and second-floor commercial/retail space and parking, third- and fourth-floor parking and residential space as well as parking/office/residential space above the fourth floors. The east block will be a single office tower and the west block will include more than 400 units of new housing (including 100 affordable units directly related to the development, at least 30 of which will be constructed at the Property). The building footprints and associated cross sections are shown on Figures 16 and 17.

The planned development project, as outlined in the approved Seattle Master Use Permit (MUP) and related State Environmental Policy Act documentation, does not include below-grade construction or features such as a basement or an underground garage. As discussed above, construction for Property development will include removal of the existing surface material to a depth of approximately 1.5 ft BGS across the entire Property, including the existing asphalt surface, associated subgrade, and shallow soil/fill, to prepare the Property for construction of the impervious surfaces and high-rise buildings associated with Property development. Below-grade excavation will be strategic and limited to utilities, piles, grade beams, and elevator pits, and will be primarily within the footprints of the two proposed buildings. A foundation plan for the buildings including the locations of the pile caps, elevator pits, and grade beams is shown on Figure 16. Profiles/cross sections showing the depths for the piles, pile caps, elevator pits, and grade beams are shown on Figure 17. Based on current construction estimates, about 16,500 $yd^3$ (in place) of existing surface material will be excavated as part of the proposed construction. Excavated material, including shallow contaminated soil, removed during construction will be disposed of off-Property consistent with MTCA regulations.

As discussed above, the cleanup will be conducted as part of the planned development that will be constructed consistent with the MUP in accordance with market conditions. The west block will be constructed first. The four-story podium structure on the west block will support three high-rise buildings. The three high-rises will sit on top of the podium approximately 40 ft above the existing ground elevation and extend to a maximum of 25 stories. The podium will be designed and constructed in anticipation of future high-rise buildings; therefore, all the physical underground requirements for the high-rise buildings will be built during the initial construction so there is no need for future disturbance of the podium foundation. The construction elements for the podium include underground and ground-level items such as piles, pile caps, elevator pits, grade beams, slab-on-grade foundations, and underground utilities. Once the podium is constructed, there will be no need to penetrate below the ground level.

The east block will be developed as market conditions allow and in accordance with the requirements of the MUP. The construction plan will account for all of the elements of the preferred alternative selected in this FS and discussed in the CAP, and will ensure protection of human health and the environment in accordance with MTCA. During construction on the west block, the asphalt on the east block will be cleaned, replaced (if necessary), and repaired. The asphalt will be maintained as a protective cap over the underlying soil until development of the east block occurs.. The groundwater compliance monitoring plan (included in the CAP) will be implemented Property-wide following cleanup and development of the west block.

Future construction and maintenance activities at the Property following development will be limited by the cap provided by the pavement and structures associated with Property development. Future construction workers will be made aware of the presence of residual contamination remaining beneath the cap by institutional controls and plan documents, which will restrict access to Property soil. Institutional controls will include, as required, provisions for a soil management plan and health and safety plan for any work, including any post-development activities at the Property such as additional utility installation, requiring disturbance of the cap. An institutional control to prohibit groundwater use at the Property will also be included. Provisions for activities that could disturb the cap and the underlying soil will include proper characterization and off-Property disposal of any excavated soil, replacement of the excavated material with clean fill, and reconstruction/replacement of the cap.

The development plan has been revised based on the presence of soil contamination at the Property and the revised development plan has been considered during the development of the remedial action alternatives. The remedial action elements evaluated, including the cap, vapor barrier, and soil excavation and stabilization, would affect the design for the building foundations and subsurface grading or construction activities. However, the Property development team is aware of the soil contamination at the Property and the associated constraints on construction. Therefore, as discussed above, the development approach is to minimize grading, and underground parking garages and basements have been eliminated from the project. The FS alternatives consider soil and groundwater conditions at the Property, and any potential negative impacts on the planned development have already been incorporated, so any of the alternatives identified in this FS could be successfully implemented.

## 7.2 CONTINGENCY FOR GROUNDWATER TREATMENT

Under current Property conditions, contamination in groundwater does not pose a threat to human health or the environment; therefore, groundwater treatment options have not been evaluated in the cleanup alternatives. In the event that compliance groundwater monitoring shows a significant increase in contaminant concentrations in groundwater and evidence of off-Property migration of groundwater with concentrations greater than the cleanup levels or a significant change in site conditions, groundwater treatment options will be evaluated to prevent contaminated groundwater from passing the conditional point of compliance. One potential treatment option that would be evaluated as part of the contingency plan is the installation of extraction wells along the Property boundary to collect groundwater before it flows off the Property. Collected groundwater would be treated using a granulated activated carbon treatment system and pumped into the sanitary sewer system for further treatment and disposal. For the purposes of selecting a preferred remedial alternative for the Property, the estimated cost for Alternatives 1 through 5 includes a line item for implementing contingent groundwater treatment to address potential off-Property migration of contaminants due to changes in groundwater flow associated with on-Property activities. For the purpose of estimating costs, we have assumed implementation of groundwater extraction along the northeastern Property boundary to address creosote contamination to groundwater. This treatment is included only as a contingency; as noted above, under current conditions groundwater does not pose a threat to human health or the environment.

As required by the MTCA regulations, monitoring is included in Alternatives 1 through 5 to monitor contaminant concentrations in groundwater and document groundwater flow direction. A groundwater compliance monitoring plan is provided in the CAP. Groundwater monitoring and contingent groundwater treatment has not been included as part of Alternative 6 because the source of the groundwater contamination would be eliminated with removal of the fill material.

## 7.3 ALTERNATIVE 1: CONTAINMENT INCLUDING A VAPOR BARRIER

Alternative 1 consists of containment, including a surface cap and a vapor barrier beneath buildings constructed in the western portion of the Property (former gasoline station area), and institutional controls.

A vapor barrier would be integrated into the design for Property development and would be installed beneath buildings constructed on the western side of the Property (west of Center Drive Lane). As discussed in Section 3.0, there is no indication that the benzene concentrations in soil present a risk via the vapor intrusion pathway. However, the vapor barrier is included as an added measure to prevent intrusion of vapor into indoor air. To ensure that impacted soil vapor does not migrate off-Property or beyond the limits of the vapor barrier on the Property at levels of concern, a passive perimeter or sub-slab venting system would also be integrated into the Property development design. The cap would consist of the placement of a cover over the impacted soil and groundwater to prevent human contact with contaminated soil and groundwater. The cap would also limit surface water infiltration and thereby limit potential contaminant leaching and migration. Because the future proposed use of the Property includes structures with first- and second-floor commercial/retail space and parking, and upper-floor office and residential space over the entire Property, the cap would ultimately consist of the buildings and associated pavement over the entire Property. Non-paved portions of the Property such as landscaped areas, if any, would include the placement of a surface layer of clean soil or other material over the Property soil surface.

Institutional controls would be an important component of Alternative 1 to prevent/control human contact with subsurface soils (RAO-1) and use of Property groundwater for drinking water (RAO-2), and would include a restrictive covenant on the property deed recorded with King County. This covenant would be binding on the owner's successors and assignees. The covenant would place restrictions on any future excavation work within the capped Property and prohibit use of groundwater. An excavation procedures work plan would be prepared that would provide specific details about how any future utility installation or other subgrade work would need to be performed to ensure that the cap integrity is maintained and that any soil that is generated is handled and disposed of appropriately. The excavation procedures work plan would include a default health and safety plan for contractors to adopt or modify for their work. Institutional controls will require that proper safety measures and soil management practices be implemented as part of any project involving disturbance of impacted soils at the Property (in accordance with WAC 173-340-440). The institutional controls would also include a requirement for periodic (e.g., annual) inspection of the cap, with cap repair to be conducted as necessary if damage is sustained from site activity or from natural events. Because the cap would consist of the future Property buildings and pavement, inspection and maintenance would be incorporated into the property maintenance plan(s). The City of Seattle will require connection to the City water system. However, an institutional control to prohibit use of Property groundwater for potable water supply will also be included as part of this alternative as requested by Ecology.

Because Alternative 1 would involve the long-term onsite containment of contaminants, long-term groundwater monitoring would be a component of this remedy. Groundwater monitoring results from the Property have shown limited evidence of leaching of contaminants from soil to groundwater and no migration of groundwater contaminants off-Property, so it is assumed that groundwater monitoring would be limited to annual monitoring, unless results indicated the need for more frequent monitoring. For purposes of estimating costs, it is assumed that groundwater monitoring could be discontinued 30 years after installation of the Property cap.

To ensure that the Property cap/vapor barrier is not causing volatile constituent migration to other parts of the Property or neighboring buildings at concentrations that might adversely impact indoor air quality, a passive venting system would be integrated with the Property cap and vapor barriers. As described in Section 7.1, surface material would be excavated to a depth of approximately 1.5 ft BGS Property-wide and excavations would be conducted for the pile caps, elevator pits, and grade beams as part of Property development before implementation of Alternative 1.

The specific items anticipated to be included in Alternative 1 are listed in Table 8 along with their estimated costs. As detailed in Table 8, the total estimated present-worth cost of the containment and monitoring alternative is approximately $3,179,000. This is a feasibility study level estimate and the actual costs may be as much as 30 percent less or 50 percent greater than the estimate.

## 7.4 ALTERNATIVE 2: HOTSPOT EXCAVATION AND CONTAINMENT

Alternative 2 is similar to Alternative 1 except that Alternative 2 includes focused excavation of contaminated soil from the northwestern portion of the Property, and does not include a vapor barrier. In Alternative 2, contaminated soil in the northwestern portion of the Property with the highest benzene concentrations would be removed. Based on the evaluation of the risk of vapor intrusion discussed in Sections 3.0 and 4.2.1, removal of soil with benzene concentrations greater than the remediation level of 780 µg/kg is planned to mitigate the potential for vapor intrusion; therefore, the hotspot soil excavation would be conducted in the northwestern portion of the Property within the area of the former gasoline stations. Soil in this area with benzene concentrations greater than the remediation level would be excavated to the groundwater table (a depth of approximately 8 ft BGS) and disposed of off-Property at a permitted solid waste Subtitle D landfill. The hotspot excavation would also include soil removal at the location where the highest concentrations of cPAHs were detected in the shallow soil (the sample from 4.6 ft BGS at boring B-23).

Use of groundwater at the Property would be prohibited under Alternative 2 through institutional controls in the same manner as described for Alternative 1. Also similar to Alternative 1, Alternative 2 includes long-term groundwater monitoring following completion of excavation activities to document attainment of groundwater cleanup levels. Groundwater monitoring would be conducted on the same schedule as outlined for Alternative 1; however, it is assumed that the number of wells could be reduced after approximately 10 years.

Shallow soil with benzene concentrations greater than the cleanup level, but less than the remediation level, in the rest of the western portion of the Property beyond the former gasoline station area would not be removed during excavation (other than the surface material to a depth of approximately 1.5 ft BGS Property-wide and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development) because, based on groundwater sampling results, the soil is not impacting groundwater and the benzene concentrations in soil do not pose a potential vapor intrusion risk. Therefore, these soils would be managed by containment through capping and institutional controls, in the same manner as described under Alternative 1.

For cost estimating purposes, the assumed lateral limits of the excavation in the northwestern portion of the Property for Alternative 2 are as shown on Figure 18, and the vertical limit is assumed to be a depth of 8 ft BGS, which is the approximate depth of the water table. The amount of soil excavated for off-Property disposal would include approximately 720 cubic yards ($yd^3$) after the Property-wide excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development. The final lateral limits of the hotspot excavation area would be determined in the field based on the results of field screening and the laboratory analysis of confirmation samples collected at the limits of the excavation.

Prior to excavation and as part of the PPCD negotiations, a plan will be developed to allow for removal of contaminated soil beyond the Property boundary, if necessary and if feasible, based on the locations of existing utilities and discussions with the City of Seattle.

The specific items anticipated to be included in Alternative 2 are listed in Table 9 along with their estimated costs. As detailed in Table 9, the total estimated present-worth cost of the excavation and containment alternative is approximately $2,902,000. This is a feasibility study level estimate and the actual cost may be as much as 30 percent less or 50 percent greater than the estimate.

## 7.5 ALTERNATIVE 3: HOTSPOT EXCAVATION, FOCUSED TREATMENT OF RESIDUAL GASOLINE/BENZENE, CONTAINMENT, AND ADDED MEASURES TO PREVENT CONTACT WITH SHALLOW CONTAMINATED SOIL OUTSIDE THE FOOTPRINTS OF THE BUILDING FOUNDATIONS

Alternative 3 is similar to Alternative 2, except that it includes focused bioremediation of residual soil and groundwater in the area of the hotspot excavation, and added measures to prevent contact with shallow contaminated soil outside the footprints of the building foundations within the Property boundary. In Alternative 3, a bioremediation technology such as Oxygen Release Compound (ORC) would be applied to the area of the hotspot excavation near the depth of the water table. The ORC would be placed at the bottom of the excavated area, prior to backfilling, to enhance bioremediation of residual gasoline and benzene contamination at the elevation of the groundwater table. Following placement of the ORC, the hotspot excavation would be backfilled with clean imported fill. Like Alternative 2, Alternative 3 provides for removal of the soil with benzene concentrations greater than the Ecology-accepted remediation level, and additionally provides ongoing treatment in the area for deeper soil contamination.

Alternative 3 also includes added measures considered to be equally effective in preventing contact with shallow contaminated soil within the Property boundary outside of the footprints of the building foundations. These measures include excavation of additional shallow soil to 5 ft BGS in landscaped areas on the Property or installation of an impervious concrete surface in other areas outside of the building foundation footprint within the Property boundary. The landscaped areas where soil will be excavated to 5 ft BGS and the areas where protective pavement will be used as part of Alternative 3 are shown on Figure 16.

Use of groundwater at the Property would be prohibited under Alternative 3 through institutional controls in the same manner as described for Alternative 1. Also similar to Alternative 1, Alternative 3 includes long-term groundwater monitoring following completion of excavation activities to document attainment of groundwater cleanup levels. Groundwater monitoring would be conducted on the same schedule as outlined for Alternative 2, with the assumption that the number of wells could be reduced after approximately 10 years.

As discussed above, for Alternative 3 the area outside the footprints of the building foundations will either be excavated to 5 ft BGS or covered with a concrete barrier. For purposes of estimating costs for Alternative 3, we have assumed that the measure to prevent contact with shallow soil in all areas outside the footprints of the building foundations within the Property boundary will be additional soil excavation to 5 ft BGS. The costs for soil excavation and off-Property disposal are being used for Alternative 3 because they are considered to be roughly equivalent to, or greater than, the costs for a concrete barrier.

The lateral limits of the excavation areas in the northwestern portion of the Property and the areas outside the building foundation but within the Property boundary for Alternative 3 are shown on Figure 19. The amount of soil excavated for off-Property disposal would include removal of approximately 720 $yd^3$ in the hotspot excavation area, and approximately 5,210 $yd^3$ in the areas outside of the footprints of the building foundations after the Property-wide excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development.

Additionally, for the purpose of estimating the cost of the bioremediation treatment, the oxidative state of the soil and groundwater in the extent of the excavation is assumed to be aerobic. An evaluation of the redox conditions in the subsurface at the Property would be a necessary component of Alternative 3 to determine if aerobic or anaerobic treatment will be more effective and efficient.

The specific items anticipated to be included in Alternative 3 are listed in Table 10 along with their estimated costs. As detailed in Table 10, the total estimated present-worth cost of the hotspot excavation, focused bioremediation, and containment alternative is approximately $3,840,000. This is a feasibility study level estimate and the actual costs may be as much as 30 percent less or 50 percent greater than the estimate.

## 7.6 ALTERNATIVE 4: HOTSPOT EXCAVATION, FOCUSED TREATMENT OF RESIDUAL GASOLINE/BENZENE, FOCUSED TREATMENT OF CREOSOTE AREA, AND CONTAINMENT

Alternative 4 builds on Alternatives 2 and 3 by including focused treatment of soil for the area where the creosote-like material is present in the northeastern portion of the site, but does not include the added measures to prevent contact with shallow contaminated soil outside the footprints of the building foundations within the Property boundary that are part of Alternative 3. Alternative 4 includes the excavation and bioremediation of soil with the high benzene and gasoline concentrations in the northwestern part of the Property included in Alternative 3, but also includes stabilization/cementation of the creosote-contaminated soil in the northeastern portion of the Property. Post-remedial excavation monitoring would be included to document the performance of the remediation.

Use of groundwater at the Property would be prohibited under Alternative 4 through institutional controls in the same manner as described for Alternative 1. Also similar to Alternative 1, Alternative 4 includes long-term groundwater monitoring following completion of excavation activities to document attainment of groundwater cleanup levels. Groundwater monitoring would be conducted on the same schedule as outlined for Alternative 2, with the assumption that the number of wells could be reduced after approximately 10 years.

As with Alternative 3, the shallow soil with benzene concentrations greater than the cleanup level, but less than the remediation level, in the rest of the western portion of the Property would remain in place, except for the Property-wide excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams that are planned as part of Property development, because the groundwater sampling results indicate that the soil is not impacting groundwater and does not pose a potential vapor intrusion risk based on the modeling data. Therefore, these soils would be managed by containment through capping and institutional controls, in the same manner as described under Alternative 1.

The zone of creosote-like material in the northeastern portion of the Property is located at a depth of 17 ft BGS or greater, and is therefore below the depth for soil cleanup levels protective of direct human contact. Off-Property and downgradient wells have demonstrated that there is no migration of the creosote constituents in groundwater; however, stabilization/cementation of the creosote contamination would prevent potential future migration due to potential changes in Property conditions, such as a substantial release of petroleum products in the vicinity that could potentially increase the mobility of the creosote-like material. Stabilization would be accomplished through pumping and mixing of cement grout with the soil throughout the creosote-impacted zone using large augers in overlapping columns to fully encapsulate the creosote-impacted soil on the Property.

For the purposes of estimating cost, the assumed lateral limits of the excavation in the northwestern portion of the Property and the stabilization/cementation in the northeastern portion of the Property for Alternative 4 are as shown on Figure 20. The excavation and remediation in the northwestern portion of the Property for the gasoline/benzene contaminated soil is assumed to be the same as Alternative 3. The stabilization/cementation of the creosote-like material in the northeastern portion of the Property would include an area of approximately 8,800 $ft^2$. Based on an average thickness of the soil column of 20 ft BGS (the average depth of the native marine sediment layer in the northeastern portion of the Property),the amount of treated soil would include approximately 6,010 $yd^3$ after the Property-wide excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams.

The specific items anticipated to be included in Alternative 4 are listed in Table 11 along with their estimated costs. As detailed in Table 11, the total estimated present-worth cost of the excavation, focused bioremediation, stabilization/cementation, and containment alternative, including contingency, is approximately $3,614,000. This is a feasibility study level estimate and the actual costs may be as much as 30 percent less or 50 percent greater than the estimate.

## 7.7 ALTERNATIVE 5: HOTSPOT EXCAVATION, FOCUSED TREATMENT OF RESIDUAL GASOLINE/BENZENE, AND EXCAVATION OF FILL MATERIAL ACROSS THE PROPERTY TO 5 FT BELOW GROUND SURFACE

Alternative 5 includes Property-wide excavation of shallow soils to approximately 5 ft BGS, and was included as requested by Ecology in the Opinion Letter responding to the May 2010 Ecology Review Draft FS report as an intermediate approach between Alternative 3 and Alternative 6 (see below). Alternative 5 includes the excavation and bioremediation of soil with the highest benzene and gasoline concentrations in the northwestern part of the Property included in Alternative 3, but also includes excavation of 3.5 ft of shallow soil Property-wide in addition to the excavation to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams planned as part of Property development for a total excavation depth of 5 ft BGS. Post-remedial excavation monitoring would be included to document performance of the remediation.

Use of groundwater at the Property would be prohibited under Alternative 5 through institutional controls in the same manner as described for Alternative 1. Also similar to Alternative 1, Alternative 5 includes long-term groundwater monitoring following completion of excavation activities to document attainment of groundwater cleanup levels. Groundwater monitoring would be conducted on the same schedule as outlined for Alternative 2, with the assumption that the number of wells could be reduced after approximately 10 years.

For cost estimating purposes, the lateral limits of the Property-wide excavation and the excavation in the northwestern portion of the Property for Alternative 5 are as shown on Figure 21. The lateral limits of the excavation in the northwestern portion of the Property are assumed to be the same as those described in Alternative 2. The volume of excavated soil would be approximately 31,360 $yd^3$ of soil (in place). This volume of soil includes the estimated 16, 510 $yd^3$ that will be excavated as part of Property development as discussed in Section 7.1, in addition to approximately 14,850 $yd^3$ of soil that will be excavated an additional 3.5 ft Property-wide (to a total depth of 5 ft BGS), and an additional 6.5 ft that will be excavated in the hotspot excavation area in the northwestern corner of the Property (to a total depth of 8 ft BGS).

Additionally, for the purpose of estimating the cost of the bioremediation treatment, the oxidative state of the soil and groundwater in the extent of the excavation is assumed to be aerobic. An evaluation of the redox conditions in the subsurface at the Property would be a necessary component of Alternative 5 to determine if aerobic or anaerobic treatment would be more effective and efficient.

The specific items anticipated to be included in Alternative 5 are listed in Table 12 along with their estimated costs. As detailed in Table 12, the total estimated present-worth cost of the hotspot and Property-wide excavation, focused bioremediation, and containment alternative is approximately $5,529,000. This is a feasibility study level estimate and the actual costs may be as much as 30 percent less or 50 percent greater than the estimate.

## 7.8 ALTERNATIVE 6: COMPLETE EXCAVATION OF FILL MATERIAL

Alternative 6 includes complete excavation and off-Property disposal of the fill material at the Property to the contact with the native marine sediments layer (approximately 25 ft BGS). As discussed in the RI and above, all of the soil (and limited groundwater) with contaminant concentrations greater than the cleanup levels is located within the fill material, so removal of all of the fill material would also remove all of the contaminated media at the Property.

Alternative 6 would involve excavation of an area of approximately 167,500 $ft^2$, down to approximately 25 ft BGS. The amount of soil excavated for off-Property disposal would include approximately 155,130 $yd^3$ of soil (in place). This volume of soil includes the estimated 16, 510 $yd^3$ that will be excavated as part of Property development as discussed in Section 7.1, in addition to approximately 138,620 $yd^3$ of soil that will be excavated an additional 23.5 ft BGS Property wide (to a total depth of 25 ft BGS).

The Property would be backfilled with clean fill material; backfill would include compaction testing and could be designed around Property development needs. Shoring and dewatering would be required during excavation for Alternative 6, as groundwater is typically encountered between 7 to 10 ft BGS across the Property (well above the elevation of the bottom of the fill).

For cost estimating purposes, the anticipated lateral limits of the excavation across the Property for Alternative 6 are as shown on Figure 21. The estimated cost assumes that treatment of groundwater will not be required during shoring/dewatering and excavation.

The specific items anticipated to be included in Alternative 6 are listed in Table 13 along with their estimated costs. As detailed in Table 13, the total estimated present-worth cost of the excavation alternative, including contingency, is approximately $24,595,000. This is a feasibility study level estimate and the actual costs may be as much as 30 percent less or 50 percent greater than the estimate.

# 8.0 DETAILED ANALYSIS OF REMEDIAL ACTION ALTERNATIVES

The six alternatives for cleanup of the Property are evaluated in this section, using applicable MTCA evaluation criteria. The alternatives are also considered with respect to future plans for Property development as discussed in Section 7.1. A preferred alternative is selected based on the evaluation and comparison of the alternatives.

## 8.1 EVALUATION CRITERIA

MTCA requires that cleanup alternatives be compared to a number of criteria to evaluate the adequacy of each alternative in achieving the intent of the regulations, and as a basis for comparing the relative merits of each of the cleanup action alternatives. Consistent with MTCA, the alternatives were evaluated with respect to compliance with threshold requirements, permanence, restoration timeframe, and consideration of public concerns. MTCA specifies preferences for remedial technologies that minimize the amount of untreated hazardous substances remaining at a site.

A “no action” alternative was considered in the feasibility study as a basis for comparison to other cleanup action alternatives. The “no action” alternative for the Property would include leaving the identified areas of soil contamination in place across the Property, leaving groundwater untreated, and taking no additional action to achieve the RAOs established for the Property. The “no action” alternative gives no assurance that the RAOs would be achieved and, therefore, the “no action” alternative is not considered to be adequately protective of human health and the environment. Because the “no action” alternative would not satisfy the RAOs, the “no action” alternative was removed from further consideration.

Each of the cleanup action alternatives described in Section 7.0 achieves the four RAOs identified for Property cleanup in Section 6.1 and meets all of the MTCA threshold requirements; each alternative is therefore a viable cleanup alternative under MTCA.

### 8.1.1 THRESHOLD REQUIREMENTS

As specified in WAC 173-340-360(2), all cleanup actions are required to meet the following threshold requirements:

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

Each of the alternatives meets the threshold requirements.

### 8.1.2 REQUIREMENT FOR A PERMANENT SOLUTION TO THE MAXIMUM EXTENT PRACTICABLE

WAC 173-340-200 defines a permanent solution as one in which cleanup standards can be met without further action being required at the site being cleaned up or any other site involved with the cleanup action, other than the approved off-Property disposal of any residue from the treatment of hazardous substances. Ecology recognizes that permanent solutions may not be practicable for all sites and provides a procedure referred to as a disproportionate cost analysis (DCA) [WAC 173-340-360(3)(e)] to determine whether a cleanup action is permanent to the maximum extent practicable.

The purpose of the DCA is to determine if the incremental increase in costs of a cleanup alternative over that of a lower cost alternative is justified by providing a corresponding incremental increase in human health and environmental benefits. If the incremental increase in costs is determined to be disproportionate to the benefits, the more expensive alternative is considered impracticable and the lower cost alternative is determined to be permanent to the maximum extent practicable. This process provides a mechanism for balancing the permanence of the cleanup action with its costs, while ensuring that human health and the environment are adequately protected.

The DCA procedure calls for comparing all cleanup alternatives against the most permanent (typically, highest cost) alternative evaluated in the feasibility study to select the alternative that is permanent to the maximum extent practicable. Alternatives are evaluated and ranked according to their costs and benefits relative to the most permanent alternative. Alternatives that are disproportionately costly relative to their incremental increase in environmental benefit are determined to be impracticable and therefore rank lower in the evaluation. Through this process, the most permanent practicable alternative is identified. The DCA table (Table 1) evaluates the permanence of each alternative compared to the respective cost.

### 8.1.3 REQUIREMENT FOR A REASONABLE RESTORATION TIMEFRAME

WAC 173-340-360(6)(a) specifies that the following factors be considered when determining whether a cleanup action provides for a reasonable restoration timeframe:

- Potential risks to human health and the environment
- Practicability of achieving a shorter restoration timeframe
- Current use of the Property, surrounding areas, and associated resources that are, or may be affected by releases from the Property
- Availability of alternative water supplies
- Likely effectiveness and reliability of institutional controls
- Ability to control and monitor migration of hazardous substances from the Property

- Toxicity of the hazardous substances at the Property
- Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the Property or under similar Property conditions.

### 8.1.4 REQUIREMENT FOR CONSIDERATION OF PUBLIC CONCERNS

Consideration of public concerns is an inherent part of the cleanup process under MTCA (see WAC 173-340-600). Prior to implementation of a cleanup action, Ecology will issue a CAP for public comment as specified in WAC 173-340-380. Under this process, the RI and FS reports, and the CAP will be available for public review as part of the 30-day comment period for the PPCD under the Ecology formal program.

## 8.2 EVALUATION AND COMPARISON OF ALTERNATIVES

This section evaluates and compares the adequacy of each alternative relative to the criteria discussed in Section 7.1. As previously discussed, each of the cleanup action alternatives described in Section 7.0 achieves the four RAOs presented in Section 6.1 and meets all of the MTCA threshold requirements; each alternative is therefore a viable and appropriate cleanup alternative under MTCA. In addition, each alternative is consistent with the goals and objectives of the plan for Property development. The comparative analysis of the alternatives is organized by criteria, and is presented in the following sections.

### 8.2.1 THRESHOLD REQUIREMENTS

For an alternative to achieve the threshold requirements, it must adequately protect human health and the environment, comply with cleanup standards, comply with state and federal laws, and provide for compliance monitoring. Each of the six alternatives achieves the threshold requirements as follows:

- ***Protection of human health and the environment***: Each of the six alternatives is protective of human health and the environment. Alternative 1 is protective of human health and the environment through maintaining a vapor barrier in buildings constructed in the western portion of the Property and a cap over the Property, which would prevent vapor intrusion into new buildings, restrict direct human contact with contaminated soil, and reduce the infiltration of water and the potential associated leaching/migration of contaminants. Alternative 1 would maintain protection of human health through the proper implementation of institutional controls, including the development of an excavation work plan for the Property and a long-term requirement for cap inspection and maintenance/repair as needed. Alternatives 2, 3, 4, and 5 would be protective of human health and the environment by removing a portion of the contamination (and stabilizing a portion of the contamination in the case of Alternative 4) and maintaining a cap and institutional controls at the Property. Alternative 6 would be protective of human health and the environment through complete removal of the fill material and the associated contamination from the Property. A comparative analysis between the six alternatives with respect to protection of human health and the environment is provided in Section 8.2.2 as part of the DCA.

- ***Compliance with cleanup standards***: Each of the six alternatives complies with the cleanup standards. Alternative 1 would not achieve preliminary cleanup levels by reducing the concentrations of contaminants in soil, but would comply with applicable cleanup standards by meeting the criteria in WAC 173-340-740(6)(f) and would prevent direct human contact with soil above cleanup levels and prevent migration of vapors into future nearby indoor air spaces. The related applicable cleanup standards include implementation of institutional controls to the area of impacted soil to ensure long-term integrity of the containment system (per WAC 173-340-440). Alternative 1 meets these cleanup standards through implementation of an environmental covenant, including property use restrictions, and through a Property cap. Alternatives 2, 3, 4, and 5 achieve the soil cleanup standards through containment and institutional controls, as described above, with the addition of excavation (and treatment in the case of Alternative 3) of impacted soils in the northwestern portion of the Property. Alternatives 2, 3, 4, and 5 also remove the soil with the highest contaminant concentrations that have been identified as posing the greatest risk (i.e., the highest likelihood of causing unacceptable levels of potential vapor intrusion or impact to groundwater). Alternative 4 additionally achieves the soil cleanup standards through stabilization/ cementation of the creosote-impacted soil, which would prevent future leaching of contaminants into groundwater that have the potential to cause exceedances of cleanup levels. Alternative 5 achieves soil cleanup levels to a depth of 5 ft BGS throughout the Property and Alternative 3 provides for removal of soil to a depth of 5 ft BGS outside the footprints of the building foundations or containment of this soil beneath concrete. Alternative 6 achieves soil cleanup standards through removal of all fill material from the Property. Each of the alternatives would comply with groundwater cleanup standards, assuming a conditional point of compliance at or near the Property boundaries; Alternative 6 would comply with the groundwater standards at the point of compliance.
- ***Compliance with applicable state and federal laws***: Each of the six alternatives would comply with applicable state and federal laws.
- ***Provisions for compliance monitoring***: Alternatives 1 through 5 include compliance monitoring. Alternative 1 includes long-term groundwater monitoring to confirm that the addition of the cap does not negatively alter Property conditions and that off-Property migration of impacted groundwater is not occurring. The long-term monitoring frequency would be gradually decreased unless monitoring results do not support such reduction. Alternatives 2, 3, 4, and 5 include long-term monitoring of groundwater similar to Alternative 1 to assess conditions following excavation and to ensure the migration of impacted groundwater from the Property is not occurring. Compliance monitoring is not included in Alternative 6 because the groundwater contamination would be eliminated with removal of the fill material and the associated contamination.

### 8.2.2 PERMANENT SOLUTIONS TO THE MAXIMUM EXTENT PRACTICABLE (I.E., DISPROPORTIONATE COST ANALYSIS)

As described in Section 8.1.2, a DCA is performed to determine whether a cleanup alternative is permanent to the maximum extent practicable. The purpose of the DCA is to determine if the costs of a cleanup alternative are disproportionate to the human health and environmental benefits achieved by the cleanup action, thus rendering the alternative impracticable. The six alternatives are evaluated below, using the DCA criteria. The evaluation is summarized in Tables 1 and 2.

- ***Protectiveness of human health and the environment***: Alternative 6 provides the highest level of protectiveness through complete removal of contaminated fill from the Property. However, based on the analytical data, existing soil conditions do not currently appear to be adversely impacting Property groundwater and there is no evidence of offsite migration of contaminants in groundwater. Alternative 5 is less protective than Alternative 6 but provides a higher level of protection relative to Alternative 1, and a slightly higher level of protection than Alternatives 2, 3, and 4 because it includes removal of additional shallow-contaminated soil Property-wide although deeper contaminated soil would still be present. However, the additional material removed Property-wide includes the widespread relatively low concentrations (although still above the cleanup levels) of PAHs and metals, neither of which presents a potential threat for migration via groundwater or soil vapor. Alternative 4 provides a slightly higher level of protection than Alternatives 1 and 2 because stabilization/ cementation of the creosote contamination provides a higher degree of certainty that future migration of contaminated groundwater off site would not occur. However, a cap (the proposed buildings and associated pavement) will cover the Property as part of development, regardless of which alternative is selected, and the additional protective measures included in Alternatives 1 and 2 (i.e., vapor barrier and institutional controls for Alternative 1, and partial Property excavation and institutional controls for Alternative 2) are considered to have nearly equivalent levels of protection. Alternative 3 provides the same level of protection as Alternative 4, and a slightly higher level of protectiveness than Alternatives 1 and 2 because it includes enhanced bioremediation in the excavation area, providing for additional treatment of soils below the water table and additional removal of shallow contaminated soil or containment of the soil beneath concrete outside the footprints of the building foundations. The excavation of shallow soils impacted with benzene and gasoline in the northwestern portion of the Property in Alternatives 2, 3, 4, and 5 would provide greater assurance that offsite migration of impacted groundwater and soil vapor does not occur compared to Alternative 1.

- ***Permanence***: Alternative 6 provides the most permanent remedy through complete removal of the fill material from the Property. Alternative 5 provides a relatively higher level of permanence than Alternatives 1 through 4 through removal of additional fill material across the Property to a depth of 5 ft. Alternatives 3 and 4 are slightly less permanent, but provide for permanent removal and treatment options for the gasoline/benzene contamination and the creosote-impacted soil through excavation/bioremediation and stabilization/cementation, respectively. Alternative 3 provides added permanence through removal or containment under concrete of additional shallow soil outside the footprints of the buildings foundations. Alternative 2 reduces the volume of hazardous materials through removal (excavation) alone. Alternative 1 provides essentially no reduction in the volume of hazardous materials at the Property and is therefore considered less permanent relative to Alternatives 2, 3, 4, 5, and 6. All of the alternatives include removal of surface material to approximately 1.5 ft BGS and excavation for the pile caps, elevator pits, and grade beams as part of Property development.

- ***Cost***: The estimated costs to implement each alternative are approximately $3,179,000, $2,902,000, $3,840,000, $3,614,000, $5,529,000, and $24,595,000 for Alternatives 1 through 6, respectively. A breakdown of these costs is presented in Tables 8 through 13. The cost for Alternative 6 is approximately 4 to 8 times higher than the cost for each of the other five alternatives. The cost of Alternative 5 is approximately 1.5 to 2 times higher than the cost for Alternatives 1, 2, 3, and 4. These costs are further evaluated against the relative environmental benefit described in Section 8.2.3.

- ***Effectiveness over the long term***: Each of the alternatives is considered to be effective over the long term because all exposure pathways will be effectively mitigated and each alternative provides measures to reduce the remaining minimal risk posed by residual contaminated soil and groundwater. Alternative 6 is considered to be the most effective over the long term because all contaminated soil would be removed from the Property. Alternative 5 provides a lower level of effectiveness compared to Alternative 6, but a slightly higher level of effectiveness than Alternatives 2, 3, and 4, through removal of a larger volume of soil across the Property. Alternatives 3 and 4 are considered to be slightly more effective than Alternatives 1 and 2 because stabilization/cementation of creosote-impacted soil (Alternative 4) should reduce groundwater contamination in the area of the creosote-impacted soil and the additional excavation/installation of a surface cap in areas outside the building footprint (Alternative 3) would prevent exposure to contaminated shallow soil over the long term. Alternatives 2 and 3 are considered more effective over the long term compared to Alternative 1 due to removal of contaminated soil in the northwestern portion of the Property. However, because the cap (Property buildings) and vapor barrier are considered permanent protective measures when provided with proper monitoring and maintenance, the difference in long-term effectiveness between Alternative 2 and Alternative 1 is considered small.

- ***Management of short-term risks***: Alternatives 5 and 6 pose the greatest short-term risk due to excavation and transportation on public roadways or rail routes of large volumes of contaminated soil. Additionally, Alternative 6 would include higher short-term risk associated with significant dewatering to allow excavation to the native marine sediment layer at about 25 ft below grade. The dewatering would pose a higher risk to the stability of older structures in the immediate Property area including King Street Station. The potential risk to these older structures due to the needed dewatering and to the vibration associated with the use of excavation equipment up to the Property boundaries is considered to be significant. Although the excavation associated with Alternative 5 is not expected to extend below the groundwater table, the 5-ft-deep excavation could pose a similar risk to the stability of older structures in the immediate Property area due to the vibration associated with the use of excavation equipment up to the Property boundaries. Alternatives 2, 3, and 4 pose a slightly higher risk during construction relative to Alternative 1 due to the risks posed by excavation and transport of contaminated soil on public roadways or rail routes. However, these risks can be managed by employing standard construction health and safety measures and adhering to traffic safety laws. Alternative 4 poses a greater risk than Alternatives 2 and 3 due to short-term risk to the stability of older structures from vibrations associated with auger drilling and the uncertainty of drilling through heterogeneous fill during implementation of stabilization/cementation of creosote-impacted soil.

- ***Technical and administrative implementability***: The technical implementability of the alternatives is considered incrementally less favorable between Alternatives 2 and 3, 4, 5, and 6 due to the increasingly larger volumes of soil that would be excavated or treated. The technical implementability of Alternative 6 is also reduced by the need to remove soil to the depth of the native marine sediment layer, more than 10 ft below the water table, and the implementability of Alternative 4 is reduced due to the uncertainty of auger drilling to the native marine layer through heterogeneous fill that could contain unknown obstructions. The technical implementation of Alternative 1 also has challenges related to the design of a vapor barrier and a passive soil vapor system to be integrated into the Property development design. The administrative implementability of Alternatives 1, 2, 3, 4, and 5 is essentially the same because they all include similar institutional controls that must be adhered to. The administrative implementability of Alternative 6 is considered favorable as institutional controls would not be required following complete excavation of the fill material.

- ***Consideration of public concerns***: Each alternative considers public concerns in the same manner by responding to public comments received on the various Property cleanup documents related to the Prospective Purchaser Agreement/Consent Decree and as part of the cleanup process under MTCA.

### 8.2.3 CONCLUSION OF DISPROPORTIONATE COST ANALYSIS

Alternative 6 is considered the most permanent alternative developed in this feasibility study per WAC 173-340-360(3)(e)(ii)(B) and is also the most expensive alternative. Alternative 6 consists of excavation of all fill at the Property down to the native marine sediment layer and would remove all contaminated soil, but the DCA shows that the cost of Alternative 6 is significantly disproportionate to the benefit. The complete DCA analysis is presented in Table 1 and the rankings and associated rationale for the various rankings are presented in Table 2. A relative cost and relative benefit analysis was also performed as part of the DCA. The results of the relative cost and benefit analysis are provided in graphical format on Figure 4. Based on the DCA, Alternative 3, which includes focused hotspot excavation of contaminated soil from the northwestern portion of the Property, focused/enhanced bioremediation of residual soil and groundwater in the area of the hotspot excavation, containment, and added measures to prevent contact with shallow contaminated soil outside the footprints of the building foundations, and institutional controls, is permanent to the maximum extent practicable.

The following summarizes the findings and conclusions of the DCA.

- The results of the comparative overall benefit analysis range from 3.4 (Alternative 1) to 8.0 (Alternative 6), with Alternatives 5 and 3 having the next two highest rankings of 6.2 and 5.8, respectively (Figure 4).
- Alternatives 5 and 3 have the highest relative benefits (78% and 73%, respectively) compared to the most permanent alternative (Alternative 6).
- The relative estimated remedy cost of the highest ranked alternatives is 8.48 (Alternative 6), 1.91 (Alternative 5), and 1.32 (Alternative 3) compared to the lowest cost alternative (Alternative 2).
- The relative comparative benefit of the highest ranked alternatives is 2.35 (Alternative 6), 1.82 (Alternative 5), and 1.71 (Alternative 3) compared to Alternative 1.
- The costs of Alternatives 1, 4, 5, and 6 are considered disproportionate to the incremental benefits.
- Alternatives 2 and 3 are considered permanent to the maximum extent practicable.
- Based on relative comparative benefits (1.71), relative estimated remedy cost (1.32), and permanence to the maximum extent practicable, Alternative 3 is selected as the preferred alternative for the Property.

As shown in Table 1, Alternative 5 ranks slightly higher in comparative overall benefit (6.2 versus 5.8) than Alternative 3, but has an estimated cost that is more than 1.4 times greater. The relative ranking considerations for the alternatives are shown in Table 2 and the estimated costs are shown in Table 1. A comparison of the two alternatives is as follows:

- **Overall Protectiveness, Permanence, Long-Term Effectiveness – Alternative 5: Medium vs. Alternative 3: Medium.** Alternative 5 permanently removes additional contaminated soil Property-wide to a depth of 5 ft BGS, which is 3.5 ft more than Alternative 3 (however, Alternative 3 includes similar removal to 5 ft BGS or containment beneath concrete outside the footprints of the building foundations); the soil has contaminant concentrations greater than the cleanup levels based on direct contact or protection of groundwater or surface water. The added protection provided by the removal of the additional soil removal would be minimal because the additional soil removal does not fully address the direct contact pathway (i.e., removal to a depth of 15 ft BGS), so the direct contact pathway for both alternatives would be mitigated by the cap and institutional controls, and there is no evidence that the shallow soils are a source of groundwater or surface water contamination. Both alternatives include groundwater monitoring.

- **Manageability of Short-Term Risk – Alternative 5: Medium High vs. Alternative 3: Medium High.** The additional soil removal included in Alternative 5 would require the mobilization of more equipment for the excavation, loading, and hauling of the additional soil, and shoring would be required to excavate up to the Property boundaries. The added equipment would add more traffic over a longer timeframe and present a greater short-term risk to occupants and businesses in the Property area, and between the Property and off-Property disposal location.

- **Implementability – Alternative 5: Medium vs. Alternative 3: High.** Both alternatives remove or contain significant amounts of contaminated shallow soil, although Alternative 5 would require more planning and coordination over a longer timeframe than Alternative 3 due to the added amount of soil excavated and disposed off-Property.

- **Consideration of Public Concerns – Alternative 5: Medium High vs. Alternative 3: Medium High.** Both alternatives were considered to be highly effective at addressing public concerns.

- **Relative Estimated Remedy Cost – Alternative 5: 1.91 vs. Alternative 3: 1.32.** The estimated cost for Alternative 5 is $5,529,000 compared to an estimated cost for Alternative 3 of $3,840,000. The added cost for removal of the additional 3.5 ft of soil Property-wide is $1,669,000, and deeper contaminated soil would still be present. As discussed above, there is no evidence that the shallow soil that would be removed for the substantial added cost presents a significant threat to human health or the environment under current Property conditions. Under Alternative 3, shallow contaminated soil outside the footprints of the building foundations would be removed or contained under concrete `and groundwater monitoring would ensure protection of groundwater and surface water.

- **Relative Comparative Overall Benefit – Alternative 5: 1.82 vs. Alternative 3: 1.71.** Both alternatives provide comparable overall benefit.

- **Costs Disproportionate to Incremental Benefits? – Alternative 5: Yes vs. Alternative 3: No.**

- **Remedy Permanent to the Maximum Extent Practicable? – Alternative 5: No vs. Alternative 3: Yes.**

### 8.2.4 RESTORATION TIMEFRAME

This section evaluates and compares the restoration timeframe associated with each of the six alternatives with respect to the eight criteria identified in Section 8.1.3 to determine if the alternatives provide for a reasonable restoration timeframe. The restoration timeframe is defined in MTCA as *"the period of time needed to achieve the required cleanup levels at the points of compliance established for the site"* (WAC 173-340-200). Per WAC 173-340-360 (4) (b), the selected alternative must meet the cleanup levels within a reasonable timeframe considering the factors outlined below.

- ***Potential risks to human health and the environment***: The Property is currently paved, preventing contact with contaminated soil by people and ecological receptors. There is no onsite use of groundwater and contamination from the Property is not migrating off-Property in groundwater. Therefore, there is currently minimal risk to human health and the environment.
- ***Practicability of achieving shorter restoration timeframe***: Each of the six alternatives would achieve cleanup within the same approximate timeframe. For all alternatives, excavation, vapor barrier installation, and capping would be completed when the western building foundation is completed.
- ***Current use of the Property, surrounding areas, and associated resources that are, or may be, affected by releases from the Property:*** The current Property use is commercial and future development on the Property will include residential, commercial, and retail uses.
- ***Availability of alternative water supplies***: The Property is located within the Seattle city limits, which is supplied by a municipal water supply. Potable water for the future Property development will be supplied by the city's municipal water system.
- ***Likely effectiveness and reliability of institutional controls***: The institutional controls that are to be included in each alternative are expected to be very effective at preventing future groundwater use and direct contact with contaminated soil.
- ***Ability to control and monitor migration of hazardous substances from the Property***: Monitoring data indicate that migration of hazardous substances from the Property is not occurring. Alternatives 1, 2, 3, 4, and 5 include monitoring to verify that this condition remains unchanged. Monitoring is not required for Alternative 6.
- ***Toxicity of hazardous substances at the Property***: The main constituents of concern at the Property are petroleum hydrocarbons, including a creosote-like material, and metals. Soil contamination is found at the highest concentration in the northeastern portion of the Property below 15 ft BGS and groundwater contamination is minimal and localized. The toxicity of these constituents at the levels present at the Property is low to moderate.
- ***Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the Property or under similar conditions***: Property data indicate that natural processes are effectively containing petroleum-contaminated groundwater to the Property. It has not been demonstrated that natural attenuation or degradation of petroleum hydrocarbons is occurring at the Property; however, it is widely accepted that both aerobic and anaerobic degradation of petroleum hydrocarbons can occur under a wide range of Property conditions; therefore, it is likely that some attenuation is occurring.

Each of the six alternatives would achieve the cleanup levels at the proposed points of compliance shortly after implementation of the alternative, within a reasonable restoration timeframe.

### 8.2.5 REQUIREMENT FOR CONSIDERATION OF PUBLIC CONCERNS

As previously indicated, public concerns for each of the alternatives will be addressed when the Prospective Purchaser Agreement Consent Decree for the Property, together with the RI, FS, and CAP documents, are submitted for public comment as required under MTCA. The public comment period will be integrated wherever possible with any ongoing public review associated with City of Seattle permitting for the development project.

### 8.2.6 NET ENVIRONMENTAL BENEFIT

Each of the six alternatives will provide a net environmental benefit. Property cleanup utilizing containment, soil removal, soil and groundwater treatment, long-term monitoring, and institutional controls would result in a net environmental benefit by reducing the risk to human health and the environment due to exposure to contamination at the Property. The cleanup action would ensure that the risk to human health and the environment is reduced and there is a net environmental benefit.

# 9.0 PREFERRED CLEANUP ACTION

Based on this FS, including the DCA discussed in Section 8.2.3, the preferred remedial action alternative for the Property is Alternative 3, which consists of hotspot excavation of contaminated soil from the northwestern portion of the Property (former gasoline station area) to the groundwater table, enhanced bioremediation for residual soil/groundwater impacted by gasoline and benzene near the elevation of the water table in the area of hotspot excavation, a surface cap over the entire property, added measures to prevent contact with shallow contaminated soil outside the footprints of the building foundations within the Property boundary, institutional controls, and groundwater monitoring. Selection of this alternative over Alternatives 1, 2, 4, 5, and 6 is primarily based on the following:

- Alternative 3 achieves each of the four RAOs and each of the threshold requirements, uses permanent solutions to the maximum extent practicable as described in Section 8.2.3, and provides for a reasonable restoration timeframe as described in Section 8.2.4.
- Focused excavation of contaminated soil to the depth of the groundwater table and focused treatment of residual contamination to soil and groundwater in the northwestern portion of the Property would remove the soil with the highest benzene and gasoline concentrations at the Property. The focused excavation and bioremediation will remove contaminant concentrations that could be a source for groundwater contamination or soil vapor, and would eliminate the need for a soil vapor barrier and installation and operation of a soil vapor control system, as would be needed under Alternative 1. The focused excavation would be in addition to the removal of surface material to approximately 1.5 ft BGS Property-wide as part of preparation for Property development.
- Excavation to 5 ft BGS or providing a concrete barrier outside the footprints of the building foundations to mitigate the potential for future exposure to construction workers by either permanently removing additional contaminated soil or providing added physical containment.
- As discussed in Section 8.2.3, the DCA, Alternative 3 ranks medium to high in all criteria, with the exception of permanence where it ranks medium low for the relative benefits ranking. However, Alternative 3 has a cost that is proportionate to the benefits, and is permanent to the maximum extent practicable.

Alternative 3 is also compatible with the conceptual model of the shallow subsurface at the Property and with the development planned for the Property. Figure 5 shows the conceptual model for the Property following incorporation of the remedial action elements included in Alternative 3 and the planned construction elements associated with Property development (i.e., removal of the existing surface material to approximately 1.5 ft BGS and the planned buildings and physical improvements). As discussed in Section 7.5, the areas outside the building footprints within the Property boundary that will be excavated to 5 ft BGS (landscaped areas) and the areas where protective pavement will be used as part of Alternative 3 are shown on Figure 16.

# 10.0 USE OF THIS REPORT

This report was prepared for the exclusive use of North Lot Development, and applicable regulatory agencies, for specific application to the North Lot Development Property, including review by the public. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied. This document was prepared under the supervision and direction of the undersigned.

LANDAU ASSOCIATES, INC.

Colette M. Griffith
Senior Staff Engineer

Piper M. Roelen, P.E.
Associate Engineer

Timothy L. Syverson, L.G.
Senior Associate Geologist

CMG/PMR/TLS/ccy

# 11.0 REFERENCES

Adams, M. 2008. E-mail message from Mark Adams, Toxics Cleanup Program, Washington State Department of Ecology, to Tim Syverson, Senior Associate Geologist, Landau Associates. Re: *Suggestions for the RI – North Lot*. October 7.

Ecology. 2011. Letter: *Re: Opinion Pursuant to WAC 173-340-515(5) on the Revised Draft Feasibility Study for the Following Hazardous Waste Site: Name: North Lot Development; Property Address: 201 South King Street, Seattle, WA 98104; Facility/Site No.: 5378137; VCP Project No.: NW1986*. From Jing Liu, Northwest Regional Office Toxics Cleanup Program, Washington State Department of Ecology, to Kevin Daniels, Daniels Development Co., LLC. February 8.

Ecology. 2010a. Letter: *Opinion Pursuant to WAC 173-340-515(5) on Remedial Investigation for the Following Hazardous Waste Site: Name: North Lot Development; Property Address: 201 South King Street, Seattle, WA 98104; Facility/Site No.: 5378137; VCP Project No.: NW1986*. From Jing Liu, Northwest Regional Office Toxics Cleanup Program, Washington State Department of Ecology, to Kevin Daniels, Daniels Development Co., LLC. February 25.

Ecology. 2010b. Letter: *Opinion Pursuant to WAC 173-340-515(5) on Draft Feasibility Study for the Following Hazardous Waste Site: Name: North Lot Development; Property Address: 201 South King Street, Seattle, WA 98104; Facility/Site No.: 5378137; VCP Project No.: NW1986*. From Jing Liu, Northwest Regional Office Toxics Cleanup Program, Washington State Department of Ecology, to Kevin Daniels, Daniels Development Co., LLC. August 12.

Ecology. 2010c. Letter: *Opinion Pursuant to WAC 173-340-515(5) on Soil Vapor Investigation Report for the Following Hazardous Waste Site: Name: North Lot Development; Property Address: 201 South King Street, Seattle, WA 98104; Facility/Site No.: 5378137; VCP Project No.: NW1986*. From Jing Liu, Northwest Regional Office Toxics Cleanup Program, Washington State Department of Ecology, to Kevin Daniels, Daniels Development Co., LLC. December 21.

Ecology. 2009a. Letter: *Prospective Purchaser Agreement/Consent Decree – Qwest Field – North Lot, Seattle*. From Jay J. Manning, Director, Washington State Department of Ecology, to Kevin Daniels, Present, Daniels Development Co., LLC. April 22.

Ecology. 2009b. Review Draft: *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*. Publication No. 09-09-047. Washington State Department of Ecology Toxics Cleanup Program. October.

Ecology. 1999. Final Report: *Screening Survey for Metals and Dioxins in Fertilizer Products and Soils in Washington State*. Publication No. 99-309. Washington State Department of Ecology. April.

Ecology. 1994. *Natural Background Soil Metals Concentrations in Washington State*. Publication No. 94-115. Washington State Department of Ecology. October.

Ecology & Environment. 2009. Final: *Rayonier Mill Off-Property Soil Dioxin Study, Data Summary Technical Memorandum*. Prepared for Washington State Department of Ecology. February 24.

Johnson, P.C. and R.A. Ettinger. 1991. "Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors in Buildings." *Environmental Science and Technology*. 25: 1445-1452.

Landau Associates. 2011. *Remedial Investigation Report, North Lot Development, Seattle, Washington*. Prepared for North Lot Development, LLC. May 23.

Landau Associates. 2010a. Letter: *Re: Ecology Opinion Letter Dated August 12, 2010, Draft Feasibility Study, North Lot Development, 201 South King Street, Seattle, Washington 98104, VCP Project No.: NW1986*. From Timothy L. Syverson, L.G., and Kristy J. Hendrickson, P.E., to Jing Liu and Mark Adams, Washington State Department of Ecology. September 7.

Landau Associates. 2010b. *Soil Vapor Investigation Work Plan, North Lot Development, Seattle, Washington*. Prepared for North Lot Development, LLC. October 11.

Landau Associates. 2009a. Revised Ecology Review Draft: *Remedial Investigation Report, North Lot Development, Seattle, Washington*. Prepared for North Lot Development, LLC. October 16.

Landau Associates. 2009b. Letter: *Ecology Opinion Letter Dated April 21, 2009, North Lot Development, 201 South King Street, Seattle, Washington 98104. VCP Project No.: NW1986*. From Timothy L. Syverson, L.G., and Kristy J. Hendrickson, P.E., to Jing Liu, Washington State Department of Ecology. June 12.

Landau Associates. 2009c. Letter: *Ecology Opinion Letter Dated April 21, 2009, Proposed Supplemental Remedial Investigation, North Lot Development, 201 South King Street, Seattle, Washington 98104. VCP Project No.: NW1986*. From Timothy L. Syverson, L.G., and Kristy J. Hendrickson, P.E., to Jing Liu and Mark Adams, Washington State Department of Ecology. July 7.

Landau Associates. 2009d. *Revised Work Plan, Supplemental Remedial Investigation, North Lot Development, Seattle, Washington*. Prepared for North Lot Development, LLC. July 7.

Landau Associates. 2007. Report: *Phase I Environmental Site Assessment, Qwest Field North Lot, Seattle, Washington*. Prepared for Nitze Stagen & Co., Inc. and Opus Northwest LLC. March 28.

Miner, R., and T. Gurtowski. 2001. "Driven Piles for Safeco Field." In: *Proceedings of the Conference on Design and Installation of Cost-Efficient Driven Piles.* Pile Driving Contractors Association. Boulder, Colorado.

Pacific Geomatic Services. 2008. Land Survey Drawings: *Monitoring Well Exhibit Map, Quest Field (North Site), S. King Street, Seattle, Washington, King County*. Sheet Nos. 1 and 2. Signed and stamped by Robert W. Pusey, Jr., State of Washington Professional Land Surveyor No. 41964. December 17.

Terra Associates. 2008. *Preliminary Geotechnical Evaluation, North Lot Development, Seattle, Washington*. June 11.

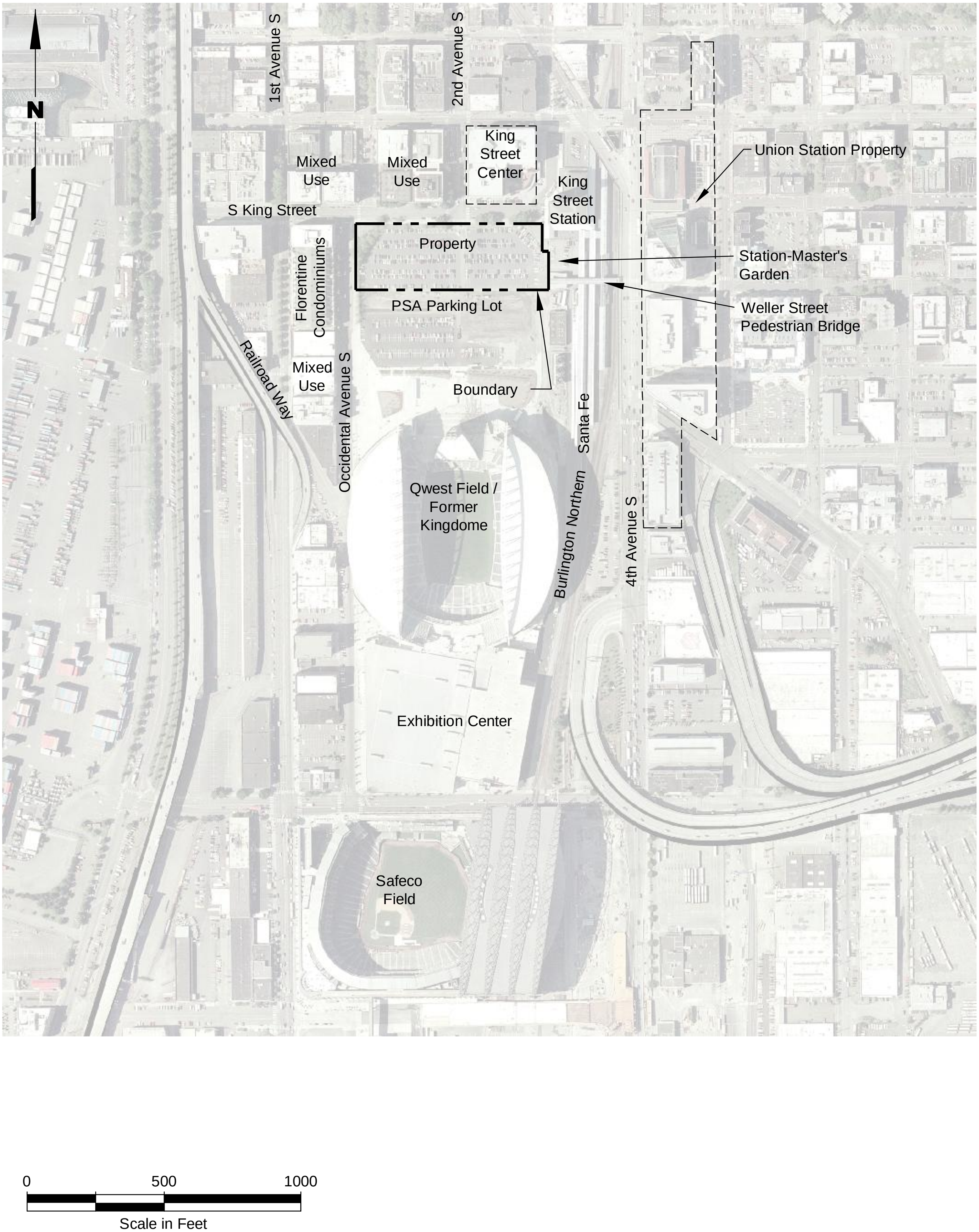
Troost, K.G., D.B. Booth, A.P. Wisher, and S.A. Shimel. 2005. *The Geologic Map of Seattle – A Progress Report*. U.S. Geological Survey Open-File Report 2005-1252, Version 1.0. Available at http://pubs.usgs.gov/of/2005/1252/.


*Data Source: ESRI 2008*

| North Lot Development<br>Seattle, Washington | **Vicinity Map** | Figure<br>1 |
|---|---|---|

LANDAU ASSOCIATES

Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\Fig1.mxd 12/22/2010



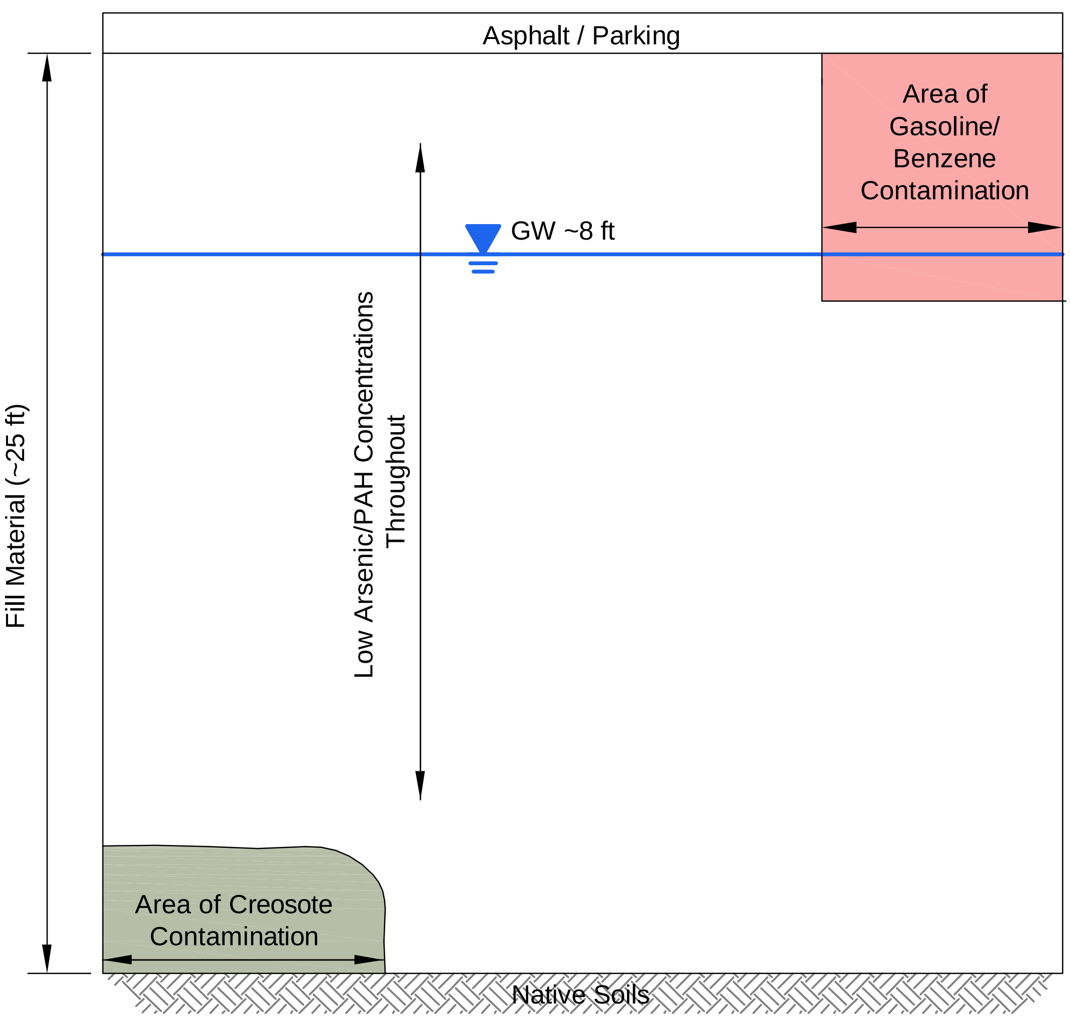

Qwest Field | V:\1014\050\Conceptual\Figure 2.dwg (A) "Figure 2" 3/9/2011

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Property Plan and Surrounding Area**

Figure
2



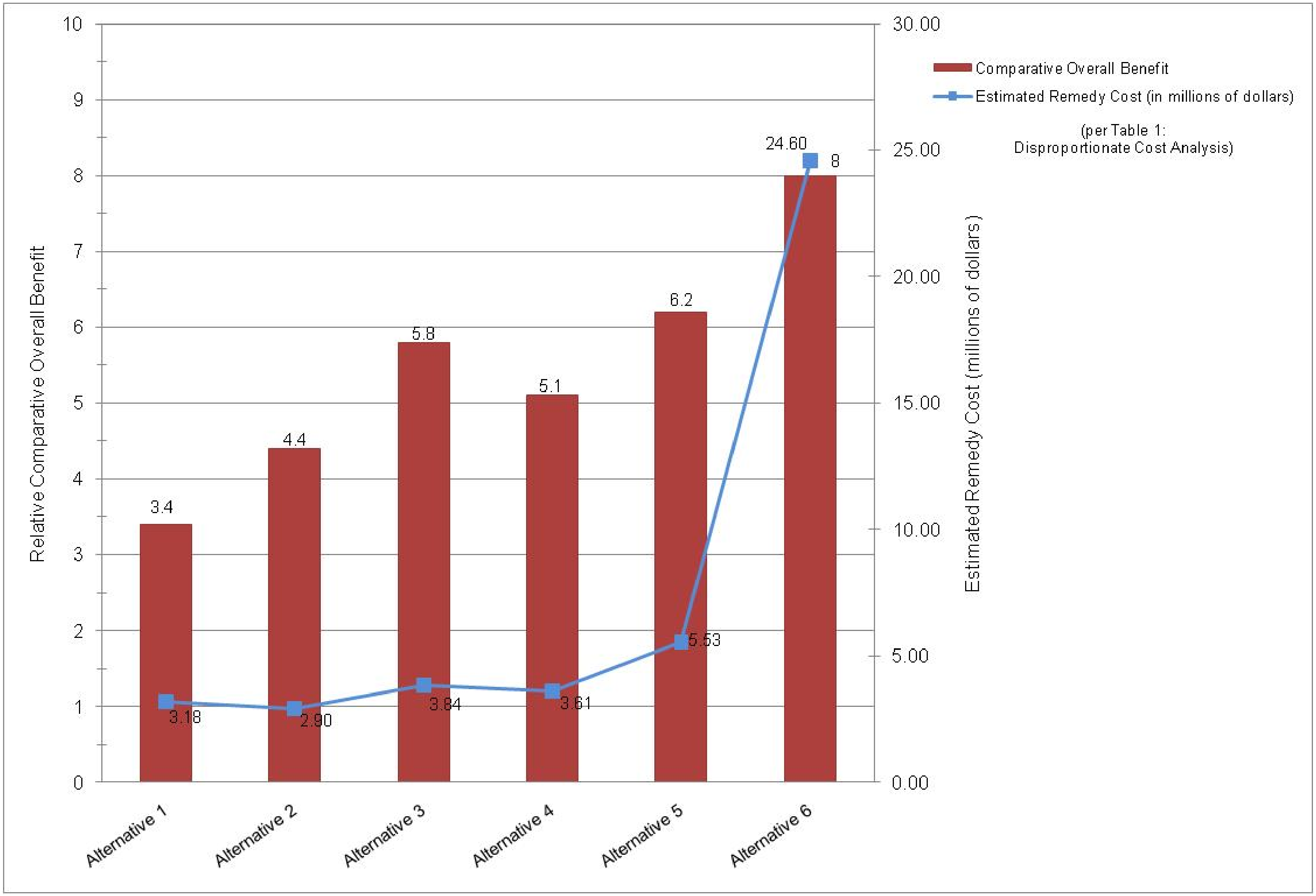



LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

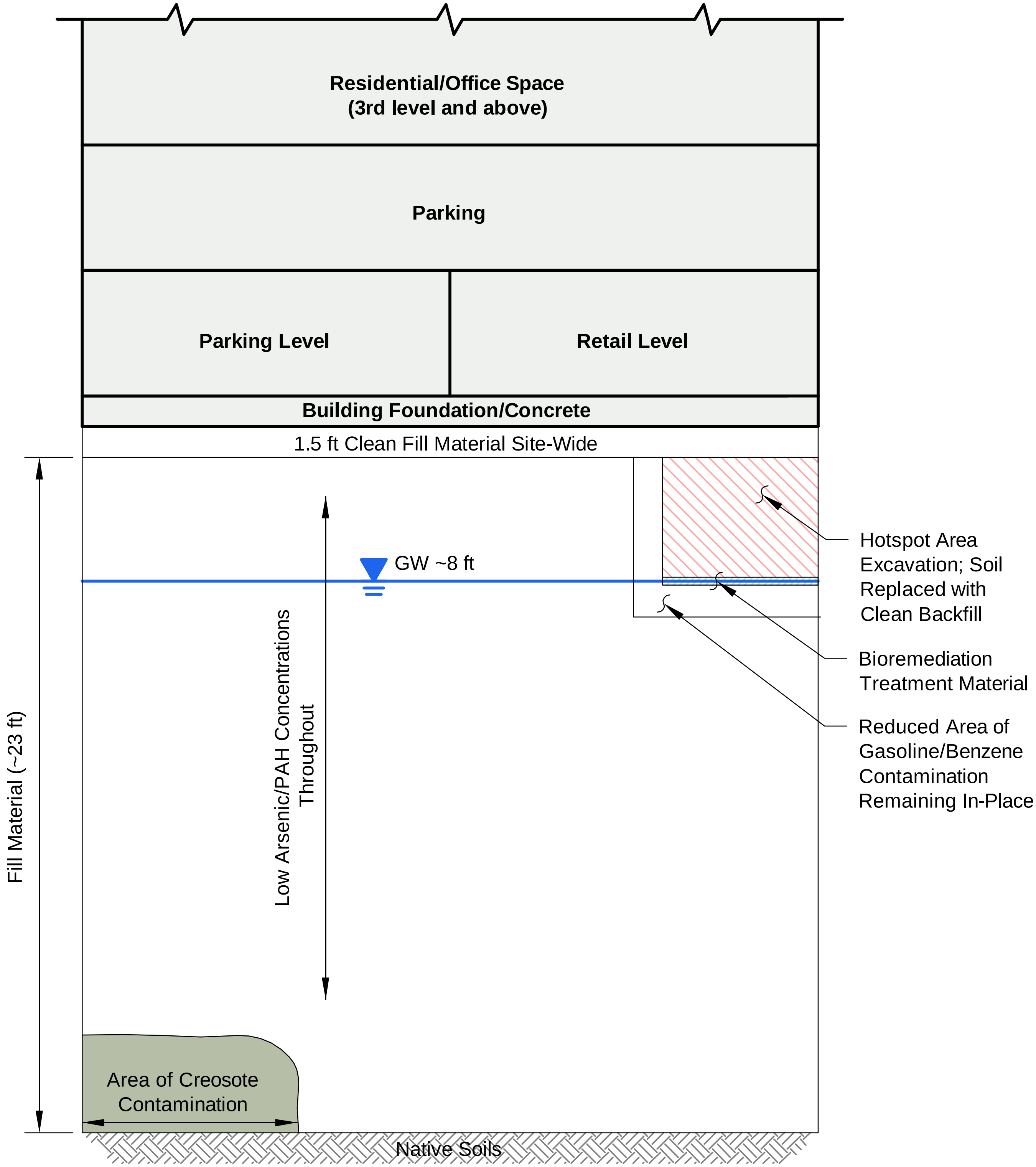
**Conceptual Site Cross Section: Current Property Conditions**

Figure
3




LANDAU ASSOCIATES

| North Lot Development<br>Seattle, Washington | **Relative Cost and Benefit Analysis** | Figure<br>4 |
|---|---|---|



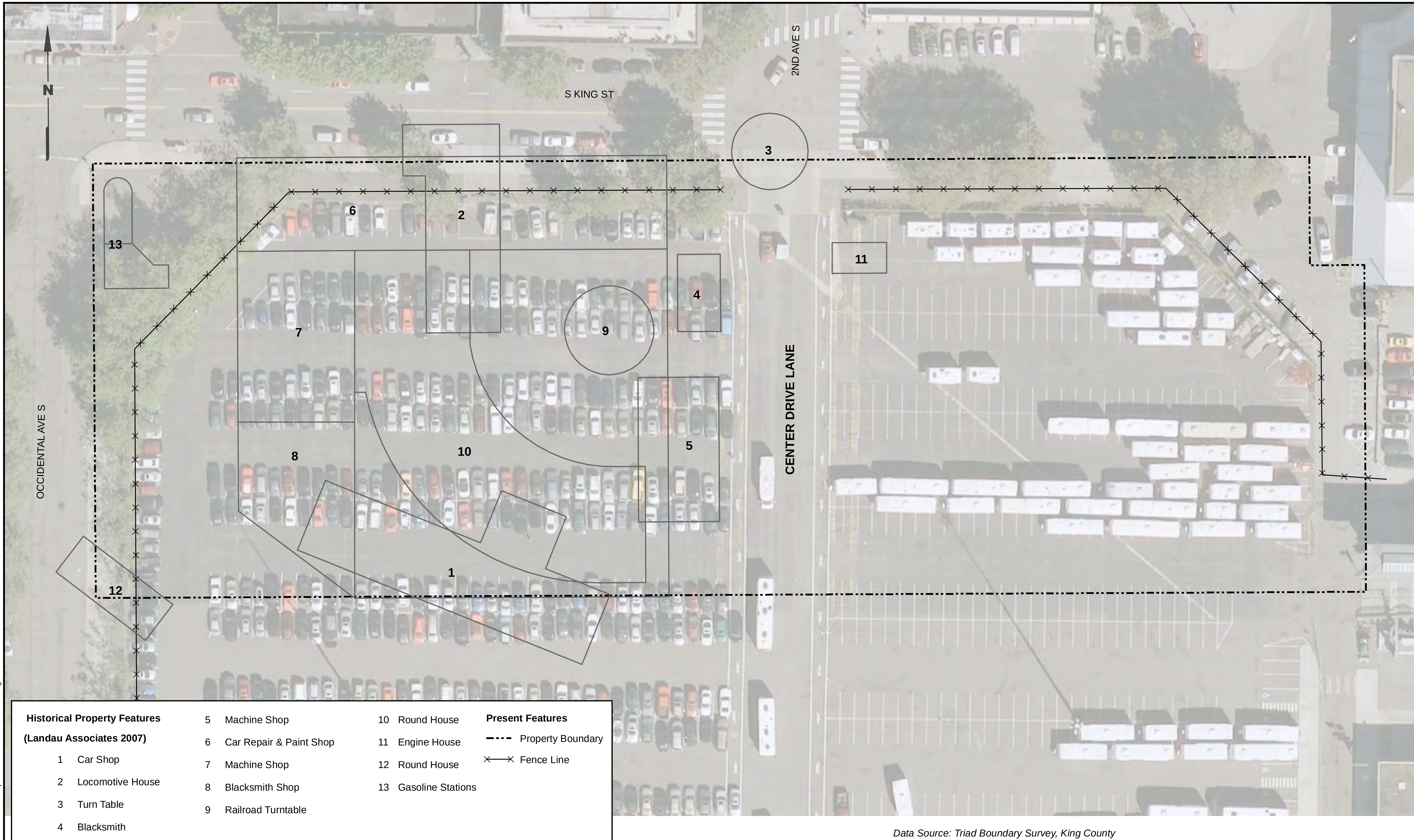

Qwest Field | V:\1014\050\Conceptual\Figure 3_5.dwg (A) "Figure 5" 3/8/2011

Landau Associates

North Lot Development
Seattle, Washington

**Conceptual Site Cross Section: Post-Preferred Remedial Action**

Figure 5




Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\Fig6-HistoricalFeatures.mxd 12/22/2010

Landau Associates

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

*Data Source: Triad Boundary Survey, King County*

| North Lot Development<br>Seattle, Washington | **Historical Property Features** | Figure<br>6 |
|---|---|---|


**Legend**

- Fence Line
- Property Boundary
- Storm Drain
- Utilities and Other Features

Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\Fig7-UtilitySitePlan.mxd 12/28/2010

LANDAU ASSOCIATES

**Note**
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 50 100
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

| North Lot Development Seattle, Washington | **Property Plan and Existing Features** | Figure 7 |
|---|---|---|


Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\Fig8-SamplingLocations.mxd 12/22/2010

**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

0 80 160

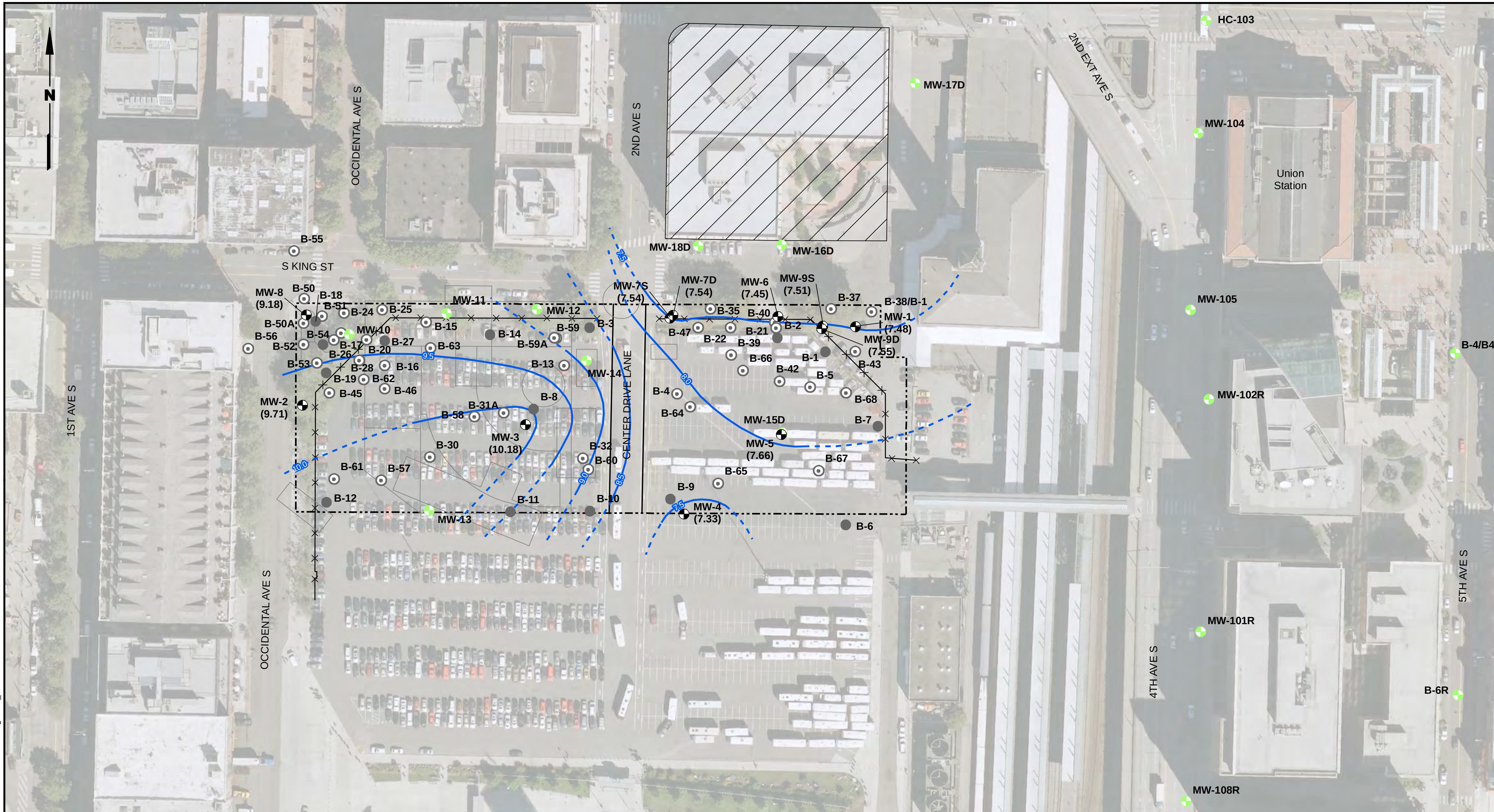
Scale in Feet

Note
1. Refer to Figure 3 for Historical Property Features Legend.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

| North Lot Development Seattle, Washington | **Sampling Locations** | Figure 8 |
|---|---|---|




**Legend**

- MW-4 (7.33) — Direct-Push Soil Boring and Monitoring Well Location with Groundwater Elevation (ft)
- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary
- 7.5 Groundwater Elevation Contour (ft)
- Area Bounded by Foundation Drain

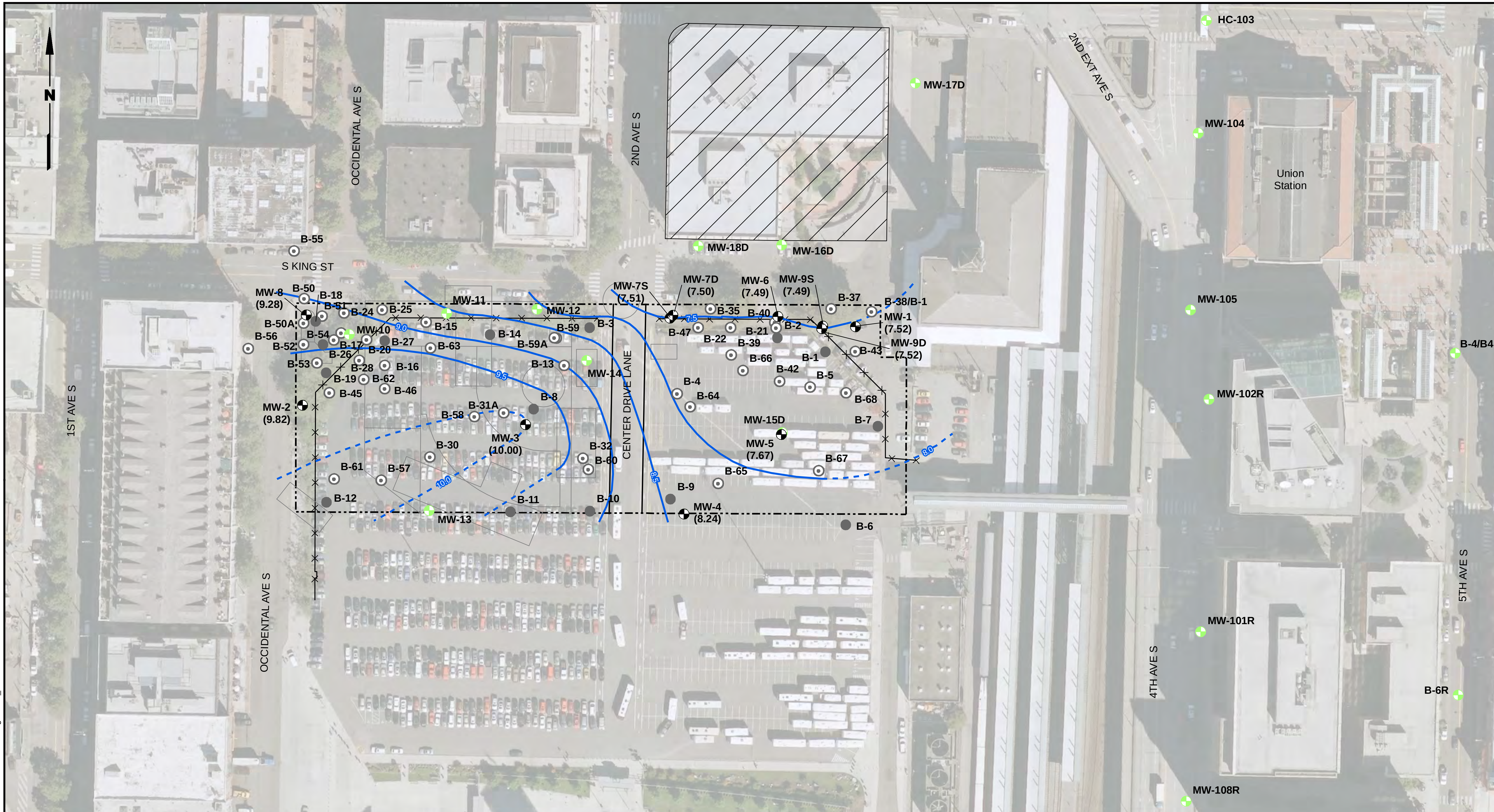
Landau Associates

Note
1. Includes groundwater elevation data from wells MW-1 through MW-9. Wells MW-10 through MW-18D not yet installed. Union Station wells to the east not measured for this round.
2. Refer to Figure 3 for Historical Property Features Legend.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 110 220
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

| North Lot Development<br>Seattle, Washington | **Groundwater Elevation Contours for November 24, 2008** | Figure<br>9 |
|---|---|---|






**Legend**

- MW-4 (8.24) — Direct-Push Soil Boring and Monitoring Well Location with Groundwater Elevation (ft)
- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary
- 8.5 Groundwater Elevation Contour (ft)
- Area Bounded by Foundation Drain

LANDAU ASSOCIATES

**Note**

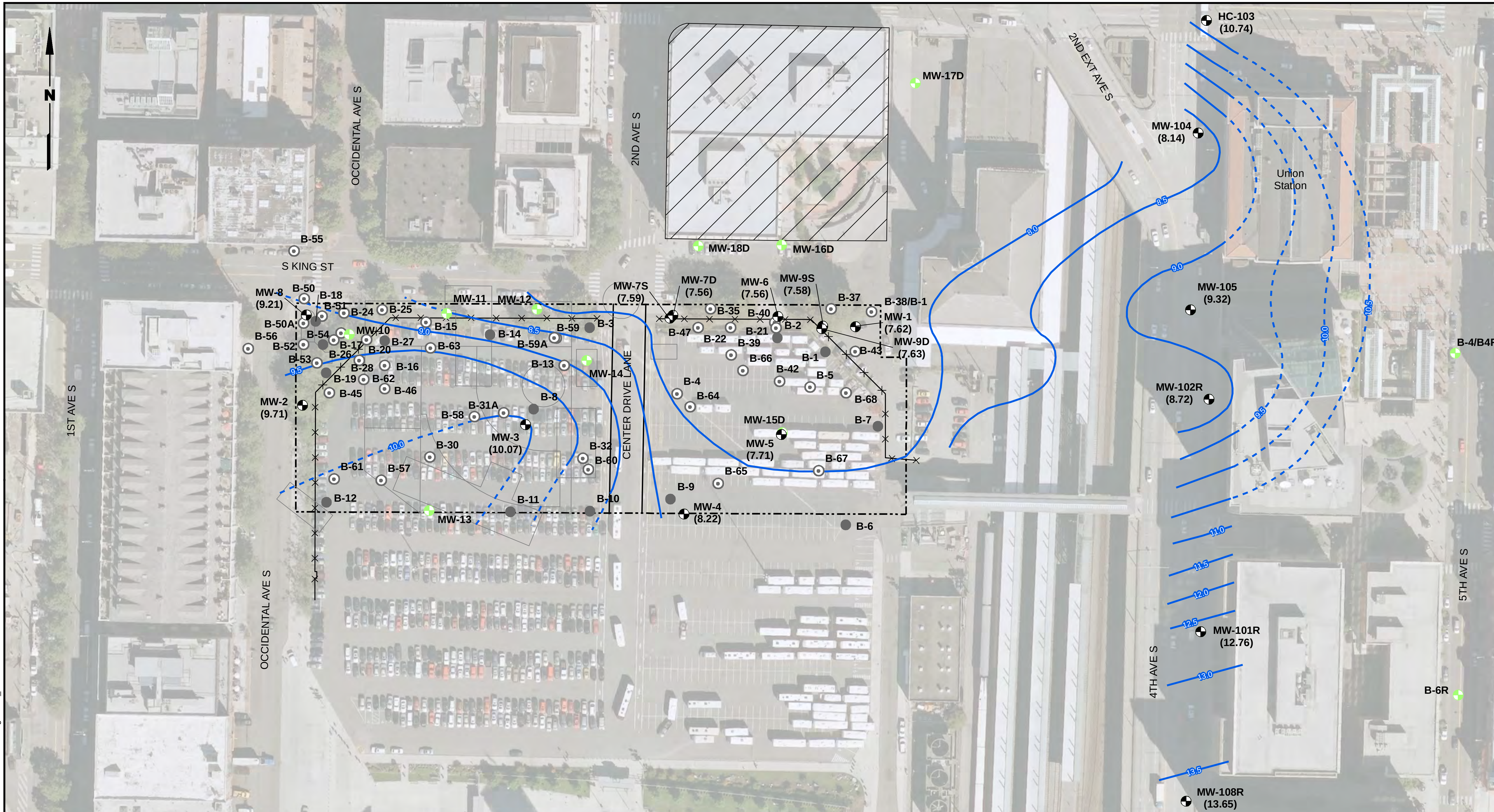
1. Includes groundwater elevation data from wells MW-1 through MW-9. Wells MW-10 through MW-18D not yet installed. Union Station wells to the east not measured for this round.
2. Refer to Figure 3 for Historical Property Features Legend.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 110 220

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

| North Lot Development<br>Seattle, Washington | **Groundwater Elevation Contours for January 16, 2009** | Figure<br>10 |
|---|---|---|




Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\Fig11-GW_ElevationJune2009.mxd 12/22/2010

## Legend

- MW-4 (8.22) — Direct-Push Soil Boring and Monitoring Well Location with Groundwater Elevation (ft)
- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary
- 8.5 Groundwater Elevation Contour (ft)
- Area Bounded by Foundation Drain

## Note

1. Includes groundwater elevation data from wells MW-1 through MW-9. Wells MW-10 through MW-18D not yet installed.
2. Refer to Figure 3 for Historical Property Features Legend.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 110 220
Scale in Feet

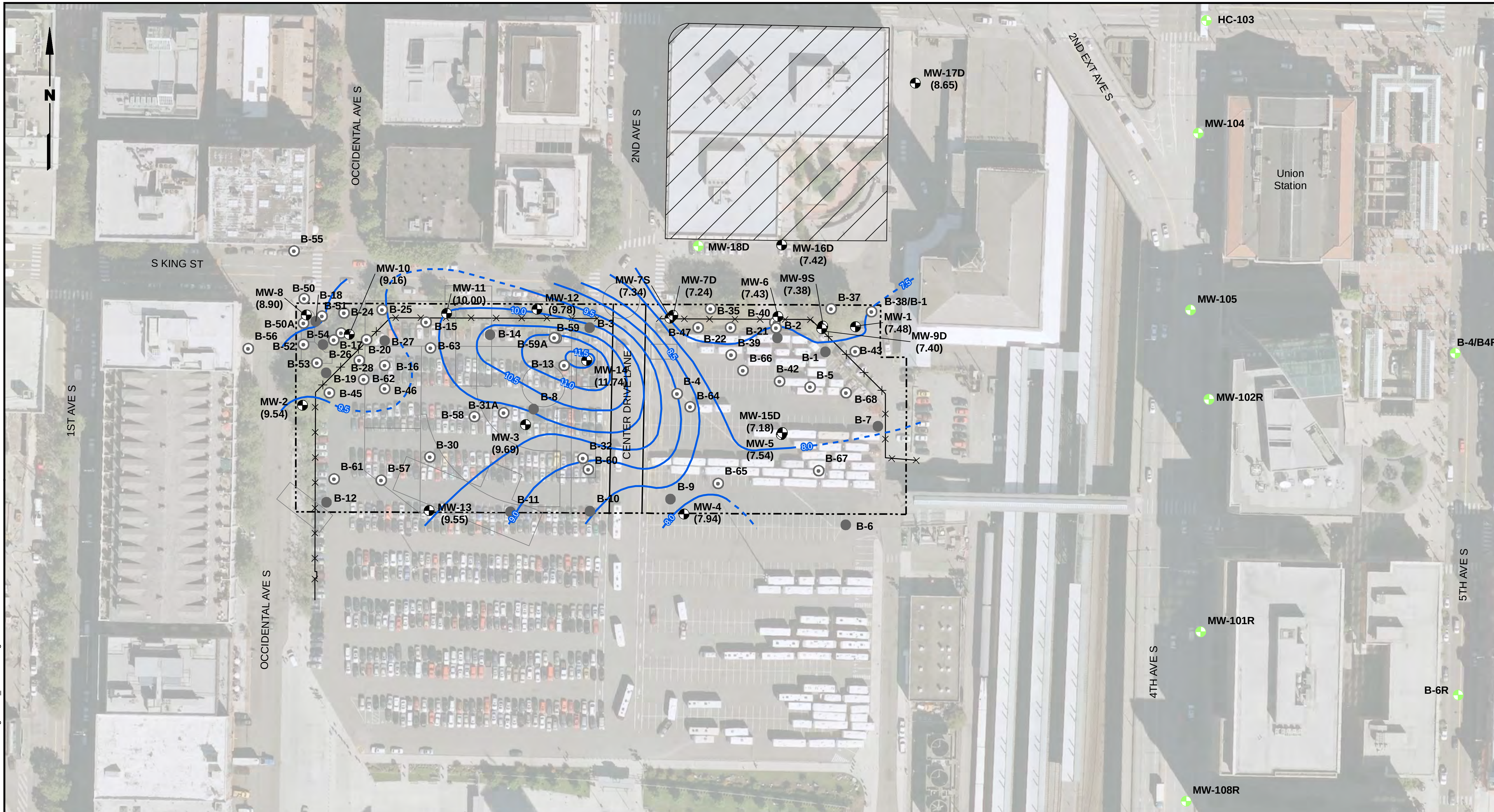
*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Groundwater Elevation Contours for June 3, 2009**

Figure
11




## Legend

| | | |
|---|---|---|
| MW-4 (7.94) Direct-Push Soil Boring and Monitoring Well Location with Groundwater Elevation (ft) | Direct-Push Soil Boring Location | Fence Line |
| Direct-Push Soil Boring and Monitoring Well Location | Direct-Push Soil and Groundwater Sample Location | Property Boundary |
| | Historical Building Outlines | 8.5 Groundwater Elevation Contour (ft) |
| | | Area Bounded by Foundation Drain |

## Note

3. Includes groundwater elevation data from wells MW-1 through MW-17D. Union Station wells to the east were not measured for this round.
2. Refer to Figure 3 for Historical Property Features Legend.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 110 220

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

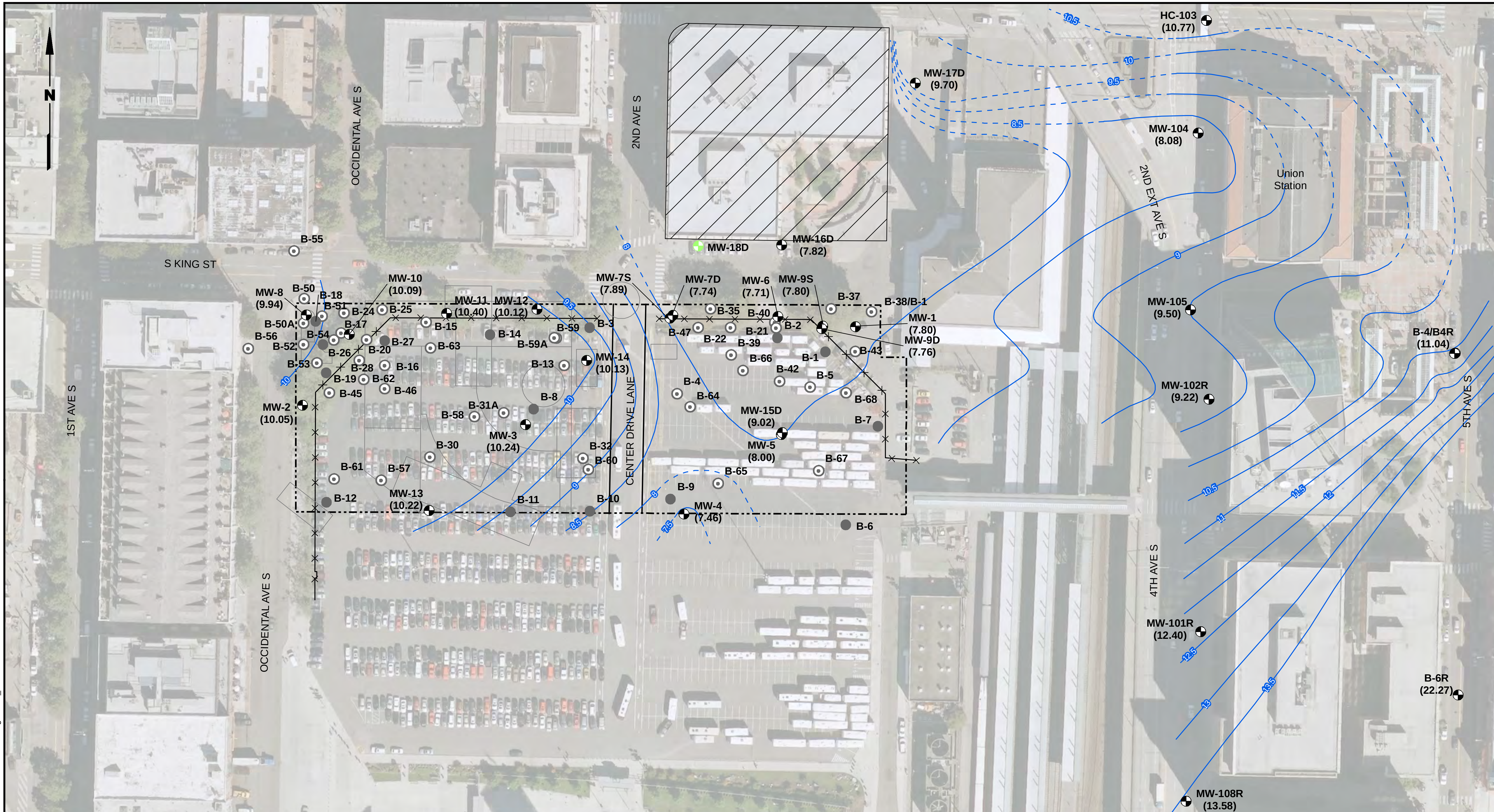
LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Groundwater Elevation Contours for August 25, 2009**

Figure 12

Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\Fig12-GW_ElevationAug09.mxd 12/22/2010




Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\Fig13-GW_ElevationFeb2010.mxd 12/22/2010

**Legend**

- MW-4 (7.46) — Direct-Push Soil Boring and Monitoring Well Location with Groundwater Elevation (ft)
- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary
- 7.5 — Groundwater Elevation Contour (ft)
- Area Bounded by Foundation Drain

**Note**

1. Includes groundwater elevation data from wells MW-1 through MW-17D and the Union Station wells to the east.
2. Refer to Figure 3 for Historical Property Features Legend.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 110 220
Scale in Feet

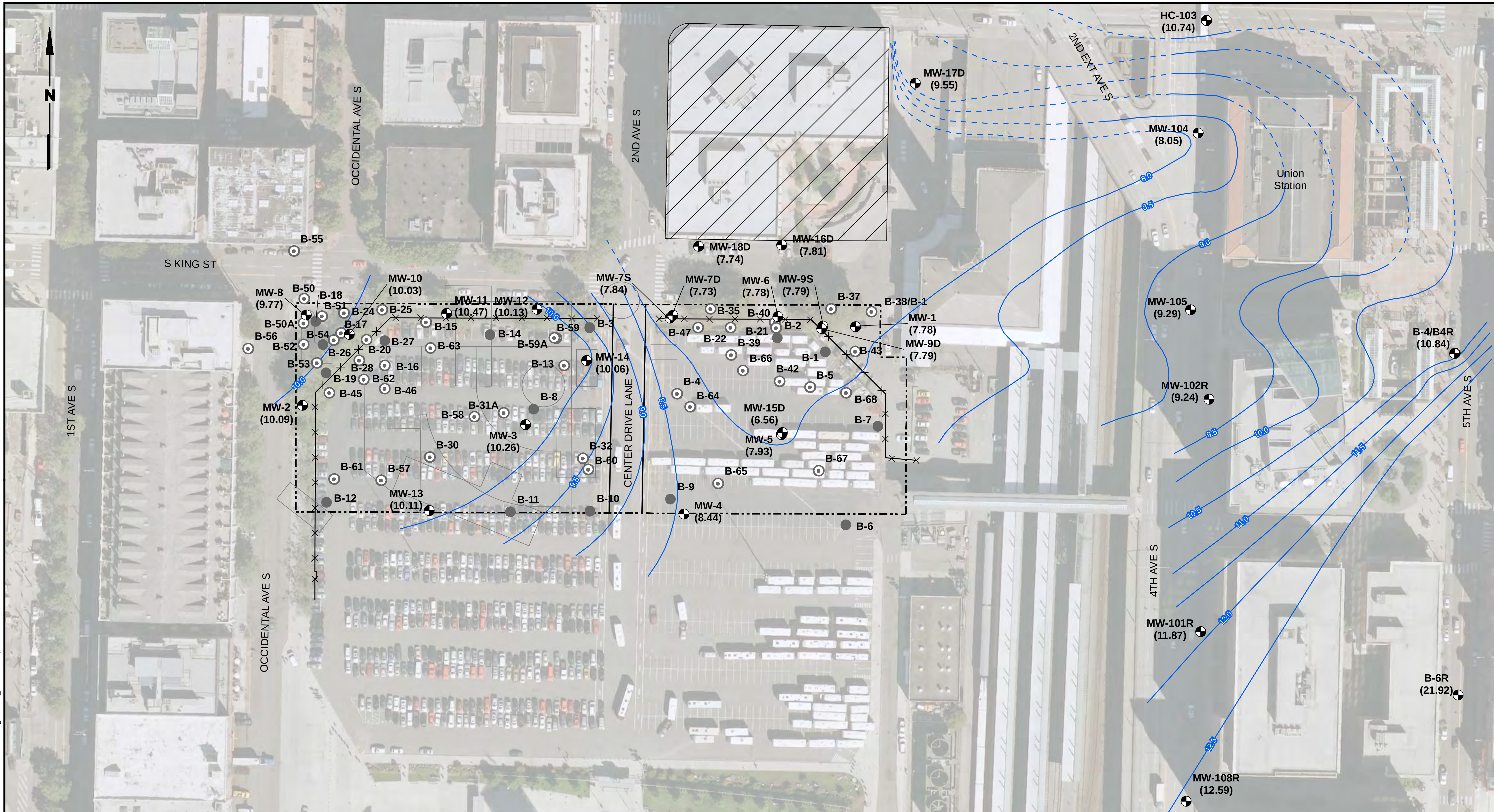
*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Groundwater Elevation Contours for February 24, 2010**

Figure 13




## Legend

- MW-4 (7.46) — Direct-Push Soil Boring and Monitoring Well Location with Groundwater Elevation (ft)
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary
- 8.5 — Groundwater Elevation Contour (ft)
- Area Bounded by Foundation Drain

## Note

1. Includes groundwater elevation data from wells MW-1 through MW-18D and the Union Station wells to the east.
2. Refer to Figure 3 for Historical Property Features Legend.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 110 220

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

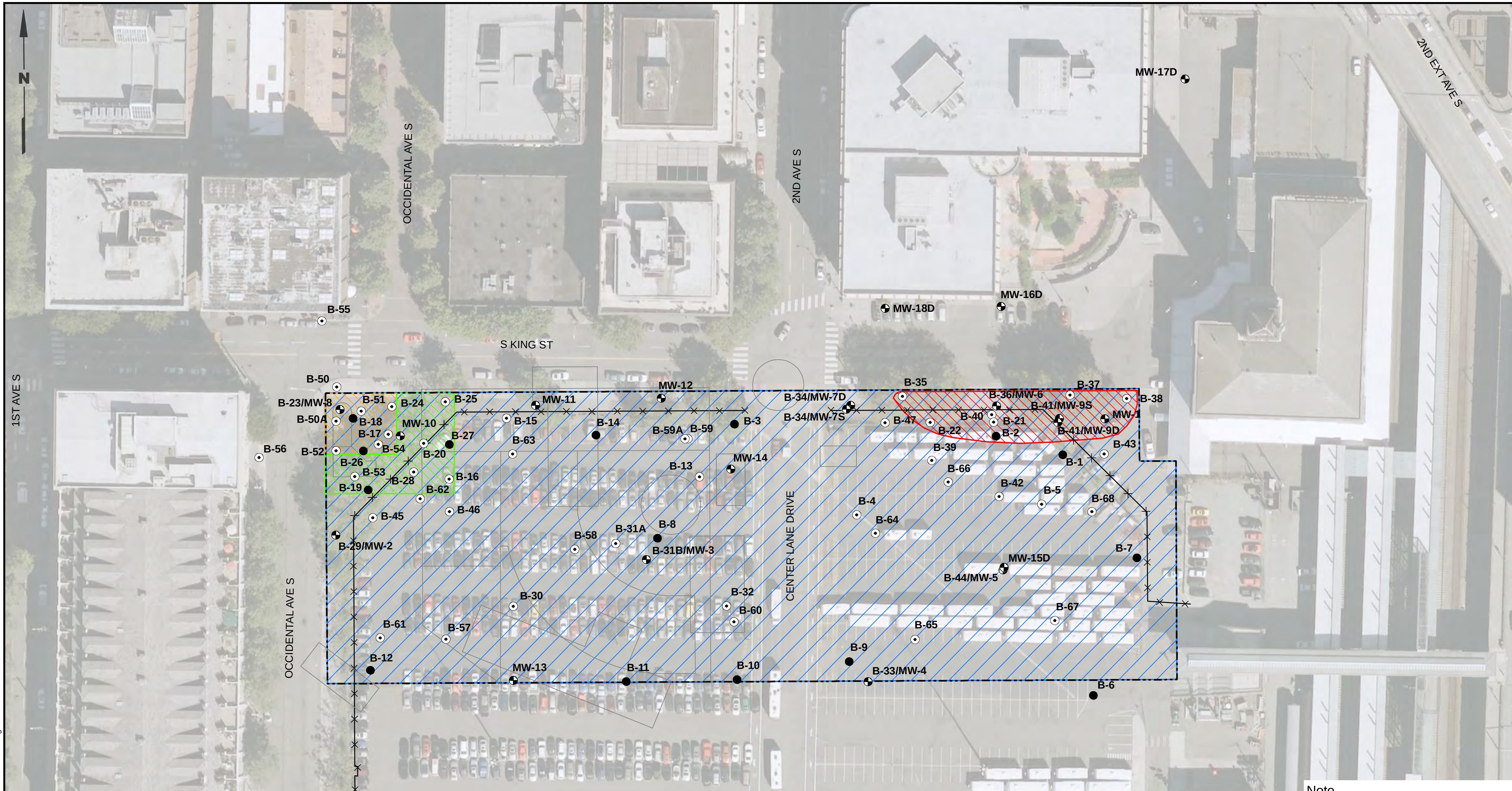
LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Groundwater Elevation Contours for April 22, 2010**

Figure 14

Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\Fig14-GW_ElevationApril2010.mxd 12/22/2010




**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

**Approximate Extent of Contaminant Concentrations in Soil Greater than the Cleanup Levels:**

- Creosote Concentrations Greater than MTCA Method B Cleanup Levels
- Benzene Concentrations Greater than the Remediation Level Based on the Potential for Vapor Intrusion
- Gasoline Concentrations Greater than MTCA Method B Cleanup Levels Based on Direct Contact and Benzene Concentrations Greater than MTCA Method B Cleanup Levels Based on Protection of Groundwater or Marine Surface Water
- Site-Wide cPAHs and Metals Concentrations Greater than MTCA Method B Cleanup Levels

0 80 160

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

Note

1. Cleanup alternatives that address remedial action for areas of contamination defined above are evaluated in the FS.
2. Refer to Figure 3 for Historical Property Features Legend.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

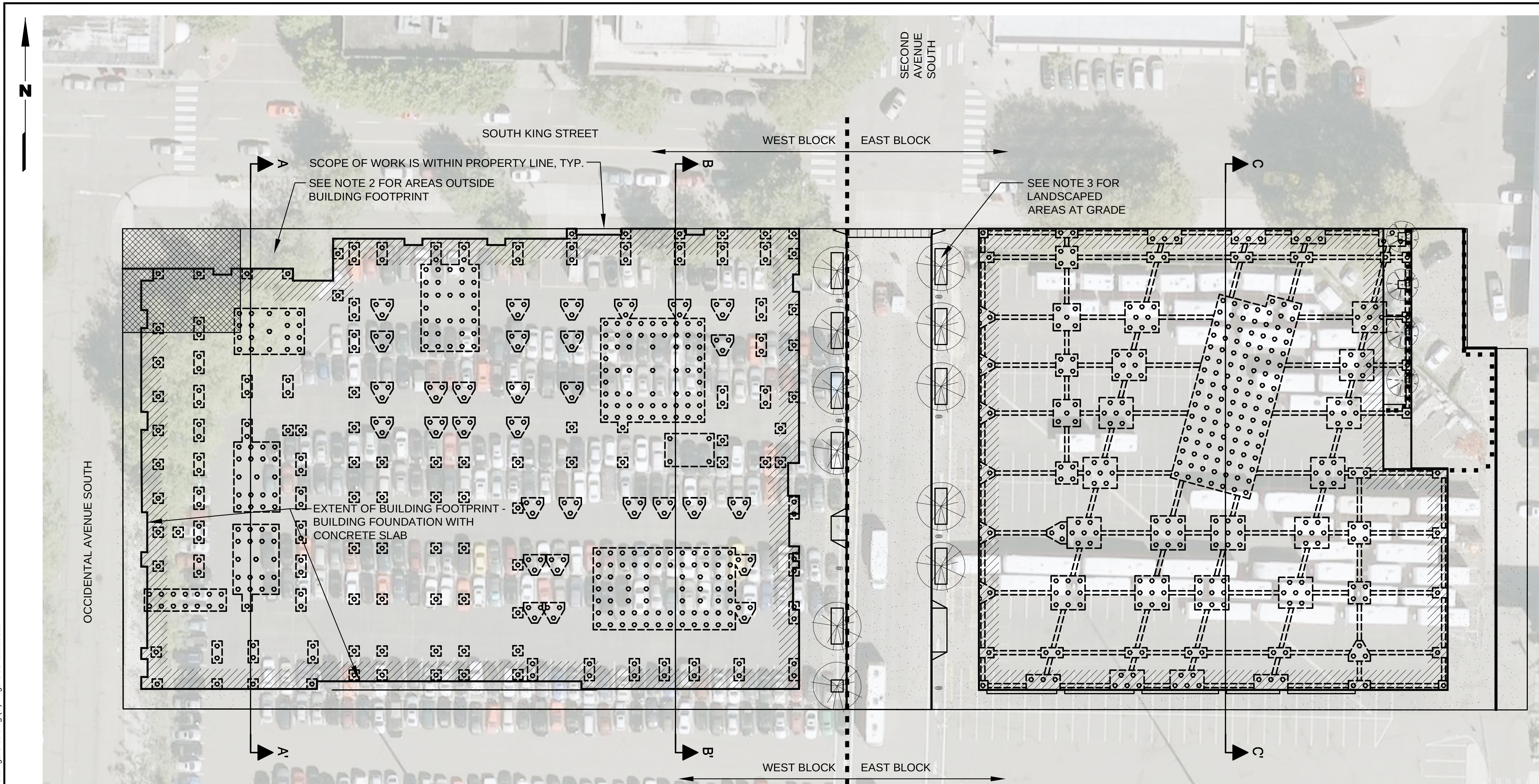
Landau Associates

North Lot Development
Seattle, Washington

**Areas of Soil Contamination Exceeding Cleanup Levels**

Figure 15

Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\Fig15-SoilContamination.mxd 12/30/2010




North Lot | V:\1014\001\050.053\FS Report\Figure 16.dwg (A) "Figure 16" 5/24/2011

NOTES

1. APPROXIMATELY 18" OF MATERIAL TO BE REMOVED ACROSS ENTIRE SITE, PER PHASE, WITHIN PROPERTY BOUNDARIES.
2. CAP NON-LANDSCAPED AREAS OUTSIDE OF BUILDING FOOTPRINT WITH CONCRETE.
3. LANDSCAPED AREAS - EXCAVATE 5'-0" BGS AND PROVIDE MEMBRANE, FILL WITH CLEAN SOIL.
4. UNTIL COMPLETION OF EAST BLOCK EXISTING ASPHALT PAVING WILL BE MAINTAINED.
5. SCOPE OF WORK IS WITHIN PROPERTY LINE.

LEGEND

A A' — Cross-Section Location and Designation, See Figures 17A, 17B, and 17C.

0 50 100
Scale in Feet

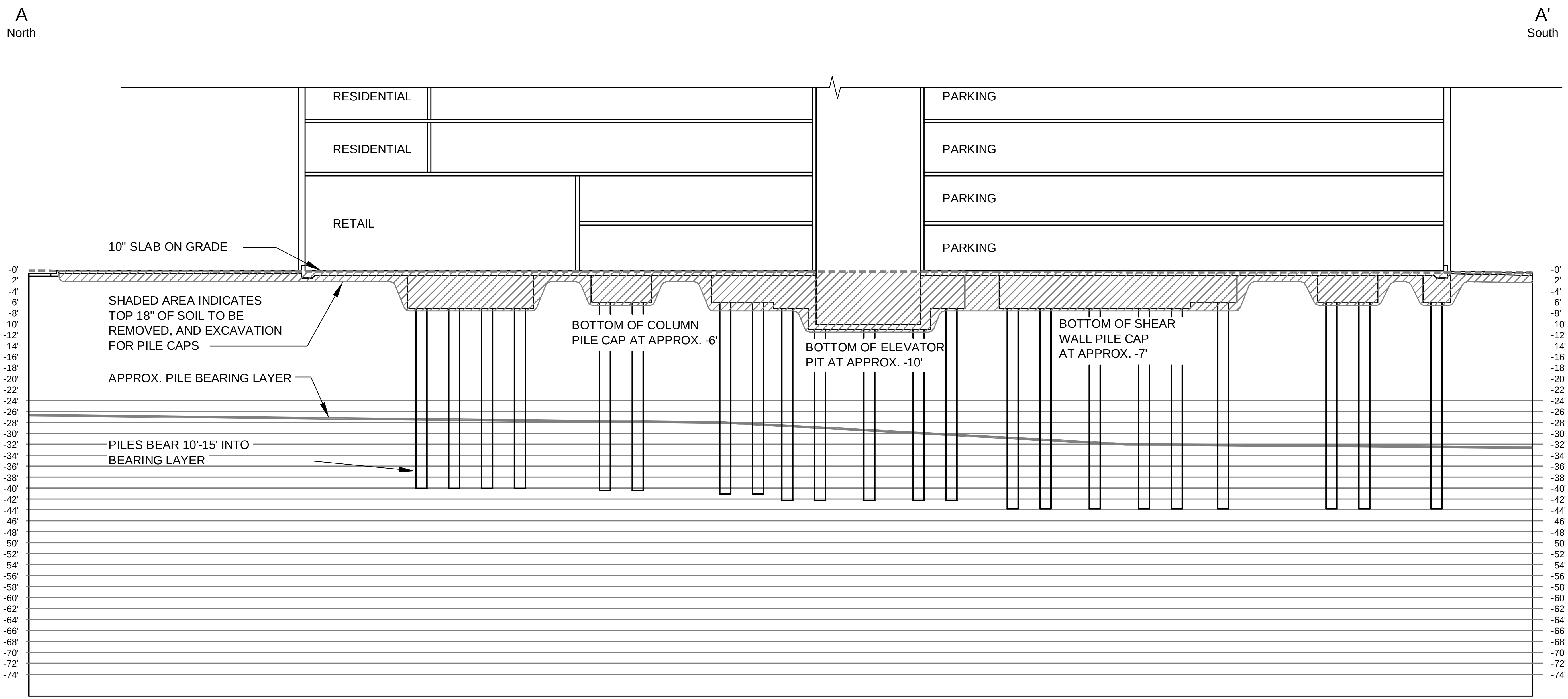
Base map source: North Lot Development Team (March 15, 2011)

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Conceptual Property Plan Development**

Figure 16




Base map source: North Lot Development Team (March 15, 2011)

0 20 40
Scale in Feet

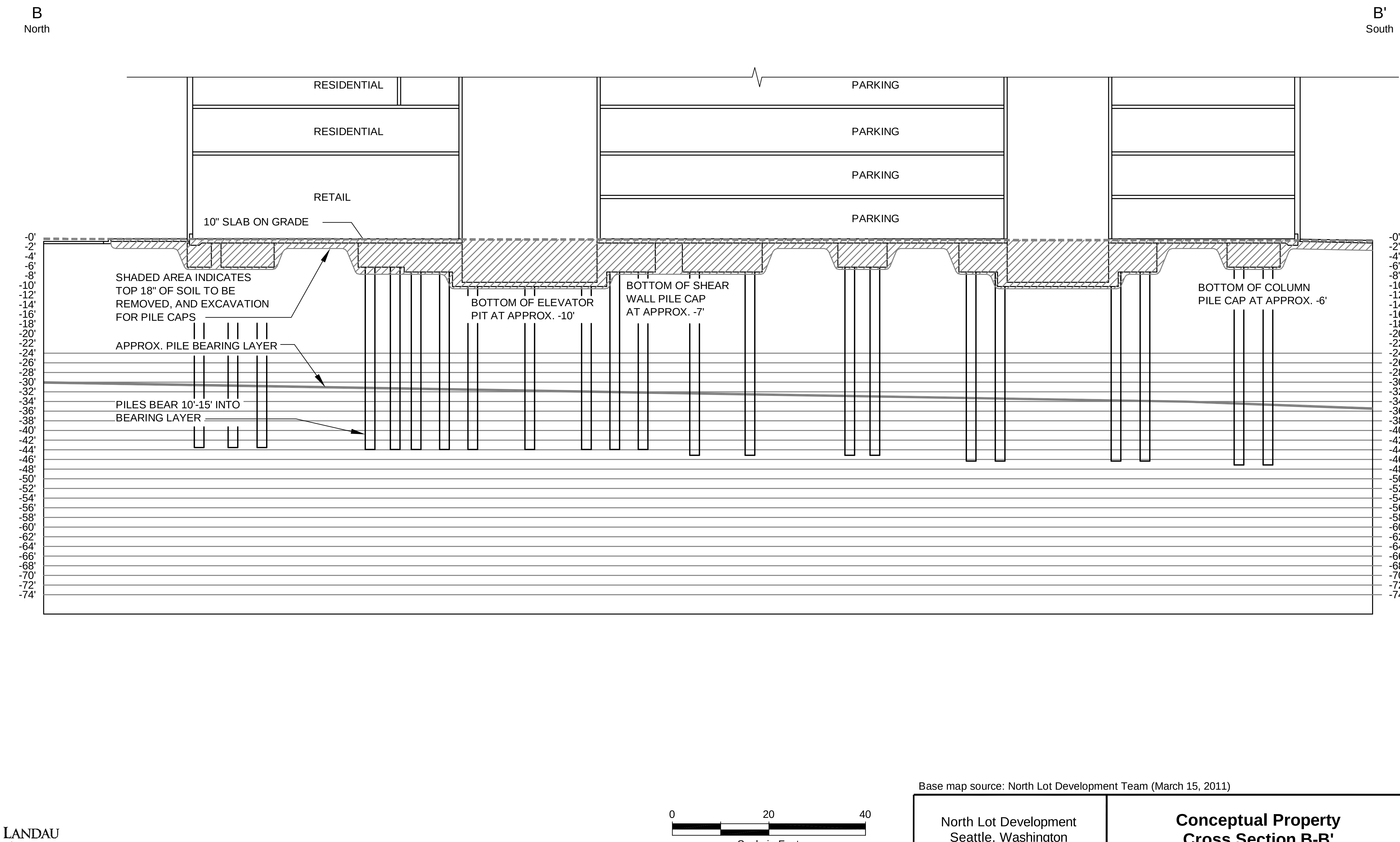
North Lot Development
Seattle, Washington

**Conceptual Property Cross Section A-A'**

Figure
17A

LANDAU ASSOCIATES

North Lot | V:\1014\001\050.053\2011-3-15\Figure 16_17ABC.dwg (A) "Figure 17A" 3/15/2011




North Lot | V:\1014\001\050.053\2011-3-15\Figure 16_17ABC.dwg (A) "Figure 17B" 3/15/2011

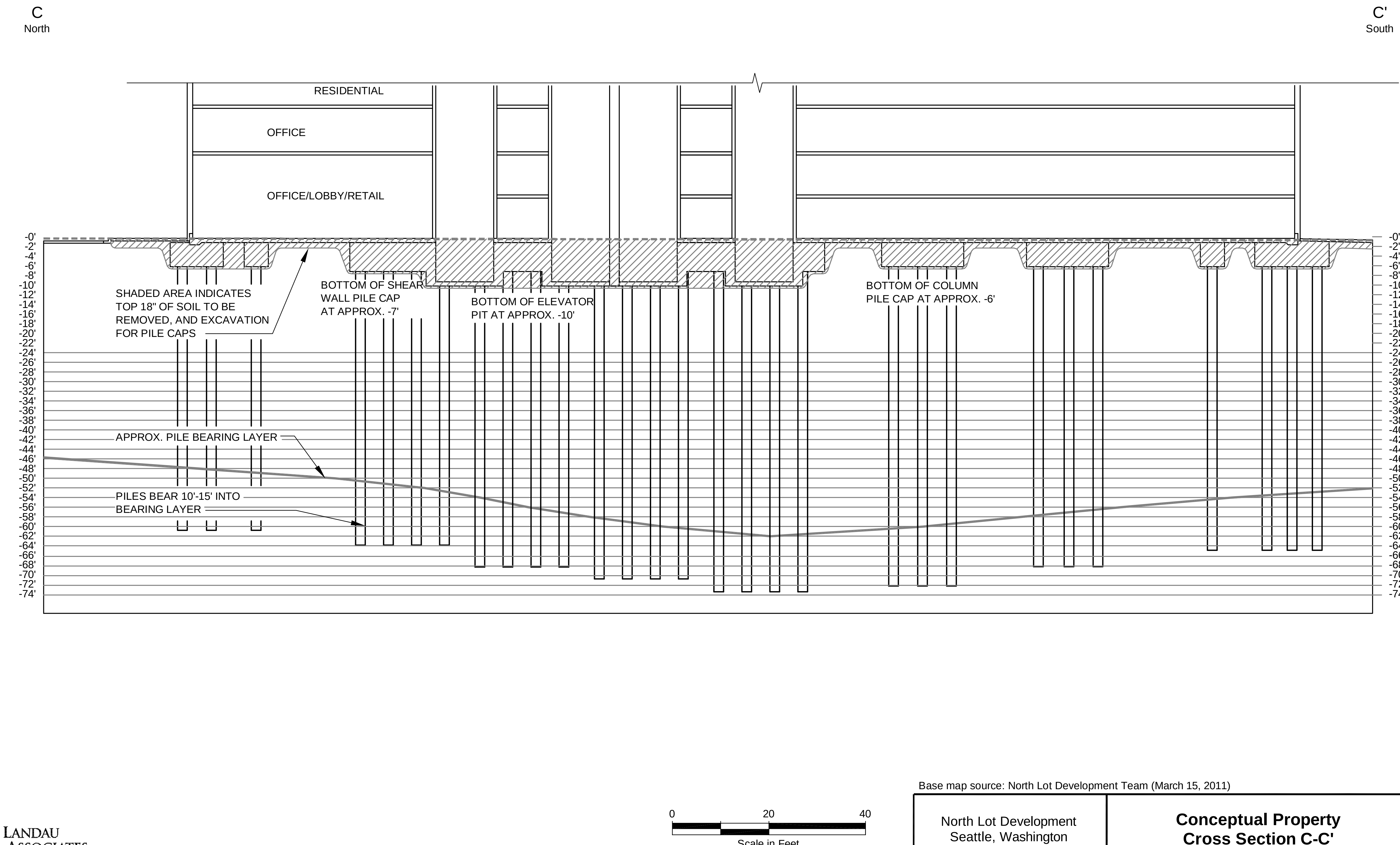
Base map source: North Lot Development Team (March 15, 2011)

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Conceptual Property Cross Section B-B'**

Figure 17B




Base map source: North Lot Development Team (March 15, 2011)

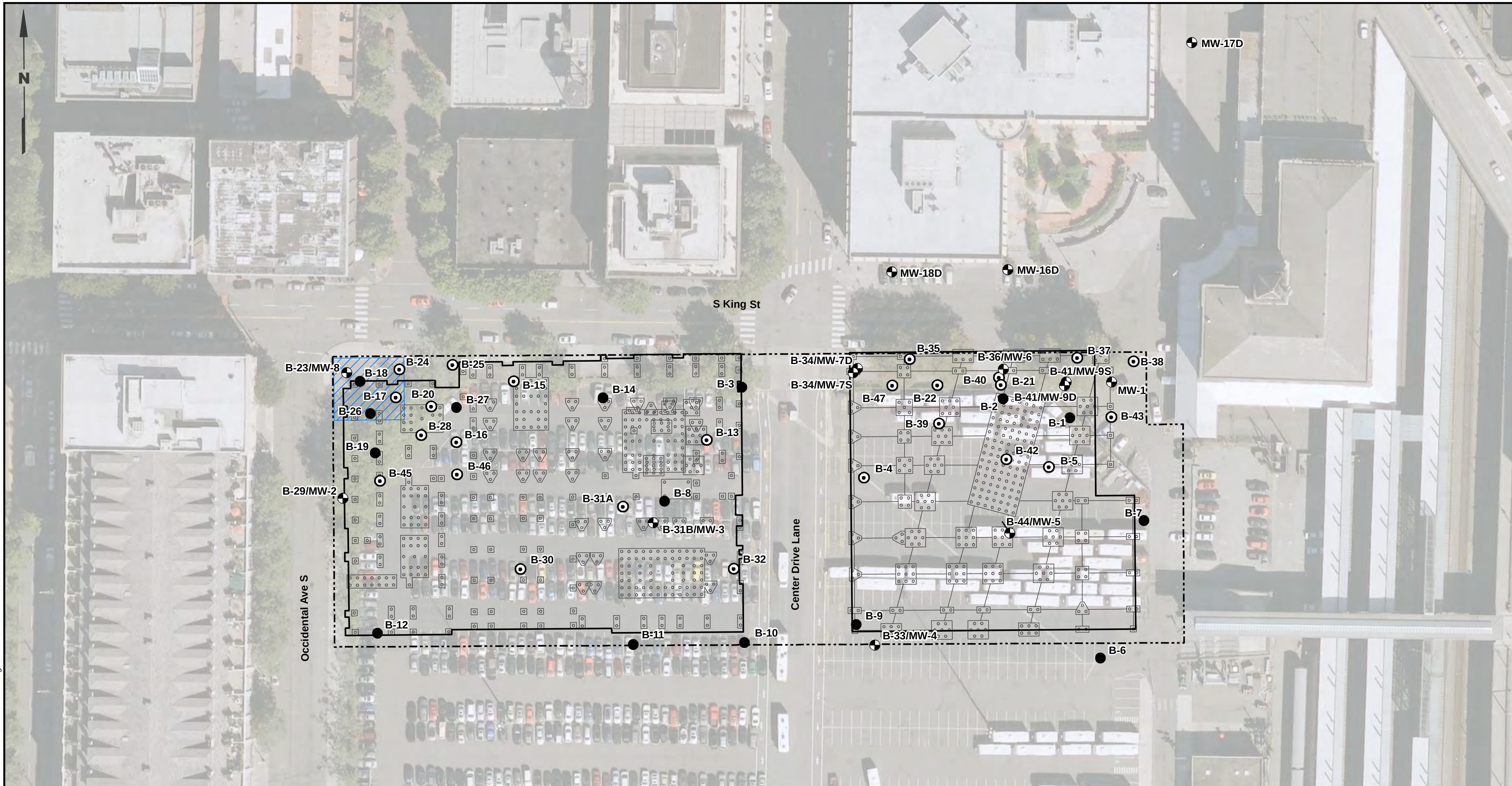
North Lot Development
Seattle, Washington

**Conceptual Property Cross Section C-C'**

Figure 17C

LANDAU ASSOCIATES

North Lot | V:\1014\001\050.053\2011-3-15\Figure 16_17ABC.dwg (A) "Figure 17C" 3/15/2011




Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\March Revisions\Fig18-Alternative2Excavation.mxd 3/9/2011

**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Site Boundary
- Assumed Area of Excavation - The lateral extent of the excavation will be determined in the field based on field screening and the laboratory results for confirmation samples collected at the limits of the excavation.

0 80 160

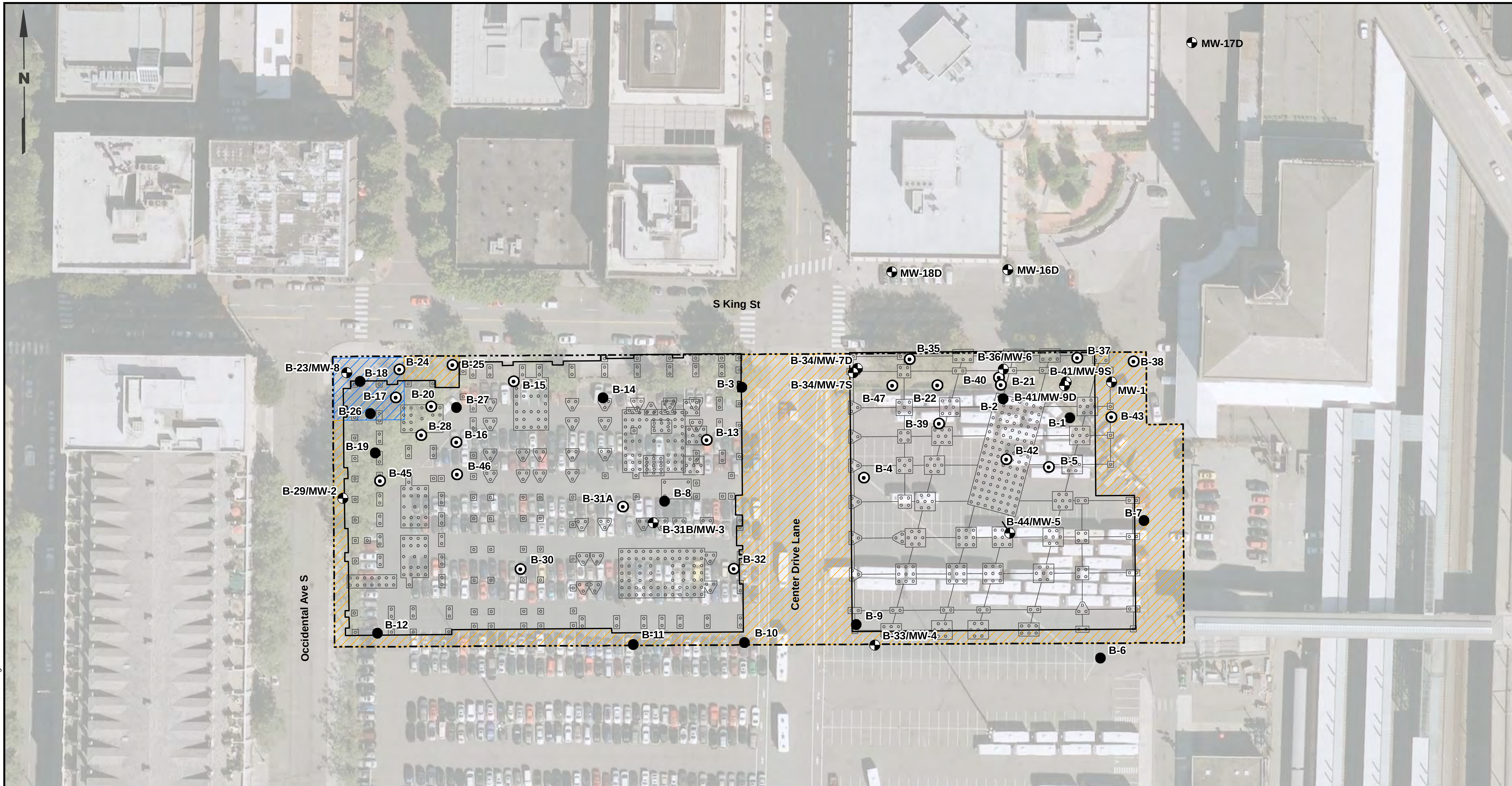
Scale in Feet

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

| North Lot Development<br>Seattle, Washington | **Alternative 2:<br>Conceptual Excavation Plan** | Figure<br>18 |
|---|---|---|




## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Site Boundary
- Assumed Area of Excavation to Approximately 8 ft BGS (or groundwater elevation)- The lateral extent of the excavation will be determined in the field based on field screening and the laboratory results for confirmation samples collected at the limits of the excavation.
- Area of Excavation to Approximately 5 ft BGS (soil located outside the building footprint but within the property boundary). Other containment measures may be applied in lieu of excavation to 5 ft BGS as described in the FS text.

0 80 160

Scale in Feet

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.
2. Building foundation plans from North Lot Development CAD files data February 25, 2011.

*Data Source: Triad Boundary Survey, King County*

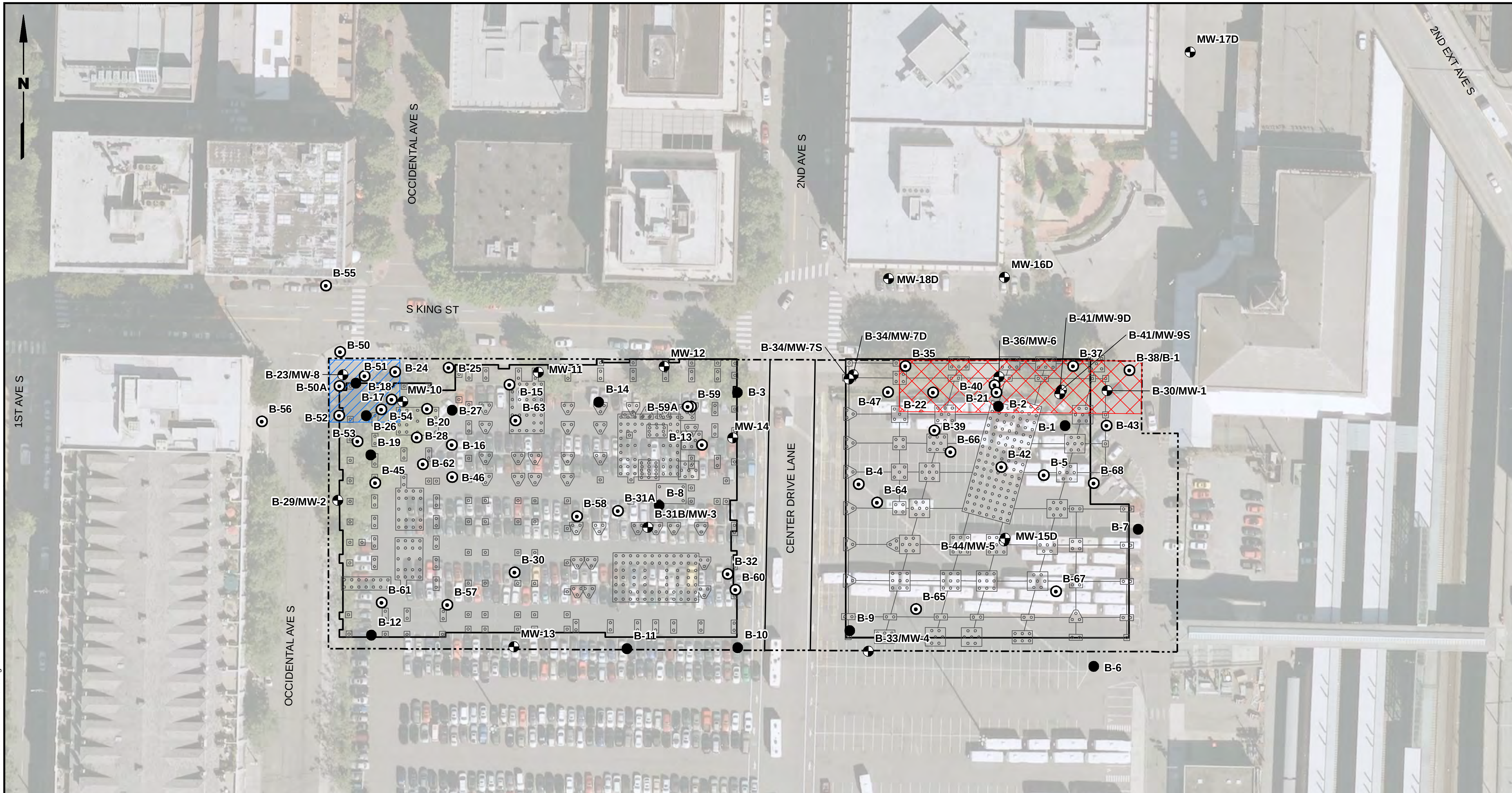
Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\March Revisions\Fig19-Alternative3Excavation.mxd 3/9/2011

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Alternative 3: Conceptual Excavation Plan**

Figure 19




## Legend

- Approximate Area of Creosote Stabilization
- Assumed Area of Excavation - The lateral extent of the excavation will be determined in the field based on field screening and the laboratory results for confirmation samples collected at the limits of the excavation.
- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Property Boundary

Note
1. Refer to Figure 3 for Historical Property Features Legend.
2. Building foundation plans from North Lot Development CAD files, dated February 25, 2011.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

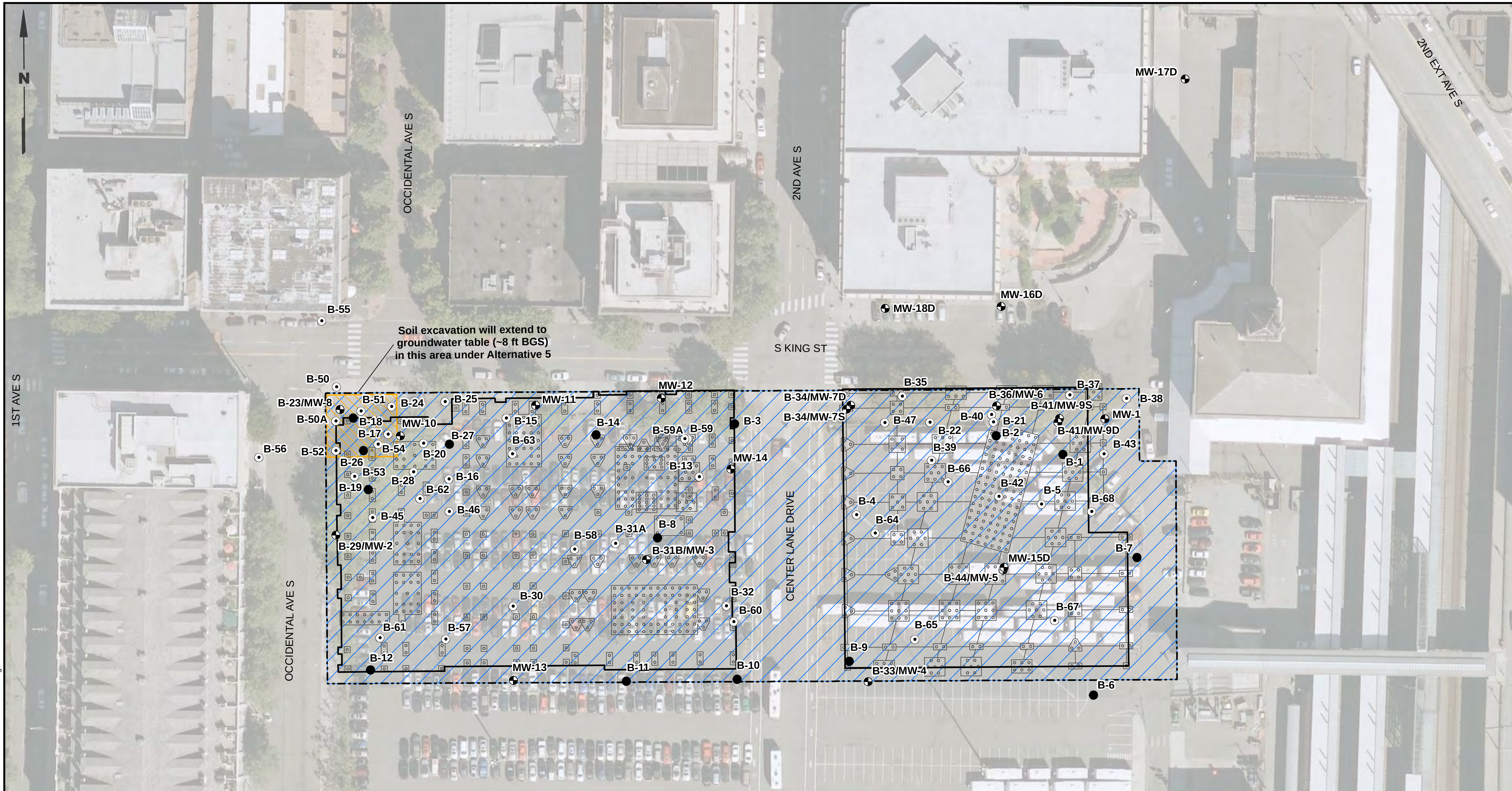
0 80 160
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

Y:\Projects\1014001\Mapdocs\North Lot RI\Revised\March Revisions\Fig20-Alternative4.mxd 3/9/2011

LANDAU ASSOCIATES

| North Lot Development Seattle, Washington | **Alternative 4: Conceptual Excavation and Stabilization Plan** | Figure 20 |
|---|---|---|






**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Property Boundary
- Excavation Area
- Hotspot Excavation Area for Alternative 5 Only - The lateral extent of the excavation will be determined in the field based on field screening and the laboratory results for confirmation samples collected at the limits of the excavation.

Note

1. Alternative 5 would consist of Property-wide excavation to approximately 5 ft BGS. Alternative 6 would consist of Property-wide excavation of total depth of fill material, to approximately 25 ft BGS.
2. Building foundation plans from North Lot Development CAD files, dated February 25, 2011.
3. Refer to Figure 3 for Historical Property Features Legend.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 80 160

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Alternative 5 and 6: Conceptual Excavation Plan**

Figure 21

**TABLE 1**
**DISPROPORTIONATE COST ANALYSIS**
**NORTH LOT DEVELOPMENT**
**SEATTLE, WASHINGTON**

| **Alternative Number:** | **Alternative 1** | **Alternative 2** | **Alternative 3** | **Alternative 4** | **Alternative 5** | **Alternative 6** |
|---|---|---|---|---|---|---|
| **Alternative Name:** | **Containment including a Vapor Barrier** | **Hotspot Excavation and Containment** | **Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Containment, and Added Measures to Prevent Contact with Shallow Contaminated Soil Beyond the Footprint of the Building Foundations** | **Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Focused Stabilization of Creosote Area, and Containment** | **Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, and Excavation of Fill Material Across the Property to 5 ft Below Ground Surface, and Containment** | **Complete Excavation of Fill Material** |
| **Alternative Description:** | Containment including:<br><br>• A vapor barrier and passive venting system beneath the buildings constructed in the western portion of the Property over the former gasoline station area.<br><br>• Institutional controls.* | Focused excavation and containment including:<br><br>• Hotspot excavation of contaminated soil from the northwestern portion of the Property (former gasoline station area) to the groundwater table to remove the highest gasoline/benzene concentrations and mitigate the potential for vapor migration.<br><br>• Institutional controls.* | Focused excavation, focused treatment of residual gasoline/benzene in soil/groundwater, and containment including:<br><br>• Hotspot excavation of contaminated soil from the northwestern portion of the Property (former gasoline station area) to the groundwater table to remove the highest gasoline/benzene concentrations and mitigate the potential for vapor migration.<br><br>• Enhanced bioremediation for residual soil/groundwater impacted by gasoline/benzene near the elevation of the water table in the area of hotspot excavation.<br><br>• Measures to prevent contact with shallow contaminated soil outside of the building footprints but within the property boundary including additional soil excavation to 5 ft BGS or concrete.<br><br>• Institutional controls.* | Focused excavation, focused treatment of residual gasoline/benzene in soil/groundwater, focused stabilization of creosote, and containment including:<br><br>• Hotspot excavation of contaminated soil from the northwestern portion of the Property (former gasoline station area) to the groundwater table to remove the highest gasoline/benzene concentrations and mitigate the potential for vapor migration.<br><br>• Enhanced bioremediation for residual soil/groundwater impacted by gasoline/benzene near the elevation of the water table in the area of hotspot excavation.<br><br>• Stabilization of the creosote in the northeastern portion of the Property using soil mixing/auger drilling techniques to prevent offsite migration of contaminants.<br><br>• Institutional controls.* | Excavation including:<br><br>• Hotspot excavation of contaminated soil from the northwestern portion of the Property (former gasoline station area) to the groundwater table to remove the highest gasoline/benzene concentrations and mitigate the potential for vapor migration.<br><br>• Enhanced bioremediation for residual soil/groundwater impacted by gasoline/benzene near the elevation of the water table in the area of hotspot excavation.<br><br>• Property excavation of fill material to approximately 5 feet below ground surface.<br><br>• Institutional controls.* | Excavation including:<br><br>Complete property excavation of fill material to approximately 25 feet below ground surface to the native marine silt layer. |
| **Individual Ranking Criteria** | | | | | | |
| **1 Meets Remedial Action Objectives** | Yes | Yes | Yes | Yes | Yes | Yes |

# TABLE 1
## DISPROPORTIONATE COST ANALYSIS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| Alternative Number: | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 | Alternative 6 |
|---|---|---|---|---|---|---|
| **2 Compliance with MTCA Threshold Criteria** | | | | | | |
| [WAC 173-340-360(2)(a)] | | | | | | |
| -Protect human health and the environment | Yes | Yes | Yes | Yes | Yes | Yes |
| -Comply with cleanup standards | Yes | Yes | Yes | Yes | Yes | Yes |
| -Comply with applicable state/federal laws | Yes | Yes | Yes | Yes | Yes | Yes |
| -Provide for compliance monitoring | Yes | Yes | Yes | Yes | Yes | Yes |
| **3 Restoration Timeframe** | | | | | | |
| [WAC 173-340-360(2)(b)(ii) and WAC 173-340-360(4)] | | | | | | |
| -Potential risk to human health and environment | Low | Low | Low | Low | Low | Low |
| -Practicability of achieving shorter restoration time | See DCA below | See DCA below | See DCA below | See DCA below | See DCA below | See DCA below |
| -Current use of site, surrounding area, and resources | Parking, commercial, rail | Parking, commercial, rail | Parking, commercial, rail | Parking, commercial, rail | Parking, commercial, rail | Parking, commercial, rail |
| -Future use of site, surrounding area, and resources | Commercial, mixed-use | Commercial, mixed-use | Commercial, mixed-use | Commercial, mixed-use | Commercial, mixed-use | Commercial, mixed-use |
| -Availability of alternative water supplies | Yes | Yes | Yes | Yes | Yes | Yes |
| -Likely effectiveness/reliability of institutional controls | High | High | High | High | High | High |
| -Ability to monitor migration of hazardous substances | High | High | High | High | High | High |
| -Toxicity of hazardous substances at the site | Moderate | Moderate | Moderate | Moderate | Moderate | Moderate |
| -Natural processes that reduce concentrations | Yes | Yes | Yes | Yes | Yes | Yes |
| Overall Reasonable Restoration Timeframe | Yes | Yes | Yes | Yes | Yes | Yes |

**4 Relative Benefits Ranking for DCA**
[WAC 173-340-360(2)(b)(i) and WAC 173-340-36093)(f)]

| | Alternative 1 | | | | Alternative 2 | | | | Alternative 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Comparative Benefit Ranking ** | Score | Weighing Factor | Weighted Score | Comparative Benefit Ranking ** | Score | Weighing Factor | Weighted Score | Comparative Benefit Ranking ** | Score | Weighing Factor | Weighted Score |
| -Overall Protectiveness | Low | 1 | 0.3 | 0.3 | Medium Low | 3 | 0.3 | 0.9 | Medium | 5 | 0.3 | 1.5 |
| -Permanence | Low | 1 | 0.2 | 0.2 | Low | 2 | 0.2 | 0.4 | Medium Low | 4 | 0.2 | 0.8 |
| -Long-Term Effectiveness | Low | 1 | 0.2 | 0.2 | Medium Low | 3 | 0.2 | 0.6 | Medium | 5 | 0.2 | 1 |
| -Manageability of Short-Term Risk | High | 9 | 0.1 | 0.9 | Medium High | 8 | 0.1 | 0.8 | Medium High | 8 | 0.1 | 0.8 |
| -Implementability | High | 10 | 0.1 | 1 | High | 9 | 0.1 | 0.9 | High | 9 | 0.1 | 0.9 |
| -Consideration of Public Concerns | Medium High | 8 | 0.1 | 0.8 | Medium High | 8 | 0.1 | 0.8 | Medium High | 8 | 0.1 | 0.8 |
| ***Comparative Overall Benefit*** | | | | **3.4** | | | | **4.4** | | | | **5.8** |

| | Alternative 4 | | | | Alternative 5 | | | | Alternative 6 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Comparative Benefit Ranking ** | Score | Weighing Factor | Weighted Score | Comparative Benefit Ranking ** | Score | Weighing Factor | Weighted Score | Comparative Benefit Ranking ** | Score | Weighing Factor | Weighted Score |
| -Overall Protectiveness | Medium | 5 | 0.3 | 1.5 | Medium | 6 | 0.3 | 1.8 | High | 10 | 0.3 | 3 |
| -Permanence | Medium Low | 4 | 0.2 | 0.8 | Medium | 6 | 0.2 | 1.2 | High | 10 | 0.2 | 2 |
| -Long-Term Effectiveness | Medium | 5 | 0.2 | 1 | Medium | 6 | 0.2 | 1.2 | High | 10 | 0.2 | 2 |
| -Manageability of Short-Term Risk | Medium | 6 | 0.1 | 0.6 | Medium High | 7 | 0.1 | 0.7 | Low | 1 | 0.1 | 0.1 |
| -Implementability | Medium Low | 4 | 0.1 | 0.4 | Medium | 5 | 0.1 | 0.5 | Low | 1 | 0.1 | 0.1 |
| -Consideration of Public Concerns | Medium High | 8 | 0.1 | 0.8 | Medium High | 8 | 0.1 | 0.8 | Medium High | 8 | 0.1 | 0.8 |
| ***Comparative Overall Benefit*** | | | | **5.1** | | | | **6.2** | | | | **8.0** |

| Alternative Number: | Alternative 1 | Alternative 2 | Alternative 3 | Alternative 4 | Alternative 5 | Alternative 6 |
|---|---|---|---|---|---|---|
| **5 Disproportionate Cost Analysis** | | | | | | |
| Estimated Remedy Cost | $ 3,179,000 | $ 2,902,000 | $ 3,840,000 | $ 3,614,000 | $ 5,529,000 | $ 24,595,000 |
| Magnitude of Cost Compared to Lowest Cost Alternative | 110% | 100% | 132% | 125% | 191% | 848% |
| Relative Estimated Remedy Cost (also shown on Figure 4) | 1.10 | 1.00 | 1.32 | 1.25 | 1.91 | 8.48 |
| Magnitude of Relative Benefit to Most Permanent Alternative | 0.43 | 0.55 | 0.73 | 0.64 | 0.78 | 1.00 |
| Relative Comparative Overall Benefit (also shown on Figure 4) | 1.00 | 1.29 | 1.71 | 1.50 | 1.82 | 2.35 |
| Costs Disproportionate to Incremental Benefits? | Yes | No | No | Yes | Yes | Yes |
| Remedy Permanent to the Maximum Extent Practicable? | No | Yes | Yes | No | No | No |
| **Preferred Alternative for Site?** | **NO** | **NO** | **YES** | **NO** | **NO** | **NO** |

*** - Consists of an Environmental Covenant to limit activities that could result in exposure to soil and groundwater and that outlines the required maintenance for the cap. Also includes groundwater monitoring and contingency plan to address potential off-Property migration of contaminants.**

**** - Comparative Benefit Ranking Scoring Criteria: High (9 - 10), Medium High (7 - 8), Medium (5 - 6), Medium Low (3 - 4), Low (1 - 2)**

# TABLE 2
## DISPROPORTIONATE COST ANALYSIS RELATIVE BENEFIT RANKING CONSIDERATIONS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| Alternative Number: | | Alternative 1 | | Alternative 2 | | Alternative 3 | | Alternative 4 | | Alternative 5 | | Alternative 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alternative Name: | Benefit Ranking | Containment including a Vapor Barrier | Benefit Ranking | Hotspot Excavation and Containment | Benefit Ranking | Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Containment, and Added Measures to Prevent Contact with Shallow Contaminated Soil Beyond the Footprint of the Building Foundations | Benefit Ranking | Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Focused Stabilization of Creosote Area, and Containment | Benefit Ranking | Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, and Excavation of Fill Material Across the Property to 5 ft Below Ground Surface, and Containment | Benefit Ranking | Complete Excavation of Fill Material |
| **Relative Benefits Ranking for DCA**<br>[WAC 173-340-360(2)(b)(i) and WAC 173-340-36093)(f)] | | **Ranking Considerations** | | **Ranking Considerations** | | **Ranking Considerations** | | **Ranking Considerations** | | **Ranking Considerations** | | **Ranking Considerations** |
| -Overall Protectiveness | 1 | • Contaminated soil left in place below about 1.5 to 2 ft BGS<br>• Vapor barrier and passive venting system for protection of indoor air<br>• Cap to prevent direct contact with contaminated media | 3 | • Focused removal of soil with highest concentrations of gasoline/benzene<br>• Eliminates need for vapor barrier<br>• Cap to prevent direct contact with shallow contaminated soil left in place Property-wide | 5 | • Focused removal of soil with highest concentrations of gasoline/benzene<br>• Additional contaminant reduction in soil and groundwater via bioremediation in vadose zone<br>• Eliminates need for vapor barrier<br>• Cap to prevent direct contact with shallow contaminated soil left in place Property-wide | 5 | • Focused removal of soil with highest concentrations of gasoline/benzene<br>• Additional contaminant reduction in soil and groundwater via bioremediation in vadose zone and contaminant mobility reduction due to stabilization of creosote-like material in deeper soil<br>• Eliminates need for vapor barrier<br>• Cap to prevent direct contact with shallow contaminated soil left in place Property-wide | 6 | • Focused removal of soil with highest concentrations of gasoline/benzene<br>• Additional contaminant reduction in soil and groundwater via bioremediation in vadose zone<br>• Eliminates need for vapor barrier<br>• Excavation of fill with low concentrations of metals and PAHs to 5 ft depth across Property<br>• Cap to prevent direct contact with contaminated soil left in place Property-wide | 10 | • Provides high protection through complete removal of contamined fill material Property-wide including hotspot area |
| -Permanence | 1 | • Risk of contact with contaminated media is mitigated through cap and vapor barrier; permanence maintained through institutional controls | 2 | • Focused removal of soil with highest concentrations of gasoline/benzene, eliminating need for vapor barrier<br>• Risk of contact with remaining contaminated media is mitigated through cap; permanence maintained through institutional controls | 4 | • Focused removal of soil with highest concentrations of gasoline/benzene, eliminating need for vapor barrier<br>• Additional contaminant reduction in soil and groundwater via bioremediation in vadose zone<br>• Risk of contact with remaining contaminated media is mitigated through cap; permanence maintained through institutional controls | 4 | • Focused removal of soil with highest concentrations of gasoline/benzene, eliminating need for vapor barrier<br>• Additional contaminant reduction in soil and groundwater via bioremediation in vadose zone and contaminant mobility reduction due to stabilization of creosote-like material in deeper soil<br>• Risk of contact with remaining contaminated media is mitigated through cap; permanence maintained through institutional controls | 6 | • Focused removal of soil with highest concentrations of gasoline/benzene, eliminating need for vapor barrier<br>• Additional contaminant reduction in soil and groundwater via bioremediation in vadose zone<br>• Excavation of fill with low concentrations of metals and PAHs to 5 ft depth across Property<br>• Risk of contact with remaining contaminated media is mitigated through cap; permanence maintained through institutional controls | 10 | • Provides high permanence through complete removal of contaminated fill material Property-wide including hotspot area |

# TABLE 2
## DISPROPORTIONATE COST ANALYSIS RELATIVE BENEFIT RANKING CONSIDERATIONS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| Alternative Number: | Benefit Ranking | Alternative 1 | Benefit Ranking | Alternative 2 | Benefit Ranking | Alternative 3 | Benefit Ranking | Alternative 4 | Benefit Ranking | Alternative 5 | Benefit Ranking | Alternative 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Alternative Name:** | | **Containment including a Vapor Barrier** | | **Hotspot Excavation and Containment** | | **Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Containment, and Added Measures to Prevent Contact with Shallow Contaminated Soil Beyond the Footprint of the Building Foundations** | | **Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Focused Stabilization of Creosote Area, and Containment** | | **Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, and Excavation of Fill Material Across the Property to 5 ft Below Ground Surface, and Containment** | | **Complete Excavation of Fill Material** |
| -Long-Term Effectiveness | 1 | • Exposure and risk is mitigated through the installation of a vapor barrier, cap, and long-term monitoring; long-term effectiveness maintained through institutional controls | 3 | • Focused removal of soil with highest concentrations of gasoline/benzene, eliminating need for vapor barrier<br>• Risk of contact with remaining contaminated media is mitigated through cap; long-term effectiveness maintained through institutional controls | 5 | • Focused removal of soil with highest concentrations of gasoline/benzene, eliminating need for vapor barrier<br>• Additional contaminant reduction in soil and groundwater via bioremediation in vadose zone<br>• Risk of contact with remaining contaminated media is mitigated through cap; long-term effectiveness maintained through institutional controls | 5 | • Focused removal of soil with highest concentrations of gasoline/benzene, eliminating need for vapor barrier<br>• Additional contaminant reduction in soil and groundwater via bioremediation in vadose zone and contaminant mobility reduction due to stabilization of creosote-like material in deeper soil<br>• Risk of contact with remaining contaminated media is mitigated through cap; long-term effectiveness maintained through institutional controls | 6 | • Focused removal of soil with highest concentrations of gasoline/benzene, eliminating need for vapor barrier<br>• Additional contaminant reduction in soil and groundwater via bioremediation in vadose zone<br>• Excavation of fill with low concentrations of metals and PAHs to 5 ft depth across Property<br>• Risk of contact with remaining contaminated media is mitigated through cap; long-term effectiveness maintained through institutional controls | 10 | • Provides high long-term effectiveness through complete removal of contaminated fill material Property-wide including hotspot area |
| -Manageability of Short-Term Risk | 9 | • No removal, contact, or disturbance of contaminated media is required | 8 | • Remediation area is limited to focused area of soil excavation with highest concentrations of gasoline/benzene<br>• Excavation of soil above vadose zone can be completed by a qualified contractor<br>• Minimal shoring needed due to limited area of excavation | 8 | • Remediation area is limited to focused area of soil excavation with highest concentrations of gasoline/benzene<br>• Excavation of soil above vadose zone can be completed by a qualified contractor and bioremediation can be completed without additional risk<br>• Minimal shoring needed due to limited area of excavation | 6 | • Focused excavation and bioremediation can be completed with limited risks<br>• Focused stabilization of the creosote area would require mobilization of large auger drilling equipment, increasing risk<br>• Risks to surrounding structures due to vibrations and underground utilities due to drilling and cementation activities | 7 | • Focused excavation can be completed with limited risks<br>• Excavation Property-wide to a depth of 5 ft would require extensive loading and hauling of removed soil and backfill soil and shoring along all Property boundaries | 1 | • Excavation of fill material Property-wide requires extensive loading, hauling, and disposal to manage the large volume of removed soil and transport of backfill soil<br>• Extensive shoring and dewatering would be required to excavate below the groundwater table<br>• Extensive excavation would present risks to surrounding structures and utilities |

# TABLE 2
## DISPROPORTIONATE COST ANALYSIS RELATIVE BENEFIT RANKING CONSIDERATIONS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| Alternative Number: | Benefit Ranking | Alternative 1 | Benefit Ranking | Alternative 2 | Benefit Ranking | Alternative 3 | Benefit Ranking | Alternative 4 | Benefit Ranking | Alternative 5 | Benefit Ranking | Alternative 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Alternative Name:** | | **Containment including a Vapor Barrier** | | **Hotspot Excavation and Containment** | | **Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Containment, and Added Measures to Prevent Contact with Shallow Contaminated Soil Beyond the Footprint of the Building Foundations** | | **Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, Focused Stabilization of Creosote Area, and Containment** | | **Hotspot Excavation, Focused Treatment of Residual Gasoline/Benzene, and Excavation of Fill Material Across the Property to 5 ft Below Ground Surface, and Containment** | | **Complete Excavation of Fill Material** |
| -Implementability | 10 | • Vapor barrier installed/integrated into the development design without significant extra effort<br>• Cap achieved through Property development activities | 9 | • Focused removal of soil with the highest concentrations of gasoline/benzene above the vadose zone can be completed by a qualified contractor<br>• Minimal area of disturbed soil<br>• Ttransport of removed soil and backfill would be focused and minimal | 9 | • Focused removal of soil with the highest concentrations of gasoline/benzene above the vadose zone can be completed by a quality contractor<br>• Minimal area of disturbed soil<br>• Transport of removed soil and backfill would be focused and minimal<br>• Bioremediation completed without significant additional effort | 4 | • Focused excavation has high implementability<br>• Focused stabilization of the deeper creosote-impacted soil has lower implementability<br>• Significant disturbance by remedial activities near the entrance of King Street Station<br>• Implementability reduced due to need to manuever around/through underground utilities and to protect nearby structures from vibration of stabilization activities | 5 | • Focused excavation can be completed with high implementability<br>• Excavation Property-wide to a depth of 5 ft requires extensive planning and coordination for loading, hauling, and disposal of removed soil, transport of backfill soil<br>• Installation and removal of shoring at Property boundaries is implementable but will cause distruption at surrounding properties | 1 | • Excavation of fill material Property-wide would require extensive coordination for loading, hauling, and disposal for the large volume of soil; transport and placement of backfill soil also needed<br>• Extensive planning and coordination for shoring and dewatering to excavate below the groundwater table<br>• Requires protection of surrounding structures and utilities |
| -Consideration of Public Concerns | 8 | • Protective of human health and the environment<br>• Provides at least the minimum level of protection under MTCA | 8 | • Protective to human health and the environment<br>• Provides at least the minimum level of protection under MTCA | 8 | • Protective to human health and the environment<br>• Provides at least the minimum level of protection under MTCA | 8 | • Protective to human health and the environment<br>• Provides at least the minimum level of protection under MTCA | 8 | • Protective to human health and the environment<br>• Provides at least the minimum level of protection under MTCA; however, consideration is decreased due to the significant disturbance for added Property-wide excavation, intrusion on public activities, and limits on accessIbility of the surrounding areas and increased time required for completion of remedial activities | 8 | • Protective to human health and the environment<br>• Provides at least the minimum level of protection under MTCA; however, consideration is decreased due to the significant disturbance represented by the complete Property-wide excavation, the potential intrusion on public activities, and limits on accessIbility of the surrounding areas due to extensive dewatering, shoring, and soil transportation activities and significantly increased time required for completion of remedial activities |
| ***Comparative Overall Benefit*** | **3.4** | | **4.4** | | **5.8** | | **5.1** | | **6.2** | | **8.0** | |

# TABLE 3
# SOIL CLEANUP LEVELS FOR DETECTED CONSTITUENTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | | Direct Contact Pathway (Ingestion Only)<br>Method B: Unrestricted Land Use<br>For soil from 0 - 15 ft BGS<br><br>Standard Formula Values | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte** | **Protection of Groundwater and Marine Surface Water (Fixed Parameter 3-Phase Model) mg/kg** | **Carcinogen mg/kg** | **Non-carcinogen mg/kg** | **Preliminary Cleanup Levels (Before adjustment for background) mg/kg** | **Background Soil Metals Concentrations<br><br>Puget Sound Region<br><br>90th Percentile mg/kg** | **Preliminary Cleanup Levels (After adjustment for background) mg/kg** | **Preliminary Cleanup Levels (After adjustment for total site risk) mg/kg** | **Final Cleanup Levels in Final Units** | **Units** | **Range of Laboratory Reporting Limits for Project Samples** |
| **TPH** | | | | | | | | | | |
| Gasoline-Range Petroleum Hydrocarbons | (b) (c) | | 30 (b,c) | 30 | | 30 | | 30 | mg/kg | 5 mg/kg |
| Diesel-Range Petroleum Hydrocarbons | (b) | | 2,000 (b) | 2,000 | | 2,000 | | 2,000 | mg/kg | 5 mg/kg |
| Motor Oil-Range Petroleum Hydrocarbons | (b) | | 2,000 (b) | 2,000 | | 2,000 | | 2,000 | mg/kg | 10 mg/kg |
| **TOTAL METALS** | | | | | | | | | | |
| Arsenic | 0.034 | 0.67 | 24 | 0.034 | 7 | 7 | | 7 | mg/kg | 5 mg/kg |
| Chromium | 1,000,000 | | 120,000 (d) | 120,000 | 42 (e) | 120,000 | | 120,000 | mg/kg | 0.5 mg/kg |
| Lead | 1,620 | | 250 (b) | 250 | 17 | 250 | | 250 | mg/kg | 2 mg/kg |
| Cadmium | 0.69 | | 80 | 0.69 | 1 | 0.69 | | 0.69 | mg/kg | 0.2 mg/kg |
| Zinc | 100 | | 24,000 | 100 | 86 | 100 | | 100 | mg/kg | 1 mg/kg |
| Copper | 1.07 | | 3,000 | 1.07 | 36 | 36 | | 36 | mg/kg | 0.2 mg/kg |
| Mercury | 0.026 | | 24 | 0.026 | 0.07 | 0.07 | | 0.07 | mg/kg | 0.05 mg/kg |
| **BTEX** | | | | | | | | | | |
| Benzene | 0.0045 | 18.0 | 320 | 0.0045 | | 0.0045 | | 25 (h) | µg/kg | 12.5 - 25 µg/kg |
| Toluene | 4.60 | | 6,400 | 4.6 | | 4.6 | 0.58 | 580 | µg/kg | 12.5 - 25 µg/kg |
| Ethylbenzene | 6.10 | | 8,000 | 6.1 | | 6.1 | 2.4 | 2,400 | µg/kg | 12.5 - 25 µg/kg |
| Total Xylenes | 15.0 | | 16,000 | 15 | | 15 | | 15,000 | µg/kg | 12.5 - 50 µg/kg |
| **PAHs** | | | | | | | | | | |
| Naphthalene | 4.5 | | 1,600 | 4.5 | | 4.5 | | 4,500 | µg/kg | 58 - 64 µg/kg |
| 2-Methylnaphthalene | (a) | | 320 | 320 | | 320 | | 320,000 | µg/kg | 58 - 64 µg/kg |
| 1-Methylnaphthalene | (a) | | | | | --- | | --- | | 58 - 64 µg/kg |
| Acenaphthylene | (a) | | | | | --- | | --- | | 58 - 64 µg/kg |
| Acenaphthene | 98 | | 4,800 | 98 | | 98 | 25 | 25,000 | µg/kg | 58 - 64 µg/kg |
| Fluorene | 100 | | 3,200 | 100 | | 100 | 79 | 79,000 | µg/kg | 58 - 64 µg/kg |
| Phenanthrene | (a) | | | | | --- | | --- | µg/kg | 58 - 64 µg/kg |
| Anthracene | 2,300 | | 24,000 | 2,300 | | 2,300 | | 2,300,000 | µg/kg | 58 - 64 µg/kg |
| Fluoranthene | 630 | | 3,200 | 630 | | 630 | 49 | 49,000 | µg/kg | 58 - 64 µg/kg |
| Pyrene | 660 | | 2,400 | 660 | | 660 | 140 | 140,000 | µg/kg | 58 - 64 µg/kg |

# TABLE 3
## SOIL CLEANUP LEVELS FOR DETECTED CONSTITUENTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| Analyte | Protection of Groundwater and Marine Surface Water (Fixed Parameter 3-Phase Model) mg/kg | Direct Contact Pathway (Ingestion Only) Method B: Unrestricted Land Use For soil from 0 - 15 ft BGS Standard Formula Values | | Preliminary Cleanup Levels (Before adjustment for background) mg/kg | Background Soil Metals Concentrations Puget Sound Region 90th Percentile mg/kg | Preliminary Cleanup Levels (After adjustment for background) mg/kg | Preliminary Cleanup Levels (After adjustment for total site risk) mg/kg | Final Cleanup Levels in Final Units | Units | Range of Laboratory Reporting Limits for Project Samples |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Carcinogen mg/kg | Non-carcinogen mg/kg | | | | | | | |
| Benzo(a)anthracene | (f) | (g) | | (g) | | (g) | | (g) | µg/kg | 58 - 64 µg/kg |
| Chrysene | (f) | (g) | | (g) | | (g) | | (g) | µg/kg | 58 - 64 µg/kg |
| Benzo(b)fluoranthene | (f) | (g) | | (g) | | (g) | | (g) | µg/kg | 58 - 64 µg/kg |
| Benzo(k)fluoranthene | (f) | (g) | | (g) | | (g) | | (g) | µg/kg | 58 - 64 µg/kg |
| Benzo(a)pyrene | 0.23 | 0.14 | | 0.14 | | 0.14 | | 140 | µg/kg | 58 - 64 µg/kg |
| Indeno(1,2,3-cd)pyrene | (f) | (g) | | (g) | | (g) | | (g) | µg/kg | 58 - 64 µg/kg |
| Dibenz(a,h)anthracene | (f) | (g) | | (g) | | (g) | | (g) | µg/kg | 58 - 64 µg/kg |
| Benzo(g,h,i)perylene | (a) | | | | | --- | | --- | | 58 - 64 µg/kg |
| Dibenzofuran | (a) | | 160 | 160 | | 160 | | 160,000 | µg/kg | 58 - 64 µg/kg |
| **SVOCs** | | | | | | | | | | |
| Phenol | 22 | | 48,000 | 22 | | 22 | | 22,000 | µg/kg | 58 - 180 µg/kg |
| 4-Methylphenol | (a) | | | | | --- | | --- | | 58 - 180 µg/kg |
| Di-n-butylphthalate | 57 | | 8000 | 57 | | 57 | | 57,000 | µg/kg | 58 - 180 µg/kg |
| Carbazole | 0.32 | 50 | | 0.32 | | 0.32 | | 320 | µg/kg | 58 - 180 µg/kg |
| **DIOXINS/FURANS** | | | | | | | | | | |
| 2,3,7,8-TCDD | 0.00000027 | 0.000011 | | 0.00000027 | | 0.00000027 | | 0.27 | ng/kg | |

# TABLE 3
# SOIL CLEANUP LEVELS FOR DETECTED CONSTITUENTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

**Notes:**

Screening level based on lowest of soil concentrations for protection of groundwater and protection of human direct contact (Method B standard formula values for carcinogens and non-carcinogens).

Cleanup levels are developed for all constituents detected above laboratory reporting limits in soil.
Shading indicates basis for cleanup level.
--- = No screening criteria available.
mg/kg = Milligrams per kilogram.
µg/kg = Micrograms per kilogram.
ng/kg = Nanograms per kilogram.

(a) Values for $K_{oc}$ and Henry's Law Constant are not available; therefore, cleanup levels protective of groundwater can not be calculated using the three-phase partitioning model.
(b) MTCA Method A soil cleanup levels are used for gasoline-range, diesel-range, motor oil-range petroleum hydrocarbons, and lead.
(c) For gasoline-range petroleum hydrocarbons, if benzene is present. If benzene is not present, screening level is 100 mg/kg.
(d) Value is for chromium III. Based on site history, chormium VI is not expected to be present.
(e) Value is for total chromium.
(f) If toxicity equivalency factors (TEFs) are considered, cleanup levels protective of groundwater for other cPAHs are less than the value for benzo(a)pyrene.
(g) Evaluated using toxicity equivalency quotient (TEQ) based on benzo(a)pyrene.
(h) Final Cleanup Level adjusted upward to the Practical Quantitation Limit (PQL), equal to 10 times the Method Detection Limit (MDL).

# TABLE 4
## REMEDIATION LEVEL FOR BENZENE IN SOIL
## BASED ON POTENTIAL FOR VAPOR INTRUSION
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| Analyte | µg/kg |
|---|---|
| Benzene | 780 |

µg/kg = Micrograms per kilogram.

Remediation level based on evaulation of soil vapor data and application of Ecology's guidance for evaluating soil vapor intrusion (Ecology 2009b).

# TABLE 5
## CONSTITUENTS DETECTED IN SOIL AT CONCENTRATIONS GREATER THAN THE CLEANUP LEVELS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Level (a) | B-1-9-9.5 MK66A 2/27/2008 | B-2-9-9.5 MK66B 2/27/2008 | B-2-20-21 MK66G 2/27/2008 | B-3-7.5-8.5 MK66H 2/27/2008 | B-4-6-7 MK66C 2/27/2008 | B-5-10-11 MK66D 2/27/2008 | B-6-6-6.5 MK66E 2/27/2008 | B-7-6-7 MK66F 2/27/2008 | B-8-5-6 MK82A 2/28/2008 | B-9-5.5-6.5 MK82B 2/28/2008 | B-10-7-8 MK82C 2/28/2008 | B-11-6-6.5 MK82D 2/28/2008 | B-12-6-7 MK82E 2/28/2008 | B-13-5-5.75 MK82F 2/28/2008 | B-14-5-6.33 MK82G 2/28/2008 | B-15-5-6.33 MK82H 2/28/2008 | B-16-5-6 ML02A 2/29/2008 | B-17-5-6 ML02B 2/29/2008 | B-18-7-8 ML02C 2/29/2008 | B-19-6-6.75 ML02D 2/29/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | | 88 | 8,600 | 22 | | | | | 15 | | | 58 | 65 | 90 | 65 | | 19 | 370 | 92 | 19 |
| Motor Oil | 2,000 | | 440 | 2,300 | 63 | | | | | 68 | | | 560 | 82 | 630 | 500 | | 150 | 160 | 98 | 44 |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | | | | | | |
| Gasoline | 30 | | | | | | | | | | | | | 13 U | | | | 18 | 1,900 | 1,500 | 54 |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 7 | 6 U | 10 U | 6 U | 9 | 6 U | 6 U | 6 U | 6 U | 7 U | 5 U | 6 U | 30 U | 8 U | 5 U | 5 U | 50 U | 5 U | 20 U | 20 U | 5 U |
| Mercury | 0.07 | 0.07 | 0.08 U | 0.06 U | 0.05 | 0.05 U | 0.06 U | 0.06 U | 0.07 | 0.06 U | 0.05 U | 0.10 | 0.09 U | 0.06 U | 0.06 | 0.06 | 0.08 | 0.16 | 0.08 | 0.05 U | 0.07 |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | | | |
| Benzene | 25 | | | | | | | | | | | | | | | | | 13 U | 1,900 | 420 | 18 U |
| Toluene | 580 | | | | | | | | | | | | | | | | | 13 U | 1,800 | 1,000 | 18 U |
| Ethylbenzene | 2,400 | | | | | | | | | | | | | | | | | 13 U | 3,200 | 1,800 | 18 U |
| Total Xylenes | 15,000 | | | | | | | | | | | | | | | | | ND | 7,000 | 6,600 | ND |
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | 64 U | 300 | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 64 U | 66 U | 66 | 65 U | 280 | 83 | 1,600 | 1,000 | 64 U |
| 2-Methylnaphthalene | 320,000 | 64 U | 580 | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 64 U | 80 | 64 U | 65 U | 330 | 78 | 3,000 | 1,200 | 64 U |
| Acenaphthene | 25,000 | 64 U | 66 | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 100 | 66 U | 75 | 150 | 730 | 240 | 320 | 66 U | 64 U |
| Fluorene | 79,000 | 64 U | 66 U | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 110 | 66 U | 89 | 200 | 830 | 300 | 240 | 66 U | 64 U |
| Fluoranthene | 49,000 | 64 U | 450 | | 64 U | 63 U | 63 U | 63 U | 64 U | 310 | 64 U | 66 U | 1,700 | 200 | 1,200 | 7,200 | 6,200 | 3,800 | 2,900 | 66 U | 280 |
| Pyrene | 140,000 | 64 U | 290 | | 64 U | 63 U | 63 U | 63 U | 64 U | 230 | 64 U | 66 U | 1,000 | 170 | 810 | 3,500 | 4,100 | 2,800 | 2,500 | 66 U | 210 |
| Benzo(a)pyrene | 140 | 64 U | 66 U | | 64 U | 63 U | 63 U | 63 U | 64 U | 140 | 64 U | 66 U | 480 | 120 | 410 | 2,200 | 2,000 | 1,800 | 1,100 | 66 U | 120 |
| Dibenzofuran | 160,000 | 64 U | 180 | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 67 | 66 U | 64 U | 140 | 290 | 120 | 150 | 66 U | 64 U |
| TEQ | 140 | ND | 30 | | ND | ND | ND | ND | ND | 189 | ND | ND | 651 | 151 | 545 | 3,048 | 2,606 | 2,453 | 1,435 | ND | 151 |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | | | | | | | | | | | | | | | | | | | | |
| Carbazole | 320 | | | | | | | | | | | | | | | | | | | | |
| Benzo(a)pyrene | 140 | | | | | | | | | | | | | | | | | | | | |
| TEQ | 140 | | | | | | | | | | | | | | | | | | | | |

# TABLE 5
## CONSTITUENTS DETECTED IN SOIL AT CONCENTRATIONS GREATER THAN THE CLEANUP LEVELS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Level (a) | B-20-6.5-8 ML02E 2/29/2008 | B-21-19-20 ML02F 2/29/2008 | B-23-4.6-6.7 NT63B 10/8/2008 | B-23-5.0 NT63A 10/8/2008 | B-23-16.0-20.0 NT63C 10/8/2008 | B-24-2.2-3.0 NT61M 10/7/2008 | B-24-7.0-8.0 NT61O 10/7/2008 | B-24-7.5 NT61N 10/7/2008 | B-26-4.0-7.6 NT63F 10/8/2008 | B-26-7.5 NT63E 10/8/2008 | B-26-16-19 NT63J 10/8/2008 | B-26-17.0 NT63I 10/8/2008 | B-27-8.0-8.3 NT61I 10/7/2008 | B-27-8.0 NT61H 10/7/2008 | B-27-16.5-17.5 NT61K 10/7/2008 | B-27-17.0 NT61J 10/7/2008 | B-28-4.2-7.0 NT61F 10/7/2008 | B-28-5.0 NT61G 10/7/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | **51** | | | | | | | | | | | | | | | | | |
| Motor Oil | 2,000 | **190** | | | | | | | | | | | | | | | | | |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 30 | **1,200** | | | **6,100** | | | | **1,400** | | **1,200** | | **4,300** | | **140** | | **17** | | **1,600** |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 7 | 20 U | 10 U | | | | | | | | | | | | | | | | |
| Mercury | 0.07 | 0.06 U | 0.07 U | | | | | | | | | | | | | | | | |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 25 | **200** | | | **57,000** | | | | **350** | | **6,400** | | **730** | | **65** | | 22 U | | **160** |
| Toluene | 580 | **180** | | | **34,000** | | | | **390** | | **810** | | **1,100** | | **40** | | 22 U | | **190** |
| Ethylbenzene | 2,400 | **240** | | | **5,900** | | | | 29 U | | **2,600** | | **3,600** | | 15 U | | 22 U | | 21 U |
| Total Xylenes | 15,000 | **1,570** | | | **61,000** | | | | **3,300** | | **2,050** | | **3,800** | | **152** | | ND | | **1,140** |
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | 66 U | | **5,500,000** | | **120** | **390** | **1,100** | | **4,100** | | **1,900** | | **360** | | **330** | | **2,300** | |
| 2-Methylnaphthalene | 320,000 | 66 U | | **760,000** | | **74** | **500** | **1,300** | | **9,500** | | **5,300** | | **1,200** | | **210** | | **2,100** | |
| Acenaphthene | 25,000 | 66 U | | **300,000** | | 60 U | **66** | **64** | | **100** | | 190 U | | **82** | | **93** | | 62 U | |
| Fluorene | 79,000 | 66 U | | **1,200,000** | | 60 U | 64 U | **74** | | **100** | | 190 U | | **110** | | **240** | | 62 U | |
| Fluoranthene | 49,000 | 66 U | | **5,000,000** | | 60 U | **610** | **610** | | **780** | | 190 U | | **980** | | **650** | | 62 U | |
| Pyrene | 140,000 | 66 U | | **5,300,000** | | 60 U | **560** | **440** | | **680** | | **210** | | **670** | | **420** | | 62 U | |
| Benzo(a)pyrene | 140 | 66 U | | **1,700,000** | | 60 U | **280** | **220** | | **540** | | 190 U | | **410** | | **180** | | 62 U | |
| Dibenzofuran | 160,000 | 66 U | | **810,000** | | 60 U | **120** | **240** | | **470** | | 190 U | | **110** | | **200** | | **120** | |
| TEQ | 140 | ND | | **2,212,000** | | ND | **381** | **286** | | **711** | | ND | | **549** | | **230** | | ND | |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | | | | | | | | | | | | | | | | | | |
| Carbazole | 320 | | | | | | | | | | | | | | | | | | |
| Benzo(a)pyrene | 140 | | | | | | | | | | | | | | | | | | |
| TEQ | 140 | | | | | | | | | | | | | | | | | | |

# TABLE 5
## CONSTITUENTS DETECTED IN SOIL AT CONCENTRATIONS GREATER THAN THE CLEANUP LEVELS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Level (a) | B-30-0.3-4.0 NT61D 10/7/2008 | B-30-8.0-10.5 NT61E 10/7/2008 | B-31-0.3-4.0 (b) NT61C 10/7/2008 | B-31-8.0-10.0 (b) NU11C 10/10/2008 | B-32-0.2-2.0 NT61A 10/7/2008 | B-32-8.0-10.5 NT61B 10/7/2008 | B-33-17.5-18.5 NU11B 10/10/2008 | B-36-19.3-20.0 NT85I 10/9/2008 | B-36-19.8 NT85H 10/9/2008 | B-38-21.5-22.4 NT85E 10/9/2008 | B-38-22.0 NT85D 10/9/2008 | B-38-22.4-23.0 NT85F 10/9/2008 | B-39-21.0-22.3 NT85J 10/9/2008 | B-40-24.5-26.0 NT63G 10/8/2008 | B-40-25.0 NT63H 10/8/2008 | B-41-16.5 NT85A 10/9/2008 | B-41-20.0-21.0 NT85B 10/9/2008 | B-44-17.5-18.5 NT85K 10/9/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | | **49** | **200** | | **160** | | | **2,900** | | **690** | | **59** | **220** | **49** | | | **2,000** | **130** |
| Motor Oil | 2,000 | | **310** | **1,200** | | **2,300** | | | **690** | | **220** | | **42** | **130** | **150** | | | **480** | **130** |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 30 | | | | | | | | | **38** | | **2,000** | | | | 4.5 U | **32** | | |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 7 | **2.4** | **1.6** | **1.9** | **9.6** | **2.1** | **2.3** | **5.0** | | | | | | | | | | | |
| Mercury | 0.07 | **0.10** | 0.05 U | **0.08** | **0.05** | **0.34** | 0.06 U | **1.88** | | | | | | | | | | | |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 25 | | | | | | | | | 28 U | | **5,200** | | | | 11 U | **19** | | |
| Toluene | 580 | | | | | | | | | **35** | | **6,100** | | | | 11 U | **93** | | |
| Ethylbenzene | 2,400 | | | | | | | | | **170** | | **35,000** | | | | 11 U | **150** | | |
| Total Xylenes | 15,000 | | | | | | | | | **290** | | **48,000** | | | | ND | **670** | | |
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | 180 U | 58 U | 170 U | 190 U | 180 U | **300** | **360** | **1,400,000** | | **1,700,000** | | **49,000** | **170,000** | **23,000** | | | **1,500,000** | **1,200** J |
| 2-Methylnaphthalene | 320,000 | 180 U | 58 U | 170 U | 190 U | 180 U | 59 U | 180 U | **500,000** | | **590,000** | | **9,100** | **51,000** | **8,100** | | | **460,000** | **2,100** |
| Acenaphthene | 25,000 | **280** | 58 U | 170 U | **230** | 180 U | 59 U | **320** | 320,000 U | | **380,000** | | **4,700** | **28,000** | **4,100** | | | **260,000** | **170** |
| Fluorene | 79,000 | **320** | 58 U | 170 U | **420** | 180 U | 59 U | **470** | 320,000 U | | **240,000** | | **4,000** | **16,000** | **4,100** | | | **180,000** | **290** |
| Fluoranthene | 49,000 | **12,000** | **95** | **1,300** J | **3,500** | **540** | 59 U | **2,400** J | 320,000 U | | **310,000** | | **7,300** | **11,000** E | **4,900** | | | **200,000** | **830** J |
| Pyrene | 140,000 | **6,600** | **74** | **1,400** J | **3,700** J | **330** | 59 U | **3,000** J | 320,000 U | | **330,000** | | **6,900** | **12,000** E | **5,900** | | | **220,000** | **700** J |
| Benzo(a)pyrene | 140 | **3,100** | 58 U | **610** J | **1,400** | 180 U | 59 U | **1,200** | 320,000 U | | **100,000** E | | **3,300** | **3,800** | **2,200** | | | 160,000 U | **380** |
| Dibenzofuran | 160,000 | **180** | 58 U | 170 U | 190 U | 180 U | 59 U | **210** | 320,000 U | | 100,000 U | | **1,300** | **4,900** | **900** | | | 160,000 U | **510** J |
| TEQ | 140 | **4,233** | ND | **799** | **1,804** | **3** | ND | **1,540** | ND | | **5,500** | | **4,232** | **4,517** | **2,807** | | | ND | **488** |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | | | | | | | | | | | | | | | | | | |
| Carbazole | 320 | | | | | | | | | | | | | | | | | | |
| Benzo(a)pyrene | 140 | | | | | | | | | | | | | | | | | | |
| TEQ | 140 | | | | | | | | | | | | | | | | | | |

# TABLE 5
## CONSTITUENTS DETECTED IN SOIL AT CONCENTRATIONS GREATER THAN THE CLEANUP LEVELS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Level (a) | B-44-21.5-22.5 NU11A 10/10/2008 | B-45-8.0-10.0 NU11E 10/10/2008 | B-45-8.5 NU11D 10/10/2008 | B-47-21.5-21.9 NU11G 10/10/2008 | B-47-21.8 NU11F 10/10/2008 | B50A-15-16 PI35A 7/28/2009 | B51-5 PI35C 7/28/2009 | B51-15-16 PI35B 7/28/2009 | B52-6.5 PI35E 7/28/2009 | B52-15-16 PI35D 7/28/2009 | B53-15-16 PI35F 7/28/2009 | B54-4 PI35H 7/28/2009 | B54-15-16 PI35G 7/28/2009 | B-55-8-9 PJ46A 8/6/2009 | B-56-9-10 PJ46B 8/6/2009 | B57-1-2 PI16A 7/27/2009 | B57-10-15 PI16B/PI54A 7/27/2009 | B57-15-16 PI16C 7/27/2009 | B58-1-2 PI16D 7/27/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | **400** | | | **140** J | | | | | | | | | | | | | **100** | | |
| Motor Oil | 2,000 | **860** | | | **310** | | | | | | | | | | | | | **470** | | |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | | | | | |
| Gasoline | 30 | | | 4.4 U | | 11 U | **60** | **3,200** | **1,600** | **760** | **12** | 5.5 U | **180** | **11** | 4.4 U | 3.8 U | | **20** | | |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 7 | | | | | | | | | | | | | | | | **7** | | | 5 U |
| Mercury | 0.07 | | | | | | | | | | | | | | | | **0.05** | | | **0.59** |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | | |
| Benzene | 25 | | | 11 U | | **32** | 22 U | **460** | 120 U | **79** | **53** | 14 U | 17 U | | 11 U | 9.5 U | | | | |
| Toluene | 580 | | | 11 U | | **48** | **81** | **2,200** | **700** | **110** | **26** | **18** | 17 U | | 11 U | 9.5 U | | | | |
| Ethylbenzene | 2,400 | | | 11 U | | 27 U | **55** | **1,400** | **510** | **430** | **20** | 14 U | 17 U | | 11 U | 9.5 U | | | | |
| Total Xylenes | 15,000 | | | ND | | ND | **170** | **5,500** | **1,840** | **970** | **242** | ND | ND | | **160** | ND | | | | |
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | **5,000** | 60 U | | **500** | | | | | | | | | | | | | | **100** | |
| 2-Methylnaphthalene | 320,000 | **1,100** J | 60 U | | **150** J | | | | | | | | | | | | | | **180** | |
| Acenaphthene | 25,000 | **2,000** | 60 U | | **480** | | | | | | | | | | | | | | **19** | |
| Fluorene | 79,000 | **2,400** | 60 U | | **320** | | | | | | | | | | | | | | **48** | |
| Fluoranthene | 49,000 | **20,000** | **280** | | **1,900** | | | | | | | | | | | | | | **120** J | |
| Pyrene | 140,000 | **17,000** J | **230** J | | **1,600** J | | | | | | | | | | | | | | **130** | |
| Benzo(a)pyrene | 140 | **9,700** | **78** | | **1,000** | | | | | | | | | | | | | | **96** | |
| Dibenzofuran | 160,000 | **1,700** | 60 U | | **130** | | | | | | | | | | | | | | **50** | |
| TEQ | 140 | **12,387** | **102** | | **1,291** | | | | | | | | | | | | | | **125** | |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | | | | | | | | | | | | | | | | **1,300** | | | 59 U |
| Carbazole | 320 | | | | | | | | | | | | | | | | **140** | | | 59 U |
| Benzo(a)pyrene | 140 | | | | | | | | | | | | | | | | **120** | | | 59 U |
| TEQ | 140 | | | | | | | | | | | | | | | | **176** | | | ND |

# TABLE 5
## CONSTITUENTS DETECTED IN SOIL AT CONCENTRATIONS GREATER THAN THE CLEANUP LEVELS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Level (a) | B58-15-16<br>PI16E<br>7/27/2009 | B59-1-2<br>PI16K<br>7/27/2009 | B60-1-2<br>PI16F<br>7/27/2009 | B60-15-16<br>PI16G<br>7/27/2009 | B61-1-2<br>PI16H<br>7/27/2009 | B62-1-2<br>PI35I<br>7/28/2009 | B63-1-2<br>PI35J<br>7/28/2009 | B64-1-2<br>PI16L<br>7/27/2009 | B65-1-2<br>PI16I<br>7/27/2009 | B66-1-2<br>PI35K<br>7/28/2009 | B67-1-2<br>PI16J<br>7/27/2009 | B68-1-2<br>PI35L<br>7/28/2009 | MW-11-4.5-5<br>PI99A<br>8/3/2009 | MW-14-15<br>PJ11A<br>8/4/2009 | MW-17D-15.5-16.5<br>PJ11B/PJ23A<br>8/4/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | | | | | | | | | | | | | | | **400** |
| Motor Oil | 2,000 | | | | | | | | | | | | | | | **160** |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | |
| Gasoline | 30 | | | | | | | | | | | | | **250** | | |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | |
| Arsenic | 7 | | **7** | **7** | | **6** | 10 U | 5 U | **8** | **30** | **5** | **7** | **6** | | | **8** |
| Mercury | 0.07 | | **0.12** | **0.05** | | 0.02 U | **0.04** | **0.05** | **0.06** | **0.05** | **0.02** | **0.02** | **0.08** | | | **0.48** |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | |
| Benzene | 25 | | | | | | | | | | | | | **20** | | |
| Toluene | 580 | | | | | | | | | | | | | **48** | | |
| Ethylbenzene | 2,400 | | | | | | | | | | | | | **170** | | |
| Total Xylenes | 15,000 | | | | | | | | | | | | | **340** | | |
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | **210** | | | **28** | | | | | | | | | | **160** | **1,900** |
| 2-Methylnaphthalene | 320,000 | **150** | | | **12** | | | | | | | | | | **81** | **1,400** |
| Acenaphthene | 25,000 | **140** J | | | **5.8** | | | | | | | | | | **74** | **3,300** |
| Fluorene | 79,000 | **370** J | | | **19** | | | | | | | | | | **100** | **2,900** |
| Fluoranthene | 49,000 | **2,000** J | | | **1,400** J | | | | | | | | | | **2,200** | **8,900** |
| Pyrene | 140,000 | **1,600** | | | **1,400** | | | | | | | | | | **1,600** | **7,700** |
| Benzo(a)pyrene | 140 | **790** | | | **1,100** | | | | | | | | | | **700** | **4,200** |
| Dibenzofuran | 160,000 | **170** J | | | **8.6** | | | | | | | | | | **90** | **1,400** |
| TEQ | 140 | **1,039** | | | **1,433** | | | | | | | | | | **969** | **5,425** |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | | **270** | **69** | | **130** | 61 U | **130** | 59 U | 58 U | **180** | **71** | 65 U | | | **10,000** |
| Carbazole | 320 | | 64 U | 63 U | | 62 U | 61 U | **300** | 59 U | 58 U | 64 U | 60 U | 65 U | | | **3,400** |
| Benzo(a)pyrene | 140 | | 64 U | **680** | | **90** | **160** | **1,200** | 59 U | 58 U | **120** | **220** | 65 U | | | **18,000** |
| TEQ | 140 | | ND | **939.2** | | **117** | **219** | **1,559** | | | **166** | **278** | | | | **22860** |

Notes:

U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
E = The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
ND = Not detected.
Bold = Detected compound.
Box = Exceedance of cleanup level.
mg/kg = Milligrams per kilogram.
µg/kg = Micrograms per kilogram.
(a) See Tables 3 and 4 for criteria used to develop cleanup levels.
(b) Samples collected from boring B-31A; no samples were collected from boring B-31B.

# TABLE 6
# GROUNDWATER CLEANUP LEVELS FOR DETECTED CONSTITUENTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| Analyte | Protective of Drinking Water: MCL Treatment Technique: MCL µg/L | MCL Treatment Technique: Action Level µg/L | MCL Treatment Technique: MCL Goal µg/L | WA State Board of Health MCLs: Primary µg/L | WA State Board of Health MCLs: Secondary µg/L | Standard Formula Values: Carcinogen µg/L | Standard Formula Values: Non-carcinogen µg/L | Protective of Marine Surface Water: AWQC for Protection of Aquatic Life (a): Acute µg/L | AWQC for Protection of Aquatic Life (a): Chronic µg/L | National Toxics Rule (b): AWQC for Acute µg/L | National Toxics Rule (b): AWQC for Chronic µg/L | National Toxics Rule (b): AWQC for Protection of Human Health µg/L | National Recommended Water Quality Criteria (c): Protection of Aquatic Life - Acute µg/L | National Recommended Water Quality Criteria (c): Protection of Aquatic Life - Chronic µg/L | National Recommended Water Quality Criteria (c): Protection of Human Health µg/L | Standard Formula Values: Carcinogen µg/L | Standard Formula Values: Non Carcinogen µg/L | Preliminary Cleanup Levels (Before adjustment for background) µg/L | Background Groundwater µg/L | Preliminary Cleanup Levels (After adjustment for background) µg/L | Preliminary Cleanup Levels (After adjustment for total site risk) µg/L | Final Cleanup Levels in Final Units | Units | Range of Laboratory Reporting Limits for Project Samples |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TPH** | | | | | | | | | | | | | | | | | | | | | | | | |
| Gasoline-Range Petroleum Hydrocarbons | | | | | | | 800 (d,e) | | | | | | | | | | 800 (d,e) | | | 800 | | 0.8 | mg/L | 0.25 mg/L |
| Diesel-Range Petroleum Hydrocarbons | | | | | | | 500 (d) | | | | | | | | | | 500 (d) | | | 500 | | 0.5 | mg/L | 0.25 mg/L |
| Oil-Range Petroleum Hydrocarbons | | | | | | | 500 (d) | | | | | | | | | | 500 (d) | | | 500 | | 0.5 | mg/L | 0.5 mg/L |
| **BTEX** | | | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | 5 | | 0 | 5 | | 0.8 | 32 | | | | | 71 | | | 51 | 23 | 2,000 | 0.8 | | 0.8 | | 0.8 | µg/L | 1 µg/L |
| Toluene | 1,000 | | 1,000 | 1,000 | | | 640 | | | | | 200,000 | | | 15,000 | | 19,000 | 640 | | 640 | 80 | 80 | µg/L | 1 µg/L |
| Ethylbenzene | 700 | | 700 | 700 | | | 800 | | | | | 29,000 | | | 2,100 | | 6,900 | 700 | | 700 | 275 | 275 | µg/L | 1 µg/L |
| Total Xylenes | 10,000 | | 10,000 | 10,000 | | | 1,600 (f) | | | | | | | | | | | 1,600 (f) | | 1,600 (f) | | 1,600 (f) | µg/L | 1 µg/L |
| **PAHs** | | | | | | | | | | | | | | | | | | | | | | | | |
| Naphthalene | | | | | | | 160 | | | | | | | | | | 4,900 | 160 | | 160 | | 160 | µg/L | 0.10 - 1.4 µg/L |
| 2-Methylnaphthalene | | | | | | | 32 | | | | | | | | | | | 32 | | 32 | | 32 | µg/L | 0.10 - 1.4 µg/L |
| 1-Methylnaphthalene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.10 - 1.4 µg/L |
| Acenaphthylene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.10 - 1.4 µg/L |
| Acenaphthene | | | | | | | 960 | | | | | | | | 990 | | 640 | 640 | | 640 | 250 | 250 | µg/L | 0.10 - 1.4 µg/L |
| Fluorene | | | | | | | 640 | | | | | 14,000 | | | 5,300 | | 3,500 | 640 | | 640 | 500 | 500 | µg/L | 0.10 - 1.4 µg/L |
| Phenanthrene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.10 - 1.4 µg/L |
| Anthracene | | | | | | | 4,800 | | | | | 110,000 | | | 40,000 | | 26,000 | 4,800 | | 4,800 | | 4,800 | µg/L | 0.10 - 1.4 µg/L |
| Fluoranthene | | | | | | | 640 | | | | | 370 | | | 140 | | 90 | 90 | | 90 | 50 | 50 | µg/L | 0.10 - 1.4 µg/L |
| Pyrene | | | | | | | 480 | | | | | 11,000 | | | 4,000 | | 2,600 | 480 | | 480 | 100 | 100 | µg/L | 0.10 - 1.4 µg/L |
| Benzo(a)anthracene | | | | | | (g) | | | | | | 0.031 | | | 0.018 | (g) | | (g) | | (g) | | (g) | µg/L | 0.10 - 1.4 µg/L |
| Chrysene | | | | | | (g) | | | | | | 0.031 | | | 0.018 | (g) | | (g) | | (g) | | (g) | µg/L | 0.10 - 1.4 µg/L |
| Benzo(b)fluoranthene | | | | | | (g) | | | | | | 0.031 | | | 0.018 | (g) | | (g) | | (g) | | (g) | µg/L | 0.10 - 1.4 µg/L |
| Benzo(k)fluoranthene | | | | | | (g) | | | | | | 0.031 | | | 0.018 | (g) | | (g) | | (g) | | (g) | µg/L | 0.10 - 1.4 µg/L |
| Benzo(a)pyrene | 0.2 | | 0 | 0.2 | | 0.012 | | | | | | 0.031 | | | 0.018 | 0.030 | | 0.012 (g) | | 0.012 (g) | | 0.012 (g) | µg/L | 0.10 - 1.4 µg/L |
| Indeno(1,2,3-cd)pyrene | | | | | | (g) | | | | | | 0.031 | | | 0.018 | (g) | | (g) | | (g) | | (g) | µg/L | 0.10 - 1.4 µg/L |
| Dibenzo(a,h)anthracene | | | | | | (g) | | | | | | 0.031 | | | 0.018 | (g) | | (g) | | (g) | | (g) | µg/L | 0.10 - 1.4 µg/L |
| Benzo(g,h,i)perylene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.10 - 1.4 µg/L |
| Dibenzofuran | | | | | | | 32 | | | | | | | | | | | 32 | | 32 | | 32 | µg/L | 0.10 - 1.4 µg/L |
| **DISSOLVED METALS** | | | | | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 10 | | | 10 | | 0.058 | 4.8 | 69 | 36 | 69 | 36 | 0.14 | 69 | 36 | 0.14 | 0.10 | 18 | 0.058 | 5/21.3(i) | 5/21.3(i) | | 5/21.3 (j) | µg/L | 0.5 - 10 µg/L |
| Lead | | 15 | 0 | | | | 15 | 210 | 8.1 | 210 | 8.1 | | 210 | 8.1 | | | | 8.1 | | 8.1 | | 8.1 | µg/L | 1 µg/L |
| Chromium | 100 | | 100 | 100 | | | 24,000 (h) | | | | | | | | | | 240,000 | 100 | | 100 | | 100 | µg/L | 5 µg/L |
| Cadmium | 5 | | 5 | 5 | | | 8.0 | 42 | 9.3 | 42 | 9.3 | | 40 | 8.8 | | | 20 | 5 | | 5 | | 5 | µg/L | 2 µg/L |
| Zinc | | | | | 5,000 | | 4,800 | 90 | 81 | 90 | 81 | | 90 | 81 | 26,000 | | 17,000 | 81 | | 81 | | 81 | µg/L | 10 µg/L |
| Copper | | 1,300 | 1,300 | 1,300 | | | 590 | 4.8 | 3.1 | 2.4 | 2.4 | | 4.8 | 3.1 | | | 2,700 | 2.4 | | 2.4 | | 2.4 | µg/L | 2 µg/L |
| Mercury | 2 | | 2 | 2 | | | 4.8 | 1.8 | 0.025 | 2.1 | 0.025 | 0.15 | 1.8 | 0.94 | 0.3 | | | 0.025 | | 0.025 | | 0.15 (k) | µg/L | 0.1 µg/L |
| **VOLATILES** | | | | | | | | | | | | | | | | | | | | | | | | |
| Chloromethane | | | | | | 3.4 | | | | | | | | | | 130 | | 3 | | 3 | | 3 | µg/L | 0.2 µg/L |
| Methylene Chloride | 5 | | 0 | 5 | | 5.8 | 480 | | | | | 1,600 | | | 590 | 960 | 170,000 | 5 | | 5 | 3 | 3 | µg/L | 0.5 µg/L |
| Acetone | | | | | | | 800 | | | | | | | | | | | 800 | | 800 | 35 | 35 | µg/L | 3 µg/L |
| Carbon Disulfide | | | | | | | 800 | | | | | | | | | | | 800 | | 800 | 350 | 350 | µg/L | 0.2 µg/L |
| Chloroform | 80 | | | 80 | | 7.2 | 80 | | | | | 470 | | | 470 | 280 | 6,900 | 7.2 | | 7.2 | | 7.2 | µg/L | 0.2 µg/L |
| 2-Butanone | | | | | | | 4,800 | | | | | | | | | | | 4,800 | | 4,800 | 2,400 | 2,400 | µg/L | 2.5 - 3.0 µg/L |

# TABLE 6
# GROUNDWATER CLEANUP LEVELS FOR DETECTED CONSTITUENTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Protective of Drinking Water | | | | | | | Protective of Marine Surface Water | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MCL Treatment Technique | | | WA State Board of Health MCLs | | Standard Formula Values | | AWQC for Protection of Aquatic Life (a) | | National Toxics Rule (b) AWQC for | | | National Recommended Water Quality Criteria (c) | | | Standard Formula Values | | | | | | | | |
| | | | | | | Carcinogen | Non-carcinogen | | | | | | | | | Carcinogen | Non Carcinogen | | | | | | | |
| Analyte | MCL µg/L | Action Level µg/L | MCL Goal µg/L | Primary µg/L | Secondary µg/L | Carcinogen µg/L | Non-carcinogen µg/L | Acute µg/L | Chronic µg/L | Acute µg/L | Chronic µg/L | AWQC for Protection of Human Health µg/L | Protection of Aquatic Life - Acute µg/L | Protection of Aquatic Life - Chronic µg/L | Protection of Human Health µg/L | µg/L | µg/L | Preliminary Cleanup Levels (Before adjustment for background) µg/L | Background Groundwater µg/L | Preliminary Cleanup Levels (After adjustment for background) µg/L | Preliminary Cleanup Levels (After adjustment for total site risk) µg/L | Final Cleanup Levels in Final Units | Units | Range of Laboratory Reporting Limits for Project Samples |
| Styrene | 100 | | 100 | 100 | | 1.5 | 1,600 | | | | | | | | | | | | | | 1.5 | | | 0.2 µg/L |
| 1,3,5-Trimethylbenzene | | | | | | | 400 | | | | | | | | | | | 400 | | 400 | | 400 | µg/L | 0.2 µg/L |
| 1,2,4-Trimethylbenzene | | | | | | | 400 | | | | | | | | | | | 400 | | 400 | | 400 | µg/L | 0.2 µg/L |
| Isopropylbenzene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.2 µg/L |
| n-Propylbenzene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.2 µg/L |
| tert-Butylbenzene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.2 µg/L |
| sec-Butylbenzene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.2 µg/L |
| 4-Isopropyltoluene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.2 µg/L |
| n-Butylbenzene | | | | | | | | | | | | | | | | | | | | --- | | --- | | 0.2 µg/L |
| **SEMIVOLATILES** | | | | | | | | | | | | | | | | | | | | | | | | |
| Phenol | | | | | | | 4,800 | | | | | 4,600,000 | | | 1,700,000 | | 1,100,000 | 4,800 | | 4,800 | | 4,800 | µg/L | |
| 4-Methylphenol | | | | | | | | | | | | | | | | | | | | --- | | --- | | |
| Di-n-butylphthalate | | | | | | | 1,600 | | | | | 12,000 | | | 4,500 | | 2,900 | 1,600 | | 1,600 | | 1,600 | µg/L | |
| Carbazole | | | | | | 4.4 | | | | | | | | | | | | 4.4 | | 4.4 | | 4.4 | µg/L | |
| **DIOXINS AND FURANS** | | | | | | | | | | | | | | | | | | | | --- | | --- | | |
| 2,3,7,8-TCDD | 3.0E-05 | | | 3.0E-05 | | | | | | | | 1.4E-08 | | | 5.1E-09 | | | 5.1E-09 | | 5.1E-09 | | 5.1E-03 | pg/L | |

**Notes:**

Preliminary cleanup level is based on lowest of federal or state MCL, state secondary MCL, and Method B standard formula values, for carcinogens without federal or state MCLs on the Method B standard formula value, and for carcinogens with federal or state MCLs.

Preliminary cleanup levels are developed for all constituents detected in groundwater or soil.

Shading indicates basis for preliminary cleanup level.

--- = No cleanup level available.

mg/L = Milligrams per liter.

µg/L = Micrograms per liter.

pg/L = Picograms per liter.

(a) Ambient water quality criteria for protection of aquatic life from WAC 173-201A-240.

(b) Ambient water quality criteria for protection of human health from 40 CFR Part 131d (National Toxics Rule).

(c) National Recommended Water Quality Criteria (EPA website 2006).

(d) MTCA Method A groundwater cleanup levels are used for gasoline-range, diesel-range, oil-range petroleum hydrocarbons.

(e) For gasoline-range petroleum hydrocarbons, if benzene is present. If benzene is not present, screening level is 1,000 µg/L (1.0 mg/L).

(f) Screening level is for total xylenes.

(g) Evaluated using toxicity equivalency quotient (TEQ) based on benzo(a)pyrene.

(h) Value is for chromium III. Based on site history, chromium VI is not expected to be present.

(i) Calculated background concentration will be used as the preliminary cleanup level at MW-5 and MW-15D.

(j) A cleanup level of 5 ug/L was agreed upon by Ecology for the western portion of the Property. A background concentration of 21.3 will be used as the cleanup level for the eastern portion of the Property.

(k) The cleanup level for mercury in groundwater was adjusted upward to the practical quantitation limit (PQL). The PQL is equal to 10 times the method detection limit (MDL).

# TABLE 7
## CONSTITUENTS DETECTED IN GROUNDWATER AT CONCENTRATIONS GREATER THAN THE CLEANUP LEVELS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B-1 MK66I 2/27/2008 | B-2 MK66M 2/27/2008 | B-3 MK66J 2/27/2008 | B-6 MK66K 2/27/2008 | B-7 MK66L 2/27/2008 | B-8 MK82I 2/28/2008 | B-9 MK82J 2/28/2008 | B-10 MK82K 2/28/2008 | B-11 MK82L 2/28/2008 | B-12 MK82M 2/28/2008 | B-14 MK82N 2/28/2008 | B-18 ML02H 2/29/2008 | B-19 ML02I 2/29/2008 | B-38 NT85G 10/9/2008 | B-41 NT85C 10/9/2008 | MW-1 OB80A 11/25/08 | MW-1 PK34B 08/12/09 | MW-2 OB80B 11/25/08 | MW-2 PK34A 08/12/09 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-DxSG (mg/L)** | | | | | | | | | | | | | | | | | | | | |
| Diesel Range Organics | 0.5 | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | **310** | **3.6** | 0.25 U | 0.25 U | 0.25 U | 0.25 U |
| Motor Oil | 0.5 | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | **150** | 2.5 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U |
| **NWTPH-GX (mg/L)** | | | | | | | | | | | | | | | | | | | | |
| Gasoline | 0.8 | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | **1.3** | 0.25 U | | | 0.25 U | 0.25 U | 0.25 U | 0.25 U |
| **BTEX (µg/L)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | | |
| Benzene | 0.8 | | | | | | | | | | | | | | | | | 1.0 U | | 1.0 U |
| **PAHs (µg/L)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 160 | 1.0 U | **43** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | **3.1** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | **5.6** | **0.13** | **7.8** | 0.10 U |
| 2-Methylnaphthalene | 32 | 1.0 U | **5.1** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | **0.61** | 0.10 U | **0.85** | 0.10 U |
| Benzo(a)pyrene | 0.012 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | 0.12 U | 0.10 U | 0.12 U | 0.10 U |
| TEQ | 0.012 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | | | ND | ND | ND | ND |
| **DISSOLVED METALS (µg/L)** | | | | | | | | | | | | | | | | | | | | |
| **Method 200.8/6010B/7470A** | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 5/21.3 (b) | **29** | **12** | **20** | **4** | **40** | **3** | **25** | **2** | 10 U | 1 U | **4** | **3** | **1** | | | **7** | **2.4** | **3** | **1.2** |
| Lead | 8.1 | 1 U | 1 U | **26** | 1 U | 1 U | **1** | 1 U | 1 U | 1 U | 1 U | **2** | 1 U | 1 U | | | 1 U | 1 U | 1 U | 1 U |
| **VOLATILES (µg/L)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8260B** | | | | | | | | | | | | | | | | | | | | |
| Benzene | 0.8 | 0.2 U | **5.3** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.4** | 0.2 U | | | 0.2 U | | 0.2 U | |
| Ethylbenzene | 275 | 0.2 U | **5.9** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.2** | 0.2 U | | | 0.2 U | | 0.2 U | |
| Naphthalene | 160 | 0.5 U | **68** | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | **6.5** | 0.5 U | 0.5 U | 0.5 U | 0.5 U | | | 0.5 U | | 0.5 U | |

# TABLE 7
## CONSTITUENTS DETECTED IN GROUNDWATER AT CONCENTRATIONS GREATER THAN THE CLEANUP LEVELS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-3 OB80C 11/24/08 | MW-3 PK44A 08/13/09 | MW-4 OB80D 11/24/08 | MW-4 PK34C 08/12/09 | MW-5 OB80E 11/24/08 | MW-5 PK15A 08/11/09 | MW-5 QL46A 02/24/10 | MW-5 QU14A 4/22/2010 | MW-6 OB80F 11/25/08 | MW-6 PK34D 08/12/09 | MW-6 QU14C 4/22/2010 | MW-7D OB80G 11/24/08 | MW-7D PK34F 08/12/09 | MW-7D QU14E 4/22/2010 | MW-7S OB80H 11/24/08 | MW-7S PK34E 08/12/09 | MW-8 OB80I 11/25/08 | MW-8 PK15B 08/11/09 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-DxSG (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Organics | 0.5 | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | | | | 0.25 U | 0.25 U | | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | |
| Motor Oil | 0.5 | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | | | | 0.50 U | 0.50 U | | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | |
| **NWTPH-GX (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 0.8 | **0.37** | **0.28** | 0.25 U | 0.25 U | 0.25 U | 0.25 U | | | 0.25 U | 0.25 U | | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U |
| **BTEX (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 0.8 | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | 1.0 U | | 1.0 U | | 1.0 U |
| **PAHs (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 160 | **9.3** | 0.10 U | **4.4** | **0.29** | **1.7** | 0.10 U | | | **1.1** | **0.32** | | **0.58** | **1.9** | **2.3** | **0.40** | **0.73** | **4.0** | 0.10 U |
| 2-Methylnaphthalene | 32 | **1.1** | 0.10 U | **0.45** | 0.10 U | **0.18** | 0.10 U | | | **0.13** | 0.10 U | | 0.10 U | **0.39** | **0.52** | 0.10 U | **0.19** | **0.47** | 0.10 U |
| Benzo(a)pyrene | 0.012 | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| TEQ | 0.012 | ND | ND | ND | ND | ND | ND | | | ND | ND | | ND | ND | ND | ND | ND | ND | ND |
| **DISSOLVED METALS (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method 200.8/6010B/7470A** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 5/21.3 (b) | **5** | **1.3** | **6** | **4.6** | 58 | **17** | 26 | 33 | **6** | **1.2** | **1.7** | **4** | **2.0** | | **7** | **3.9** | **7** | **2.0** |
| Lead | 8.1 | 2 U | 1 U | 2 U | 1 U | 1 U | 1 U | | | 1 U | 1 U | | 1 U | 1 U | | 1 U | 1 U | 1 U | 1 U |
| **VOLATILES (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8260B** | | | | | | | | | | | | | | | | | | | |
| Benzene | 0.8 | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | | 0.2 U | | **0.4** | |
| Ethylbenzene | 275 | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | | 0.2 U | | **0.4** | |
| Naphthalene | 160 | 0.5 U | | 0.5 U | | 0.5 U | | | | 0.5 U | | | 0.5 U | | | 0.5 U | | 0.5 U | |

# TABLE 7
## CONSTITUENTS DETECTED IN GROUNDWATER AT CONCENTRATIONS GREATER THAN THE CLEANUP LEVELS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-88 PK15C 08/11/09 | MW-9D OB80J 11/25/08 | MW-9D PK34G 08/12/09 | MW-9D QL46C 02/24/10 | MW-9D QU14F 4/22/2010 | MW-9S OB80K 11/25/08 | MW-9S PK34H 08/12/09 | MW-9S QL46D 2/24/2010 | MW-10 PK44B 8/13/2009 | MW-11 PK44C 8/13/2009 | MW-12 PK44D 8/13/2009 | MW-13 PK44E 8/13/2009 | MW-14 PK44F 8/13/2009 | MW-15D PK44G 8/13/2009 | MW-15D QL46B 2/24/2010 | MW-15D QU14B 4/22/2010 | MW-16D PK34I 08/12/09 | MW-16D QU14D 4/22/2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-DxSG (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Organics | 0.5 | | **2.0** | **0.77** | **1.1** | **0.62** | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | | | 0.25 U | 0.25 U |
| Motor Oil | 0.5 | | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | | | 0.50 U | 0.50 U |
| **NWTPH-GX (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 0.8 | **0.25** | **9.7** | **2.2** | **2.9** | **2.7** | **0.54** | 0.25 U | 0.25 U | 0.25 U | 0.25 U | **0.30** | 0.25 U | 0.25 U | 0.25 U | | | 0.25 U | 0.25 U |
| **BTEX (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 0.8 | 1.0 U | | **13** | **16** | **13** | | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | 1.0 U | 1.0 U |
| **PAHs (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 160 | 0.10 U | **4,800** | **880** | | **1,600** | **16** | **0.99** | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **1.8** | | | **0.28** | **1.1** |
| 2-Methylnaphthalene | 32 | 0.10 U | **660** | **230** | | **430** | **1.9** | **0.23** | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **0.23** | | | 0.10 U | **0.26** |
| Benzo(a)pyrene | 0.012 | 0.10 U | **5.5** | **0.15** | | 0.11 U | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | | | 0.10 U | 0.12 U |
| TEQ | 0.012 | ND | **7.0** | **0.21** | | **0.026** | ND | ND | | ND | ND | ND | ND | ND | ND | | | ND | ND |
| **DISSOLVED METALS (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method 200.8/6010B/7470A** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 5/21.3 (b) | **1.8** | **8** | **3.8** | | | **6** | **5.0** | | **4.9** | **2.6** | **1.8** | **2.2** | **2.5** | **16.8** | 0.50 U | **14** | **7.2** | **2.1** |
| Lead | 8.1 | 1 U | 1 U | 1 U | | | 1 U | 1 U | | 1 U | **2** | **1** | 1 U | **1** | 1 U | | | 1 U | |
| **VOLATILES (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8260B** | | | | | | | | | | | | | | | | | | | |
| Benzene | 0.8 | | **120** | | | | 0.2 U | | | | | | | | | | | | |
| Ethylbenzene | 275 | | **370** | | | | 0.2 U | | | | | | | | | | | | |
| Naphthalene | 160 | | **7,400** | | | | **0.6** | | | | | | | | | | | | |

# TABLE 7
## CONSTITUENTS DETECTED IN GROUNDWATER AT CONCENTRATIONS GREATER THAN THE CLEANUP LEVELS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-17D PK34J 08/12/09 | MW-17D QL46E 02/24/10 | MW-17D QU14G 4/22/2010 | MW-18D QU14H 4/22/2010 |
|---|---|---|---|---|---|
| **NWTPH-DxSG (mg/L)** | | | | | |
| Diesel Range Organics | 0.5 | 0.25 U | | | 0.25 U |
| Motor Oil | 0.5 | 0.50 U | | | 0.50 U |
| **NWTPH-GX (mg/L)** | | | | | |
| Gasoline | 0.8 | 0.25 U | | | **0.26** |
| **BTEX (µg/L)** | | | | | |
| **Method SW8021BMod** | | | | | |
| Benzene | 0.8 | 1.0 U | | | 1.0 U |
| **PAHs (µg/L)** | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | |
| Naphthalene | 160 | **8.3** | | | **1.2** |
| 2-Methylnaphthalene | 32 | **3.1** | | | **0.30** |
| Benzo(a)pyrene | 0.012 | 0.10 U | | | 0.11 U |
| TEQ | 0.012 | **0.02** | | | ND |
| **DISSOLVED METALS (µg/L)** | | | | | |
| **Method 200.8/6010B/7470A** | | | | | |
| Arsenic | 5/21.3 (b) | **13.5** | **6.6** | **9.3** | **1.6** |
| Lead | 8.1 | 1 U | | | |
| **VOLATILES (µg/L)** | | | | | |
| **Method SW8260B** | | | | | |
| Benzene | 0.8 | | | | |
| Ethylbenzene | 275 | | | | |
| Naphthalene | 160 | | | | |

Notes:

U = Indicates the compound was undetected at the reported concentration
E = The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate
ND = Not detected.
Bold = Detected compound.
Box = Exceedance of cleanup level.
mg/L = Milligrams per liter.
µg/L = Micrograms per liter.
Data for groundwater grab samples from borings (samples B-1 through B-38) are not considered representative of groundwater conditions, and are only used for screening purposes
(a) See Table 6 for criteria used to develop cleanup levels.
(b) Cleanup level of 21.3 will be used for the eastern portion of the Property due to the influence of upgradient, off-Property sources (i.e., wells MW-1, MW-5, MW-6, MW-7S, MW-7D, MW-9S, MW-9D, MW-15D, MW-16D, MW-17D, and MW-18D)

# TABLE 8
# REMEDIAL ACTION ALTERNATIVE 1 DETAILED COST ESTIMATE
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

**REMEDIAL ALTERNATIVE 1 - CONTAINMENT INCLUDING VAPOR BARRIEF**

| ITEM | QUANTITY | UNIT | UNIT COST | TOTAL | NOTES/COMMENTS |
|---|---|---|---|---|---|
| **Work Plans and Regulatory Review** | | | | | |
| Meetings and Negotiations with Ecology | 1 | LS | $ 5,000 | $ 5,000 | For this alternative, the level of effort for this element is anticipated to be less than for the other alternatives. |
| Preparation of Work Plans | 1 | LS | $ 20,000 | $ 20,000 | Includes SAP, Containment Work Plan, HASP. |
| Vapor Intrusion Design/Plan | 1 | LS | $ 10,000 | $ 10,000 | |
| Development of Institutional Controls | 1 | LS | $ 5,000 | $ 5,000 | |
| Project Management | 8% | pcnt | $ 40,000 | $ 3,200 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 5,000 | $ 5,000 | |
| *Task Subtotal* | | | | *$ 48,200* | |
| **Site Development Contaminant and Excavation Management** | | | | | |
| Field Work and Oversight | 15 | day | $ 1,000 | $ 15,000 | Oversight and verification of vapor barrier installation. |
| Contractor Mobilization | 1 | LS | $ 10,000 | $ 10,000 | |
| Excavate and Load Construction Prep Soil | 16510 | CY | $ 18 | $ 297,180 | Assume approximately 16,510 CY of soil removed for Property-wide development preparation, including Property-wide excavation to 1.5 ft BGS and excavation of pile caps, elevator pits, and grade beams. |
| Hauling of Soil | 24765 | tons | $ 5.00 | $ 123,825 | Assume 1.5 tons/CY. Estimated based on hauling soil to Alaska Street Transfer Station ($125/hr x 1 hr/trip / 25 tons/trip). |
| Disposal of Soil | 24765 | tons | $ 45.00 | $ 1,114,425 | Unit Cost for disposal at Alaska Street Transfer Station. |
| Vapor Intrusion Barrier | 86400 | sf | $ 3.50 | $ 302,400 | Assume footprints of proposed buildings west of Center Drive Lane (approx. 360'x240'=86,400 sq. ft.) will require vapor barrier. Product such as Geo-Seal or Liquid Boot will be used. Cost varies depending on site conditions, project complexity, and other factors, but less complex sites average $2.50 to $3.50 per square foot, while more complex sites average $3.50 to $5.00 per square foot. |
| Perimeter or Sub-Slab Depressurization System Design, Installation, and Operation | 1 | LS | $ 100,000 | $ 100,000 | Would require integration into site development design. Include minor operation and maintenance cost for 30 years. |
| Project Management | 8% | pcnt | $ 1,962,830 | $ 157,000 | |
| *Task Subtotal* | | | | *$ 2,119,830* | |
| **Construction Report** | | | | | |
| Meetings and Coordination with Ecology | 1 | LS | $ 5,000 | $ 5,000 | |
| Final Report Preparation | 1 | LS | $ 10,000 | $ 10,000 | |
| Project Management | 8% | pcnt | $ 15,000 | $ 1,200 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 3,000 | $ 3,000 | |
| *Task Subtotal* | | | | *$ 19,200* | |
| **Long-Term Cap Maintenance and Groundwater/Soil Vapor Monitoring** | | | | | Assume 30 years of cap maintenance and groundwater and soil vapor monitoring. |
| | Discount Rate | | 3% * | | * The 3% discount rate represents an average return on investment of 6% minus an assumed inflation rate of 3%. |
| Cap Monitoring and Maintenance | 30 | yr | $ 1,000 | $ 20,000 | |
| Groundwater Sampling/Analysis (annually for 30 yrs) | 30 | yr | $ 8,500 | $ 167,000 | Assume 30-year monitoring schedule. |
| Prepare Groundwater Monitoring Work Plan/Schedule | 1 | LS | $ 8,000 | $ 8,000 | |
| Groundwater Treatment Contingency | 1 | LS | $ 650,000 | $ 650,000 | Assumes pump and treat groundwater granular activated carbon treatment system with treated groundwater disposed of to sanitary sewer, assumes 30 years of operation, maintenance, sampling, and permit compliance for groundwater treatment at 3% discount rate, contingent on the need for groundwater treatment based on the compliance monitoring results. |
| Reporting and Project Management | 30 | yrs | $ 7,500 | $ 147,000 | |
| *Task Subtotal* | | | | *$ 992,000* | |
| | | | **TOTAL** | **$ 3,179,000** | Cost rounded to nearest $1,000. |
| **Engineering Estimate Range** | | | ***-30%*** | ***$ 2,225,000*** | |
| | | | ***50%*** | ***$ 4,769,000*** | |

# TABLE 9
## REMEDIAL ACTION ALTERNATIVE 2 DETAILED COST ESTIMATE
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTION

**REMEDIAL ALTERNATIVE 2 - HOTSPOT EXCAVATION AND CONTAINMENT**

| ITEM | QUANTITY | UNIT | UNIT COST | TOTAL | NOTES/COMMENTS |
|---|---|---|---|---|---|
| **Work Plans and Regulatory Review** | | | | | |
| Negotiations with Ecology | 1 | LS | $ 10,000 | $ 10,000 | |
| Preparation of Work Plans | 1 | LS | $ 20,000 | $ 20,000 | Includes SAP, Removal Action Work Plan, HASP. |
| Develop Institutional Controls | 1 | LS | $ 5,000 | $ 5,000 | |
| Health and Safety Plan | 1 | LS | $ 5,000 | $ 5,000 | Plan for the protection of construction worker safety against exposure to impacted media. |
| Project Management | 8% | pcnt | $ 40,000 | $ 3,200 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 5,000 | $ 5,000 | |
| *Task Subtotal* | | | | *$ 48,200* | |
| **Construction Oversight** | | | | | Including fencing, cleanup, flagging, security, and safety. |
| General Conditions | 1 | LS | $ 10,000 | $ 10,000 | |
| Clearing/Grading Plan (Construction Drawings) | 1 | LS | $ 10,000 | $ 10,000 | Assume simple specifications in memo or letter format (not complete technical specifications). |
| Construction Specs and Bid Documents | 1 | LS | $ 7,500 | $ 7,500 | |
| Field Work and Oversight | 10 | day | $ 1,000 | $ 10,000 | Assume TPH/BTEX sampling only. |
| Confirmation Sampling Analysis | 10 | sample | $ 160 | $ 1,600 | |
| Compaction Testing for Backfill | 1 | LS | $ 5,000 | $ 5,000 | |
| Data Validation and Analysis | 1 | LS | $ 2,500 | $ 2,500 | |
| Project Management | 8% | pcnt | $ 36,600 | $ 2,900 | |
| *Task Subtotal* | | | | *$ 49,500* | |
| **Site Development Excavation Management** | | | | | |
| Excavate and Load Construction Prep Soil | 16510 | CY | $ 18 | $ 297,180 | Assume approximately 16,510 CY of soil removed for Property-wide development preparation, including Property-wide excavation to 1.5 ft BGS and excavation of pile caps, elevator pits, and grade beams. |
| Hauling of Soil | 24765 | tons | $ 5.00 | $ 123,825 | Assume 1.5 tons/CY. Estimated based on hauling soil to Alaska Street Transfer Station ($125/hr x 1 hr/trip / 25 tons/trip). |
| Disposal of Soil | 24765 | tons | $ 45.00 | $ 1,114,425 | Unit Cost for disposal at Alaska Street Transfer Station. |
| Project Management | 8% | pcnt | $ 1,535,430 | $ 122,800 | |
| *Task Subtotal* | | | | *$ 1,658,230* | |
| **Remedial Excavation/Construction/Site Restoration** | | | | | Assume 3,000 square ft excavation around B-26, B-17, to 8 ft deep (does not include volume of soil to be removed as part of planned development activities, approx 200 CY) |
| Contractor Mobilization | 1 | LS | $ 10,000 | $ 10,000 | |
| Excavate and Load Impacted Soil in NW corner of property | 720 | CY | $ 18 | $ 13,000 | Assume 3,000 square ft excavation around B-26, B-17, an additional 6.5 ft deep beyond 1.5 ft removed Property-wide (does not include volume of soil to be removed as part of planned development activities, approx 180 CY) |
| Hauling of Soil | 1080 | tons | $ 5 | $ 5,400 | Unit Cost for disposal at Alaska Street Transfer Station. |
| Disposal of Soil | 1080 | tons | $ 45 | $ 48,600 | |
| Import, Place, and Compact Clean Fill | 1080 | tons | $ 27 | $ 29,200 | |
| Dewatering and Groundwater Management | 0 | LS | $ 20,000 | $ - | Assume no wastewater pumping and management is necessary during remedial excavation. |
| Shoring | 1 | LS | $ 30,000 | $ 30,000 | Shoring required at property boundary during construction to protect off-property features |
| Vapor Intrusion Barrier | 0 | sf | $ 3.00 | $ - | Assume vapor intrusion barrier not necessary after soil removal. |
| *Task Subtotal* | | | | *$ 136,200* | |
| **Construction Report** | | | | | |
| Meetings and Coordination with Ecology | 1 | LS | $ 5,000 | $ 5,000 | |
| Final Report Preparation | 1 | LS | $ 10,000 | $ 10,000 | Assume 8% of task cost. |
| Project Management | 8% | pcnt | $ 15,000 | $ 1,000 | |
| Ecology Oversight | 1 | LS | $ 2,000 | $ 2,000 | |
| *Task Subtotal* | | | | *$ 18,000* | |
| **Long-Term Cap Maintenance and Groundwater Monitoring** | | | | | Assume 30 years of cap maintenance and groundwater monitoring (soil vapor not required after excavation). |
| | Discount Rate | | 3% * | | * The 3% discount rate represents an average return on investment of 6% minus an assumed inflation rate of 3%. |
| Cap Monitoring and Maintenance | 30 | yr | $ 1,000 | $ 20,000 | |
| Groundwater Sampling/Analysis (annually for 30 yrs) | 30 | yr | $ 8,500 | $ 167,000 | Assume 30-year monitoring schedule. |
| Prepare Groundwater Monitoring Work Plan/Schedule | 1 | LS | $ 8,000 | $ 8,000 | |
| Groundwater Treatment Contingency | 1 | LS | $ 650,000 | $ 650,000 | Assumes pump and treat groundwater granular activated carbon treatment system with treated groundwater disposed of to sanitary sewer, assumes 30 years of operation, maintenance, sampling, and permit compliance for groundwater treatment at 3% discount rate, contingent on the need for groundwater treatment based on the compliance monitoring results. |
| Reporting and Project Management | 30 | yrs | $ 7,500 | $ 147,000 | |
| *Task Subtotal* | | | | *$ 992,000* | |
| | | | **TOTAL** | **$ 2,902,000** | Cost rounded to nearest $1,000. |
| **Engineering Estimate Range** | | | ***-30%*** | ***$ 2,031,000*** | |
| | | | ***50%*** | ***$ 4,353,000*** | |

**TABLE 10**
**REMEDIAL ACTION ALTERNATIVE 3 DETAILED COST ESTIMATE**
**NORTH LOT DEVELOPMENT**
**SEATTLE, WASHINGTON**

**REMEDIAL ALTERNATIVE 3 - HOT SPOT EXCAVATION, FOCUSED TREATMENT OF RESIDUAL GASOLINE/BENZENE, CONTAINMENT, AND ADDED MEASURES TO PREVENT CONTACT WITH SHALLOW CONTAMINATED SOIL OUTSIDE THE FOOTPRINT OF THE BUILDING FOUNDATIONS**

| ITEM | QUANTITY | UNIT | UNIT COST | TOTAL | NOTES/COMMENTS |
|---|---|---|---|---|---|
| **Work Plans and Regulatory Review** | | | | | |
| Negotiations with Ecology | 1 | LS | $ 10,000 | $ 10,000 | |
| Preparation of Work Plans | 1 | LS | $ 25,000 | $ 30,000 | Includes SAP, Removal Action, and Bioremediation Work Plan, HASP. |
| Develop Institutional Controls | 1 | LS | $ 5,000 | $ 5,000 | |
| Health and Safety Plan | 1 | LS | $ 5,000 | $ 5,000 | Plan for the protection of construction worker safety against exposure to impacted media. |
| Project Management | 8% | pcnt | $ 50,000 | $ 4,000 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 5,000 | $ 5,000 | |
| *Task Subtotal* | | | | *$ 59,000* | |
| **Construction Oversight** | | | | | |
| General Conditions | 1 | LS | $ 12,000 | $ 14,000 | Including fencing, cleanup, flagging, security, and safety. |
| Clearing/Grading Plan (Construction Drawings) | 1 | LS | $ 10,000 | $ 10,000 | |
| Construction Specs and Bid Documents | 1 | LS | $ 7,500 | $ 7,500 | Assume simple specifications in memo or letter format (not complete technical specifications). |
| Field Work and Oversight | 20 | day | $ 1,000 | $ 20,000 | |
| Confirmation Sampling Analysis | 10 | sample | $ 160 | $ 1,600 | Assume TPH/BTEX sampling only. |
| Compaction Testing for Backfill | 1 | LS | $ 5,000 | $ 5,000 | |
| Data Validation and Analysis | 1 | LS | $ 2,500 | $ 2,500 | |
| Project Management | 8% | pcnt | $ 46,600 | $ 3,700 | |
| *Task Subtotal* | | | | *$ 64,300* | |
| **Site Development Excavation Management** | | | | | |
| Excavate and Load Construction Prep Soil | 16510 | CY | $ 18 | $ 297,180 | Assume approximately 16,510 CY of soil removed for Property-wide development preparation, including Property-wide excavation to 1.5 ft BGS and excavation of pile caps, elevator pits, and grade beams. |
| Hauling of Soil | 24765 | tons | $ 5.00 | $ 123,825 | Assume 1.5 tons/CY. Estimated based on hauling soil to Alaska Street Transfer Station ($125/hr x 1 hr/trip / 25 tons/trip). |
| Disposal of Soil | 24765 | tons | $ 45.00 | $ 1,114,425 | Unit Cost for disposal at Alaska Street Transfer Station. |
| Project Management | 8% | pcnt | $ 1,535,430 | $ 122,800 | |
| *Task Subtotal* | | | | *$ 1,658,230* | |
| **Remedial Excavation/Bioremediation/Construction/Site Restoration** | | | | | |
| Contractor Mobilization | 1 | LS | $ 10,000 | $ 10,000 | |
| Excavate and Load Impacted Soil Outside the Building Footprints within the Property Boundary | 5210 | CY | $ 18 | $ 93,800 | Assumes excavation of soil outside the building foundations within the property boundary from 1.5 ft to 5 ft BGS |
| Excavate and Load Impacted Soil in NW corner of property | 720 | CY | $ 18 | $ 13,000 | Assume 3,000 square ft excavation around B-26, B-17, an additional 6.5 ft deep beyond 1.5 ft removed Property-wide (does not include volume of soil to be removed as part of planned development activities, approx 180 CY) |
| Hauling of Soil | 8895 | tons | $ 5 | $ 44,475 | Assume 1.5 tons/cy. Include volume of soil to be removed outside of buidling footprints but within property boundary and volume of soil to be removed in NW corner of property. Estimated based on hauling soil to Alaska Street Transfer Station ($125/hr x 1 hr/trip / 25 tons/trip). |
| Disposal of Soil | 8895 | tons | $ 45 | $ 400,275 | Unit Cost for disposal at Alaska Street Transfer Station. |
| Import, Place, and Compact Clean Fill | 8895 | tons | $ 29 | $ 257,955 | Includes additional $2 per ton to place and mix bioremediation substrate in excavation prior to backfill and compaction. |
| Dewatering and Groundwater Management | 0 | LS | $ 20,000 | $ - | Assume no wastewater pumping and management is necessary during remedial excavation. |
| Shoring | 1 | LS | $ 30,000 | $ 30,000 | Shoring required at property boundary during construction to protect off-property features |
| Geomembrane | 40190 | SF | $ 3 | $ 120,570 | Assumes geomembrane placed in excavation areas located outside of the buidling footprint within the property boundary |
| Vapor Intrusion Barrier | 0 | sf | $ 3.00 | $ - | Assume vapor intrusion barrier not necessary after soil removal. |
| Evaluation of Site Redox Conditions | 1 | LS | $ 8,000 | $ 8,000 | Includes additional sample collection and analysis to determine redox state of soil and groundwater in excavation vicinity. |
| Bioremediation Substrate | 7000 | pounds | $ 10 | $ 70,000 | Assume aerobic conditions and application of ORC to area of excavated soil in the NW corner of the property prior to backfilling with soil, cost will be less for anaerobic conditions. |
| *Task Subtotal* | | | | *$ 1,048,075* | |
| **Construction Report** | | | | | |
| Meetings and Coordination with Ecology | 1 | LS | $ 5,000 | $ 5,000 | |
| Final Report Preparation | 1 | LS | $ 10,000 | $ 10,000 | |
| Project Management | 8% | pcnt | $ 15,000 | $ 1,000 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 2,000 | $ 2,000 | |
| *Task Subtotal* | | | | *$ 18,000* | |
| **Long-Term Cap Maintenance and Groundwater Monitoring** | | | | | Assume 30 years of cap maintenance and groundwater monitoring (soil vapor not required after excavation). |
| | Discount Rate | | 3% * | | * The 3% discount rate represents an average return on investment of 6% minus an assumed inflation rate of 3%. |
| Cap Monitoring and Maintenance | 30 | yr | $ 1,000 | $ 20,000 | |
| Groundwater Sampling/Analysis (annually for 30 yrs) | 30 | yr | $ 8,500 | $ 167,000 | Assume 30-year monitoring schedule. |
| Prepare Groundwater Monitoring Work Plan/Schedule | 1 | LS | $ 8,000 | $ 8,000 | |
| Groundwater Treatment Contingency | 1 | LS | $ 650,000 | $ 650,000 | Assumes pump and treat groundwater granular activated carbon treatment system with treated groundwater disposed of to sanitary sewer, assumes 30 years of operation, maintenance, sampling, and permit compliance for groundwater treatment at 3% discount rate, contingent on the need for groundwater treatment based on the compliance monitoring results. |
| Reporting and Project Management | 30 | yrs | $ 7,500 | $ 147,000 | |
| *Task Subtotal* | | | | *$ 992,000* | |
| | | | **TOTAL** | **$ 3,840,000** | Cost rounded to nearest $1,000. |
| **Engineering Estimate Range** | | | ***-30%*** | ***$ 2,688,000*** | |
| | | | ***50%*** | ***$ 5,760,000*** | |

# TABLE 11
# REMEDIAL ACTION ALTERNATIVE 4 DETAILED COST ESTIMATE
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

**REMEDIAL ALTERNATIVE 4 - HOTSPOT EXCAVATION, EXCAVATION TO 5FT BGS BEYOND BUILDING FOOTPRINTS, FOCUSED TREATMENT OF RESIDUAL GASOLINE/BENZENE, FOCUSED TREATMENT OF CREOSOTE AREA, AND CONTAINMENT**

| ITEM | QUANTITY | UNIT | UNIT COST | TOTAL | NOTES/COMMENTS |
|---|---|---|---|---|---|
| **Work Plans and Regulatory Review** | | | | | |
| Negotiations with Ecology | 1 | LS | $ 10,000 | $ 10,000 | |
| Preparation of Work Plans | 1 | LS | $ 30,000 | $ 30,000 | Includes SAP, Removal Action, Bioremediation, and Stabilization Work Plan, HASP. |
| Develop Institutional Controls | 1 | LS | $ 5,000 | $ 5,000 | |
| Health and Safety Plan | 1 | LS | $ 5,000 | $ 5,000 | Plan for the protection of construction worker safety against exposure to impacted media. |
| Project Management | 8% | pcnt | $ 50,000 | $ 4,000 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 5,000 | $ 5,000 | |
| *Task Subtotal* | | | | *$ 59,000* | |
| **Construction Oversight** | | | | | |
| General Conditions | 1 | LS | $ 14,000 | $ 14,000 | Including cleanup, flagging, security, and safety. |
| Clearing/Grading Plan (Construction Drawings) | 1 | LS | $ 10,000 | $ 10,000 | |
| Construction Specs and Bid Documents | 1 | LS | $ 7,500 | $ 7,500 | Assume simple specifications in memo or letter format (not complete technical specifications). |
| Field Work and Oversight | 20 | day | $ 1,000 | $ 20,000 | |
| Confirmation Sampling Analysis | 10 | sample | $ 160 | $ 1,600 | Assume TPH/BTEX sampling only. |
| Compaction Testing for Backfill | 1 | LS | $ 5,000 | $ 5,000 | |
| Data Validation and Analysis | 1 | LS | $ 2,500 | $ 2,500 | |
| Project Management | 8% | pcnt | $ 46,600 | $ 3,700 | |
| *Task Subtotal* | | | | *$ 64,300* | |
| **Site Development Excavation Management** | | | | | |
| Excavate and Load Construction Prep Soil | 16510 | CY | $ 18 | $ 297,180 | Assume approximately 16,510 CY of soil removed for Property-wide development preparation, including Property-wide excavation to 1.5 ft BGS and excavation of pile caps, elevator pits, and grade beams. |
| Hauling of Soil | 24765 | tons | $ 5.00 | $ 123,825 | Assume 1.5 tons/CY. Estimated based on hauling soil to Alaska Street Transfer Station ($125/hr x 1 hr/trip / 25 tons/trip). |
| Disposal of Soil | 24765 | tons | $ 45.00 | $ 1,114,425 | Unit Cost for disposal at Alaska Street Transfer Station. |
| Project Management | 8% | pcnt | $ 1,535,430 | $ 122,800 | |
| *Task Subtotal* | | | | *$ 1,658,230* | |
| **Remedial Excavation/Bioremediation/Construction/Site Restoration** | | | | | |
| Contractor Mobilization | 1 | LS | $ 12,000 | $ 12,000 | |
| Excavate and Load Impacted Soil in NW corner of property | 720 | CY | $ 18 | $ 13,000 | Assume 3,000 square ft excavation around B-26, B-17, an additional 6.5 ft deep beyond 1.5 ft removed Property-wide (does not include volume of soil to be removed as part of planned development activities, approx 180 CY) |
| Hauling of Soil | 1080 | tons | $ 5 | $ 5,400 | Assume 1.5 tons/CY. Estimated based on hauling soil to Alaska Street Transfer Station ($125/hr x 1 hr/trip / 25 tons/trip). |
| Disposal of Soil | 1080 | tons | $ 45 | $ 48,600 | Unit Cost for disposal at Alaska Street Transfer Station . |
| Import, Place, and Compact Clean Fill | 1080 | tons | $ 29 | $ 31,320 | Includes additional $2 per ton to place and mix bioremediation substrate in excavation prior to backfill and compaction. |
| Dewatering and Groundwater Management | 0 | LS | $ 20,000 | $ - | Assume no wastewater pumping and management is necessary during remedial excavation. |
| Shoring | 1 | LS | $ 30,000 | $ 30,000 | Shoring required at property boundary during construction to protect off-property features |
| Vapor Intrusion Barrier | 0 | sf | $ 3.00 | $ - | Assume vapor intrusion barrier not necessary after soil removal. |
| Evaluation of Site Redox Conditions | 1 | LS | $ 8,000 | $ 8,000 | Includes additional sample collection and analysis to determine redox state of soil and groundwater in excavation vicinity. |
| Bioremediation Substrate | 7000 | pounds | $ 10 | $ 70,000 | Assume aerobic conditions and application of ORC to area of excavated soil in the NW corner of the property prior to backfilling with soil, cost will be less for anaerobic conditions. |
| Soil Auger Mixing with Cement Grout | 6010 | CY | $ 100 | $ 601,000 | Assume to treat to depth of 18.5' following 1.5 ft property-wide excavation in area 8,775 sf (45'x195'); about 6,010 CY. Cost will vary from $80 to $120 per cubic yard, cost includes driller costs, large diameter auger, concrete slurry. |
| Stabilization/Cementation Performance Sampling | 1 | LS | $ 3,000 | $ 3,000 | |
| *Task Subtotal* | | | | *$ 822,320* | |
| **Construction Report** | | | | | |
| Meetings and Coordination with Ecology | 1 | LS | $ 5,000 | $ 5,000 | |
| Final Report Preparation | 1 | LS | $ 10,000 | $ 10,000 | |
| Project Management | 8% | pcnt | $ 15,000 | $ 1,000 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 2,000 | $ 2,000 | |
| *Task Subtotal* | | | | *$ 18,000* | |
| **Long-Term Cap Maintenance and Groundwater Monitoring** | | | | | Assume 30 years of cap maintenance and groundwater monitoring (soil vapor not required after excavation). |
| | Discount Rate | | 3% * | | * The 3% discount rate represents an average return on investment of 6% minus an assumed inflation rate of 3%. |
| Cap Monitoring and Maintenance | 30 | yr | $ 1,000 | $ 20,000 | |
| Groundwater Sampling/Analysis (annually for 30 yrs) | 30 | yr | $ 8,500 | $ 167,000 | |
| Prepare Groundwater Monitoring Work Plan/Schedule | 1 | LS | $ 8,000 | $ 8,000 | Assume monitoring schedule. |
| Groundwater Treatment Contingency | 1 | LS | $ 650,000 | $ 650,000 | Assumes pump and treat groundwater granular activated carbon treatment system with treated groundwater disposed of to sanitary sewer, assumes 30 years of operation, maintenance, sampling, and permit compliance for groundwater treatment at 3% discount rate, contingent on the need for groundwater treatment based on the compliance monitoring results. |
| Reporting and Project Management | 30 | yrs | $ 7,500 | $ 147,000 | |
| *Task Subtotal* | | | | *$ 992,000* | |
| | | | **TOTAL** | **$ 3,614,000** | Cost rounded to nearest $1,000. |
| **Engineering Estimate Range** | | | ***-30%*** | ***$ 2,530,000*** | |
| | | | ***50%*** | ***$ 5,421,000*** | |

**TABLE 12**
**REMEDIAL ACTION ALTERNATIVE 5 DETAILED COST ESTIMATE**
**NORTH LOT DEVELOPMENT**
**SEATTLE, WASHINGTON**

**REMEDIAL ALTERNATIVE 5 - HOT SPOT EXCAVATION, FOCUSED TREATMENT OF RESIDUAL GASOLINE/BENZENE, EXCAVATION OF FILL MATERIAL ACROSS THE PROPERTY BOUNDARY TO 5 FT BGS, AND CONTAINMEN**

| ITEM | QUANTITY | UNIT | UNIT COST | TOTAL | NOTES/COMMENTS |
|---|---|---|---|---|---|
| **Work Plans and Regulatory Review** | | | | | |
| Negotiations with Ecology | 1 | LS | $ 10,000 | $ 10,000 | |
| Preparation of Work Plans | 1 | LS | $ 25,000 | $ 25,000 | Includes SAP, Removal Action, and Bioremediation Work Plan, HASP |
| Develop Institutional Controls | 1 | LS | $ 5,000 | $ 5,000 | |
| Health and Safety Plan | 1 | LS | $ 5,000 | $ 5,000 | Plan for the protection of construction worker safety against exposure to impacted media. |
| Project Management | 8% | pcnt | $ 45,000 | $ 3,600 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 5,000 | $ 5,000 | |
| *Task Subtotal* | | | | *$ 53,600* | |
| **Construction Oversight** | | | | | |
| General Conditions | 1 | LS | $ 12,000 | $ 12,000 | Including fencing, cleanup, flagging, security, and safety. |
| Clearing/Grading Plan (Construction Drawings) | 1 | LS | $ 10,000 | $ 10,000 | |
| Construction Specs and Bid Documents | 1 | LS | $ 7,500 | $ 7,500 | Assume simple specifications in memo or letter format (not complete technical specifications) |
| Field Work and Oversight | 15 | day | $ 1,000 | $ 15,000 | |
| Confirmation Sampling Analysis | 10 | sample | $ 160 | $ 1,600 | Assume TPH/BTEX sampling only. |
| Compaction Testing for Backfill | 1 | LS | $ 15,000 | $ 15,000 | |
| Data Validation and Analysis | 1 | LS | $ 2,500 | $ 2,500 | |
| Project Management | 8% | pcnt | $ 51,600 | $ 4,100 | |
| *Task Subtotal* | | | | *$ 67,700* | |
| **Site Development and Property-Wide Remedial Excavation to 5 ft BGS** | | | | | |
| Excavate and Load Property-Wide soil to 5 ft bgs | 31026 | CY | $ 18 | $ 558,500 | Assume property size of 167,539 sf x 5 ft deep/27 = 31,026 CY. (includes 1.5 ft of soil to be removed Property-wide for site development and excavation of shallow contaminated soil to an additional 3.5 ft to a total excavation depth of 5 ft BGS) |
| Hauling of Soil | 46539 | tons | $ 5 | $ 232,700 | Assume 1.5 tons/CY. Estimated based on hauling soil to Alaska Street Transfer Station ($125/hr x 1 hr/trip / 25 tons/trip). |
| Disposal of Soil | 46539 | tons | $ 45 | $ 2,094,300 | Unit Cost for disposal at Alaska Street Transfer Station. |
| Import, Place, and Compact Clean Fill | 46539 | tons | $ 29 | $ 1,349,600 | |
| *Task Subtotal* | | | | *$ 4,235,100* | |
| **Remedial Excavation/Bioremediation/Construction/Site Restoration** | | | | | |
| Contractor Mobilization | 1 | LS | $ 10,000 | $ 10,000 | |
| Excavate and Load Impacted Soil in NW corner of property | 330 | CY | $ 18 | $ 5,900 | Assume 3,000 square ft excavation around B-26, B-17, an additional 3 ft deep beyond the 5 ft removed Property-wide (assuming groundwater is at 8 ft BGS) |
| Hauling of Soil | 495 | tons | $ 5 | $ 2,475 | Assume 1.5 tons/CY. Estimated based on hauling soil to Alaska Street Transfer Station ($125/hr x 1 hr/trip / 25 tons/trip). |
| Disposal of Soil | 495 | tons | $ 45 | $ 22,275 | Unit Cost for disposal at Alaska Street Transfer Station. |
| Import, Place, and Compact Clean Fill | 495 | tons | $ 29 | $ 14,355 | Includes additional $2 per ton to place and mix bioremediation substrate in excavation prior to backfill and compaction. |
| Dewatering and Groundwater Managemen | 0 | LS | $ 20,000 | $ - | Assume no wastewater pumping and management is necessary during remedial excavation |
| Shoring | 1 | LS | $ 30,000 | $ 30,000 | Shoring required at property boundary during construction to protect off-property feature |
| Vapor Intrusion Barrier | 0 | sf | $ 3.00 | $ - | Assume vapor intrusion barrier not necessary after soil removal |
| Evaluation of Site Redox Conditions | 1 | LS | $ 8,000 | $ 8,000 | Includes additional sample collection and analysis to determine redox state of soil and groundwater in excavation vicinity. |
| Bioremediation Substrate | 7000 | pounds | $ 10 | $ 70,000 | Assume aerobic conditions and application of ORC to area of excavated soil in the NW corner of the property prior to backfilling with soil, cost will be less for anaerobic conditions. |
| *Task Subtotal* | | | | *$ 163,005* | |
| **Construction Report** | | | | | |
| Meetings and Coordination with Ecology | 1 | LS | $ 5,000 | $ 5,000 | |
| Final Report Preparation | 1 | LS | $ 10,000 | $ 10,000 | |
| Project Management | 8% | pcnt | $ 15,000 | $ 1,000 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 2,000 | $ 2,000 | |
| *Task Subtotal* | | | | *$ 18,000* | |
| **Long-Term Cap Maintenance and Groundwater Monitoring** | | | | | Assume 30 years of cap maintenance and groundwater monitoring (soil vapor not required after excavation) |
| | Discount Rate | | 3% * | | * The 3% discount rate represents an average return on investment of 6% minus an assumed inflation rate of 3%. |
| Cap Monitoring and Maintenance | 30 | yr | $ 1,000 | $ 20,000 | |
| Groundwater Sampling/Analysis (annually for 30 yrs) | 30 | yr | $ 8,500 | $ 167,000 | |
| Prepare Groundwater Monitoring Work Plan/Schedule | 1 | LS | $ 8,000 | $ 8,000 | Assume monitoring schedule. |
| Groundwater Treatment Contingency | 1 | LS | $ 650,000 | $ 650,000 | Assumes pump and treat groundwater granular activated carbon treatment system with treated groundwater disposed of to sanitary sewer, assumes 30 years of operation, maintenance, sampling, and permit compliance for groundwater treatment a 3% discount rate, contingent on the need for groundwater treatment based on the compliance monitoring results. |
| Reporting and Project Management | 30 | yrs | $ 7,500 | $ 147,000 | |
| *Task Subtotal* | | | | *$ 992,000* | |
| | | | **TOTAL** | **$ 5,529,000** | Cost rounded to nearest $1,000. |
| **Engineering Estimate Range** | | | ***-30%*** | ***$ 3,870,000*** | |
| | | | ***50%*** | ***$ 8,294,000*** | |

# TABLE 13
# REMEDIAL ACTION ALTERNATIVE 6 DETAILED COST ESTIMATE
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

**REMEDIAL ALTERNATIVE 6 - COMPLETE EXCAVATION OF FILL MATERIAL**

| ITEM | QUANTITY | UNIT | UNIT COST | TOTAL | NOTES/COMMENTS |
|---|---|---|---|---|---|
| **Work Plans and Regulatory Review** | | | | | |
| Negotiations with Ecology | 1 | LS | $ 10,000 | $ 10,000 | |
| Preparation of Work Plans | 1 | LS | $ 60,000 | $ 60,000 | Includes SAP, Removal Action Work Plan, Shoring/Dewatering Work Plan. |
| Develop Institutional Controls | 1 | LS | $ 5,000 | $ 5,000 | |
| Health and Safety Plan | 1 | LS | $ 5,000 | $ 5,000 | Plan for the protection of construction worker safety against exposure to impacted media. |
| Project Management | 8% | pcnt | $ 80,000 | $ 6,400 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 5,000 | $ 5,000 | |
| *Task Subtotal* | | | | *$ 91,400* | |
| **Construction Oversight** | | | | | |
| General Conditions | 1 | LS | $ 16,000 | $ 16,000 | Including cleanup, flagging, security, and safety. |
| Clearing/Grading Plan (Construction Drawings) | 1 | LS | $ 60,000 | $ 60,000 | Including shoring and dewatering designs. |
| Construction Specs and Bid Documents | 1 | LS | $ 40,000 | $ 40,000 | Including shoring and dewatering specifications. |
| Field Work and Oversight | 30 | day | $ 1,000 | $ 30,000 | |
| Confirmation Sampling Analysis | 80 | sample | $ 305 | $ 24,400 | Assume TPH/BTEX/metals sampling. |
| Compaction Testing for Backfill | 1 | LS | $ 15,000 | $ 15,000 | |
| Data Validation and Analysis | 1 | LS | $ 2,500 | $ 2,500 | |
| Project Management | 8% | pcnt | $ 171,900 | $ 13,800 | |
| *Task Subtotal* | | | | *$ 201,700* | |
| **Remedial Excavation/Bioremediation/Construction/Site Restoration** | | | | | |
| Contractor Mobilization | 1 | LS | $ 15,000 | $ 15,000 | |
| Excavate and Load Impacted Soil | 155130 | CY | $ 18 | $ 2,792,300 | Assume property size of 167,539 sf x 25 ft deep/27 = 155,130 CY. |
| Hauling of Soil | 232695 | tons | $ 5 | $ 1,163,475 | Assume 1.5 tons/CY. Estimated based on hauling soil to Alaska Street Transfer Station ($125/hr x 1 hr/trip / 25 tons/trip). |
| Disposal of Soil | 232695 | tons | $ 45 | $ 10,471,275 | Unit Cost for disposal at Alaska Street Transfer Station. |
| Import, Place, and Compact Clean Fill | 232695 | tons | $ 29 | $ 6,748,155 | Includes an additional $2 per ton for additional compaction design required at excavation depth |
| Shoring | 1 | LS | $ 2,444,000 | $ 2,444,000 | Shoring required at property boundary during construction to protect off-property features |
| Dewatering | 1 | LS | $ 650,000.00 | $ 650,000 | Assumes no treatment of groundwater. |
| Vapor Intrusion Barrier | 0 | sf | $ 3.00 | $ - | Assume vapor intrusion barrier not necessary after soil removal. |
| *Task Subtotal* | | | | *$ 24,284,205* | |
| **Construction Report** | | | | | |
| Meetings and Coordination with Ecology | 1 | LS | $ 5,000 | $ 5,000 | |
| Final Report Preparation | 1 | LS | $ 10,000 | $ 10,000 | |
| Project Management | 8% | pcnt | $ 15,000 | $ 1,000 | Assume 8% of task cost. |
| Ecology Oversight | 1 | LS | $ 2,000 | $ 2,000 | |
| *Task Subtotal* | | | | *$ 18,000* | |
| | | | **TOTAL** | **$ 24,595,000** | Cost rounded to nearest $1,000. |
| **Engineering Estimate Range** | | | ***-30%*** | ***$ 17,217,000*** | |
| | | | ***50%*** | ***$ 36,893,000*** | |

APPENDIX A

# Report: Focused Soil Vapor Investigation

# Report
# Focused Soil Vapor Investigation
# North Lot Development
# Seattle, Washington

November 19, 2010

Prepared for

**North Lot Development, LLC**
**Seattle, Washington**

LANDAU ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

# TABLE OF CONTENTS



## FIGURES



## TABLES



## APPENDICES

# 1.0 INTRODUCTION

This report presents the results of focused soil vapor investigation activities that were completed at the North Lot Development property (Property) on October 15, 2010. The Property is located at the southeast corner of the intersection of South King Street and Occidental Avenue South in Seattle, Washington (Figure 1). Soil vapor investigation activities were performed by Landau Associates at the request of North Lot Development, LLC (NLD) to collect data to document benzene concentrations in soil vapor at selected locations in the northwest portion of the Property in the area formerly occupied by gasoline stations and where benzene and gasoline have been detected in soil. Soil vapor investigation activities were performed in accordance with the *Soil Vapor Investigation Work Plan, North Lot Development* (Work Plan; Landau Associates 2010a). The Work Plan was approved by the Washington State Department of Ecology (Ecology) per the Opinion Letter dated October 5, 2010 (Ecology 2010). The nature and extent of the soil and groundwater contamination at the Property is summarized in the Ecology Review Draft Report: *Feasibility Study, North Lot Development* (Draft FS; Landau Associates 2010b).

The Draft FS includes focused excavation and offsite treatment or disposal of benzene- and gasoline-contaminated soil from the northwest portion of the Property as a remedial element to reduce the potential for vapor intrusion into buildings planned as part of future development of the Property. A remediation level for benzene in soil was developed in the Draft FS using the Johnson and Ettinger (J&E) Model for Subsurface Vapor Intrusion into Buildings (Johnson and Ettinger 1991) and the benzene concentrations detected in soil in the northwest portion of the Property. The modeling showed that removal of soil with benzene concentrations greater than the proposed remediation level [2,450 micrograms per kilogram (μg/kg)] would be protective of indoor air to an incremental cancer risk less than the regulatory level of $1x10^{-6}$.

Following its review of the Draft FS, Ecology requested that focused soil vapor sampling be conducted at the two locations where the highest benzene concentrations were detected in soil to calibrate the J&E modeling results and to allow for adjustment of the remediation level, as warranted based on the soil vapor data and additional modeling results, to ensure that the selected remediation level will be sufficiently protective of indoor air. The comments received from Ecology regarding the Draft FS and responses from the NLD team are documented in the response letter to Ecology dated September 7, 2010 (Landau Associates 2010c).

The objective of this report is to document soil vapor sampling activities, present and evaluate the analytical results for the soil and soil vapor samples, and support a remediation level for benzene in soil. The subsurface investigation included the collection and laboratory analysis of soil vapor and soil samples from the two locations requested by Ecology and one additional location selected to aid in evaluation of the data (Figure 2).

# 2.0 SOIL VAPOR AND SOIL SAMPLING

Soil and soil vapor samples were collected from the same locations to help identify the relationship between contaminant concentrations in soil and soil vapor and to aid in the justification of the site-specific model input parameters to make the J&E model results more representative for predicting site-specific benzene concentrations in soil that are protective of the vapor intrusion pathway. Soil and soil vapor samples were collected from the same locations and approximate depths where soil sampling in 2008 indicated the highest benzene concentrations at the Property or about 6 inches above the elevation of the groundwater table, whichever was shallower at the time of sampling. Each specific sampling location was selected from areas near the previous sample location where the asphalt showed minimal signs of cracking or deterioration.

The three 2008 sampling locations (B-23, B-26, and B-17) are shown on Figure 2. Two of the sample locations were located close to [i.e., within 1 foot (ft) of] the two previous soil boring/sampling locations that indicated the highest detected benzene concentrations in soil at the Property in 2008, B-23 and B-26, as requested by Ecology. The third soil sample location was located close to the 2008 soil boring/sample location (B-17) where the benzene concentration detected in soil (1,900 μg/kg) was close to the remediation level proposed in the Draft FS (2,450 μg/kg).

## 2.1 PREPARATORY ACTIVITIES

Prior to sample collection, preparatory activities included update and review of the project health and safety plan (HASP), locating and marking underground utilities, and the measurement of groundwater elevations at nearby monitoring wells. Underground utilities were marked by public and private utility locating services in the area of the investigation activities. All borings were located a minimum of 4 ft from any marked utility. Water levels were measured at nearby monitoring wells MW-2, MW-8, and MW-10 (Figure 2). Depth to groundwater was used for planning purposes to ensure that soil vapor and soil sample collection depths were above the water table.

## 2.2 SAMPLING METHODOLOGY

Per the Work Plan, the soil vapor samples were to be collected from the same depth at each location where the maximum benzene concentrations were previously detected in soil. During drilling, field screening with a photoionization detector (PID) indicated that the most concentrated presence of volatile contamination was in the depth range approximately 1 ft above the elevation of the groundwater table. Therefore, the soil and soil vapor samples were collected in a narrower range from depths between 6.5 and 8 ft below ground surface (BGS) versus the 2008 soil sampling depths of between 5 and 7.5 ft

BGS. Soil and soil vapor sampling activities were performed in accordance with the procedures identified in Section 2.2 of the Work Plan and are summarized in the sections below.

### 2.2.1 Soil Sampling

Soil samples were collected using direct-push drilling and sampling techniques. Soil sampling was conducted prior to soil vapor sampling to facilitate the use of field-screening data (i.e., visual observations and PID measurements) to collect soil vapor samples at depths corresponding to the highest levels of contamination.

Soil samples were obtained from direct-push borings using a closed-piston sampling device with a 48-inch long, 1.5-inch inside-diameter core sampler. An environmental professional from Landau Associates was on site to supervise all drilling and sampling activities, prepare a descriptive log of each soil boring, and field-screen samples for possible contamination. All soil samples were collected in conformance with the Work Plan. Field-screening results (i.e., obvious signs of contamination, PID headspace analysis) are recorded on the boring logs (Appendix A). Headspace analysis was conducted by placing a representative portion of the soil in a sealable plastic bag, allowing the soil to vaporize inside the sealed container for 5 minutes, then inserting the PID tip into the bag to measure total volatile organic compounds (VOCs). All samples collected were visually described in the field in general accordance with the American Society for Testing and Materials (ASTM) D 2455, *Standard Recommended Practice for Description of Soils (Visual-Manual Procedure).*

One soil sample was collected for laboratory analysis from the deepest 1-ft interval above the water table at each boring; this was also the interval in which the maximum observed PID reading was observed in the field. All samples were collected using a laboratory-supplied coring device for collection of soil for VOC analysis [gasoline-range total petroleum hydrocarbons (TPH-G) and benzene] per U.S. Environmental Protection Agency (EPA) Method 5035A. Each VOC sampling device was preset by the sampler to collect approximately 5 grams of soil. The sample was collected directly from the soil of interest (i.e., an undisturbed portion of the soil core) using the coring device. The soil was transferred from the coring device to pre-weighed, laboratory-supplied vials. After the sample was collected, it was placed in a cooler on ice, cooled to 4ºC, and recorded on the chain-of-custody form. Samples were submitted to Analytical Resources in Tukwila, Washington for laboratory analysis under the appropriate chain-of-custody procedures. The soil samples were analyzed for TPH-G by Method NWTPH-G and benzene by EPA Method 8021B.

A soil sample was also collected at each boring location and analyzed for physical parameters, including organic carbon fraction, porosity, wet and dry bulk density, and grain size analyses, to document Property-specific soil conditions.

### 2.2.2 SOIL VAPOR SAMPLING

Soil vapor samples were collected using the direct-push drilling rig and a post-run tubing (PRT) system setup. Soil vapor sampling was also supervised and performed by an environmental professional from Landau Associates, and all vapor sampling was completed in accordance with the Work Plan. Field parameters measured during soil vapor sampling are detailed in Table C-1 in Appendix C.

The PRT setup allows polyethylene tubing to be inserted through the direct-push rod and connected to the bottom of the rod after the rod has been advanced to the selected sampling depth. The surface end of the tubing is connected directly to the purge and sampling pump. The PRT setup reduces the potential for leakage through the rod connections and eliminates the need to evacuate/purge air from the rods prior to sample collection. The sampling procedures are as follows:

- The direct-push rod was fitted with a PRT drive point holder.
- The direct-push rod was advanced to the location-specific sampling depth, which was selected based on the previous soil sampling depth and adjusted based on field observations and the depth of groundwater.
- Dedicated sample tubing and a PRT adapter were inserted down the sampling rods and connected to the point holder. The surface end of the tubing was fitted with a valve to allow the flow of air to be controlled.
- The direct-push rods were pulled back about 1 ft to allow the drive point to drop off and expose the tubing for sample collection.
- A surface seal of hydrated bentonite was placed around the top of the drill rods at the surface.
- A helium tracer leak test was conducted to evaluate leakage through the surface seal by comparing the concentration of the helium tracer contained in a shroud placed over the sampling equipment setup with the tracer concentration in vapor collected through the sample tubing. The general procedures for the leak test included: 1) Covering the sampling setup with a gas shroud (bucket) fitted with a notch (sealed with an inert modeling putty) to allow the end of the sample tubing to remain outside the shroud and be connected to a helium gas detector; 2) Pumping helium into the shroud; 3) Using a helium detector to measure helium gas concentrations in the air within the shroud to establish a baseline helium concentration; and 4) Measuring the helium concentration in vapor drawn through the sample tubing. The comparison of the helium concentration in vapor collected from the sample tubing with the baseline concentration was used to evaluate leakage through the surface seal to the sample tip below the ground surface. Helium was not detected in the vapor collected from the sample tubing at any of the soil vapor sampling points, indicating that no leaks were present throughout soil vapor sampling activities.
- The sample tubing was slowly purged for 5 to 10 minutes using a vapor purge pump to evacuate air from the sampling system.
- During purging, the flow rate was monitored, and a PID and multi-gas meter were used to evaluate the presence of VOCs within the air being evacuated along with the concentrations of oxygen and methane and the percent lower explosive limit (%LEL).

Measurements were taken immediately after the purging had begun and near the middle and end points of purging.

- Following purging, the valve was closed to prevent backflow of air into the sample tubing.
- The soil vapor sample was then collected by connecting the sample tubing to an individually certified, laboratory-provided, 1-liter Summa canister using an airtight fitting. The valves were opened and the canister was allowed to fill until the pressure valve on the canister indicated that the canister was full.
- After the canister was filled, an identification label was affixed to the canister with a zip-tie, the sample was recorded on the chain-of-custody form, and the sample canister was placed back into the cardboard shipping container for shipment to the laboratory.

As noted above, the laboratory-supplied Summa canisters arrived under a vacuum such that when the orifice was opened the canister filled with soil gas from the attached tubing. Each canister was outfitted with a critical orifice assembly that allowed the canister to fill gradually over the course of approximately 4 minutes. Field personnel ensured that the Summa canister seal was maintained and the valves were kept completely closed until the canister had been fully connected to the sample tubing so that ambient air was not allowed to enter the canister. The samples were packed and shipped to Columbia Analytical Services for analysis of benzene using EPA Method TO-15 low level analysis.

# 3.0 DATA RESULTS AND EVALUATION

This section presents an evaluation of the potential for vapor intrusion to result in benzene concentrations in indoor air greater than the Model Toxics Control Act (MTCA) modified Method B indoor air cleanup level for benzene of 1.4 micrograms per cubic meter ($\mu g/m^3$) in future buildings on the Property. The buildings to be constructed at the Property will not have first-floor residential use. Plans call for the on-Property buildings to have a ground-floor parking garage and commercial development; all residential units would be constructed on the third story and higher. The 1.4 $\mu g/m^3$ benzene cleanup level is protective of an occupational exposure scenario, modified from the standard Method B indoor air cleanup level (0.32 $\mu g/m^3$) to account for an occupational exposure frequency of 8 hr/day, 250 days/yr, as provided for when considering alternative exposure scenarios under Washington Administrative Code (WAC) 173-340-750(3)(d).

Table 1 presents the chemical concentrations and physical parameter values reported by the laboratory for the soil samples collected from the three borings. The three soil samples were collected from borings completed as near as possible to 2008 soil borings B-17, B-23, and B-26 (Figure 3). Soil samples from those three borings contained the highest benzene concentrations detected during the 2008 investigation. The 2010 benzene concentrations in soil (ranging from non-detect at a laboratory reporting limit of 24 μg/kg to a detection of 78 μg/kg) were approximately 20 to 1,000 times less than the concentrations detected at the same locations in 2008 (1,900 to 57,000 μg/kg). Although some reduction in concentrations may be expected from chemical degradation or natural attenuation over time, the magnitude of the reductions observed at the Property is likely the result of a high degree of spatial variability in the soil contamination.

The benzene concentrations detected in the soil vapor samples are presented in Table 2 and shown on Figure 3; the concentrations ranged from 10 to 58 $\mu g/m^3$. The observed soil vapor concentrations are lower than those predicted by the J&E model, and result in estimates of acceptable risk ($9.5 \times 10^{-9}$ to $2.8 \times 10^{-8}$) using the J&E model (Table 3 and Appendix B). These same concentrations, however, exceed screening levels developed in accordance with MTCA and Ecology's draft soil vapor intrusion guidance document (Ecology 2009). Evaluations of potential risk in the context of both approaches—the J&E model and Ecology's draft guidance—are discussed below.

## 3.1 JOHNSON AND ETTINGER MODEL

Whether using the lower 2010 benzene concentrations in soil or the greater 2008 concentrations, the J&E model predicts higher soil vapor concentrations than the actual soil vapor concentrations measured during soil vapor sampling (by factors ranging between two and five orders of magnitude). The

J&E model provides a conservative overestimate of the anticipated soil vapor concentrations and, therefore, a conservative overestimate of the risk associated with the proposed soil cleanup level of 2,450 µg/kg for benzene. The data from the 2010 sampling event support the conclusion that the previously proposed cleanup level (2,450 µg/kg) is protective of the vapor intrusion pathway at the Property.

Without knowing the degree to which the more elevated benzene concentrations in soil (e.g., 57,000 µg/kg at B-23 in 2008) are impacting the soil vapor concentrations at a location versus the lower concentrations (e.g., 58 µg/kg at B-23 in 2010), it is difficult to accurately model the partitioning from the soil contamination into the vapor phase using the J&E model.

Although the J&E model overestimates the benzene concentrations in soil vapor at the Property based on the observed concentrations in soil, the model does provide a conservative estimate of the predicted soil vapor concentrations. If the model were to be used to estimate indoor air benzene concentrations in a commercial building based on measured soil vapor concentrations, then the corresponding risks would be between $9.5 \times 10^{-9}$ and $2.8 \times 10^{-8}$, all less than the acceptable risk level of $1 \times 10^{-6}$.

## 3.2 ECOLOGY'S GUIDANCE METHODOLOGY

Although the J&E model predicts acceptable levels of risk associated with vapor intrusion when benzene concentrations in soil are at or below 2,450 µg/kg, NLD also recognizes that Ecology has identified screening levels and vapor attenuation factors (VAFs) in its draft soil vapor intrusion guidance document (Ecology 2008). This section presents an evaluation of the soil vapor data in the context of the Ecology soil vapor guidance document.

Ecology recommends that a VAF of 0.1 be used for soil vapor samples collected to a maximum depth of 15 ft BGS. Ecology's recommended VAF is intentionally conservative and has been established to be protective of residential exposure in single-family dwellings. Several site-specific factors at the Property combine to make the VAF of 0.1 overly conservative:

- The VAF of 0.1 represents the 95$^{th}$ percentile of the EPA database for VAFs relating soil vapor to indoor air contaminant concentrations (EPA 2008). Even if the data set were completely representative of site-specific conditions, the 95$^{th}$ percentile would be a strong upper-bound estimate of the VAF (i.e., providing a high confidence that indoor air cleanup levels would not be exceeded). Use of the 95$^{th}$ percentile to establish the VAF when the data set is representative of site-specific conditions will yield a large percentage of "false positives" (i.e., erroneous conclusions that soil vapor contaminant concentrations are not protective of indoor air).
- Most of the buildings included in the EPA (2008) database for VAFs are residential. Residential buildings typically have lower indoor air exchange rates and, therefore, higher VAFs than commercial buildings. Future development at the Property will have ground-level

parking facilities and first-floor commercial use. Vapor intrusion risks, therefore, will be much less than those predicted for residential scenarios.

- Older concrete slabs have higher crack fractions than newer slabs; new concrete slabs have fewer cracks and less potential for vapor intrusion. Any building construction at the Property will be new and will have less risk for vapor intrusion than that characterized by the EPA database.
- Benzene is a highly degradable chemical and prone to more degradation in the subsurface than many of the chemicals included in the EPA database.

Given the range of VAFs in the EPA database and the site-specific conditions described above, a VAF of 0.01 is expected to be a reasonably conservative value for vapor attenuation at the Property. If applied to the Property, a VAF of 0.01 would correspond to a soil vapor screening level of 140 $\mu g/m^3$. All of the benzene soil vapor concentrations detected at the Property were less than 140 $\mu g/m^3$; the maximum detected concentration of benzene in soil vapor at the Property was 58 $\mu g/m^3$. A comparison of the benzene concentrations detected in soil vapor at the Property to the screening level based on the modified VAF of 0.01 results in the conclusion that no further action is warranted at the Property with respect to vapor intrusion as a pathway of concern.

# 4.0 SUMMARY AND RECOMMENDATIONS

As demonstrated in Section 3.0, using the benzene concentrations in soil vapor observed during the October 2010 sampling event, the J&E model predicts that the potential risks associated with vapor intrusion in an occupational worker scenario would be acceptable (up to $2.8\text{x}10^{-8}$), not requiring any active remedial action at the Property. Using the soil vapor screening level developed in accordance with Ecology's draft guidance with a modified VAF of 0.01 (i.e., soil vapor screening level of 140 $\mu g/m^3$), all of the benzene soil vapor concentrations detected at the Property are less than the screening level and, therefore, remedial action would not be required.

The results of the recent soil and soil vapor sampling indicate that the benzene contamination in soil at the Property does not pose a potential vapor intrusion risk. However, in an effort to avoid prolonged technical discussions with Ecology that could impact the schedule for development of the Property, NLD proposes to move forward with the proposed hotspot excavation of soil from the northwest portion the Property, and proposes a remediation level of 780 micrograms per kilogram (μg/kg; (see below) based on the overly conservative soil vapor screening level established in the Ecology draft soil vapor intrusion guidance document (14 $\mu g/m^3$; as calculated using a VAF of 0.1). The remedial action proposed in the FS includes excavation of soil to the depth of the groundwater table at locations where the highest concentrations of soil and soil vapor have been detected (B-17, B-23, and B-26), and continued excavation until benzene concentrations in soil are reached that are considered conservatively protective of the vapor intrusion pathway. The minimum proposed excavation area is shown on Figure 4.

The soil vapor samples were collected within 1 ft of the soil borings completed in 2008. Although the benzene concentrations in soil were highly variable, the close proximity of the soil vapor samples to the 2008 soil sample locations allows for a direct correlation between the 2008 benzene concentrations in soil and the 2010 benzene concentrations in soil vapor. Even though the same discrete soil contamination was not encountered in 2010, the soil vapor samples were collected close enough to the 2008 sample locations that the higher contaminant concentrations in soil would be expected to influence the soil vapor samples. The most conservative correlation between soil and soil vapor concentrations is observed at B-17:

$$Ratio_{s-sv} = \frac{C_{sv}}{C_s} = \frac{34\ \mu\text{g/m}^3}{1{,}900\ \mu\text{g/kg}} = 0.018\,\frac{\mu\text{g - kg}}{\text{m}^3\text{ - }\mu\text{g}}$$

Applying this ratio to the benzene soil vapor screening value of 14 $\mu g/m^3$ yields a benzene concentration in soil of 780 μg/kg. NLD recommends that this concentration—780 μg/kg benzene—be established as the remediation level for benzene in soil, which is protective of the vapor intrusion pathway, at the Property. Compliance with this remediation level would be demonstrated by confirmation sampling in the field at the time of excavation. The remediation level will be included in the revised FS and pending Cleanup Action Plan (CAP).

NLD requests a timely review and approval of this conservative remediation level for benzene in soil to facilitate finalization of the FS and preparation of the CAP.

# 5.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of North Lot Development, LLC, and applicable regulatory agencies, for specific application to the North Lot Development property, including review by the public. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Charles P. Halbert, P.E.
Associate

Timothy L. Syverson, L.G.
Senior Associate Geologist

CPH/TLS/ccy

# 6.0 REFERENCES

Ecology. 2010. Letter: *Opinion Pursuant to WAC 173-340-515(5) on Soil Vapor Investigation Work Plan for the Following Hazardous Waste Site: Name: North Lot Development; Property Address: 201 South King Street, Seattle, WA 98104; Facility/Site No.: 5378137; VCP Project No.: NW1986*. From Jing Liu, Northwest Regional Office Toxics Cleanup Program, Washington State Department of Ecology, to Kevin Daniels, Daniels Development Co., LLC. October 5.

Ecology. 2009. *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Review Draft.* Toxics Cleanup Program, Washington State Department of Ecology. October.

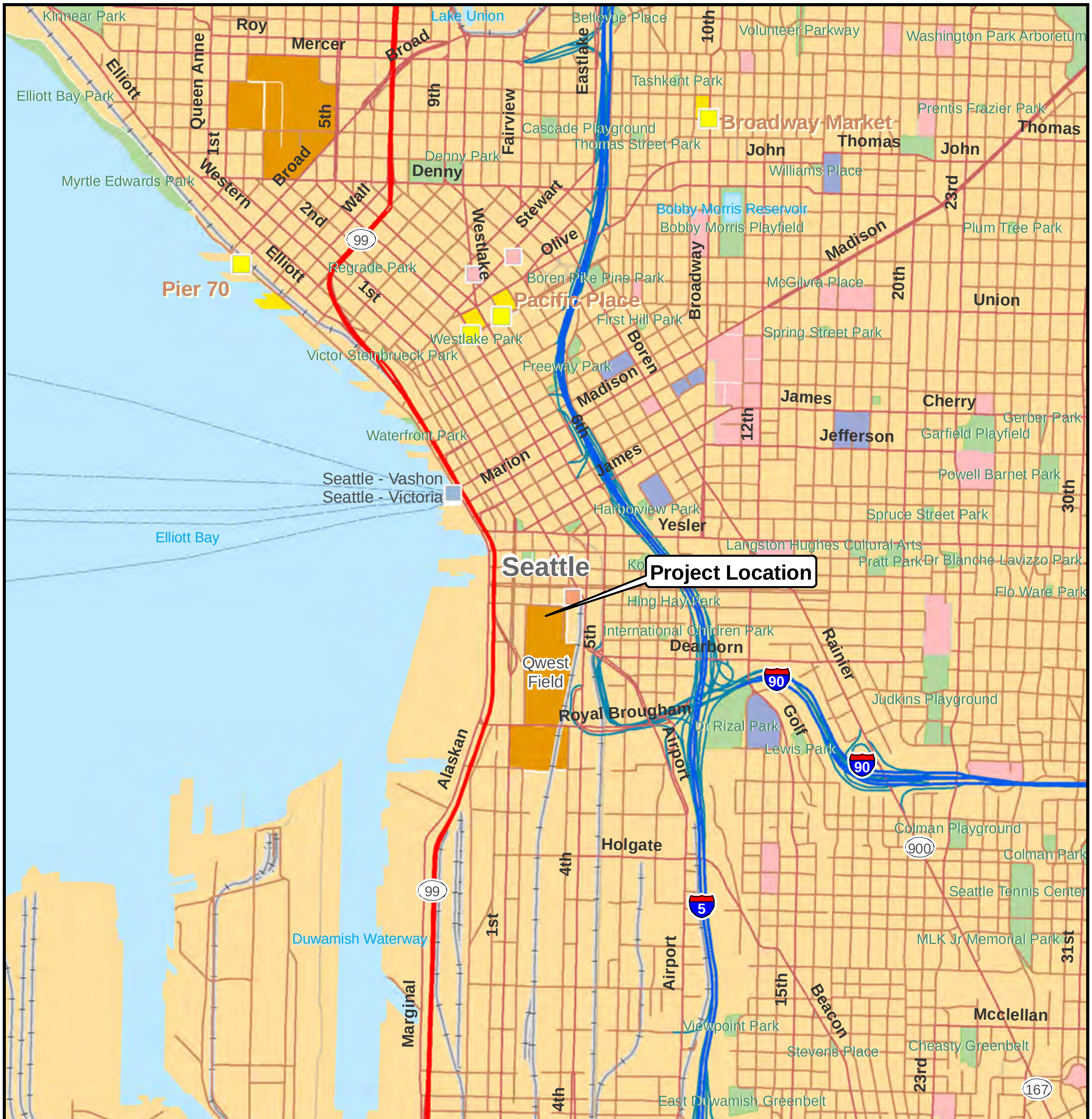
EPA. 2008. *U.S. EPA's Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors, Draft.* Office of Solid Waste, U.S. Environmental Protection Agency. March 4.

Johnson, P.C. and R.A. Ettinger. 1991. "Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings." *Environmental Science & Technology*. 25:1445-1452.

Landau Associates. 2010a. *Soil Vapor Investigation Work Plan, North Lot Development, Seattle, Washington*. Prepared for North Lot Development, LLC. October 11.

Landau Associates. 2010b. Ecology Review Draft Report: *Feasibility Study North Lot Development*. Prepared for North Lot Development, LLC. May 21.

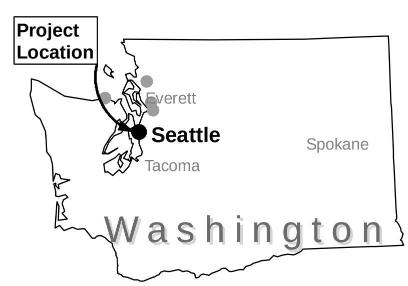
Landau Associates. 2010c. Letter: *Re: Ecology Opinion Letter dated August 12, 2010, Draft Feasibility Study, North Lot Development, 201 South King Street, Seattle, Washington 98104, VCP Project No: NW1986*. From Timothy L. Syverson, L.G., and Kristy J. Hendrickson, P.E., to Jing Liu and Mark Adams, Washington State Department of Ecology. September 7.




N

0 0.5 1

Miles

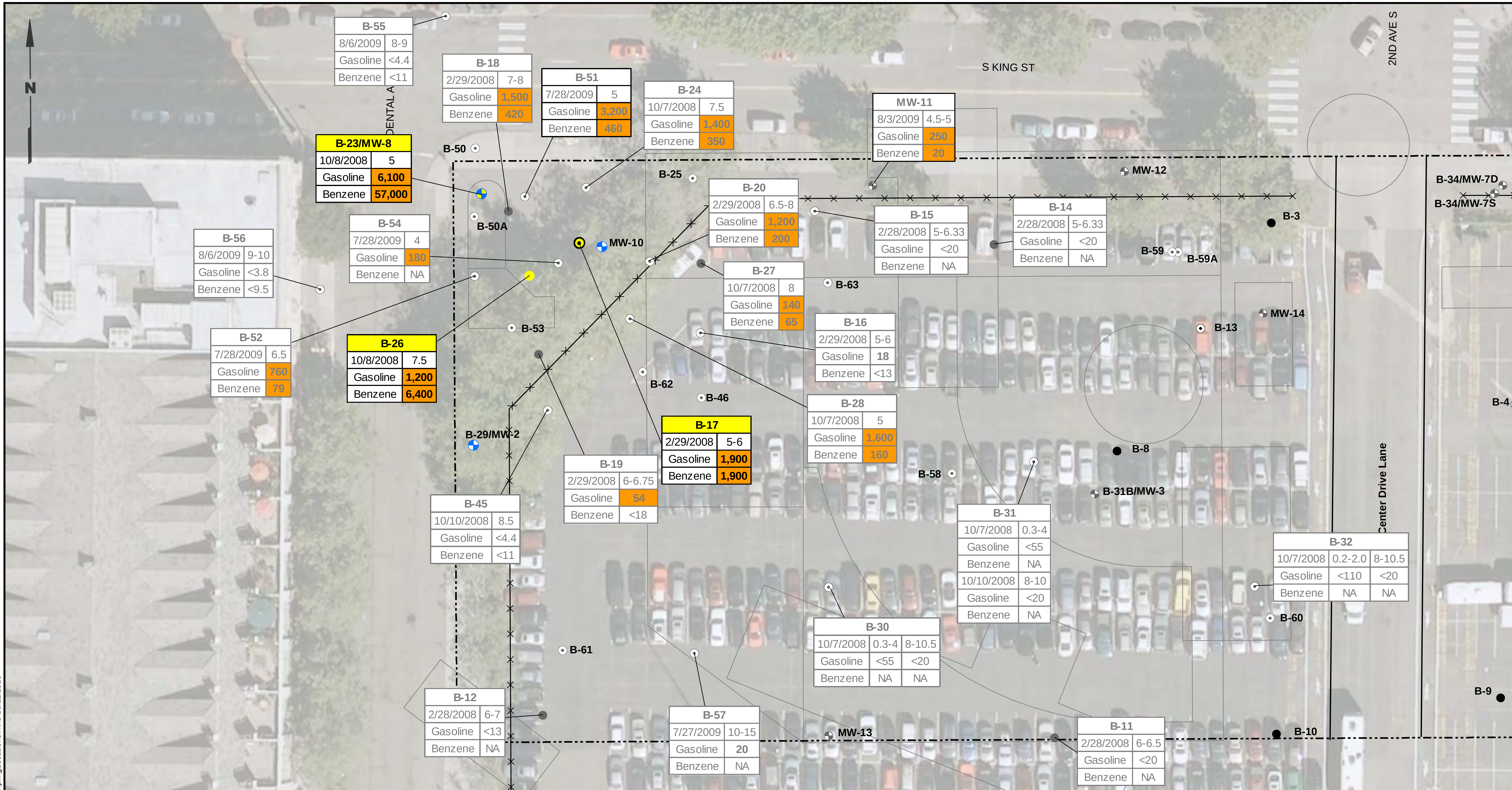



*Data Source: ESRI 2008*

Y:\Projects\1014001\Mapdocs\North Lot RI\Fig1.mxd 10/11/2010

LANDAU ASSOCIATES

| North Lot Development<br>Seattle, Washington | **Vicinity Map** | Figure<br>1 |
|---|---|---|




**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary
- Soil Vapor and Soil Sampling Location
- Water Level Measurement Location

| Location ID | |
|---|---|
| Date | Depth (ft) |
| Gasoline | Result mg/kg |
| Benzene | Result µg/kg |

**Notes**

1. Gray symbol indicates sample was not analyzed for the constituent at this depth.
2. Depths are in feet below ground surface.
3. Gasoline soil cleanup level is 30 mg/kg, Benzene soil cleaup level is 4.5 µg/kg.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration.
6. Refer to Figure 3 for Historical Property Features Legend.
7. NA = Not Analyzed.
8. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 40 80

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

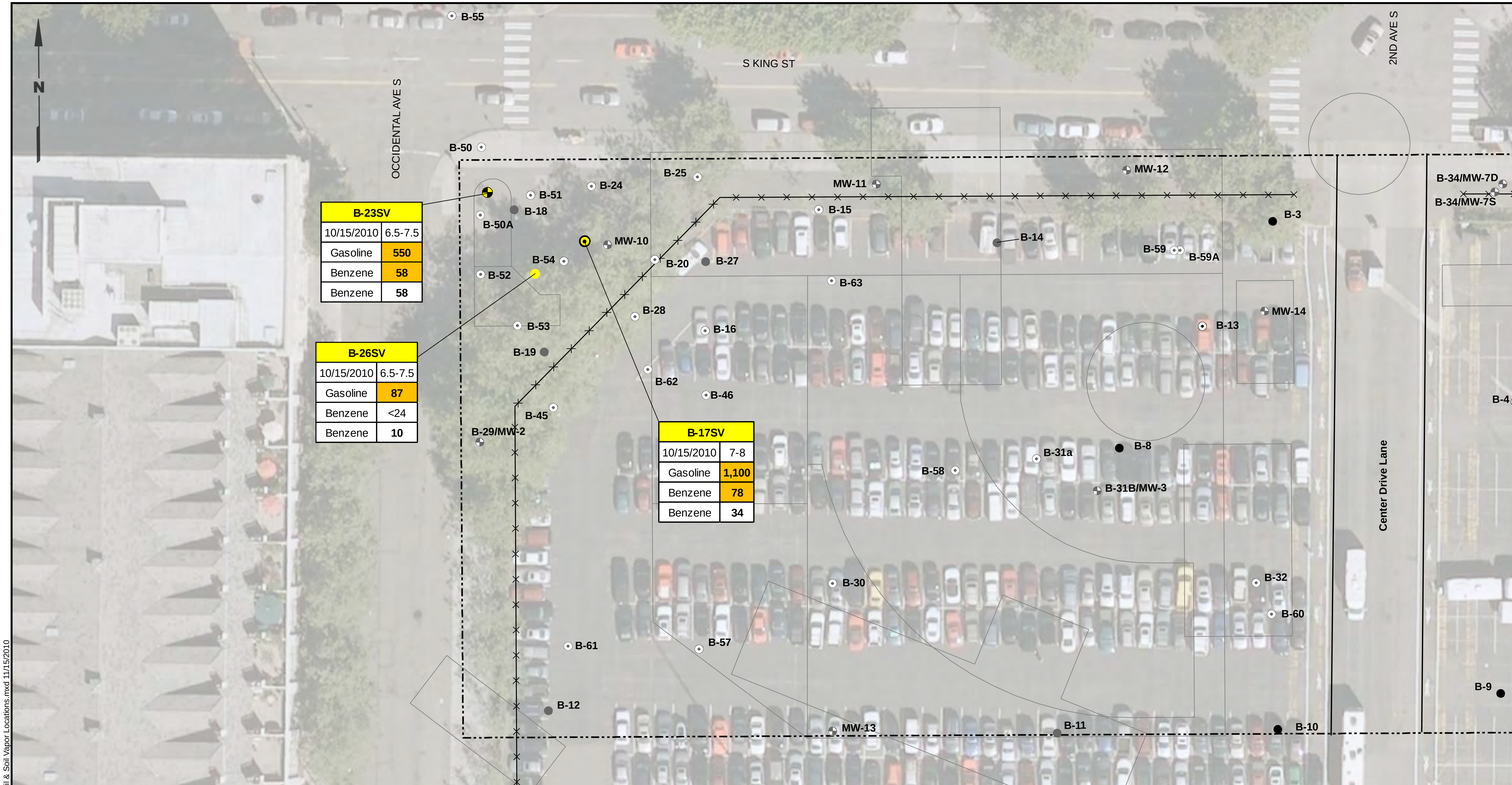
Y:\Projects\1014001\Mapdocs\Fig2SamplingLocations.mxd 10/11/2010

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Sampling Locations**

Figure 2




Y:\Projects\1014001\Mapdocs\Fig3-Soil & Soil Vapor Locations.mxd 11/15/2010

**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary
- Soil Vapor and Soil Sampling Location

| Location ID | |
|---|---|
| Date | Depth (ft) |
| Gasoline (Soil) | Result mg/kg |
| Benzene (Soil) | Result µg/kg |
| Benzene (Soil Vapor) | Result µg/m³ |

**Notes**

1. Depths are in feet below ground surface.
2. Gasoline soil cleanup level is 30 mg/kg, Benzene soil cleanup level is 4.5 µg/kg.
3. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
4. <1.00 = The analyte was not detected at the reported concentration.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

*Data Source: Triad Boundary Survey, King County*

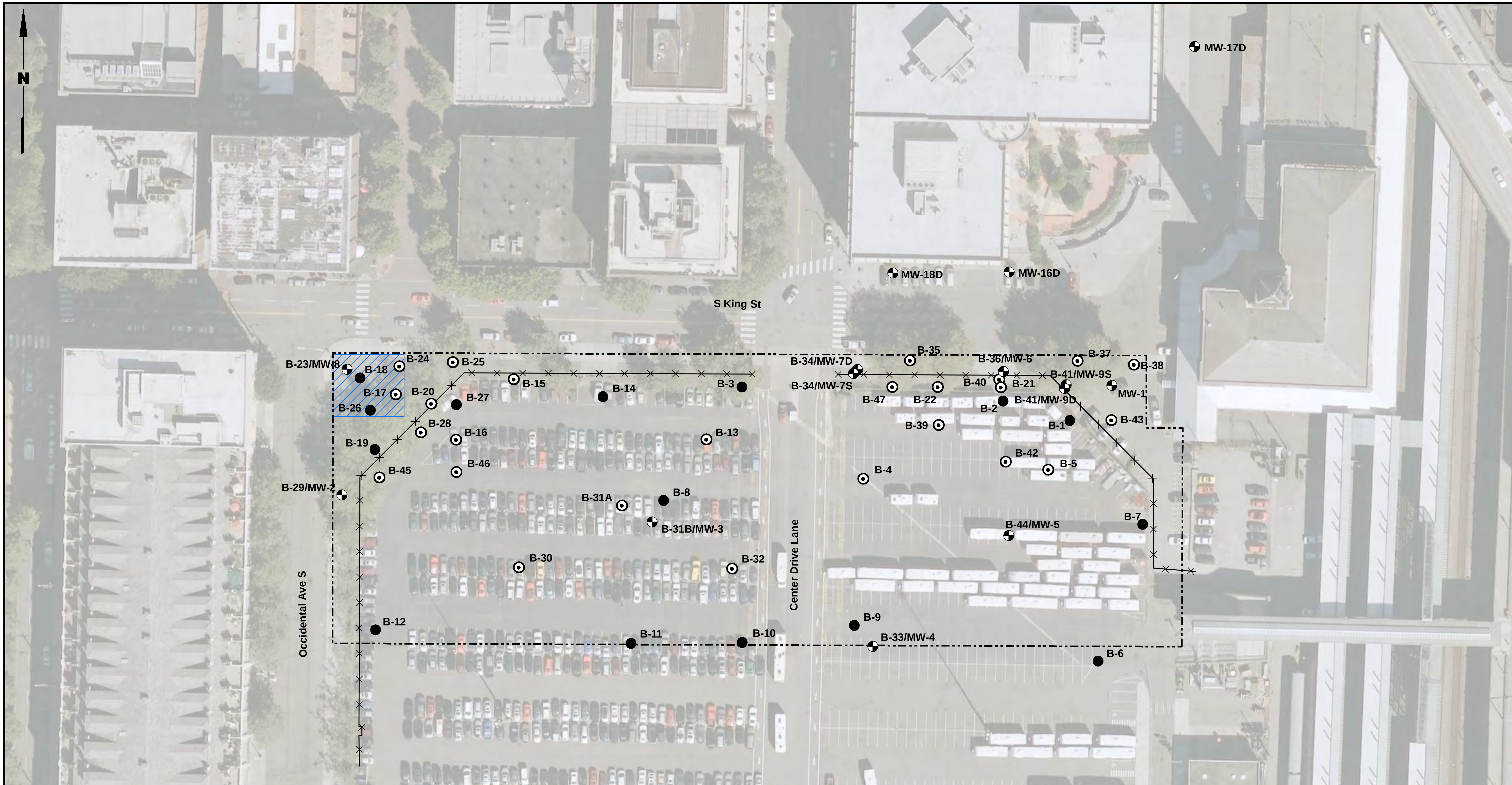
0 40 80
Scale in Feet

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Soil and Soil Vapor Results**

Figure
3




## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Fence Line
- Site Boundary
- Approximate Boundary of Minimum Proposed Excavation; Actual Area to be Based on Confirmation Samples

0 80 160

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Y:\Projects\1014001\Mapdocs\Fig4-Excavation.mxd 11/17/2010

LANDAU ASSOCIATES

| | | |
|---|---|---|
| North Lot Development<br>Seattle, Washington | **Proposed Excavation Area** | Figure<br>4 |

# TABLE 1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | LAI-S-B17(7-8) RR78B 10/15/2010 | LAI-S-B23(6.5-7.5) RR78A 10/15/2010 | LAI-S-B26(6.5-7.5) RR78C 10/15/2010 |
|---|---|---|---|
| **BTEX/TPHG** | | | |
| Benzene (SW8021Mod) (µg/kg) | 78 | 58 | 24 U |
| Gasoline Range Organics (NWTPH-G) (mg/kg) | 1,100 | 550 | 87 |
| **CONVENTIONALS (%)** | | | |
| Total Solids (EPA 160.3) | 69.80 | 93.40 | 71.50 |
| Total Organic Carbon (PLUMB81TC) | 16.4 | 2.27 | 10.5 |
| **GEOTECHNICAL ANALYSIS** | | | |
| Wet Density (ASTM D 2937) ($lb/ft^3$) | 97.5 | 92.8 | 88.4 |
| Dry Density (ASTM D 2937) ($lb/ft^3$) | 87.9 | 87.1 | 80.1 |
| Porosity (SW9100) (Std Units) | 0.45 | 0.49 | 0.48 |
| **GRAIN SIZE (ASTM D422)** | | | |
| Particle/Grain Size, Gravel | 25.7 | 14.3 | 30.6 |
| Particle/Grain Size, Sand | 63.5 | 76.4 | 57.4 |
| Particle/Grain Size, Silt | 9.0 | 7.0 | 9.1 |
| Particle/Grain Size, Clay | 1.8 | 2.3 | 2.8 |

U = Indicates the compound was undetected at the reported concentration.
µg/kg = Micrograms per kilogram
mg/kg = Milligrams per kilogram
$lb/ft^3$ = Pounds per cubic feet

# TABLE 2
# SOIL VAPOR ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | | | Benzene EPA Method TO-15 | |
|---|---|---|---|---|
| Sample Location | Lab ID | Date Collected | µg/m³ | ppbV |
| LAI-SV-B17(7-8) | P1004034-002 | 10/15/2010 | 34 | 11 |
| LAI-SV-B23(6.5-7.5) | P1004034-001 | 10/15/2010 | 58 | 18 |
| LAI-SV-B26(6.5-7.5) | P1004034-003 | 10/15/2010 | 10 | 3.1 |

$\mu g/m^3$ = Micrograms per cubic meter

ppbV = Parts per billion by volume

# TABLE 3
# DATA COMPARISON
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| Sample ID | Original Samples (2008) | | | | Confirmation Samples (2010) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Date | Soil Source (µg/kg) | Modeled Source Vapor (µg/m$^3$) | Modeled Risk | Date | Soil Source (µg/kg) | Modeled Source Vapor (µg/m$^3$) | Measured Source Vapor (µg/m$^3$) | Modeled Risk (from Source Vapor) |
| B17 | 2/29/2008 | 1,900 | 1.30E+06 | 6.5E-07 | 10/15/2010 | 78 | 7.18E+03 | 3.40E+01 | 2.8E-08 |
| B23 | 10/8/2008 | 57,000 | 3.90E+07 | 2.4E-05 | 10/15/2010 | 58 | 5.32E+03 | 5.80E+01 | 2.3E-08 |
| B26 | 10/8/2008 | 6,400 | 4.38E+06 | 2.0E-06 | 10/15/2010 | 24 | 2.19E+03 | 1.00E+01 | 9.5E-09 |
| Cleanup Level | | 2,450 | 1.68E+06 | 1.0E-06 | | | | | |

µg/kg = Micrograms per kilogram
µg/m$^3$ = Micrograms per cubic meter

APPENDIX A

# Boring Logs

# Soil Classification System

| MAJOR DIVISIONS | | | GRAPHIC SYMBOL | USCS LETTER SYMBOL[1] | TYPICAL DESCRIPTIONS [2][3] |
|---|---|---|---|---|---|
| COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size) | GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve) | CLEAN GRAVEL (Little or no fines) | | GW | Well-graded gravel; gravel/sand mixture(s); little or no fines |
| | | | | GP | Poorly graded gravel; gravel/sand mixture(s); little or no fines |
| | | GRAVEL WITH FINES (Appreciable amount of fines) | | GM | Silty gravel; gravel/sand/silt mixture(s) |
| | | | | GC | Clayey gravel; gravel/sand/clay mixture(s) |
| | SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve) | CLEAN SAND (Little or no fines) | | SW | Well-graded sand; gravelly sand; little or no fines |
| | | | | SP | Poorly graded sand; gravelly sand; little or no fines |
| | | SAND WITH FINES (Appreciable amount of fines) | | SM | Silty sand; sand/silt mixture(s) |
| | | | | SC | Clayey sand; sand/clay mixture(s) |
| FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size) | SILT AND CLAY (Liquid limit less than 50) | | | ML | Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity |
| | | | | CL | Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay |
| | | | | OL | Organic silt; organic, silty clay of low plasticity |
| | SILT AND CLAY (Liquid limit greater than 50) | | | MH | Inorganic silt; micaceous or diatomaceous fine sand |
| | | | | CH | Inorganic clay of high plasticity; fat clay |
| | | | | OH | Organic clay of medium to high plasticity; organic silt |
| | HIGHLY ORGANIC SOIL | | | PT | Peat; humus; swamp soil with high organic content |

| OTHER MATERIALS | GRAPHIC SYMBOL | LETTER SYMBOL | TYPICAL DESCRIPTIONS |
|---|---|---|---|
| PAVEMENT | | AC or PC | Asphalt concrete pavement or Portland cement pavement |
| ROCK | | RK | Rock (See Rock Classification) |
| WOOD | | WD | Wood, lumber, wood chips |
| DEBRIS | | DB | Construction debris, garbage |

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

| | | |
|---|---|---|
| Primary Constituent: | > 50% | "GRAVEL," "SAND," "SILT," "CLAY," etc. |
| Secondary Constituents: | > 30% and ≤ 50% | "very gravelly," "very sandy," "very silty," etc. |
| | > 15% and ≤ 30% | "gravelly," "sandy," "silty," etc. |
| Additional Constituents: | > 5% and ≤ 15% | "with gravel," "with sand," "with silt," etc. |
| | ≤ 5% | "with trace gravel," "with trace sand," "with trace silt," etc., or not noted. |

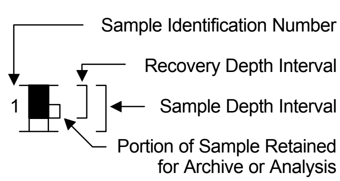
4. Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

## Drilling and Sampling Key

### SAMPLER TYPE

| Code | Description |
|---|---|
| a | 3.25-inch O.D., 2.42-inch I.D. Split Spoon |
| b | 2.00-inch O.D., 1.50-inch I.D. Split Spoon |
| c | Shelby Tube |
| d | Grab Sample |
| e | Single-Tube Core Barrel |
| f | Double-Tube Core Barrel |
| g | 2.50-inch O.D., 2.00-inch I.D. WSDOT |
| h | 3.00-inch O.D., 2.375-inch I.D. Mod. California |
| i | Other - See text if applicable |
| 1 | 300-lb Hammer, 30-inch Drop |
| 2 | 140-lb Hammer, 30-inch Drop |
| 3 | Pushed |
| 4 | Vibrocore (Rotosonic/Geoprobe) |
| 5 | Other - See text if applicable |

### SAMPLE NUMBER & INTERVAL




## Field and Lab Test Data

| Code | Description |
|---|---|
| PP = 1.0 | Pocket Penetrometer, tsf |
| TV = 0.5 | Torvane, tsf |
| PID = 100 | Photoionization Detector VOC screening, ppm |
| W = 10 | Moisture Content, % |
| D = 120 | Dry Density, pcf |
| -200 = 60 | Material smaller than No. 200 sieve, % |
| GS | Grain Size - See separate figure for data |
| AL | Atterberg Limits - See separate figure for data |
| GT | Other Geotechnical Testing |
| CA | Chemical Analysis |

## Groundwater

- ▽ Approximate water level at time of drilling (ATD)
- ▼ Approximate water level at time other than ATD

11/15/10 N:\PROJECTS\1014001.050.GPJ SOIL CLASS SHEET

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

Soil Classification System and Key

Figure
A-1

# B-17

| Depth (ft) | Sample Number & Interval | Sampler Type | Blows/Foot | PID (ppm) | USCS Symbol | Soil Profile | Water Level |
|---|---|---|---|---|---|---|---|
| 0 | | | | | AC | Asphalt | |
| | | | | | SM | Brown, silty, fine to medium SAND with gravel (medium dense, damp) (no odors) (fill) | |
| | | | | | AC | Asphalt | |
| 2 | S-1 | d3 | | 0.0 | SP/SM | Black, fine to coarse SAND with silt and gravel (medium dense, damp) (no odors) | |
| 4 | | | | 0.0 | | | |
| 6 | S-2 | d3 | | | AC | Concrete debris from 6.0 to 6.5 ft | |
| | | | | | SP/SM | | |
| 8 | | d3 | | 23.4 | SP | Black, medium to coarse SAND with gravel (loose, wet) (strong hydrocarbon odors, sheen present) | ATD |

Drilling Method: Geoprobe™

Ground Elevation (ft): 

Drilled By: Cascade Drilling Inc.

Boring Completed 10/15/10
Total Depth of Boring = 8.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

1014001.05 11/15/10 N:\PROJECTS\1014001.050.GPJ SOIL BORING LOG

Landau Associates

North Lot Development
Seattle, Washington

Log of Boring B-17

Figure A-2

# B-23

| SAMPLE DATA | | | | SOIL PROFILE | | | GROUNDWATER |
|---|---|---|---|---|---|---|---|
| Depth (ft) | Sample Number & Interval | Sampler Type | Blows/Foot | PID (ppm) | Graphic Symbol | USCS Symbol | Drilling Method: Geoprobe™ Ground Elevation (ft): Drilled By: Cascade Drilling Inc. | Water Level |
| 0 | | | | | | AC | Asphalt | |
| | | | | | | SM | Gray, silty, fine to medium SAND with gravel (medium dense, damp) (no odors) (fill) | |
| 2 | S-1 | d3 | | 0.0 | | AC | Asphalt | |
| | | | | | | SP | Dark gray to black, fine to medium SAND with trace silt and gravel (medium dense, damp to wet) (no odors) | |
| 4 | | | | 0.0 | | | | |
| | S-2 | d3 | | | | | | |
| 6 | | | | | | | | |
| | | d3 | | 29 | | | Hydrocarbon odors observed at 7 ft | ∇ ATD |
| 8 | | | | | | | | |

Boring Completed 10/15/10
Total Depth of Boring = 8.0 ft.

Notes: 1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.



LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

Log of Boring B-23

Figure A-3

# B-26

| SAMPLE DATA | | | | | SOIL PROFILE | | | GROUNDWATER |
|---|---|---|---|---|---|---|---|---|
| Depth (ft) | Sample Number & Interval | Sampler Type | Blows/Foot | PID (ppm) | Graphic Symbol | USCS Symbol | Drilling Method: Geoprobe™<br>Ground Elevation (ft):<br>Drilled By: Cascade Drilling Inc. | Water Level |
| 0 | | | | | | AC | Asphalt | |
| | | | | | | SM | Brown, silty, fine to medium SAND, trace gravel (medium dense, damp) (no odors) (fill) | |
| 2 | S-1 | d3 | | 0.0 | | SP | Black, fine to coarse SAND with gravel (medium dense, damp) (no odors) | |
| | | | | | | SM | Brown, silty, fine to medium SAND with gravel (medium dense, moist) (no odors) | |
| 4 | | | | | | SP | Black, medium to coarse SAND with gravel, lenses of silt, wood fragments (loose, damp) (no odors) | |
| | S-2 | d3 | | | | | | |
| 6 | | | | | | | Red brick fragments at 7 ft | |
| | | d3 | | 0.0 | | | Hydorcarbon odors at 8 ft | ATD |
| 8 | | | | | | | | |

Boring Completed 10/15/10
Total Depth of Boring = 8.0 ft.

10

12

14

16

18

20

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

APPENDIX B

# Johnson & Ettinger Model Files

Appendix B1: B-17 Soil Vapor-to-Soil Modeling

Appendix B2: B-23 Soil Vapor-to-Soil Modeling

Appendix B3: B-26 Soil Vapor-to-Soil Modeling

**APPENDIX B1**
**JOHNSON ETTINGER MODEL FILE**
**B-17 SOIL VAPOR-TO-SOIL MODELING**
**DATA ENTRY SHEET**

SG-ADV
Version 3.1; 02/04

Reset to Defaults

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu g/m^3$) | | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical |
|---|---|---|---|---|
| | | OR | | |
| 71432 | 7.80E+01 | | | Benzene |

**MORE ↓**

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | | ENTER User-defined stratum A soil vapor permeability, $k_v$ ($cm^2$) |
|---|---|---|---|---|---|---|---|---|
| | | | Totals must add up to value of Ls (cell F24) | | | | OR | |
| 15 | 213 | 12.5 | 213 | 0 | 0 | S | | |

**MORE ↓**

| ENTER Stratum A SCS soil type (Lookup Soil Parameters) | ENTER Stratum A soil dry bulk density, $\rho_b^A$ ($g/cm^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ ($cm^3/cm^3$) | ENTER Stratum B SCS soil type (Lookup Soil Parameters) | ENTER Stratum B soil dry bulk density, $\rho_b^B$ ($g/cm^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ ($cm^3/cm^3$) | ENTER Stratum C SCS soil type (Lookup Soil Parameters) | ENTER Stratum C soil dry bulk density, $\rho_b^C$ ($g/cm^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ ($cm^3/cm^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | 1.41 | 0.45 | 0.054 | | | | | | | | |

**MORE ↓**

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ ($g/cm\text{-}s^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 244 | 0.1 | 1.5 | |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 75 | 30 | 30 | 250 |

**END**

**APPENDIX B1**
**JOHNSON ETTINGER MODEL FILE**
**B-17 SOIL VAPOR-TO-SOIL MODELING**
**INTERMEDIATE CALCULATIONS SHEET**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.46E+08 | 198 | 0.396 | ERROR | ERROR | 0.003 | 9.97E-08 | 0.999 | 9.95E-08 | 4,000 | 7.80E+01 | 1.02E+05 |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ (atm-$m^3$/mol) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.06E+06 | 3.77E-04 | 15 | 8,096 | 3.04E-03 | 1.30E-01 | 1.76E-04 | 1.99E-02 | 0.00E+00 | 0.00E+00 | 1.99E-02 | 198 |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless) | Infinite source indoor attenuation coefficient, $\alpha$ (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF $(\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 7.80E+01 | 0.10 | 9.96E+01 | 1.99E-02 | 4.00E+02 | 2.42E+54 | 5.06E-04 | 3.95E-02 | 7.8E-06 | 3.0E-02 |

**END**

**APPENDIX B1**
**JOHNSON ETTINGER MODEL FILE**
**B-17 SOIL VAPOR-TO-SOIL MODELING**
**RESULTS SHEET**

INCREMENTAL RISK CALCULATIONS:

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) |
|---|---|
| 2.8E-08 | 3.0E-04 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

**SCROLL DOWN TO "END"**

**END**

**APPENDIX B2**
**JOHNSON ETTINGER MODEL FILE**
**B-23 SOIL VAPOR-TO-SOIL MODELING**
**DATA ENTRY SHEET**

SG-ADV
Version 3.1; 02/04

Reset to Defaults

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu$g/m$^3$) | OR | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical |
|---|---|---|---|---|
| 71432 | 5.80E+01 | | | Benzene |

MORE ↓

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ (cm$^2$) |
|---|---|---|---|---|---|---|---|---|
| | | | Totals must add up to value of Ls (cell F24) | | | | | |
| 15 | 198 | 12.5 | 198 | 0 | 0 | S | | |

MORE ↓

| ENTER Stratum A SCS soil type (Lookup Soil Parameters) | ENTER Stratum A soil dry bulk density, $\rho_b^A$ (g/cm$^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ (cm$^3$/cm$^3$) | ENTER Stratum B SCS soil type (Lookup Soil Parameters) | ENTER Stratum B soil dry bulk density, $\rho_b^B$ (g/cm$^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ (cm$^3$/cm$^3$) | ENTER Stratum C SCS soil type (Lookup Soil Parameters) | ENTER Stratum C soil dry bulk density, $\rho_b^C$ (g/cm$^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ (cm$^3$/cm$^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | 1.4 | 0.49 | 0.054 | | | | | | | | |

MORE ↓

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ (g/cm-s$^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 244 | 0.1 | 1.5 | |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 75 | 30 | 30 | 250 |

END

**APPENDIX B2**
**JOHNSON ETTINGER MODEL FILE**
**B-23 SOIL VAPOR-TO-SOIL MODELING**
**INTERMEDIATE CALCULATIONS SHEET**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ (cm$^3$/cm$^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ (cm$^3$/cm$^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ (cm$^3$/cm$^3$) | Stratum A effective total fluid saturation, $S_{te}$ (cm$^3$/cm$^3$) | Stratum A soil intrinsic permeability, $k_i$ (cm$^2$) | Stratum A soil relative air permeability, $k_{rg}$ (cm$^2$) | Stratum A soil effective vapor permeability, $k_v$ (cm$^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu$g/m$^3$) | Bldg. ventilation rate, $Q_{building}$ (cm$^3$/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.46E+08 | 183 | 0.436 | ERROR | ERROR | 0.002 | 9.97E-08 | 0.999 | 9.95E-08 | 4,000 | 5.80E+01 | 1.02E+05 |

| Area of enclosed space below grade, $A_B$ (cm$^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ (atm-m$^3$/mol) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ (cm$^2$/s) | Stratum B effective diffusion coefficient, $D^{eff}_B$ (cm$^2$/s) | Stratum C effective diffusion coefficient, $D^{eff}_C$ (cm$^2$/s) | Total overall effective diffusion coefficient, $D^{eff}_T$ (cm$^2$/s) | Diffusion path length, $L_d$ (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.06E+06 | 3.77E-04 | 15 | 8,096 | 3.04E-03 | 1.30E-01 | 1.76E-04 | 2.31E-02 | 0.00E+00 | 0.00E+00 | 2.31E-02 | 183 |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu$g/m$^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ (cm$^3$/s) | Crack effective diffusion coefficient, $D^{crack}$ (cm$^2$/s) | Area of crack, $A_{crack}$ (cm$^2$) | Exponent of equivalent foundation Peclet number, exp(Pe$^f$) (unitless) | Infinite source indoor attenuation coefficient, $\alpha$ (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu$g/m$^3$) | Unit risk factor, URF ($\mu$g/m$^3$)$^{-1}$ | Reference conc., RfC (mg/m$^3$) |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 5.80E+01 | 0.10 | 9.96E+01 | 2.31E-02 | 4.00E+02 | 6.45E+46 | 5.62E-04 | 3.26E-02 | 7.8E-06 | 3.0E-02 |

**END**

**APPENDIX B2**
**JOHNSON ETTINGER MODEL FILE**
**B-23 SOIL VAPOR-TO-SOIL MODELING**
**RESULTS SHEET**

INCREMENTAL RISK CALCULATIONS:

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) |
|---|---|
| 2.3E-08 | 2.5E-04 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

**SCROLL DOWN TO "END"**

**END**

**APPENDIX B3**
**JOHNSON ETTINGER MODEL FILE**
**B-26 SOIL VAPOR-TO-SOIL MODELING**
**DATA ENTRY SHEET**

SG-ADV
Version 3.1; 02/04

Reset to Defaults

Soil Gas Concentration Data

| ENTER Chemical CAS No. (numbers only, no dashes) | ENTER Soil gas conc., $C_g$ ($\mu g/m^3$) | OR | ENTER Soil gas conc., $C_g$ (ppmv) | Chemical |
|---|---|---|---|---|
| 71432 | 2.40E+01 | | | Benzene |

MORE ↓

| ENTER Depth below grade to bottom of enclosed space floor, $L_F$ (cm) | ENTER Soil gas sampling depth below grade, $L_s$ (cm) | ENTER Average soil temperature, $T_S$ (°C) | ENTER Thickness of soil stratum A, $h_A$ (cm) | ENTER Thickness of soil stratum B, (Enter value or 0) $h_B$ (cm) | ENTER Thickness of soil stratum C, (Enter value or 0) $h_C$ (cm) | ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability) | OR | ENTER User-defined stratum A soil vapor permeability, $k_v$ ($cm^2$) |
|---|---|---|---|---|---|---|---|---|
| 15 | 198 | 12.5 | 198 | 0 | 0 | S | | |

Totals must add up to value of Ls (cell F24)

MORE ↓

| ENTER Stratum A SCS soil type (Lookup Soil Parameters) | ENTER Stratum A soil dry bulk density, $\rho_b^A$ ($g/cm^3$) | ENTER Stratum A soil total porosity, $n^A$ (unitless) | ENTER Stratum A soil water-filled porosity, $\theta_w^A$ ($cm^3/cm^3$) | ENTER Stratum B SCS soil type (Lookup Soil Parameters) | ENTER Stratum B soil dry bulk density, $\rho_b^B$ ($g/cm^3$) | ENTER Stratum B soil total porosity, $n^B$ (unitless) | ENTER Stratum B soil water-filled porosity, $\theta_w^B$ ($cm^3/cm^3$) | ENTER Stratum C SCS soil type (Lookup Soil Parameters) | ENTER Stratum C soil dry bulk density, $\rho_b^C$ ($g/cm^3$) | ENTER Stratum C soil total porosity, $n^C$ (unitless) | ENTER Stratum C soil water-filled porosity, $\theta_w^C$ ($cm^3/cm^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | 1.28 | 0.48 | 0.054 | | | | | | | | |

MORE ↓

| ENTER Enclosed space floor thickness, $L_{crack}$ (cm) | ENTER Soil-bldg. pressure differential, $\Delta P$ ($g/cm\text{-}s^2$) | ENTER Enclosed space floor length, $L_B$ (cm) | ENTER Enclosed space floor width, $W_B$ (cm) | ENTER Enclosed space height, $H_B$ (cm) | ENTER Floor-wall seam crack width, w (cm) | ENTER Indoor air exchange rate, ER (1/h) | ENTER Average vapor flow rate into bldg. OR Leave blank to calculate $Q_{soil}$ (L/m) |
|---|---|---|---|---|---|---|---|
| 10 | 40 | 1000 | 1000 | 244 | 0.1 | 1.5 | |

| ENTER Averaging time for carcinogens, $AT_C$ (yrs) | ENTER Averaging time for noncarcinogens, $AT_{NC}$ (yrs) | ENTER Exposure duration, ED (yrs) | ENTER Exposure frequency, EF (days/yr) |
|---|---|---|---|
| 75 | 30 | 30 | 250 |

END

**APPENDIX B3**
**JOHNSON ETTINGER MODEL FILE**
**B-26 SOIL VAPOR-TO-SOIL MODELING**
**INTERMEDIATE CALCULATIONS SHEET**

| Exposure duration, $\tau$ (sec) | Source-building separation, $L_T$ (cm) | Stratum A soil air-filled porosity, $\theta_a^A$ ($cm^3/cm^3$) | Stratum B soil air-filled porosity, $\theta_a^B$ ($cm^3/cm^3$) | Stratum C soil air-filled porosity, $\theta_a^C$ ($cm^3/cm^3$) | Stratum A effective total fluid saturation, $S_{te}$ ($cm^3/cm^3$) | Stratum A soil intrinsic permeability, $k_i$ ($cm^2$) | Stratum A soil relative air permeability, $k_{rg}$ ($cm^2$) | Stratum A soil effective vapor permeability, $k_v$ ($cm^2$) | Floor-wall seam perimeter, $X_{crack}$ (cm) | Soil gas conc. ($\mu g/m^3$) | Bldg. ventilation rate, $Q_{building}$ ($cm^3/s$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.46E+08 | 183 | 0.426 | ERROR | ERROR | 0.002 | 9.97E-08 | 0.999 | 9.95E-08 | 4,000 | 2.40E+01 | 1.02E+05 |

| Area of enclosed space below grade, $A_B$ ($cm^2$) | Crack-to-total area ratio, $\eta$ (unitless) | Crack depth below grade, $Z_{crack}$ (cm) | Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) | Henry's law constant at ave. soil temperature, $H_{TS}$ (atm-$m^3$/mol) | Henry's law constant at ave. soil temperature, $H'_{TS}$ (unitless) | Vapor viscosity at ave. soil temperature, $\mu_{TS}$ (g/cm-s) | Stratum A effective diffusion coefficient, $D^{eff}_A$ ($cm^2/s$) | Stratum B effective diffusion coefficient, $D^{eff}_B$ ($cm^2/s$) | Stratum C effective diffusion coefficient, $D^{eff}_C$ ($cm^2/s$) | Total overall effective diffusion coefficient, $D^{eff}_T$ ($cm^2/s$) | Diffusion path length, $L_d$ (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.06E+06 | 3.77E-04 | 15 | 8,096 | 3.04E-03 | 1.30E-01 | 1.76E-04 | 2.23E-02 | 0.00E+00 | 0.00E+00 | 2.23E-02 | 183 |

| Convection path length, $L_p$ (cm) | Source vapor conc., $C_{source}$ ($\mu g/m^3$) | Crack radius, $r_{crack}$ (cm) | Average vapor flow rate into bldg., $Q_{soil}$ ($cm^3/s$) | Crack effective diffusion coefficient, $D^{crack}$ ($cm^2/s$) | Area of crack, $A_{crack}$ ($cm^2$) | Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless) | Infinite source indoor attenuation coefficient, $\alpha$ (unitless) | Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$) | Unit risk factor, URF $(\mu g/m^3)^{-1}$ | Reference conc., RfC ($mg/m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 2.40E+01 | 0.10 | 9.96E+01 | 2.23E-02 | 4.00E+02 | 3.35E+48 | 5.53E-04 | 1.33E-02 | 7.8E-06 | 3.0E-02 |

**END**

**APPENDIX B3**
**JOHNSON ETTINGER MODEL FILE**
**B-26 SOIL VAPOR-TO-SOIL MODELING**
**RESULTS SHEET**

INCREMENTAL RISK CALCULATIONS:

| Incremental risk from vapor intrusion to indoor air, carcinogen (unitless) | Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless) |
|---|---|
| 9.5E-09 | 1.0E-04 |

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

**SCROLL DOWN TO "END"**

**END**

APPENDIX C

# Soil Vapor Sampling Parameters

# TABLE C-1
## SOIL VAPOR SAMPLING PARAMETERS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | | | | Pre-sample Collection | | | Mid-sample Collection | | | Post-sample Collection | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Date | Average Barometric Pressure (mbar) (a) | Sampling Flow Rate (min/L) | Total Organic Vapors with PID (ppm) | %Oxygen | %LEL (Methane) | Total Organic Vapors with PID (ppm) | %Oxygen | %LEL (Methane) | Total Organic Vapors with PID (ppm) | %Oxygen | %LEL (Methane) |
| LAI-SV-B23 (6.5-7.5) | 10/15/2010 | 1023 | 4.0 | 2.0 | 19.7 | 20.0 | 40.2 | 3.7 | 66.0 | 55.6 | 34.0 | 3.4 |
| LAI-SV-B17 (7-8) | 10/15/2010 | 1023 | 3.75 | 3.0 | 0.3 | 36.0 | 21.7 | 0.9 | 88.0 | 31.5 | 0.3 | NM |
| LAI-SV-B26 (6.5-7.5) | 10/15/2010 | 1023 | 3.25 | 0.6 | 0.7 | 82.0 | 1.3 | 0.5 | 92.0 | 1.8 | 0.7 | 73.0 |

Notes:

PID = Photoionization Detector
NM = Not Measured
(a) Barometric pressure for the Seattle area was recorded in morning, afternoon, and evening on the day prior to, day of, and day after sampling.
Average of recorded values over the three day span is shown in the table above.

APPENDIX B

# Technical Memorandum: Response to Comments – North Lot Development Cleanup Levels

# TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Jing Liu and Mark Adams
Northwest Regional Office – Toxics Cleanup Program
Washington State Department of Ecology

FROM: Tim Syverson, L.G., and Kris Hendrickson, P.E.

DATE: May 19, 2010

**RE: RESPONSE TO COMMENTS : NORTH LOT DEVELOPMENT CLEANUP LEVELS SEATTLE, WASHINGTON**

## INTRODUCTION

This technical memorandum has been prepared in response to comments received from the Washington State Department of Ecology (Ecology) in the letter titled *Opinion pursuant to WAC 173-340-515(5) on Remedial Investigation for the following Hazardous Waste Site: Name: North Lot Development; Property Address: 201 South King Street, Seattle, WA 98104; Facility/Site No.: 5378137; VCP Project No.: NW1986* (Ecology Opinion Letter) dated February 25, 2010. The above-mentioned letter provides Ecology's comments on the *Revised Ecology Review Draft Remedial Investigation Report, North Lot Development, Seattle, Washington.* The Remedial Investigation Report was prepared by Landau Associates on behalf of North Lot Development, LLC, and submitted to Ecology on October 16, 2009. Specifically, this technical memorandum addresses Ecology comments in the Opinion Letter related to the selection of cleanup levels for the site. These comments are found under the Cleanup Levels heading of Enclosure B – Data Gaps to the Ecology Opinion Letter. The Ecology comments are presented below in italics, followed by the response. Updated soil and groundwater cleanup level tables, and comprehensive data tables for the soil and groundwater analytical results, which include the laboratory reporting limits, are provided with the Feasibility Study report.

## CLEANUP LEVEL COMMENTS AND RESPONSES

Comments received from Ecology and the associated responses are provided below:

- *Ecology does not accept 1 mg/kg as the background value for cadmium, given that almost all analyses for this metal show it present at less than 0.2 mg/kg, and none exceed 1 mg/kg. Soil cleanup level for cadmium should be re-evaluated.*

  We understand that Ecology does not want us to use the published Puget Sound regional cadmium soil background value. Therefore, the soil cleanup level for cadmium will be adjusted to 0.69 milligrams per kilogram (mg/kg), which is the preliminary soil cleanup level identified prior to adjustment for background concentrations.

- *For zinc and copper, the background appears to have been derived from a PTI 1989 draft report. Ecology does not accept this report as an appropriate reference since the report has never been finalized, and the data set used in the report may not represent the specific situation at this Property. Soil cleanup level for zinc and copper should be re-evaluated. If the soil cleanup levels need to be revised, then ground water cleanup levels for zinc and copper should be re-evaluated too since the proposed ground water cleanup levels are established using the soil cleanup levels.*

  The cleanup levels for zinc and copper in groundwater have been revised to the corresponding cleanup levels prior to adjustment for background. The revised cleanup level for zinc in groundwater is 81 micrograms per liter (µg/L) and the revised cleanup level for copper in groundwater is 2.4 µg/L. As Ecology requested, all references to the PTI 1989 draft report for background groundwater values have been removed from the tables.

  With the adjustments to the groundwater cleanup levels for zinc and copper, adjustments to the soil cleanup levels for zinc and copper are also necessary. The revised soil cleanup level for zinc is 100 mg/kg, which is the concentration in soil protective of groundwater based on the Fixed Parameter Three-Phase Model and the groundwater cleanup level of 81 µg/L. The revised soil cleanup level for copper is 36 mg/kg, which is the 90$^{th}$ percentile background soil concentration for the Puget Sound Region.

- *Marine water quality standards appear to have been discounted for lead. Ecology believes the most stringent of the marine standards should be retained as the cleanup level (8.1. µg/L).*

  The most stringent of the marine standards will be retained as the cleanup level for lead in groundwater (8.1 µg/L). This change does not affect the established soil cleanup level for lead, and has been reflected on the groundwater cleanup level table.

- *Ecology does not accept the arsenic background value of 25 µg/L derived from upgradient concentration at the Union Station Site as the preliminary ground water cleanup level because the August 2009 data from all of the monitoring wells within the Property, except one, shows arsenic at or below 5 µg/L. The exception is 17 µg/L at MW-5. Arsenic concentrations may rebound to the higher levels reflected in the November 2008 data. However, it appears more likely that arsenic concentrations will remain near the lower August 2009 levels. If then groundwater at the Site is already cleaner than "background," it does not make sense to impose a less stringent cleanup level that potentially allows degradation of ground water quality.*

  *There is also a hydrologic reason not to adopt arsenic concentrations from upgradient areas to the east as background – ground water flowing onto the Property from these areas would be largely captured in the eastern hydraulic sink, and would not reach the rest of the Property. The only exceptions are the eastern and southeastern edges of the Property. Ecology therefore recommends using the MTCA Method A groundwater cleanup level of 5 µg/L, based on the state background concentration as the ground water cleanup level at this Site.*

  *The southeast corner of the Property has elevated arsenic concentrations in both soil and ground water, and arsenic appears to be migrating into ground water onto this portion of the Property from an upgradient source to the east. Therefore, Ecology recognizes that the water quality in this area is being impacted by an upgradient source with a background concentration of 21.3 µg/L.*

  Two cleanup levels will be used for arsenic in groundwater to account for differing conditions in the western and eastern portions of the Property including hydraulic flow in the central and eastern portions of the Property toward King Street Center due to the presence of a foundation drain system (see Figure 25 in Appendix B of the Feasibility Study report). A cleanup level of 5 µg/L will be adopted for the western portion of the Property. Adopting a cleanup level of 5 µg/L for most of the Property does not result in additional exceedances for arsenic that would impact the planned alternatives that are evaluated in the Feasibility Study. The cleanup level of 5 µg/L has been incorporated into the data and cleanup level tables in the Feasibility Study report.

A cleanup level of 21.3 µg/L will be used for arsenic in groundwater in the eastern portion of the Property, including the area of monitoring wells MW-5 and MW-15D due to the effect of upgradient sources to the east. Two additional rounds of sampling and analysis for arsenic were conducted at these two wells since Ecology issued the comments above. The analytical results from the February and April 2010 sampling events are included in the comprehensive groundwater data tables (Appendix C of the Feasibility Study report). In February and April 2010, arsenic was detected in the groundwater samples from MW-5 at 26 µg/L and 33 µg/L, respectively (up from 17 µg/L in August 2009). In the sample collected in February 2010, arsenic was not detected in the sample from MW-15D at a concentration above the laboratory reporting limit of 0.50 µg/L. However, arsenic was detected in the sample collected from MW-15D in April 2010 at a concentration of 14 µg/L (which is down from 16.8 µg/L in August 2009).

Based on the recent groundwater flow data (Figures 6 through 11 of the Feasibility Study report) and the arsenic concentrations detected in the samples from the on- and off-Property wells, the groundwater in the eastern portion of the Property is impacted by arsenic from off-Property sources. However, the concentrations detected in the groundwater samples from the on-Property wells located hydraulically downgradient of MW-5 and MW-15D do not indicate concentrations of arsenic greater than the cleanup level of 21.3 µg/L, indicating that the elevated concentrations are not due to on-Property sources.

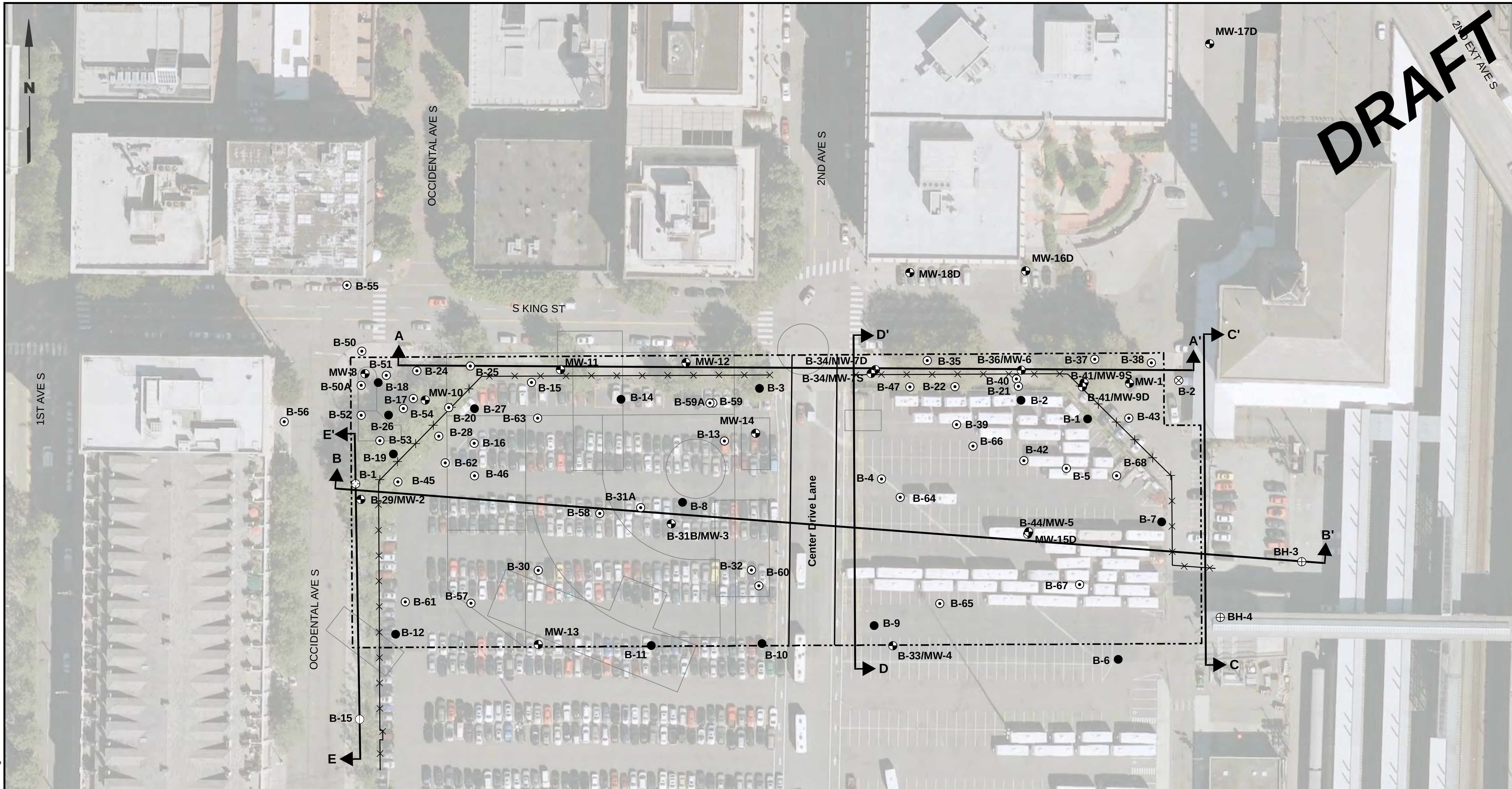
In addition, as requested by Ecology, an additional off-Property monitoring well (MW-18D) was installed to the west of well MW-16D and hydraulically downgradient of the central and eastern portions of the Property prior to the April 2010 sampling event. The arsenic concentration in the sample from MW-18D in April 2010 was 1.6 µg/L, further indicating that groundwater with arsenic concentrations above the cleanup levels is not migrating off site.

- *Tables for soil and groundwater cleanup levels should be updated by adding detection limits for all the compounds, including the non-detected compounds. It should be noted that detections limits should be as low as the preliminary cleanup levels unless the Practical Quantitation Limit (PQL) is above the cleanup level.*

  Reporting limits for all constituents analyzed for have been added to the comprehensive data tables for soil and groundwater, which are provided in Appendix C of the Feasibility Study report.

APPENDIX C

# Detected Constituents and Cleanup Level Exceedances in Soil and Groundwater: Figures from the Remedial Investigation Report




## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Previous Boring - Metropolitan Engineers, 1966
- Previous Boring - Shannon & Wilson, 1993
- Previous Boring - Geosciences Inc, 1998
- Previous Boring - Geogroup NW, 1996
- Historical Building Outlines
- Fence Line
- Property Boundary

0 80 160

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

**Note**

1. Refer to Figure 3 for Historical Property Features Legend.

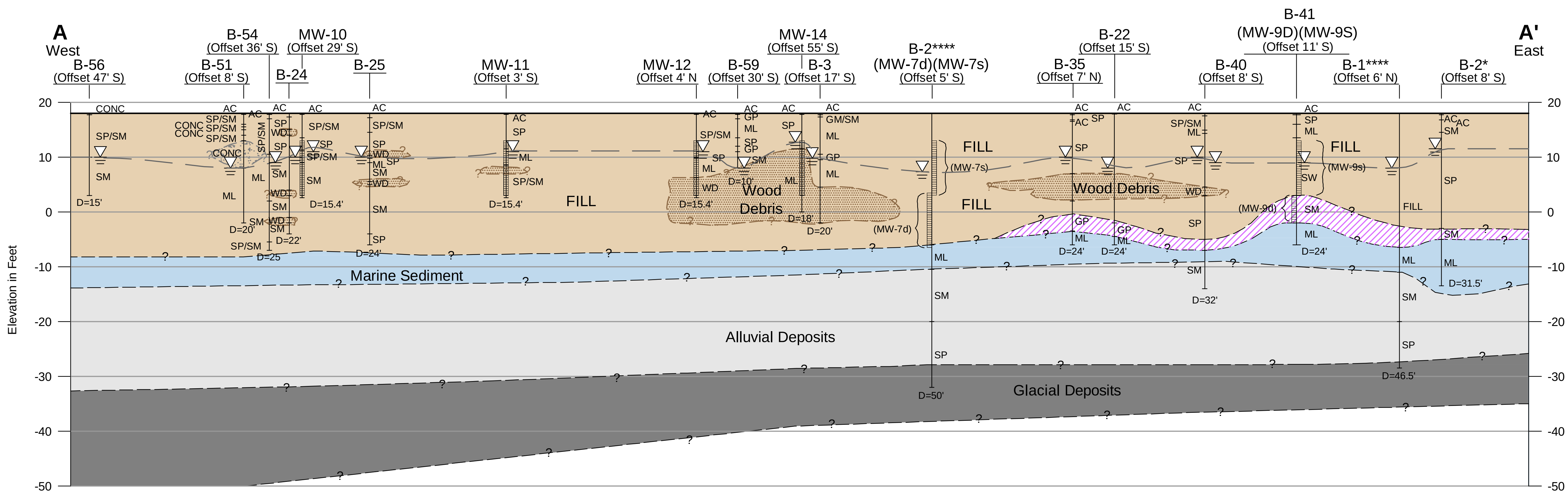
Y:\Projects\1014001\Mapdocs\North Lot RI\Fig10-Cross-SectionLocations.mxd 5/19/2010

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Cross-Section Locations**

Figure
10




## Legend

* Shannon & Wilson 1993
** Geogroup NW 1996
*** Geosciences Inc. 1998
**** Terra Associates 2008
***** Metropolitan Engineers 1966

**B-1** — Project Exploration Designation
(Offset 160' W) — Offset Distance in Feet and Direction

Top of Exploration
Groundwater Level (At time of drilling)
GM — Unified Soils Classification Symbol (see Appendix A-1)
Inferred Groundwater Table
Inferred Geologic Contact
Well Screen Interval (If a Monitoring Well was Constructed)
Bottom of Exploration
D=14' — Total Depth of Exploration

**Fill** — Primarily SAND, with varying percentages of silt and gravel; SILT with varying percentages of sand; GRAVEL with varying percentages of sand and silt; Debris contained in matrix includes concrete, brick, and trace to substantial percentages of wood.

- Creosote Affected Zone — Creosote-like material in soil
- Wood Debris — Brown wood debris as sawdust, wood chippings, and timber (loose to very dense)
- Concrete Debris — Crushed concrete

**Marine Sediment** — Primarily SILT, with varying percentages of sand; SAND with varying percentages of silt; trace shell fragments contained in matrix (very soft to medium stiff).

**Alluvial Deposits** — Primarily SAND with varying percentages of silt, gravel, and clay (very loose to dense).

**Glacial Deposits** — Mixture of sand, gravels, silt, and clay (dense to very dense). Contact between alluvial deposits and glacial deposits corresponds to increased material density.

## Notes

1. This cross section has been interpreted and generalized from project field data. Variations between this cross section and actual conditions may exist. The project boring logs and written report must be referenced for a proper understanding of the nature of the subsurface conditions. This cross section was prepared for environmental interpretation purposes and is not intended to be used for geotechnical planning purposes.
2. See report text for descriptions of geologic units.
3. For cross-section line location, see Figure 7.
4. Water level data for borings B-2 and B-1 (Terra Associates 2008) adjusted based on data from monitoring wells MW-7 and MW-1.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

DRAFT

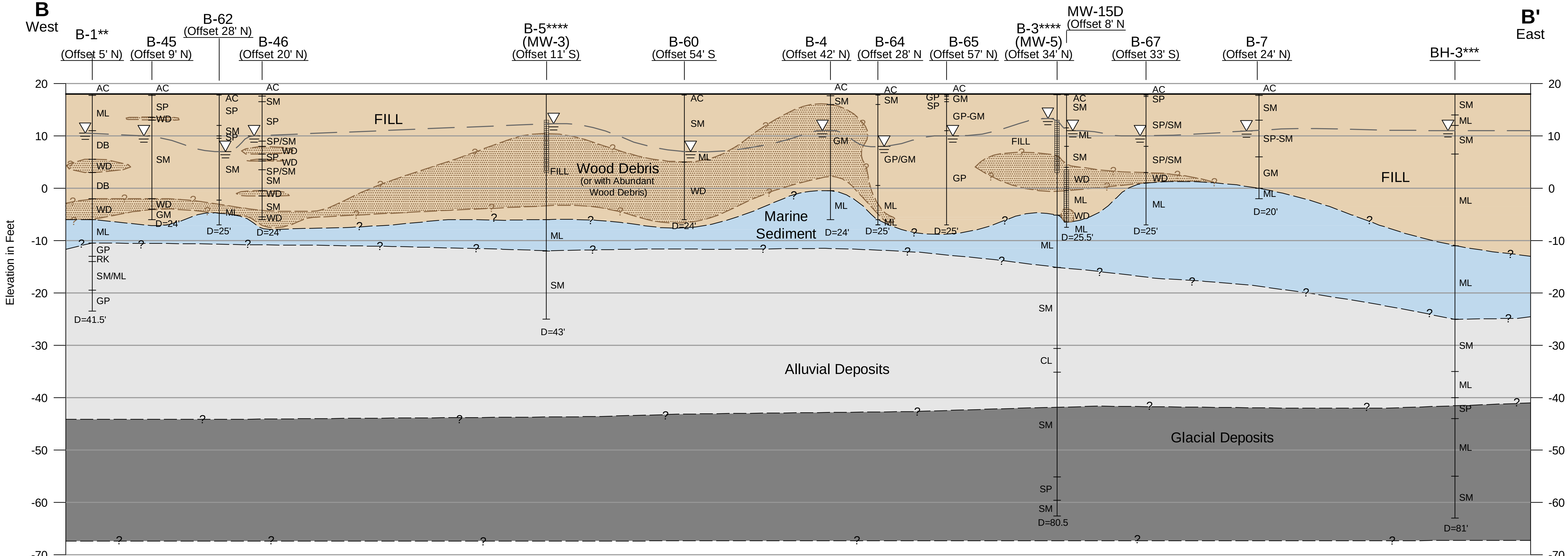
0 60 120
Horizontal Scale: 1" = 60'
Vertical Scale: 1" = 20'

Data Source: Triad Boundary Survey, King County



LANDAU ASSOCIATES

| North Lot Development<br>Seattle, Washington | **Geologic Cross Section A-A'** | Figure<br>11 |
|---|---|---|




## Legend

| | |
|---|---|
| * | Shannon & Wilson 1993 |
| ** | Geogroup NW 1996 |
| *** | Geosciences Inc. 1998 |
| **** | Terra Associates 2008 |
| ***** | Metropolitan Engineers 1966 |

**B-1** — Project Exploration Designation

(Offset 160' W) — Offset Distance in Feet and Direction

- Top of Exploration
- Groundwater Level (At time of drilling)
- GM — Unified Soils Classification Symbol (see Appendix A-1)
- Inferred Groundwater Table
- Inferred Geologic Contact
- Well Screen Interval (If a Monitoring Well was Constructed)
- Bottom of Exploration
- D=14' — Total Depth of Exploration

| | |
|---|---|
| Fill | Primarily SAND, with varying percentages of silt and gravel; SILT with varying percentages of sand; GRAVEL with varying percentages of sand and silt; Debris contained in matrix includes concrete, brick, and trace to substantial percentages of wood. |
| Creosote Affected Zone | Creosote-like material in soil |
| Wood Debris | Brown wood debris as sawdust, wood chippings, and timber (loose to very dense). |
| Marine Sediment | Primarily SILT, with varying percentages of sand; SAND with varying percentages of silt; trace shell fragments contained in matrix (very soft to medium stiff). |
| Alluvial Deposits | Primarily SAND with varying percentages of silt, gravel, and clay (very loose to dense). |
| Glacial Deposits | Mixture of sand, gravels, silt, and clay (dense to very dense). Contact between alluvial deposits and glacial deposits corresponds to increased material density. |

0 60 120

Horizontal Scale: 1" = 60'
Vertical Scale: 1" = 20'

## Notes

1. This cross section has been interpreted and generalized from project field data. Variations between this cross section and actual conditions may exist. The project boring logs and written report must be referenced for a proper understanding of the nature of the subsurface conditions. This cross section was prepared for environmental interpretation purposes and is not intended to be used for geotechnical planning purposes.
2. See report text for descriptions of geologic units.
3. For cross-section line location, see Figure 7.
4. Water level data from borings B-5 and B-3 (Terra Associates 2008) adjusted based on data from monitoring wells MW-3 and MW-5.
5. Wood debris observations in B-5 and B-3 (Terra Associates 2008) noted from co-located borings B-31b and B-44.
6. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

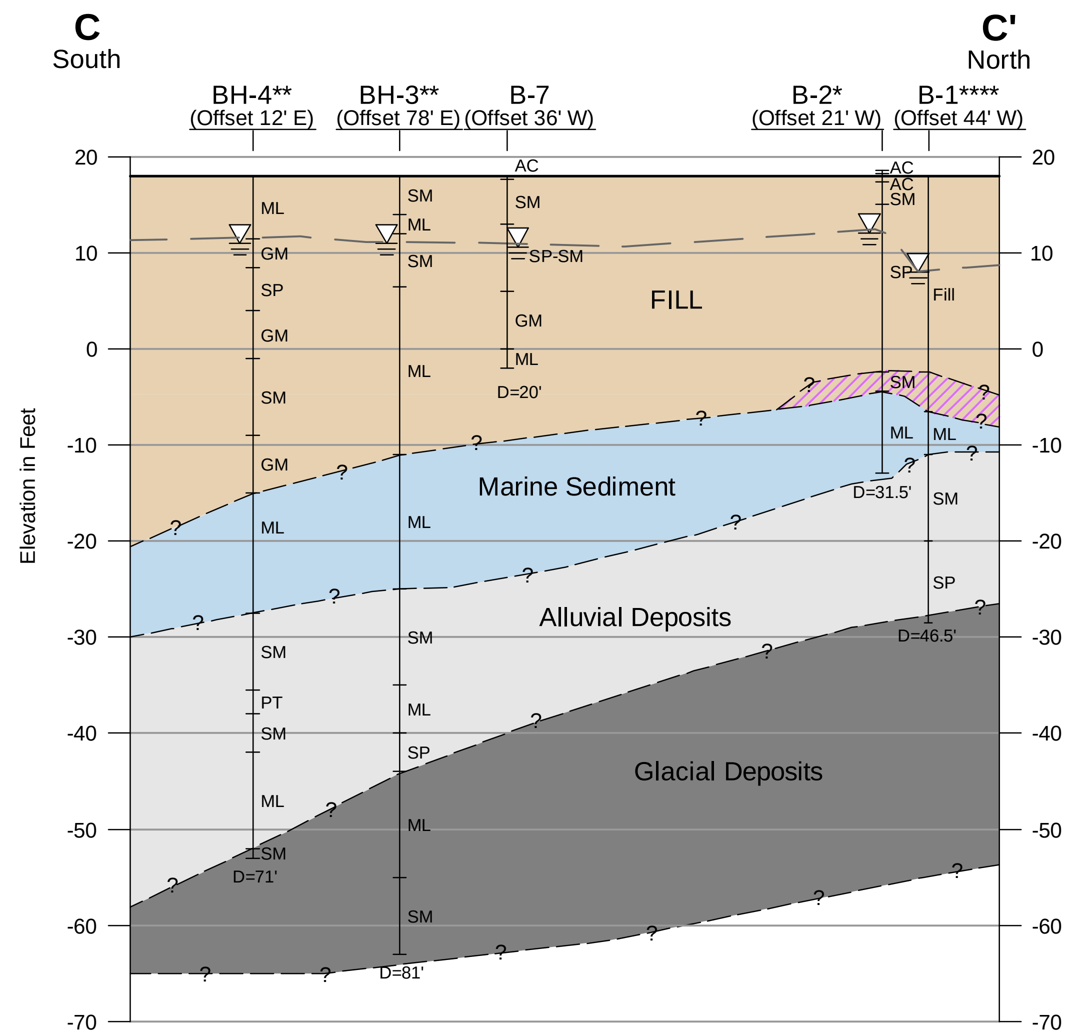
Data Source: Triad Boundary Survey, King County

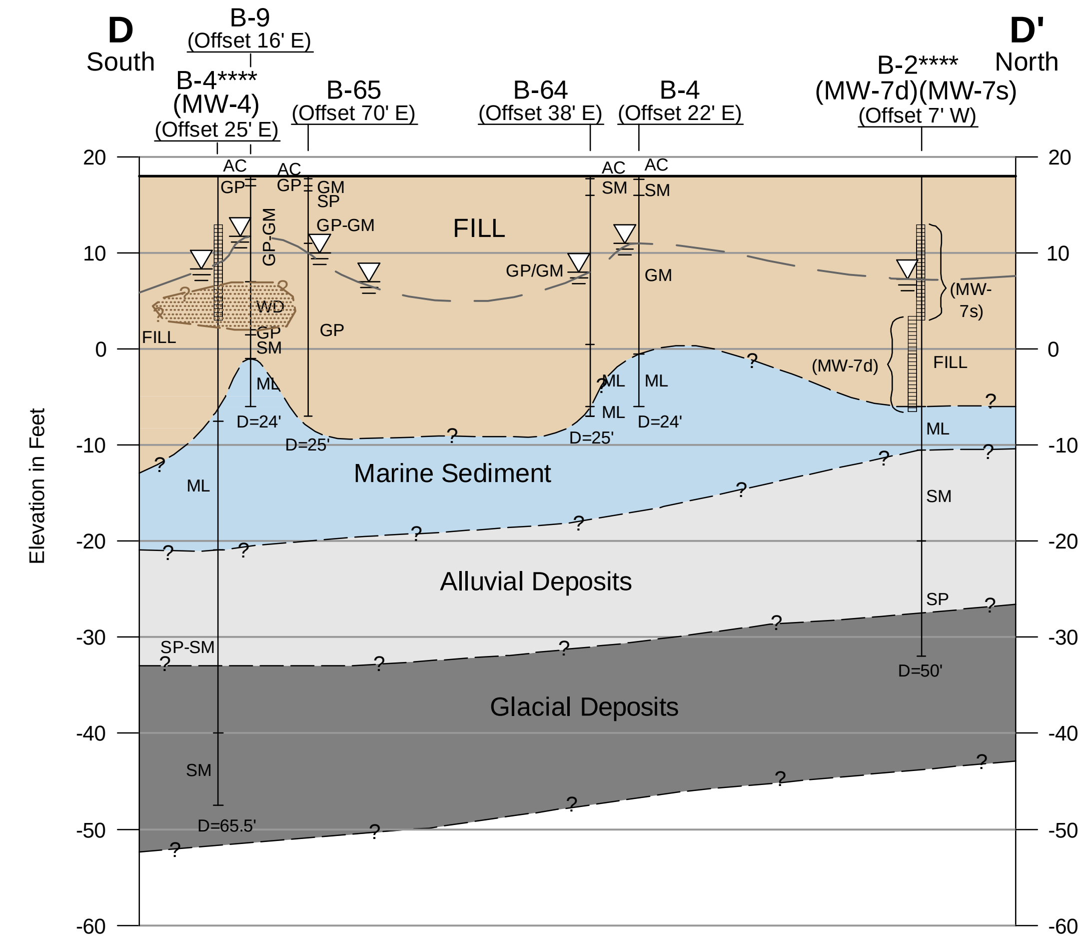
DRAFT

Qwest Field | V:\1014\040\044\Supplemental RIFS\Fig11-14.dwg (A) "Figure 12" 10/9/2009

LANDAU ASSOCIATES

| North Lot Development Seattle, Washington | Geologic Cross Section B-B' | Figure 12 |
|---|---|---|




## Legend

| | |
|---|---|
| * | Shannon & Wilson 1993 |
| ** | Geogroup NW 1996 |
| *** | Geosciences Inc. 1998 |
| **** | Terra Associates 2008 |
| ***** | Metropolitan Engineers 1966 |
| B-1 | Project Exploration Designation |
| (Offset 160' W) | Offset Distance in Feet and Direction |
| | Top of Exploration |
| | Groundwater Level (At time of drilling) |
| GM | Unified Soils Classification Symbol (see Appendix A-1) |
| | Inferred Groundwater Table |
| | Inferred Geologic Contact |
| | Well Screen Interval (If a Monitoring Well was Constructed) |
| | Bottom of Exploration |
| D=14' | Total Depth of Exploration |

DRAFT

| | |
|---|---|
| Fill | Primarily SAND, with varying percentages of silt and gravel; SILT with varying percentages of sand; GRAVEL with varying percentages of sand and silt; Debris contained in matrix includes concrete, brick, and trace to substantial percentages of wood. |
| Creosote Affected Zone | Creosote-like material in soil |
| Wood Debris | Brown wood debris as sawdust, wood chippings, and timber (loose to very dense). |
| Marine Sediment | Primarily SILT, with varying percentages of sand; SAND with varying percentages of silt; trace shell fragments contained in matrix (very soft to medium stiff). |
| Alluvial Deposits | Primarily SAND with varying percentages of silt, gravel, and clay (very loose to dense). |
| Glacial Deposits | Mixture of sand, gravels, silt, and clay (dense to very dense). Contact between alluvial deposits and glacial deposits corresponds to increased material density. |

## Notes

1. This cross section has been interpreted and generalized from project field data. Variations between this cross section and actual conditions may exist. The project boring logs and written report must be referenced for a proper understanding of the nature of the subsurface conditions. This cross section was prepared for environmental interpretation purposes and is not intended to be used for geotechnical planning purposes.
2. See report text for descriptions of geologic units.
3. For cross-section line location, see Figure 7.
4. Water level data from borings B-1, B-4, and B-2 (Terra Associates 2008) adjusted based on data from monitoring wells MW-1, MW-4, and MW-7.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 60 120
Horizontal Scale: 1" = 60'
Vertical Scale: 1" = 20'

Data Source: Triad Boundary Survey, King County

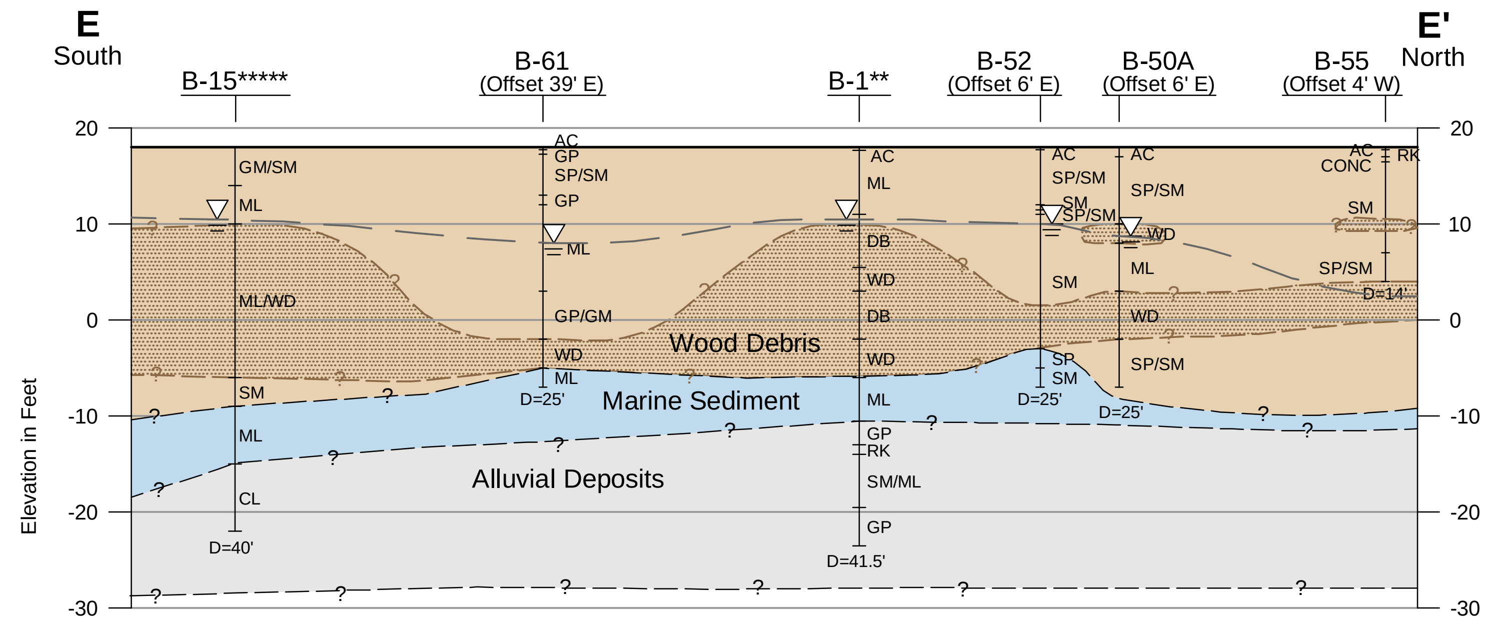
Qwest Field | V:\1014\040\044\Supplemental RIFS\Fig11-14.dwg (A) "Figure 13" 10/9/2009

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Geologic Cross Sections C-C' & D-D'**

Figure 13




## Legend

| | |
|---|---|
| * | Shannon & Wilson 1993 |
| ** | Geogroup NW 1996 |
| *** | Geosciences Inc. 1998 |
| **** | Terra Associates 2008 |
| ***** | Metropolitan Engineers 1966 |
| B-1 | Project Exploration Designation |
| (Offset 160' W) | Offset Distance in Feet and Direction |
| | Top of Exploration |
| | Groundwater Level (At time of drilling) |
| GM | Unified Soils Classification Symbol (see Appendix A-1) |
| | Inferred Groundwater Table |
| | Inferred Geologic Contact |
| | Well Screen Interval (If a Monitoring Well was Constructed) |
| | Bottom of Exploration |
| D=14' | Total Depth of Exploration |

| | |
|---|---|
| Fill | Primarily SAND, with varying percentages of silt and gravel; SILT with varying percentages of sand; GRAVEL with varying percentages of sand and silt; Debris contained in matrix includes concrete, brick, and trace to substantial percentages of wood. |
| Creosote Affected Zone | Creosote-like material in soil |
| Wood Debris | Brown wood debris as sawdust, wood chippings, and timber (loose to very dense). |
| Marine Sediment | Primarily SILT, with varying percentages of sand; SAND with varying percentages of silt; trace shell fragments contained in matrix (very soft to medium stiff). |
| Alluvial Deposits | Primarily SAND with varying percentages of silt, gravel, and clay (very loose to dense). |
| Glacial Deposits | Mixture of sand, gravels, silt, and clay (dense to very dense). Contact between alluvial deposits and glacial deposits corresponds to increased material density. |

## Notes

1. This cross section has been interpreted and generalized from project field data. Variations between this cross section and actual conditions may exist. The project boring logs and written report must be referenced for a proper understanding of the nature of the subsurface conditions. This cross section was prepared for environmental interpretation purposes and is not intended to be used for geotechnical planning purposes.
2. See report text for descriptions of geologic units.
3. For cross-section line location, see Figure 7.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

DRAFT

0 60 120
Horizontal Scale: 1" = 60'
Vertical Scale: 1" = 20'

Data Source: Triad Boundary Survey, King County

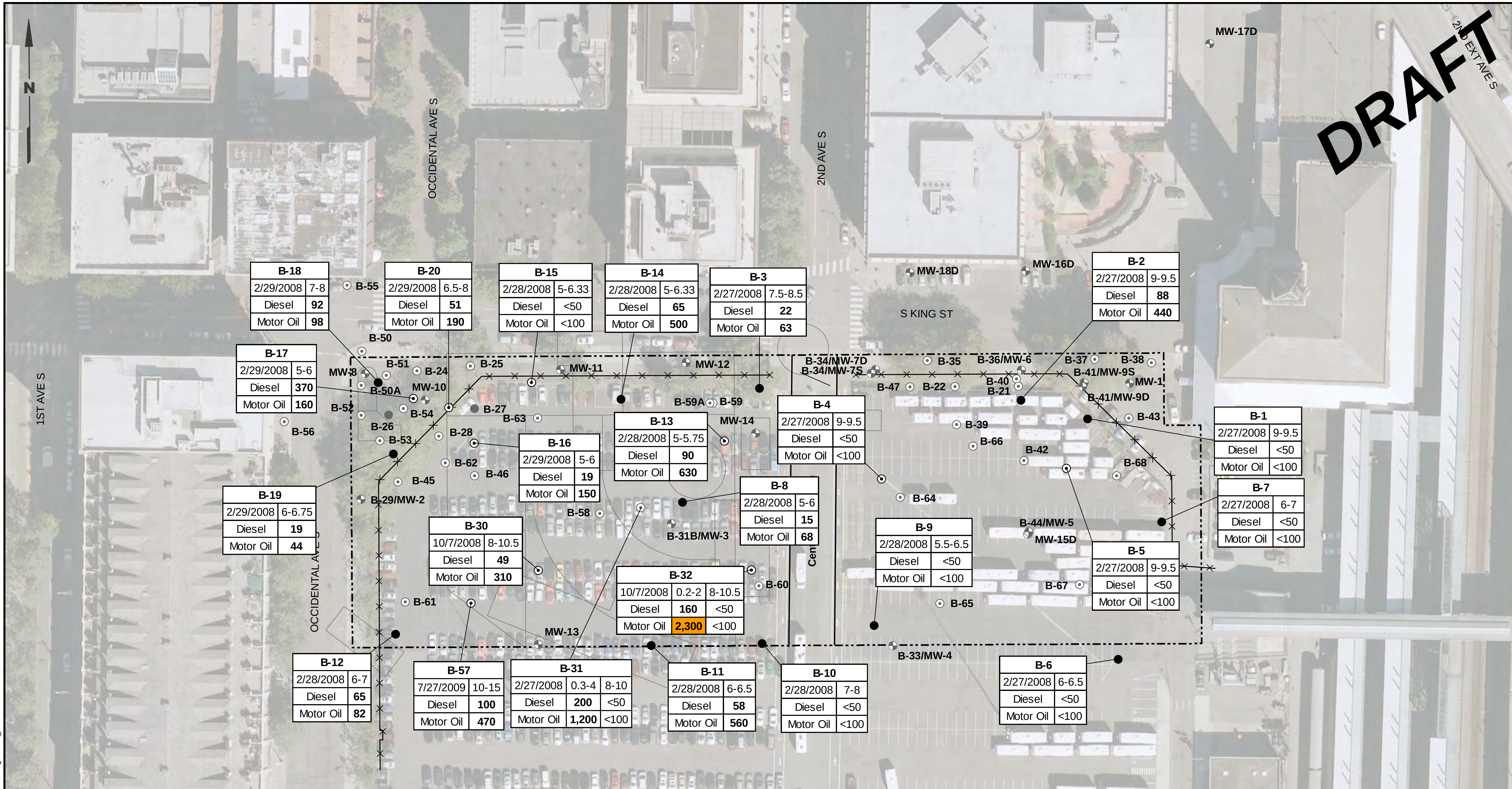
Qwest Field | V:\1014\040\044\Supplemental RIFS\Fig11-14.dwg (A) "Figure 14" 10/9/2009

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Geologic Cross Section E-E'**

Figure 14




**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | |
|---|---|
| Date | Depth (ft) |
| Diesel | Result mg/kg |
| Motor Oil | Result mg/kg |

**Notes**

1. Gray symbol indicates sample was not analyzed for this constituent at this depth.
2. Depths are in feet below ground surface.
3. Diesel soil cleanup level is 2,000 mg/kg, Motor Oil soil cleanup level is 2,000 mg/kg.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration
6. Refer to Figure 3 for Historical Property Features Legend.
7. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 80 160

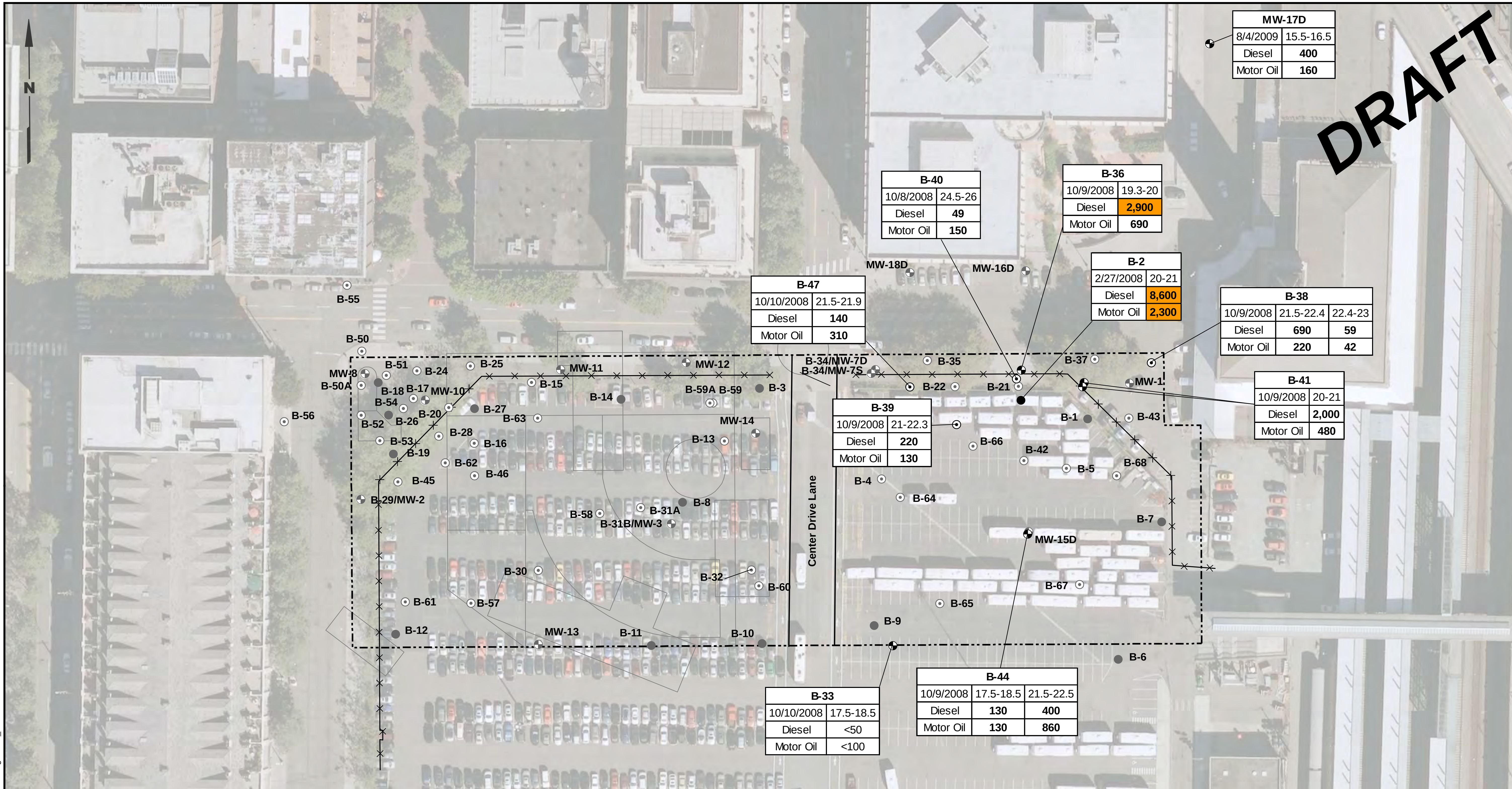
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

| North Lot Development Seattle, Washington | Diesel and Motor Oil Detected in Soil 0-15 Feet Below Ground Surface | Figure 15 |
|---|---|---|

Y:\Projects\1014001\Mapdocs\North Lot RI\Fig15-DM_0-15.mxd 5/20/2010




Y:\Projects\1014001\Mapdocs\North Lot RI\Fig16-DM_15+.mxd 5/20/2010

## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | |
|---|---|
| Date | Depth (ft) |
| Diesel | Result mg/kg |
| Motor Oil | Result mg/kg |

**Notes**

1. Gray symbol indicates sample was not analyzed for this constituent at this depth.
2. Depths are in feet below ground surface.
3. Diesel soil cleanup level is 2,000 mg/kg, Motor Oil soil cleanup level is 2,000 mg/kg.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration
6. Refer to Figure 3 for Historical Property Features Legend.
7. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

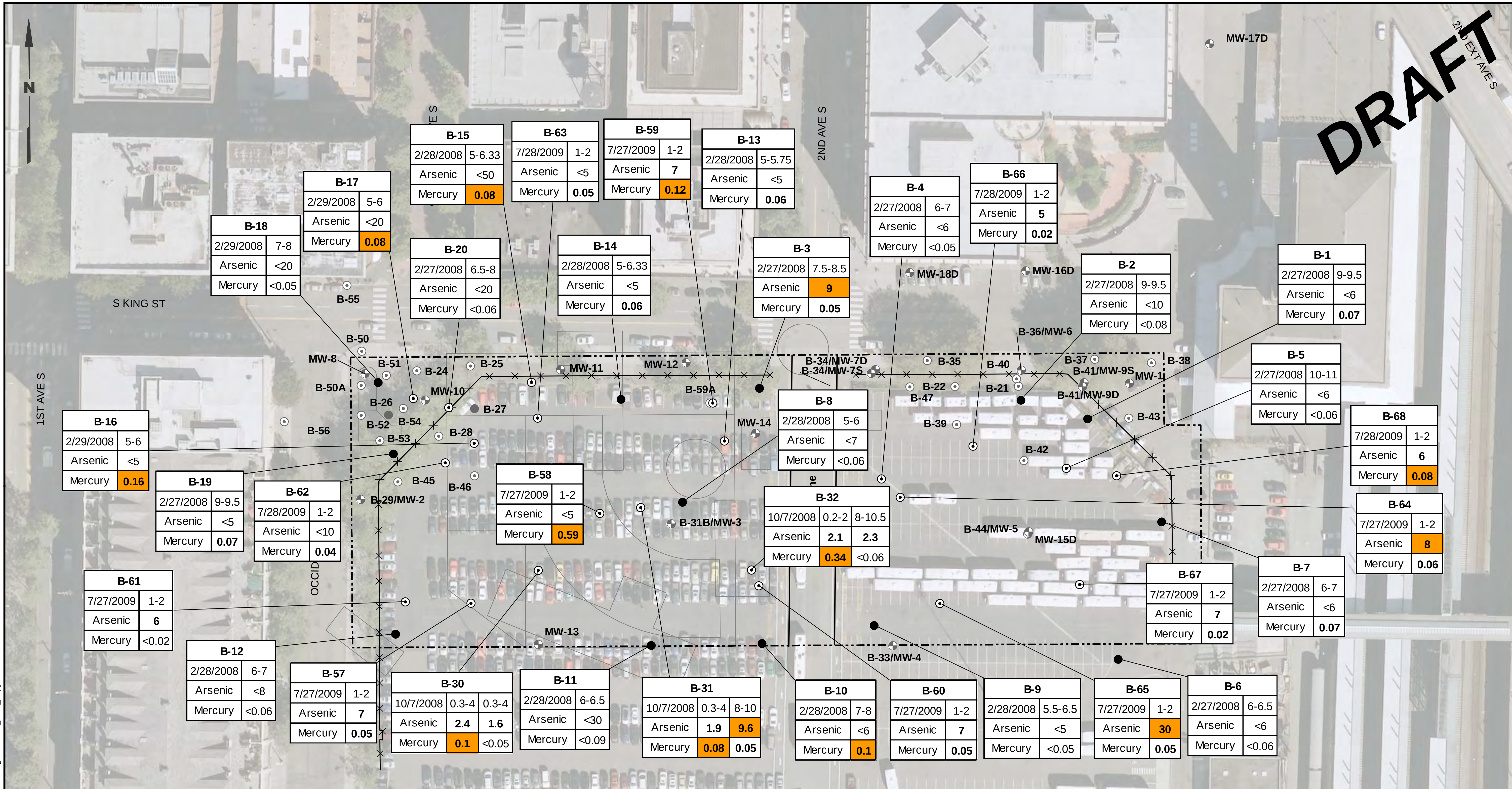
0 80 160

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

| North Lot Development<br>Seattle, Washington | **Diesel and Motor Oil Detected in Soil 15+ Feet Below Ground Surface** | Figure 16 |
|---|---|---|




## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | |
|---|---|
| Date | Depth (ft) |
| Arsenic | Result mg/kg |
| Mercury | Result mg/kg |

**Notes**

1. Gray symbol indicates sample was not analyzed for this constituent at this depth.
2. Depths are in feet below ground surface.
3. Soil cleanup levels for metals are as follows: Arsenic is 7 mg/kg, Mercury is 0.07 mg/kg.
4. NA = Not Analyzed
5. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
6. <1.00 = The analyte was not detected at the reported concentration
7. Refer to Figure 3 for historical property features legend.
8. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 80 160
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

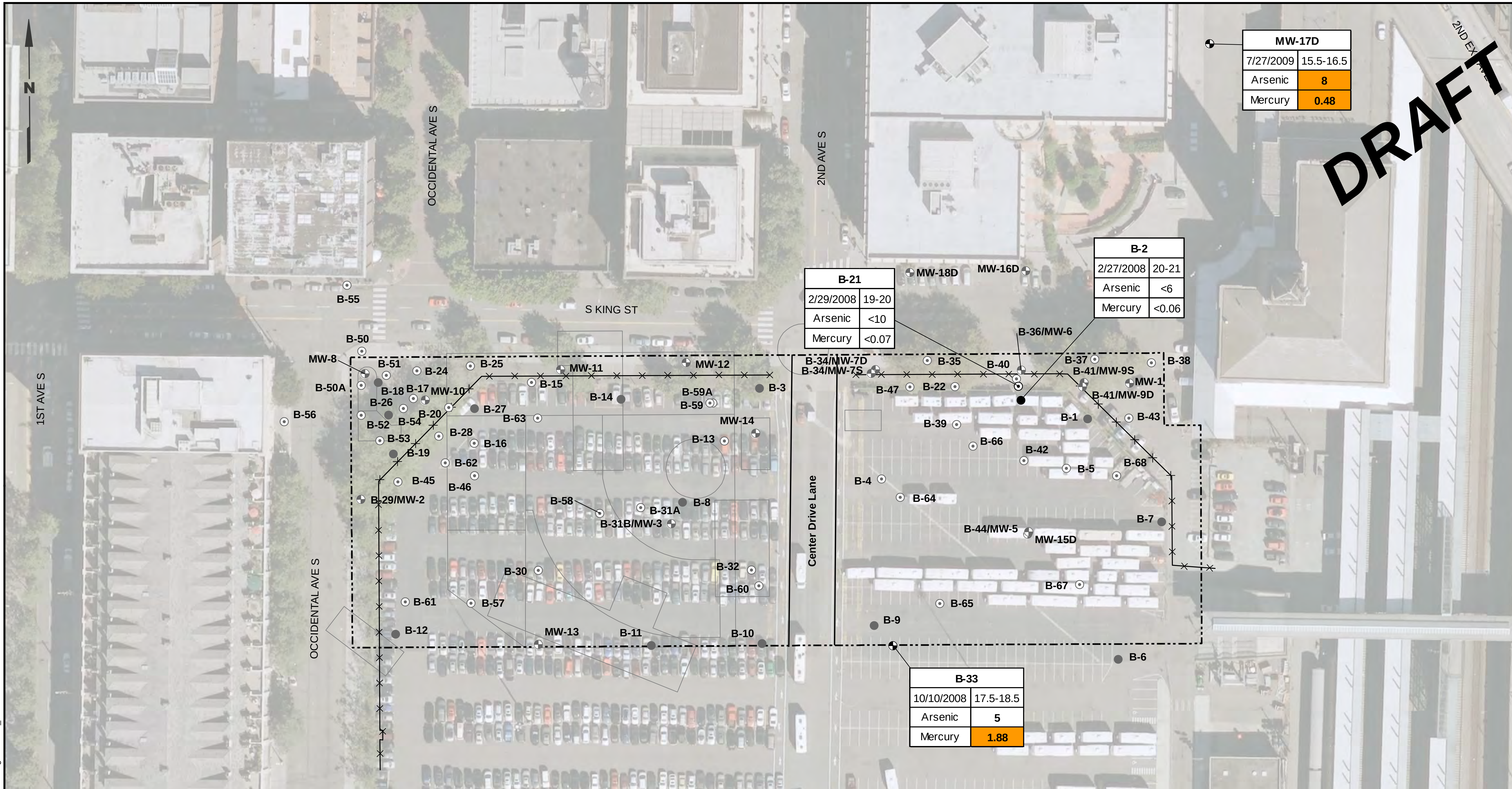
Y:\Projects\1014001\Mapdocs\North Lot RI\Fig17-Metals_0-15_copy.mxd 5/19/2010

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Arsenic, and Mercury Detected in Soil 0-15 Feet Below Ground Surface**

Figure 17




## Legend

| | |
|---|---|
| ⊕ | Direct-Push Soil Boring and Monitoring Well Location |
| ⊙ | Direct-Push Soil Boring Location |
| ● | Direct-Push Soil and Groundwater Sample Location |
| —— | Historical Building Outlines |
| ×—× | Fence Line |
| - · - | Property Boundary |

| Location ID | |
|---|---|
| Date | Depth (ft) |
| Arsenic | Result mg/kg |
| Mercury | Result mg/kg |

**Notes**
1. Gray symbol indicates sample was not analyzed for this constituent at this depth.
2. Depths are in feet below ground surface.
3. Metal soil cleanup levels are as follows: Arsenic = 7 mg/kg, Mercury = 0.07 mg/kg
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. NA = Not Analyzed
6. <1.00 = The analyte was not detected at the reported concentration
7. Refer to Figure 3 for Historical Property Features Legend.
8. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

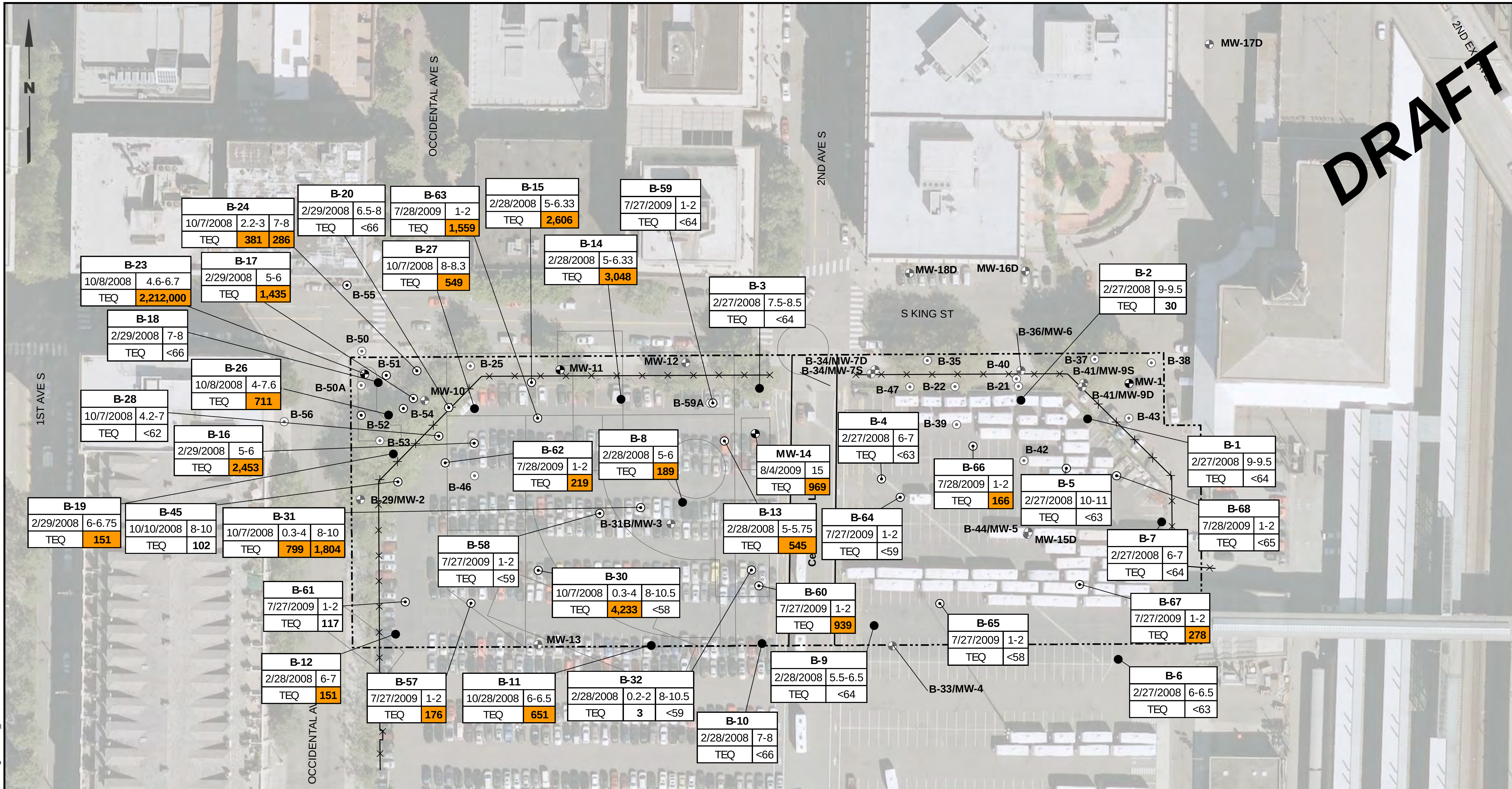
0 80 160
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

Y:\Projects\1014001\Mapdocs\North Lot RI\Fig18-Metals_15+.mxd 5/19/2010

LANDAU ASSOCIATES

| North Lot Development Seattle, Washington | Arsenic, and Mercury Detected in Soil 15+ Feet Below Ground Surface | Figure 18 |
|---|---|---|




## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | |
|---|---|
| Date | Depth (ft) |
| TEQ | Result µg/kg |

**Notes**
1. Gray symbol indicates sample was not analyzed for this constituent at this depth.
2. Depths are in feet below ground surface.
3. Soil cPAH TEQ cleanup level is 140 µg/kg.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration.
6. Refer to Figure 3 for Historical Property Features Legend.
7. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

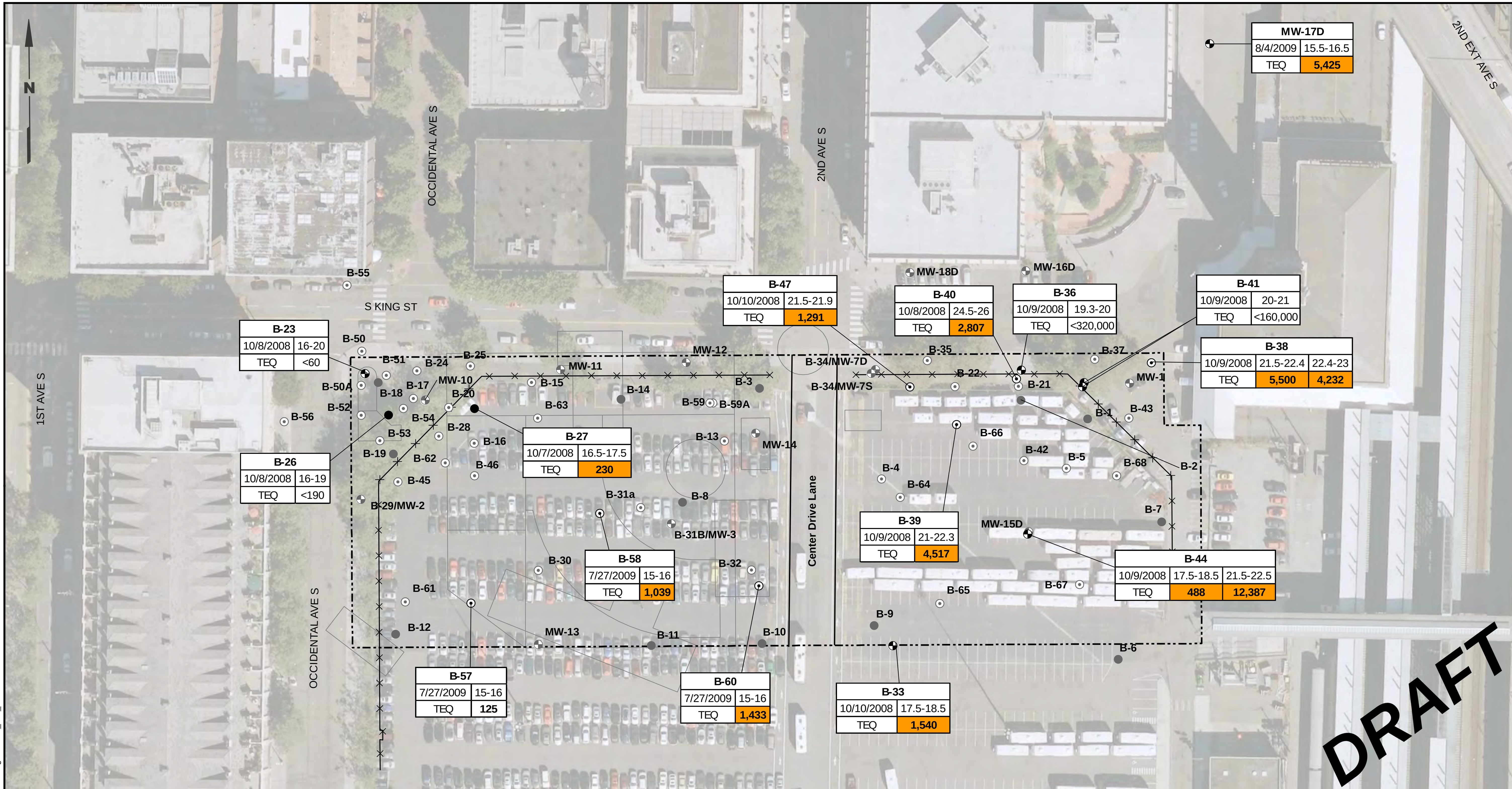
0 80 160
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

| North Lot Development Seattle, Washington | **cPAHs (TEQ) Detected in Soil 0-15 Feet Below Ground Surface** | Figure 19 |
|---|---|---|

LANDAU ASSOCIATES

Y:\Projects\1014001\Mapdocs\North Lot RI\Fig19-cPAH_0-15.mxd 5/19/2010




Y:\Projects\1014001\Mapdocs\North Lot RI\Fig20-cPAH_Soil_15+.mxd 5/19/2010

**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | |
|---|---|
| Date | Depth (ft) |
| TEQ | Result µg/kg |

**Notes**

1. Gray symbol indicates sample was not analyzed for this constituent at this depth.
2. Depths are in feet below ground surface.
3. Soil cPAH TEQ is 140 µg/kg.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration
6. Refer to Figure 3 for Historical Property Features Legend.
7. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

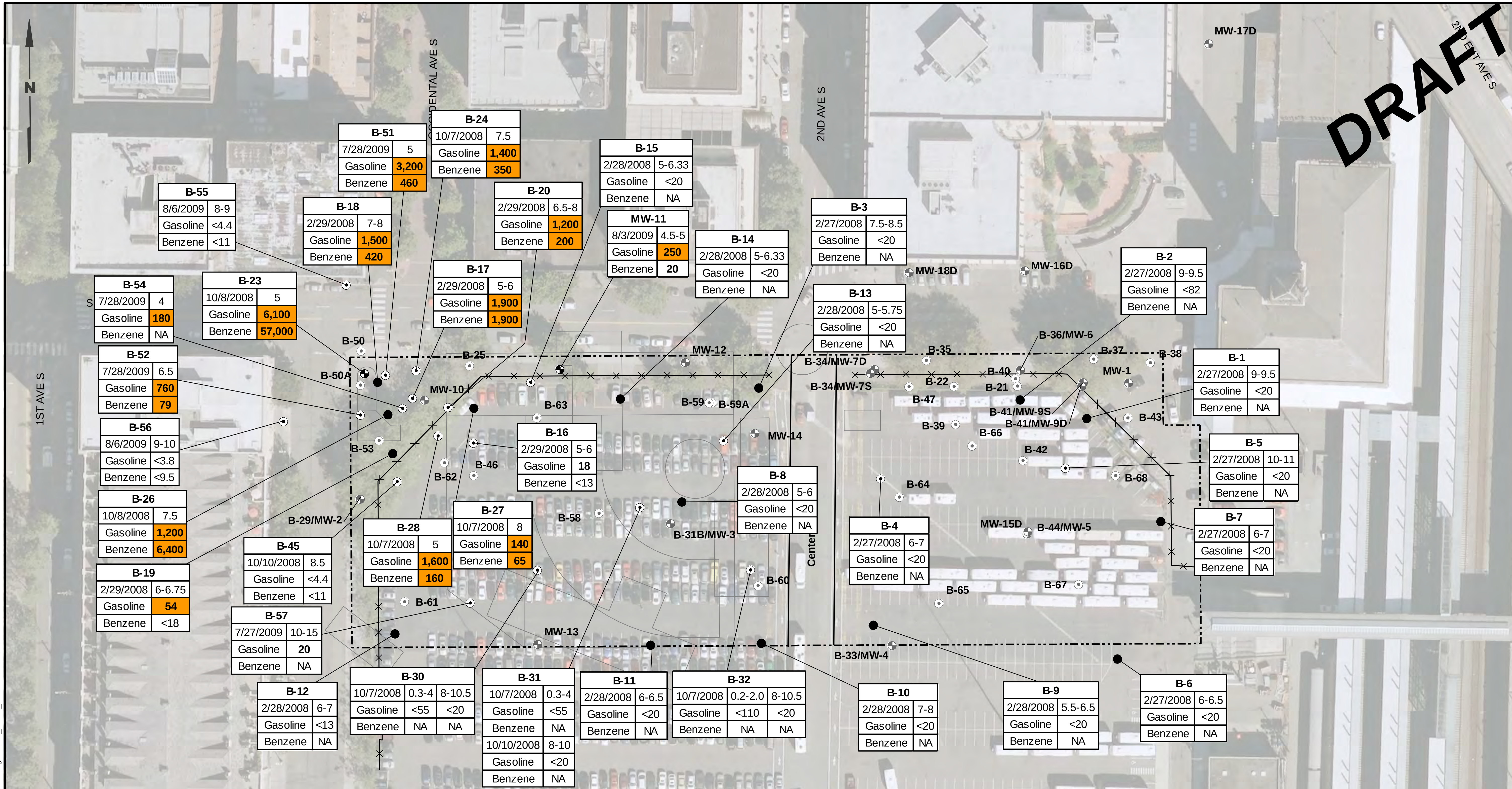
0 80 160

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

| North Lot Development<br>Seattle, Washington | **cPAHs (TEQ) Detected in Soil 15+ Feet Below Ground Surface** | Figure<br>20 |
|---|---|---|






**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | |
|---|---|
| Date | Depth (ft) |
| Gasoline | Result mg/kg |
| Benzene | Result µg/kg |

**Notes**

1. Gray symbol indicates sample was not analyzed for the constituent at this depth.
2. Depths are in feet below ground surface.
3. Gasoline soil cleanup level is 30 mg/kg. Benzene soil cleaup level is 25 µg/kg, which was revised based on revisions to Feasibility Study.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration.
6. Refer to Figure 3 for Historical Property Features Legend.
7. NA = Not Analyzed.
8. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 80 160

Scale in Feet

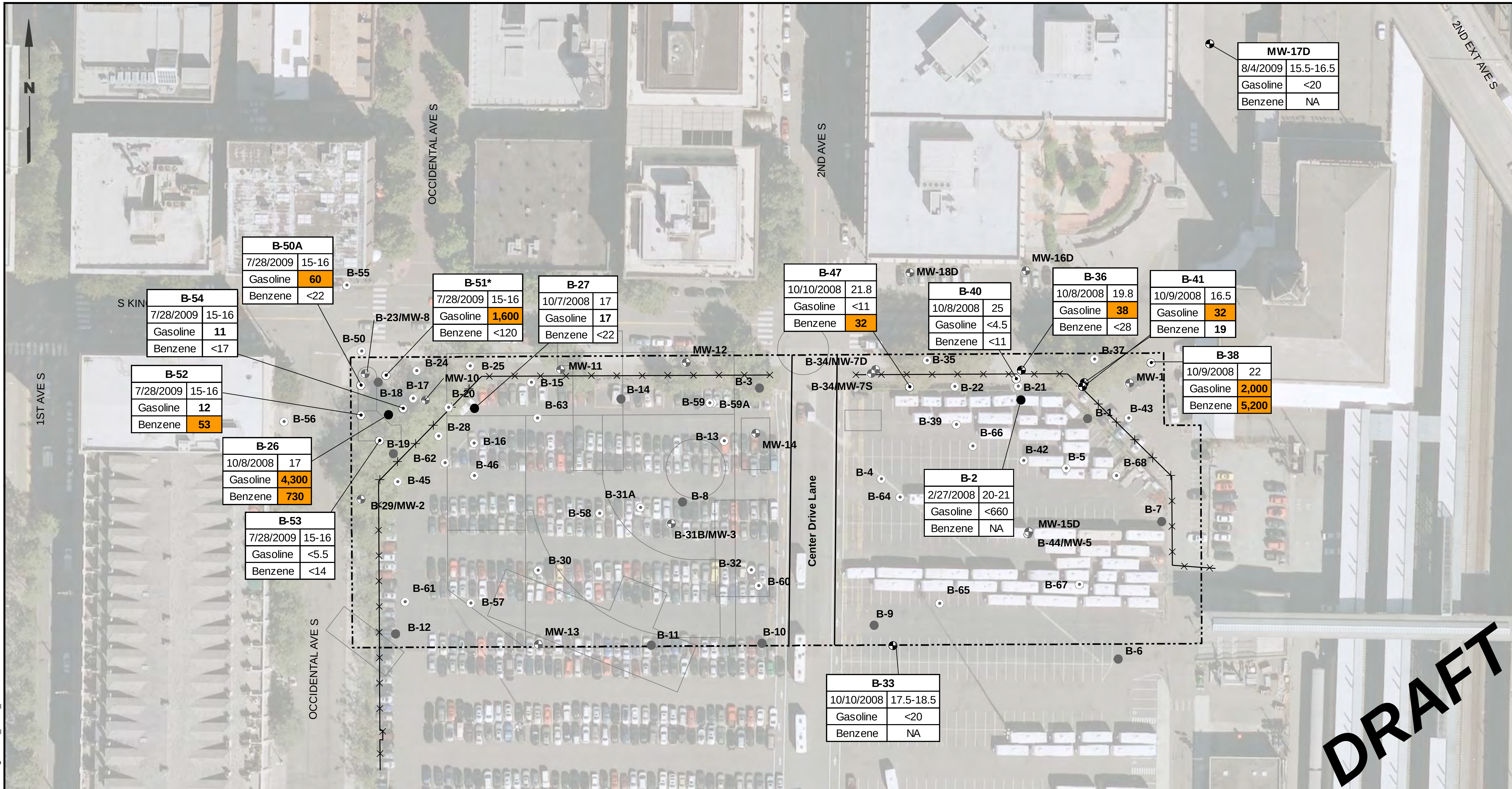
*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Gasoline and Benzene Detected in Soil 0-15 Feet Below Ground Surface**

Figure 21




## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | |
|---|---|
| Date | Depth (ft) |
| Gasoline | Result mg/kg |
| Benzene | Result µg/kg |

**Notes**

1. Gray symbol indicates sample was not analyzed for this constituent at this depth.
2. Depths are in feet below ground surface.
3. Gasoline soil cleanup level is 30 mg/kg. Benzene soil cleanup level is 25 µg/kg, which was revised based on revisions to Feasibility Study.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration.
6. Refer to Figure 3 for Historical Property Features Legend.
7. NA = Not Analyzed.
8. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

* Benzene reporting limit elevated at B-51 due to sample conditions. Toluene was detected at B-51 at 700 µg/kg.

0 70 140
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

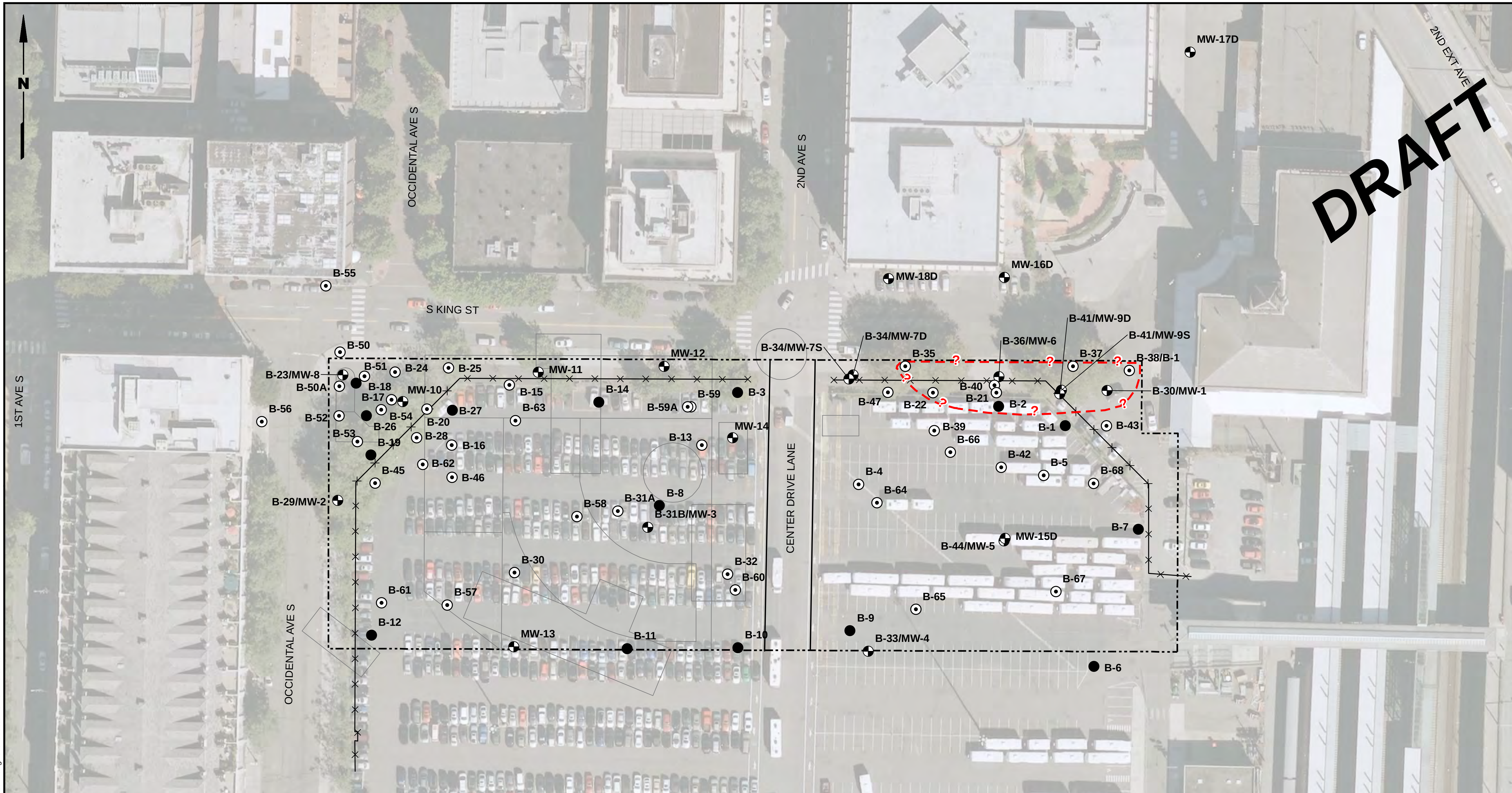
Y:\Projects\1014001\Mapdocs\North Lot RI\Fig22-Gas_BTEX_15+.mxd 3/14/2011

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Gasoline and Benzene Detected in Soil 15+ Feet Below Ground Surface**

Figure 22




Y:\Projects\1014001\Mapdocs\North Lot RI\Fig23-CreosotePlume.mxd 5/19/2010

**Legend**

- Approximate Extent of Creosote-Like Material
- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Historical Building Outlines
- Fence Line
- Property Boundary

Note
1. Refer to Figure 3 for Historical Property Features Legend.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 80 160

Scale in Feet

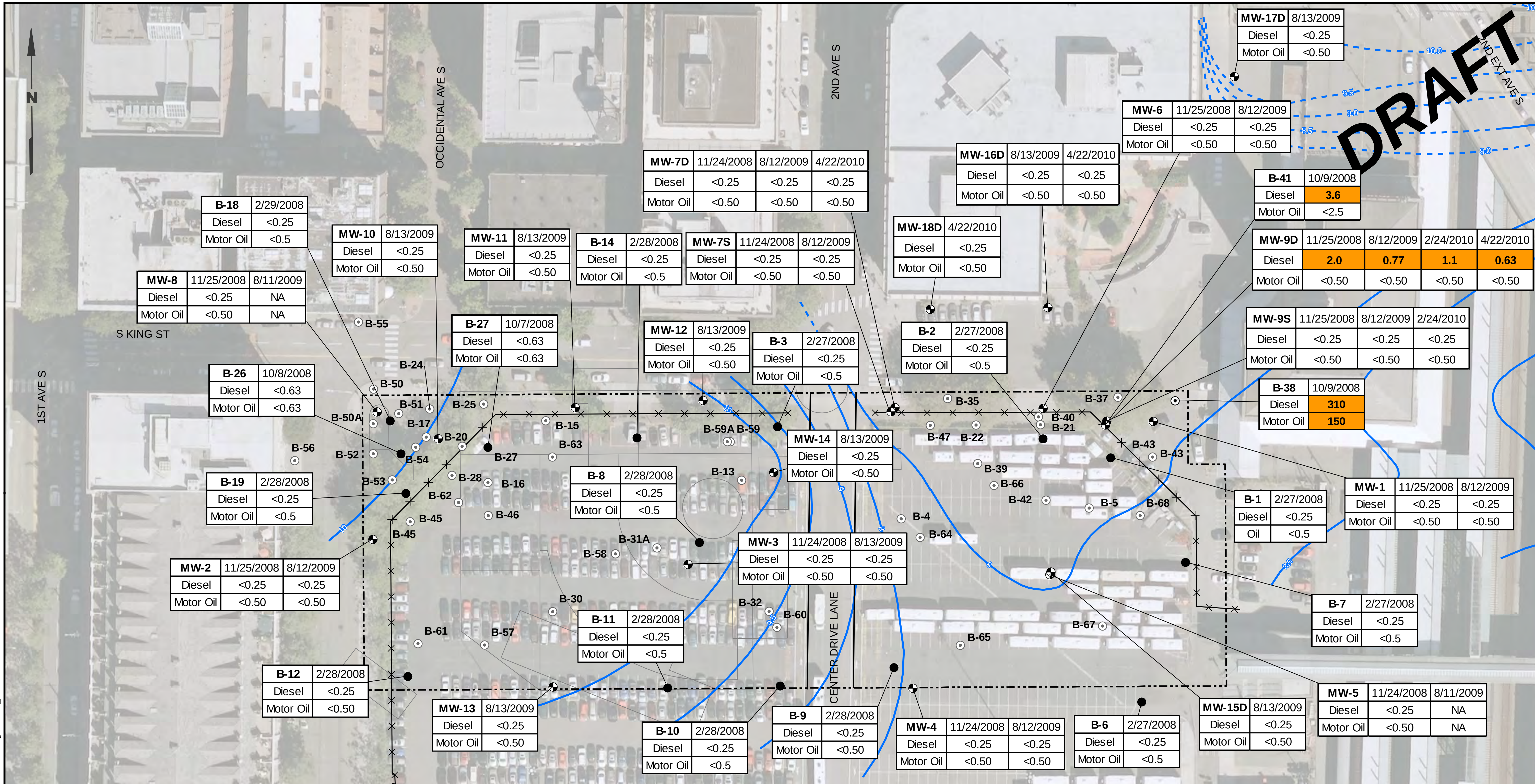
*Data Source: Triad Boundary Survey, King County*

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Approximate Extent of Observed Creosote-Like Material**

Figure 23




## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- 9.5 Groundwater Elevation Contour (ft) April 2010
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | Date |
|---|---|
| Diesel | Result mg/L |
| Motor Oil | Result mg/L |

**Notes**

1. Gray symbol indicates groundwater was not analyzed for this constituent at this location.
2. Depths are in feet below ground surface.
3. Diesel groundwater cleanup level is 0.5 mg/L, Motor Oil groundwater cleanup level is 0.5 mg/L.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration.
6. Refer to Figure 3 for Historical Property Features Legend.
7. NA = Not Analyzed.
8. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 80 160

Scale in Feet

*Data Source: Triad Boundary Survey, King County*

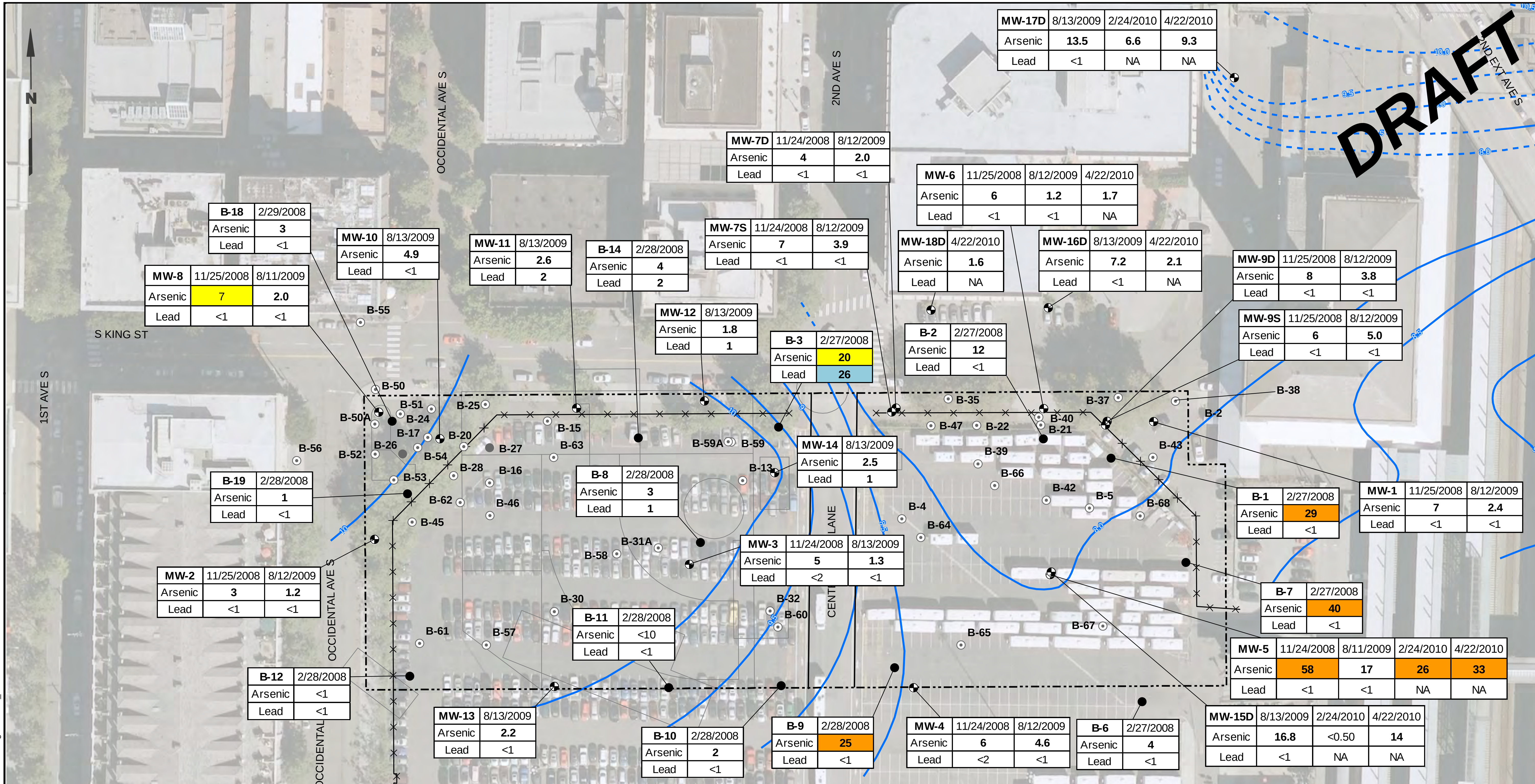
Y:\Projects\1014001\Mapdocs\North Lot RI Revisions\Fig24-DMO_GW.mxd 5/19/2010

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Diesel and Motor Oil Detected in Groundwater**

Figure 24




## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- 9.5 Groundwater Elevation Contour (ft) April 2010
- Historical Building Outlines
- Fence Line
- Property Boundary
- Arsenic Concentration Greater than 21.3 µg/L (Eastern Portion Only)
- Arsenic Concentration Greater than 5 µg/L (Western Portion Only)
- Lead Concentration Greater than 8.1 µg/L

| Location ID | Date |
|---|---|
| Arsenic | Result µg/L |
| Lead | Result µg/L |

LANDAU ASSOCIATES

**Notes**

1. Gray symbol indicates groundwater was not analyzed for these constituents at this location.
2. Depths are in feet below ground surface.
3. Dissolved arsenic groundwater cleanup level is 21.3 µg/L for the eastern portion of the Property and 5 µg/L for the western portion; dissolved lead cleanup level is 5 µg/L.
4. **Bold** values indicate compound was detected at the reported concentration.
5. <1 = The analyte was not detected at the reported concentration.
6. Refer to Figure 3 for Historical Property Features Legend.
7. NA = Not Analyzed.
8. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

*Data Source: Triad Boundary Survey, King County*

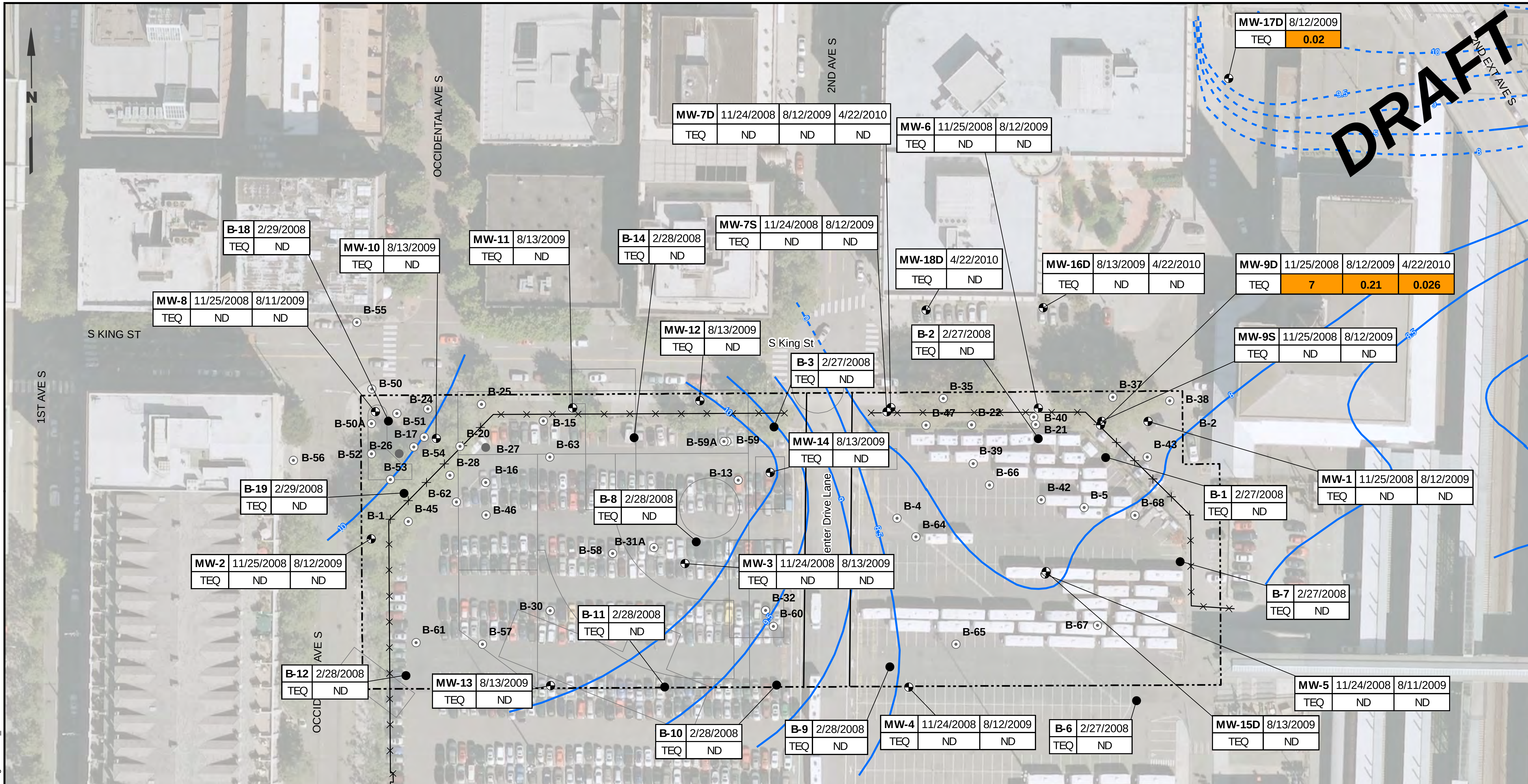
0 80 160

Scale in Feet

North Lot Development
Seattle, Washington

**Arsenic and Lead Detected in Groundwater**

Figure 25




## Legend

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- Groundwater Elevation Contour (ft) April 2010
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | Date |
|---|---|
| TEQ for cPAHs | Result µg/L |

**Notes**

1. Gray symbol indicates groundwater was not analyzed for this constituent at this location.
2. Depths are in feet below ground surface.
3. Groundwater cPAH TEQ cleanup level is 0.012 µg/L.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration.
6. Refer to Figure 3 for Historical Property Features Legend.
7. NA = Not Analyzed.
8. ND = Not Detected.
9. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

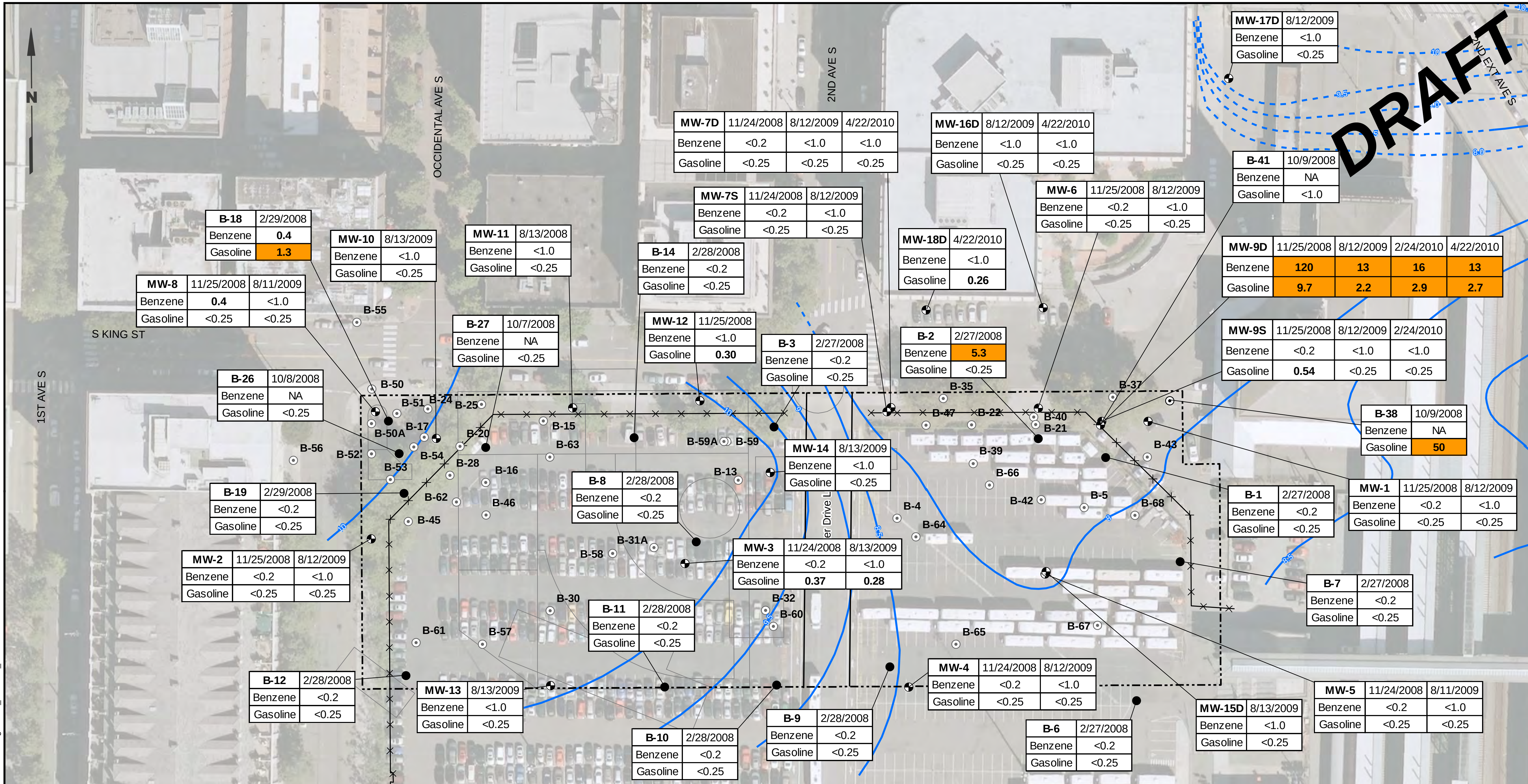
0 80 160
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

Y:\Projects\1014001\Mapdocs\North Lot RI\Fig26-cPAH_GW.mxd 5/20/2010

LANDAU ASSOCIATES

| North Lot Development Seattle, Washington | **cPAHs (TEQ) Detected in Groundwater** | Figure 26 |
|---|---|---|




**Legend**

- Direct-Push Soil Boring and Monitoring Well Location
- Direct-Push Soil Boring Location
- Direct-Push Soil and Groundwater Sample Location
- 9.5 Groundwater Elevation Contour (ft) April 2010
- Historical Building Outlines
- Fence Line
- Property Boundary

| Location ID | Date |
|---|---|
| Benzene | Result µg/L |
| Gasoline | Result mg/L |

**Notes**

1. Gray symbol indicates groundwater was not analyzed for this constituent at this location.
2. Depths are in feet below ground surface.
3. Gasoline groundwater cleanup level is 0.8 mg/L, Benzene groundwater cleanup level is 0.8 µg/L.
4. **Bold** values indicate compound was detected at the reported concentration. Orange highlight indicates compound exceeds cleanup level.
5. <1.00 = The analyte was not detected at the reported concentration.
6. Refer to Figure 3 for Historical Property Features Legend.
7. NA = Not Analyzed.
8. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 80 160
Scale in Feet

*Data Source: Triad Boundary Survey, King County*

Y:\Projects\1014001\Mapdocs\North Lot RI Revisions\Fig27-Gas_Benzene_GW.mxd 5/20/2010

LANDAU ASSOCIATES

North Lot Development
Seattle, Washington

**Gasoline and Benzene Detected in Groundwater**

Figure 27

APPENDIX D

# Comprehensive Analytical Data Tables

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | Typical Laboratory Reporting Limit (b) | B-1-9-9.5 MK66A 2/27/2008 | B-2-9-9.5 MK66B 2/27/2008 | B-2-20-21 MK66G 2/27/2008 | B-3-7.5-8.5 MK66H 2/27/2008 | B-4-6-7 MK66C 2/27/2008 | B-5-10-11 MK66D 2/27/2008 | B-6-6-6.5 MK66E 2/27/2008 | B-7-6-7 MK66F 2/27/2008 | B-8-5-6 MK82A 2/28/2008 | B-9-5.5-6.5 MK82B 2/28/2008 | B-10-7-8 MK82C 2/28/2008 | B-11-6-6.5 MK82D 2/28/2008 | B-12-6-7 MK82E 2/28/2008 | B-13-5-5.75 MK82F 2/28/2008 | B-14-5-6.33 MK82G 2/28/2008 | B-15-5-6.33 MK82H 2/28/2008 | B-16-5-6 ML02A 2/29/2008 | B-17-5-6 ML02B 2/29/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-HCID (mg/kg)** | | | | | | | | | | | | | | | | | | | | |
| Gasoline Range Organics | 30 | | 20 U | 82 U | **> 660** | **> 20** | 20 U | 20 U | 20 U | 20 U | 20 U | 20 U | 20 U | 20 U | **> 20** | 20 U | 20 U | 20 U | 20 U | **> 20** |
| Diesel Range Organics | 2,000 | | 50 U | 210 U | **> 1,600** | 50 U | 50 U | 50 U | 50 U | 50 U | 50 U | 50 U | 50 U | **> 50** | **> 50** | **> 50** | **> 50** | **> 50** | **> 50** | **> 50** |
| Motor Oil | 2,000 | | 100 U | **> 410** | **> 3,300** | **> 100** | 100 U | 100 U | 100 U | 100 U | **> 100** | 100 U | 100 U | **> 100** | **> 100** | **> 100** | **> 100** | **> 100** | **> 100** | **> 100** |
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | 5 | | **88** | **8,600** | **22** | | | | | **15** | | | **58** | **65** | **90** | **65** | | **19** | **370** |
| Motor Oil | 2,000 | 10 | | **440** | **2,300** | **63** | | | | | **68** | | | **560** | **82** | **630** | **500** | | **150** | **160** |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | | | | | |
| Gasoline | 30 | 5 | | | | | | | | | | | | | 13 U | | | | **18** | **1,900** |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 7 | 5 | 6 U | 10 U | 6 U | **9** | 6 U | 6 U | 6 U | 6 U | 7 U | 5 U | 6 U | 30 U | 8 U | 5 U | 5 U | 50 U | 5 U | 20 U |
| Cadmium | 0.69 | 0.2 | 0.2 U | 0.4 U | 0.3 U | 0.3 U | 0.2 U | 0.2 U | 0.2 U | 0.3 U | 0.3 U | 0.2 U | 0.2 U | 1 U | 0.3 U | 0.2 U | 0.2 U | 2 U | 0.2 U | 0.7 U |
| Chromium | 120,000 | 0.5 | **28.5** | **6** | **11.1** | **30.6** | **28.9** | **12.6** | **17.9** | **11.1** | **21.5** | **29.6** | **38.9** | **12** | **7.0** | **36.3** | **34.5** | **39** | **19.5** | **12** |
| Copper | 36 | 0.2 | | | | | | | | | | | | | | | | | | |
| Lead | 250 | 2 | **13** J | **5** | **5** | **143** | **7** | **3** | **5** | **3** | **39** | **3** | **25** | **10** | **5** | **10** | **85** | **70** | 2 U | **38** |
| Mercury | 0.07 | 0.05 | **0.07** | 0.08 U | 0.06 U | **0.05** | 0.05 U | 0.06 U | 0.06 U | **0.07** | 0.06 U | 0.05 U | **0.10** | 0.09 U | 0.06 U | **0.06** | **0.06** | **0.08** | **0.16** | **0.08** |
| Zinc | 100 | 1.0 | | | | | | | | | | | | | | | | | | |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | | |
| Benzene | 25 (d) | 12.5 - 25 | | | | | | | | | | | | | | | | | 13 U | **1,900** |
| Toluene | 580 | 12.5 - 25 | | | | | | | | | | | | | | | | | 13 U | **1,800** |
| Ethylbenzene | 2,400 | 12.5 - 25 | | | | | | | | | | | | | | | | | 13 U | **3,200** |
| m,p-Xylene | | 25 - 50 | | | | | | | | | | | | | | | | | 26 U | **5,100** |
| o-Xylene | | 12.5 - 25 | | | | | | | | | | | | | | | | | 13 U | **1,900** |
| Total Xylenes | 15,000 | | | | | | | | | | | | | | | | | | ND | **7,000** |
| **PCBs (µg/kg)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8082** | | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1016 | 1,000 | 30 - 66 | | | 66 U | | | | | | | | | | | | | | | |
| PCB-Aroclor 1242 | | 30 - 66 | | | 66 U | | | | | | | | | | | | | | | |
| PCB-Aroclor 1248 | | 30 - 66 | | | 66 U | | | | | | | | | | | | | | | |
| PCB-Aroclor 1254 | | 30 - 66 | | | 66 U | | | | | | | | | | | | | | | |
| PCB-Aroclor 1260 | | 30 - 66 | | | 66 U | | | | | | | | | | | | | | | |
| PCB-Aroclor 1221 | | 30 - 66 | | | 66 U | | | | | | | | | | | | | | | |
| PCB-Aroclor 1232 | | 30 - 66 | | | 66 U | | | | | | | | | | | | | | | |

**TABLE D-1**
**SOIL ANALYTICAL RESULTS**
**NORTH LOT DEVELOPMENT**
**SEATTLE, WASHINGTON**

| | Cleanup Levels (a) | Typical Laboratory Reporting Limit (b) | B-1-9-9.5 MK66A 2/27/2008 | B-2-9-9.5 MK66B 2/27/2008 | B-2-20-21 MK66G 2/27/2008 | B-3-7.5-8.5 MK66H 2/27/2008 | B-4-6-7 MK66C 2/27/2008 | B-5-10-11 MK66D 2/27/2008 | B-6-6-6.5 MK66E 2/27/2008 | B-7-6-7 MK66F 2/27/2008 | B-8-5-6 MK82A 2/28/2008 | B-9-5.5-6.5 MK82B 2/28/2008 | B-10-7-8 MK82C 2/28/2008 | B-11-6-6.5 MK82D 2/28/2008 | B-12-6-7 MK82E 2/28/2008 | B-13-5-5.75 MK82F 2/28/2008 | B-14-5-6.33 MK82G 2/28/2008 | B-15-5-6.33 MK82H 2/28/2008 | B-16-5-6 ML02A 2/29/2008 | B-17-5-6 ML02B 2/29/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | 58 - 64 | 64 U | **300** | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 64 U | 66 U | **66** | 65 U | **280** | **83** | **1,600** |
| 2-Methylnaphthalene | 320,000 | 58 - 64 | 64 U | **580** | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 64 U | **80** | 64 U | 65 U | **330** | **78** | **3,000** |
| 1-Methylnaphthalene | | 58 - 64 | 64 U | **640** | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 64 U | **95** | 64 U | 65 U | **350** | 64 U | **2,200** |
| Acenaphthylene | | 58 - 64 | 64 U | 66 U | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 64 U | 66 U | 64 U | 65 U | 65 U | 64 U | 65 U |
| Acenaphthene | 25,000 | 58 - 64 | 64 U | **66** | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | **100** | 66 U | **75** | **150** | **730** | **240** | **320** |
| Fluorene | 79,000 | 58 - 64 | 64 U | 66 U | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | **110** | 66 U | **89** | **200** | **830** | **300** | **240** |
| Phenanthrene | | 58 - 64 | 64 U | **510** | | **130** | 63 U | 63 U | 63 U | 64 U | **190** | 64 U | 66 U | **1,000** | **180** | **940** | **2,900** | **6,400** | **2,300** | **2,400** |
| Anthracene | 2,300,000 | 58 - 64 | 64 U | **90** | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | **220** | 66 U | **200** | **500** | **1,700** | **650** | **680** |
| Fluoranthene | | 58 - 64 | 64 U | **450** | | 64 U | 63 U | 63 U | 63 U | 64 U | **310** | 64 U | 66 U | **1,700** | **200** | **1,200** | **7,200** | **6,200** | **3,800** | **2,900** |
| Pyrene | 140,000 | 58 - 64 | 64 U | **290** | | 64 U | 63 U | 63 U | 63 U | 64 U | **230** | 64 U | 66 U | **1,000** | **170** | **810** | **3,500** | **4,100** | **2,800** | **2,500** |
| Benzo(a)anthracene | | 58 - 64 | 64 U | **120** | | 64 U | 63 U | 63 U | 63 U | 64 U | **130** | 64 U | 66 U | **520** | **97** | **380** | **2,100** | **1,800** J | **1,500** | **1,100** |
| Chrysene | | 58 - 64 | 64 U | **160** | | 64 U | 63 U | 63 U | 63 U | 64 U | **150** | 64 U | 66 U | **600** | **130** | **500** | **2,400** | **1,900** | **1,800** | **1,200** |
| Benzo(b)fluoranthene | | 58 - 64 | 64 U | **66** | | 64 U | 63 U | 63 U | 63 U | 64 U | **120** | 64 U | 66 U | **520** | **99** | **370** | **3,000** | **1,700** J | **2,000** | **1,000** |
| Benzo(k)fluoranthene | | 58 - 64 | 64 U | **100** | | 64 U | 63 U | 63 U | 63 U | 64 U | **150** | 64 U | 66 U | **460** | **100** | **420** | **2,100** | **1,700** | **2,000** | **860** |
| Benzo(a)pyrene | 140 | 58 - 64 | 64 U | 66 U | | 64 U | 63 U | 63 U | 63 U | 64 U | **140** | 64 U | 66 U | **480** | **120** | **410** | **2,200** | **2,000** | **1,800** | **1,100** |
| Indeno(1,2,3-cd)pyrene | | 58 - 64 | 64 U | 66 U | | 64 U | 63 U | 63 U | 63 U | 64 U | **71** | 64 U | 66 U | **150** | 66 U | **130** | **740** | **580** | **590** | **270** |
| Dibenz(a,h)anthracene | | 58 - 64 | 64 U | 66 U | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | 64 U | 66 U | 64 U | **300** | **91** | **260** | 65 U |
| Benzo(g,h,i)perylene | | 58 - 64 | 64 U | 66 U | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | **140** | 66 U | **130** | **660** | **600** | **520** | **260** |
| Dibenzofuran | | 58 - 64 | 64 U | **180** | | 64 U | 63 U | 63 U | 63 U | 64 U | 66 U | 64 U | 66 U | **67** | 66 U | 64 U | **140** | **290** | **120** | **150** |
| TEQ | 140 | 58 - 64 | ND | **30** | | ND | ND | ND | ND | ND | **189** | ND | ND | **651** | **151** | **545** | **3,048** | **2,606** | **2,453** | **1,435** |
| | | | | | | | | | | | | | | | | | | | | |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | | | | | |
| Phenol | 22,000 | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Bis-(2-Chloroethyl) Ether | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 2-Chlorophenol | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Benzyl Alcohol | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 2-Methylphenol | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 2,2'-Oxybis(1-Chloropropane) | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 4-Methylphenol | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| N-Nitroso-Di-N-Propylamine | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| Hexachloroethane | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Nitrobenzene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Isophorone | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 2-Nitrophenol | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 2,4-Dimethylphenol | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Benzoic Acid | | 580 - 1800 | | | | | | | | | | | | | | | | | | |
| bis(2-Chloroethoxy) Methane | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 2,4-Dichlorophenol | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Naphthalene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 4-Chloroaniline | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| Hexachlorobutadiene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 4-Chloro-3-methylphenol | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Hexachlorocyclopentadiene | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| 2,4,6-Trichlorophenol | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| 2-Chloronaphthalene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 2-Nitroaniline | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| Dimethylphthalate | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Acenaphthylene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 3-Nitroaniline | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| Acenaphthene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 2,4-Dinitrophenol | | 580 - 1800 | | | | | | | | | | | | | | | | | | |
| 4-Nitrophenol | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| Dibenzofuran | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 2,6-Dinitrotoluene | | 290 - 890 | | | | | | | | | | | | | | | | | | |

# TABLE D-1
## SOIL ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | Typical Laboratory Reporting Limit (b) | B-1-9-9.5 MK66A 2/27/2008 | B-2-9-9.5 MK66B 2/27/2008 | B-2-20-21 MK66G 2/27/2008 | B-3-7.5-8.5 MK66H 2/27/2008 | B-4-6-7 MK66C 2/27/2008 | B-5-10-11 MK66D 2/27/2008 | B-6-6-6.5 MK66E 2/27/2008 | B-7-6-7 MK66F 2/27/2008 | B-8-5-6 MK82A 2/28/2008 | B-9-5.5-6.5 MK82B 2/28/2008 | B-10-7-8 MK82C 2/28/2008 | B-11-6-6.5 MK82D 2/28/2008 | B-12-6-7 MK82E 2/28/2008 | B-13-5-5.75 MK82F 2/28/2008 | B-14-5-6.33 MK82G 2/28/2008 | B-15-5-6.33 MK82H 2/28/2008 | B-16-5-6 ML02A 2/29/2008 | B-17-5-6 ML02B 2/29/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-Dinitrotoluene | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| Diethylphthalate | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 4-Chlorophenyl-phenylether | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Fluorene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 4-Nitroaniline | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| 4,6-Dinitro-2-Methylphenol | | 580 - 1800 | | | | | | | | | | | | | | | | | | |
| N-Nitrosodiphenylamine | | 58 - 340 | | | | | | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Hexachlorobenzene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Pentachlorophenol | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| Phenanthrene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Carbazole | 320 | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Anthracene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Di-n-Butylphthalate | 57,000 | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Fluoranthene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Pyrene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Butylbenzylphthalate | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 3,3'-Dichlorobenzidine | | 290 - 890 | | | | | | | | | | | | | | | | | | |
| Benzo(a)anthracene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Chrysene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Di-n-Octyl phthalate | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Benzo(b)fluoranthene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Benzo(k)fluoranthene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Benzo(a)pyrene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Indeno(1,2,3-cd)pyrene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Dibenz(a,h)anthracene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| Benzo(g,h,i)perylene | | 58 - 180 | | | | | | | | | | | | | | | | | | |
| 1-Methylnaphthalene | | 58 - 180 | | | | | | | | | | | | | | | | | | |

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B-18-7-8 ML02C 2/29/2008 | B-19-6-6.75 ML02D 2/29/2008 | B-20-6.5-8 ML02E 2/29/2008 | B-21-19-20 ML02F 2/29/2008 | B-23-4.6-6.7 NT63B 10/8/2008 | B-23-5.0 NT63A 10/8/2008 | B-23-16.0-20.0 NT63C 10/8/2008 | B-24-2.2-3.0 NT61M 10/7/2008 | B-24-7.0-8.0 NT61O 10/7/2008 | B-24-7.5 NT61N 10/7/2008 | B-26-4.0-7.6 NT63F 10/8/2008 | B-26-7.5 NT63E 10/8/2008 | B-26-16-19 NT63J 10/8/2008 | B-26-17.0 NT63I 10/8/2008 | B-27-8.0-8.3 NT61I 10/7/2008 | B-27-8.0 NT61H 10/7/2008 | B-27-16.5-17.5 NT61K 10/7/2008 | B-27-17.0 NT61J 10/7/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-HCID (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline Range Organics | 30 | **> 20** | 20 U | **> 20** | | | | | | | | | | | | | | | |
| Diesel Range Organics | 2,000 | **> 50** | 50 U | **> 50** | | | | | | | | | | | | | | | |
| Motor Oil | 2,000 | **> 100** | 100 U | **> 100** | | | | | | | | | | | | | | | |
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | **92** | **19** | **51** | | | | | | | | | | | | | | | |
| Motor Oil | 2,000 | **98** | **44** | **190** | | | | | | | | | | | | | | | |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 30 | **1,500** | **54** | **1,200** | | | **6,100** | | | | **1,400** | | **1,200** | | **4,300** | | **140** | | **17** |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 7 | 20 U | 5 U | 20 U | 10 U | | | | | | | | | | | | | | |
| Cadmium | 0.69 | 0.7 U | 0.2 U | 0.6 U | 0.4 U | | | | | | | | | | | | | | |
| Chromium | 120,000 | **11** | **26.2** | **6** | **11** | | | | | | | | | | | | | | |
| Copper | 36 | | | | | | | | | | | | | | | | | | |
| Lead | 250 | **18** | **22** | **8** | **5** | | | | | | | | | | | | | | |
| Mercury | 0.07 | 0.05 U | **0.07** | 0.06 U | 0.07 U | | | | | | | | | | | | | | |
| Zinc | 100 | | | | | | | | | | | | | | | | | | |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 25 (d) | **420** | 18 U | **200** | | | **57,000** | | | | **350** | | **6,400** | | **730** | | **65** | | 22 U |
| Toluene | 580 | **1,000** | 18 U | **180** | | | **34,000** | | | | **390** | | **810** | | **1,100** | | **40** | | 22 U |
| Ethylbenzene | 2,400 | **1,800** | 18 U | **240** | | | **5,900** | | | | 29 U | | **2,600** | | **3,600** | | 15 U | | 22 U |
| m,p-Xylene | | **4,700** | 36 U | **700** | | | **43,000** | | | | **2,200** | | **1,200** | | **1,800** | | **100** | | 43 U |
| o-Xylene | | **1,900** | 18 U | **870** | | | **18,000** | | | | **1,100** | | **850** | | **2,000** | | **52** | | 22 U |
| Total Xylenes | 15,000 | **6,600** | ND | **1,570** | | | **61,000** | | | | **3,300** | | **2,050** | | **3,800** | | **152** | | ND |
| **PCBs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8082** | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1016 | 1,000 | | | | | | | | | 32 U | | | | | | | | 32 U | |
| PCB-Aroclor 1242 | | | | | | | | | | 32 U | | | | | | | | 32 U | |
| PCB-Aroclor 1248 | | | | | | | | | | 48 U | | | | | | | | 32 U | |
| PCB-Aroclor 1254 | | | | | | | | | | 32 U | | | | | | | | 32 U | |
| PCB-Aroclor 1260 | | | | | | | | | | 32 U | | | | | | | | 32 U | |
| PCB-Aroclor 1221 | | | | | | | | | | 32 U | | | | | | | | 32 U | |
| PCB-Aroclor 1232 | | | | | | | | | | 32 U | | | | | | | | 32 U | |

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B-18-7-8 | B-19-6-6.75 | B-20-6.5-8 | B-21-19-20 | B-23-4.6-6.7 | B-23-5.0 | B-23-16.0-20.0 | B-24-2.2-3.0 | B-24-7.0-8.0 | B-24-7.5 | B-26-4.0-7.6 | B-26-7.5 | B-26-16-19 | B-26-17.0 | B-27-8.0-8.3 | B-27-8.0 | B-27-16.5-17.5 | B-27-17.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ML02C | ML02D | ML02E | ML02F | NT63B | NT63A | NT63C | NT61M | NT61O | NT61N | NT63F | NT63E | NT63J | NT63I | NT61I | NT61H | NT61K | NT61J |
| | | 2/29/2008 | 2/29/2008 | 2/29/2008 | 2/29/2008 | 10/8/2008 | 10/8/2008 | 10/8/2008 | 10/7/2008 | 10/7/2008 | 10/7/2008 | 10/8/2008 | 10/8/2008 | 10/8/2008 | 10/8/2008 | 10/7/2008 | 10/7/2008 | 10/7/2008 | 10/7/2008 |
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | **1,000** | 64 U | 66 U | | **5,500,000** | | **120** | **390** | **1,100** | | **4,100** | | **1,900** | | **360** | | **330** | |
| 2-Methylnaphthalene | 320,000 | **1,200** | 64 U | 66 U | | **760,000** | | **74** | **500** | **1,300** | | **9,500** | | **5,300** | | **1,200** | | **210** | |
| 1-Methylnaphthalene | | **1,200** | 64 U | 66 U | | **440,000** | | **90** | **470** | **900** | | **7,300** | | **4,900** | | **880** | | **230** | |
| Acenaphthylene | | 66 U | 64 U | 66 U | | **1,600,000** | | 60 U | 64 U | 62 U | | 62 U | | 190 U | | 65 U | | **100** | |
| Acenaphthene | 25,000 | 66 U | 64 U | 66 U | | **300,000** | | 60 U | **66** | **64** | | **100** | | 190 U | | **82** | | **93** | |
| Fluorene | 79,000 | 66 U | 64 U | 66 U | | **1,200,000** | | 60 U | 64 U | **74** | | **100** | | 190 U | | **110** | | **240** | |
| Phenanthrene | | **70** | **230** | 66 U | | **7,400,000** | | **71** | **810** | **940** | | **1,700** | | **380** | | **1,000** | | **1,300** | |
| Anthracene | 2,300,000 | 66 U | 64 U | 66 U | | **1,600,000** | | 60 U | **120** | **100** | | **280** | | 190 U | | **120** | | **260** | |
| Fluoranthene | | 66 U | **280** | 66 U | | **5,000,000** | | 60 U | **610** | **610** | | **780** | | 190 U | | **980** | | **650** | |
| Pyrene | 140,000 | 66 U | **210** | 66 U | | **5,300,000** | | 60 U | **560** | **440** | | **680** | | **210** | | **670** | | **420** | |
| Benzo(a)anthracene | | 66 U | **110** | 66 U | | **1,400,000** | | 60 U | **270** | **130** | | **500** | | 190 U | | **430** | | **170** | |
| Chrysene | | 66 U | **120** | 66 U | | **1,600,000** | | 60 U | **360** | **320** | | **700** | | 190 U | | **590** | | **270** | |
| Benzo(b)fluoranthene | | 66 U | **86** | 66 U | | **1,200,000** | | 60 U | **220** | **160** | | **390** | | 190 U | | **390** | | **130** | |
| Benzo(k)fluoranthene | | 66 U | **100** | 66 U | | **1,000,000** | | 60 U | **210** | **190** | | **410** | | 190 U | | **360** | | **110** | |
| Benzo(a)pyrene | 140 | 66 U | **120** | 66 U | | **1,700,000** | | 60 U | **280** | **220** | | **540** | | 190 U | | **410** | | **180** | |
| Indeno(1,2,3-cd)pyrene | | 66 U | 64 U | 66 U | | **1,100,000** | | 60 U | **200** | **150** | | **250** | | 190 U | | **150** | | **66** | |
| Dibenz(a,h)anthracene | | 66 U | 64 U | 66 U | | **260,000** | | 60 U | **69** | 62 U | | **94** | | 190 U | | 65 U | | 60 U | |
| Benzo(g,h,i)perylene | | 66 U | 64 U | 66 U | | **1,200,000** | | 60 U | **230** | **180** | | **270** | | 190 U | | **140** | | **63** | |
| Dibenzofuran | | 66 U | 64 U | 66 U | | **810,000** | | 60 U | **120** | **240** | | **470** | | 190 U | | **110** | | **200** | |
| TEQ | 140 | ND | **151** | ND | | **2,212,000** | | ND | **381** | **286** | | **711** | | ND | | **549** | | **230** | |
| | | | | | | | | | | | | | | | | | | | |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | | | | |
| Phenol | 22,000 | | | | | | | | | | | | | | | | | | |
| Bis-(2-Chloroethyl) Ether | | | | | | | | | | | | | | | | | | | |
| 2-Chlorophenol | | | | | | | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | | | | | | | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | | | | | | | | | | | | | | | | | | | |
| Benzyl Alcohol | | | | | | | | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | | | | | | | | | | | | | | | | | | | |
| 2-Methylphenol | | | | | | | | | | | | | | | | | | | |
| 2,2'-Oxybis(1-Chloropropane) | | | | | | | | | | | | | | | | | | | |
| 4-Methylphenol | | | | | | | | | | | | | | | | | | | |
| N-Nitroso-Di-N-Propylamine | | | | | | | | | | | | | | | | | | | |
| Hexachloroethane | | | | | | | | | | | | | | | | | | | |
| Nitrobenzene | | | | | | | | | | | | | | | | | | | |
| Isophorone | | | | | | | | | | | | | | | | | | | |
| 2-Nitrophenol | | | | | | | | | | | | | | | | | | | |
| 2,4-Dimethylphenol | | | | | | | | | | | | | | | | | | | |
| Benzoic Acid | | | | | | | | | | | | | | | | | | | |
| bis(2-Chloroethoxy) Methane | | | | | | | | | | | | | | | | | | | |
| 2,4-Dichlorophenol | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | | | | | | | | | | | | | | | | | | | |
| Naphthalene | | | | | | | | | | | | | | | | | | | |
| 4-Chloroaniline | | | | | | | | | | | | | | | | | | | |
| Hexachlorobutadiene | | | | | | | | | | | | | | | | | | | |
| 4-Chloro-3-methylphenol | | | | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | | | | | | | | | | | | | | | | | | | |
| Hexachlorocyclopentadiene | | | | | | | | | | | | | | | | | | | |
| 2,4,6-Trichlorophenol | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | | | | | | | | | | | | | | | | | | | |
| 2-Chloronaphthalene | | | | | | | | | | | | | | | | | | | |
| 2-Nitroaniline | | | | | | | | | | | | | | | | | | | |
| Dimethylphthalate | | | | | | | | | | | | | | | | | | | |
| Acenaphthylene | | | | | | | | | | | | | | | | | | | |
| 3-Nitroaniline | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | | | | | | | | | | | | | | | | | | | |
| 2,4-Dinitrophenol | | | | | | | | | | | | | | | | | | | |
| 4-Nitrophenol | | | | | | | | | | | | | | | | | | | |
| Dibenzofuran | | | | | | | | | | | | | | | | | | | |
| 2,6-Dinitrotoluene | | | | | | | | | | | | | | | | | | | |

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B-18-7-8 ML02C 2/29/2008 | B-19-6-6.75 ML02D 2/29/2008 | B-20-6.5-8 ML02E 2/29/2008 | B-21-19-20 ML02F 2/29/2008 | B-23-4.6-6.7 NT63B 10/8/2008 | B-23-5.0 NT63A 10/8/2008 | B-23-16.0-20.0 NT63C 10/8/2008 | B-24-2.2-3.0 NT61M 10/7/2008 | B-24-7.0-8.0 NT61O 10/7/2008 | B-24-7.5 NT61N 10/7/2008 | B-26-4.0-7.6 NT63F 10/8/2008 | B-26-7.5 NT63E 10/8/2008 | B-26-16-19 NT63J 10/8/2008 | B-26-17.0 NT63I 10/8/2008 | B-27-8.0-8.3 NT61I 10/7/2008 | B-27-8.0 NT61H 10/7/2008 | B-27-16.5-17.5 NT61K 10/7/2008 | B-27-17.0 NT61J 10/7/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-Dinitrotoluene | | | | | | | | | | | | | | | | | | | |
| Diethylphthalate | | | | | | | | | | | | | | | | | | | |
| 4-Chlorophenyl-phenylether | | | | | | | | | | | | | | | | | | | |
| Fluorene | | | | | | | | | | | | | | | | | | | |
| 4-Nitroaniline | | | | | | | | | | | | | | | | | | | |
| 4,6-Dinitro-2-Methylphenol | | | | | | | | | | | | | | | | | | | |
| N-Nitrosodiphenylamine | | | | | | | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | | | | | | | | | | | | | | | | | | | |
| Hexachlorobenzene | | | | | | | | | | | | | | | | | | | |
| Pentachlorophenol | | | | | | | | | | | | | | | | | | | |
| Phenanthrene | | | | | | | | | | | | | | | | | | | |
| Carbazole | 320 | | | | | | | | | | | | | | | | | | |
| Anthracene | | | | | | | | | | | | | | | | | | | |
| Di-n-Butylphthalate | 57,000 | | | | | | | | | | | | | | | | | | |
| Fluoranthene | | | | | | | | | | | | | | | | | | | |
| Pyrene | | | | | | | | | | | | | | | | | | | |
| Butylbenzylphthalate | | | | | | | | | | | | | | | | | | | |
| 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | | | | | | |
| Benzo(a)anthracene | | | | | | | | | | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | | | | | | | | | | | | | | | | | | | |
| Chrysene | | | | | | | | | | | | | | | | | | | |
| Di-n-Octyl phthalate | | | | | | | | | | | | | | | | | | | |
| Benzo(b)fluoranthene | | | | | | | | | | | | | | | | | | | |
| Benzo(k)fluoranthene | | | | | | | | | | | | | | | | | | | |
| Benzo(a)pyrene | | | | | | | | | | | | | | | | | | | |
| Indeno(1,2,3-cd)pyrene | | | | | | | | | | | | | | | | | | | |
| Dibenz(a,h)anthracene | | | | | | | | | | | | | | | | | | | |
| Benzo(g,h,i)perylene | | | | | | | | | | | | | | | | | | | |
| 1-Methylnaphthalene | | | | | | | | | | | | | | | | | | | |

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B-28-4.2-7.0 NT61F 10/7/2008 | B-28-5.0 NT61G 10/7/2008 | B-30-0.3-4.0 NT61D 10/7/2008 | B-30-8.0-10.5 NT61E 10/7/2008 | B-31-0.3-4.0 (c) NT61C 10/7/2008 | B-31-8.0-10.0 (c) NU11C 10/10/2008 | B-32-0.2-2.0 NT61A 10/7/2008 | B-32-8.0-10.5 NT61B 10/7/2008 | B-33-17.5-18.5 NU11B 10/10/2008 | B-36-19.3-20.0 NT85I 10/9/2008 | B-36-19.8 NT85H 10/9/2008 | B-38-21.5-22.4 NT85E 10/9/2008 | B-38-22.0 NT85D 10/9/2008 | B-38-22.4-23.0 NT85F 10/9/2008 | B-39-21.0-22.3 NT85J 10/9/2008 | B-40-24.5-26.0 NT63G 10/8/2008 | B-40-25.0 NT63H 10/8/2008 | B-41-16.5 NT85A 10/9/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-HCID (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline Range Organics | 30 | | | 55 U | 20 U | 55 U | 20 U | 110 U | 20 U | 20 U | | | | | | | | | |
| Diesel Range Organics | 2,000 | | | **>140** | 50 U | **>140** | 50 U | 280 U | 50 U | 50 U | | | | | | | | | |
| Motor Oil | 2,000 | | | **>280** | 100 U | **>270** | 100 U | **>550** | 100 U | 100 U | | | | | | | | | |
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | | | | **49** | **200** | | **160** | | | **2,900** | | **690** | | **59** | **220** | **49** | | |
| Motor Oil | 2,000 | | | | **310** | **1,200** | | **2,300** | | | **690** | | **220** | | **42** | **130** | **150** | | |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 30 | | **1,600** | | | | | | | | | **38** | | **2,000** | | | | 4.5 U | **32** |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 7 | | | **2.4** | **1.6** | **1.9** | **9.6** | **2.1** | **2.3** | **5.0** | | | | | | | | | |
| Cadmium | 0.69 | | | 0.2 U | 0.2 U | **0.2** | 0.2 U | 0.2 U | 0.3 U | 0.3 U | | | | | | | | | |
| Chromium | 120,000 | | | **28.7** | **21.7** | **31.5** | **26.7** | **31.2** | **16.6** | **22.9** | | | | | | | | | |
| Copper | 36 | | | | | | | | | | | | | | | | | | |
| Lead | 250 | | | **24** | **19** | **37** | **22** | **12.4** | **9.2** | **33** | | | | | | | | | |
| Mercury | 0.07 | | | **0.10** | 0.05 U | **0.08** | **0.05** | **0.34** | 0.06 U | **1.88** | | | | | | | | | |
| Zinc | 100 | | | | | | | | | | | | | | | | | | |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 25 (d) | | **160** | | | | | | | | | 28 U | | **5,200** | | | | 11 U | **19** |
| Toluene | 580 | | **190** | | | | | | | | | **35** | | **6,100** | | | | 11 U | **93** |
| Ethylbenzene | 2,400 | | 21 U | | | | | | | | | **170** | | **35,000** | | | | 11 U | **150** |
| m,p-Xylene | | | **410** | | | | | | | | | **180** | | **34,000** | | | | 23 U | **440** |
| o-Xylene | | | **730** | | | | | | | | | **110** | | **14,000** | | | | 11 U | **230** |
| Total Xylenes | 15,000 | | **1,140** | | | | | | | | | **290** | | **48,000** | | | | ND | **670** |
| **PCBs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8082** | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1016 | 1,000 | | | | 32 U | | | | 30 U | | | | | | | | | | |
| PCB-Aroclor 1242 | | | | | 32 U | | | | 30 U | | | | | | | | | | |
| PCB-Aroclor 1248 | | | | | 32 U | | | | 30 U | | | | | | | | | | |
| PCB-Aroclor 1254 | | | | | 32 U | | | | 30 U | | | | | | | | | | |
| PCB-Aroclor 1260 | | | | | 32 U | | | | 30 U | | | | | | | | | | |
| PCB-Aroclor 1221 | | | | | 32 U | | | | 30 U | | | | | | | | | | |
| PCB-Aroclor 1232 | | | | | 32 U | | | | 30 U | | | | | | | | | | |

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B-28-4.2-7.0 NT61F 10/7/2008 | B-28-5.0 NT61G 10/7/2008 | B-30-0.3-4.0 NT61D 10/7/2008 | B-30-8.0-10.5 NT61E 10/7/2008 | B-31-0.3-4.0 (c) NT61C 10/7/2008 | B-31-8.0-10.0 (c) NU11C 10/10/2008 | B-32-0.2-2.0 NT61A 10/7/2008 | B-32-8.0-10.5 NT61B 10/7/2008 | B-33-17.5-18.5 NU11B 10/10/2008 | B-36-19.3-20.0 NT85I 10/9/2008 | B-36-19.8 NT85H 10/9/2008 | B-38-21.5-22.4 NT85E 10/9/2008 | B-38-22.0 NT85D 10/9/2008 | B-38-22.4-23.0 NT85F 10/9/2008 | B-39-21.0-22.3 NT85J 10/9/2008 | B-40-24.5-26.0 NT63G 10/8/2008 | B-40-25.0 NT63H 10/8/2008 | B-41-16.5 NT85A 10/9/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | **2,300** | | 180 U | 58 U | 170 U | 190 U | 180 U | **300** | **360** | **1,400,000** | | **1,700,000** | | **49,000** | **170,000** | **23,000** | | |
| 2-Methylnaphthalene | 320,000 | **2,100** | | 180 U | 58 U | 170 U | 190 U | 180 U | 59 U | 180 U | **500,000** | | **590,000** | | **9,100** | **51,000** | **8,100** | | |
| 1-Methylnaphthalene | | **1,500** | | 180 U | 58 U | 170 U | 190 U | 180 U | 59 U | 180 U | 320,000 U | | **360,000** | | **6,400** | **33,000** | **5,000** | | |
| Acenaphthylene | | 62 U | | 180 U | 58 U | 170 U | 190 U | 180 U | 59 U | 180 U | 320,000 U | | **30,000** | | **160** | **1,000** | **1,600** | | |
| Acenaphthene | 25,000 | 62 U | | **280** | 58 U | 170 U | **230** | 180 U | 59 U | **320** | 320,000 U | | **380,000** | | **4,700** | **28,000** | **4,100** | | |
| Fluorene | 79,000 | 62 U | | **320** | 58 U | 170 U | **420** | 180 U | 59 U | **470** | 320,000 U | | **240,000** | | **4,000** | **16,000** | **4,100** | | |
| Phenanthrene | | **270** | | **4,000** | **94** | **1,100** J | **3,700** | **200** | 59 U | **3,700** | **650,000** | | **820,000** | | **12,000** | **38,000** | **12,000** | | |
| Anthracene | 2,300,000 | 62 U | | **1,100** | 58 U | **250** J | **1,300** | 180 U | 59 U | **820** | 320,000 U | | **150,000** | | **3,800** | **5,600** E | **2,400** | | |
| Fluoranthene | | 62 U | | **12,000** | **95** | **1,300** J | **3,500** | **540** | 59 U | **2,400** J | 320,000 U | | **310,000** | | **7,300** | **11,000** E | **4,900** | | |
| Pyrene | 140,000 | 62 U | | **6,600** | **74** | **1,400** J | **3,700** J | **330** | 59 U | **3,000** J | 320,000 U | | **330,000** | | **6,900** | **12,000** E | **5,900** | | |
| Benzo(a)anthracene | | 62 U | | **3,100** | 58 U | **580** J | **1,600** | 180 U | 59 U | **1,100** | 320,000 U | | **120,000** | | **3,400** | **3,800** | **2,200** | | |
| Chrysene | | 62 U | | **3,800** | 58 U | **660** J | **1,600** | **290** | 59 U | **1,200** | 320,000 U | | **84,000** E | | **3,400** | **3,700** | **2,000** | | |
| Benzo(b)fluoranthene | | 62 U | | **2,900** | 58 U | **430** J | **830** | 180 U | 59 U | **820** | 320,000 U | | **45,000** E | | **1,800** | **370** | **1,300** | | |
| Benzo(k)fluoranthene | | 62 U | | **3,200** | 58 U | **460** J | **1,100** | 180 U | 59 U | **970** | 320,000 U | | **47,000** E | | **1,900** | **380** | **1,200** | | |
| Benzo(a)pyrene | 140 | 62 U | | **3,100** | 58 U | **610** J | **1,400** | 180 U | 59 U | **1,200** | 320,000 U | | **100,000** E | | **3,300** | **3,800** | **2,200** | | |
| Indeno(1,2,3-cd)pyrene | | 62 U | | **1,300** | 58 U | **350** J | **350** | 180 U | 59 U | **390** | 320,000 U | | **41,000** | | **1,400** | **1,700** | **940** | | |
| Dibenz(a,h)anthracene | | 62 U | | **450** | 58 U | 170 U | 190 U | 180 U | 59 U | 180 U | 320,000 U | | **14,000** | | **480** | **550** | **230** | | |
| Benzo(g,h,i)perylene | | 62 U | | **950** | 58 U | **400** J | **340** | 180 U | 59 U | **390** | 320,000 U | | **32,000** | | **1,200** | **1,400** | **730** | | |
| Dibenzofuran | | **120** | | **180** | 58 U | 170 U | 190 U | 180 U | 59 U | **210** | 320,000 U | | 100,000 U | | **1,300** | **4,900** | **900** | | |
| TEQ | 140 | ND | | **4,233** | ND | **799** | **1,804** | **3** | ND | **1,540** | ND | | **5,500** | | **4,232** | **4,517** | **2,807** | | |
| | | | | | | | | | | | | | | | | | | | |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | | | | |
| Phenol | 22,000 | | | | | | | | | | | | | | | | | | |
| Bis-(2-Chloroethyl) Ether | | | | | | | | | | | | | | | | | | | |
| 2-Chlorophenol | | | | | | | | | | | | | | | | | | | |
| 1,3-Dichlorobenzene | | | | | | | | | | | | | | | | | | | |
| 1,4-Dichlorobenzene | | | | | | | | | | | | | | | | | | | |
| Benzyl Alcohol | | | | | | | | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | | | | | | | | | | | | | | | | | | | |
| 2-Methylphenol | | | | | | | | | | | | | | | | | | | |
| 2,2'-Oxybis(1-Chloropropane) | | | | | | | | | | | | | | | | | | | |
| 4-Methylphenol | | | | | | | | | | | | | | | | | | | |
| N-Nitroso-Di-N-Propylamine | | | | | | | | | | | | | | | | | | | |
| Hexachloroethane | | | | | | | | | | | | | | | | | | | |
| Nitrobenzene | | | | | | | | | | | | | | | | | | | |
| Isophorone | | | | | | | | | | | | | | | | | | | |
| 2-Nitrophenol | | | | | | | | | | | | | | | | | | | |
| 2,4-Dimethylphenol | | | | | | | | | | | | | | | | | | | |
| Benzoic Acid | | | | | | | | | | | | | | | | | | | |
| bis(2-Chloroethoxy) Methane | | | | | | | | | | | | | | | | | | | |
| 2,4-Dichlorophenol | | | | | | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | | | | | | | | | | | | | | | | | | | |
| Naphthalene | | | | | | | | | | | | | | | | | | | |
| 4-Chloroaniline | | | | | | | | | | | | | | | | | | | |
| Hexachlorobutadiene | | | | | | | | | | | | | | | | | | | |
| 4-Chloro-3-methylphenol | | | | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | | | | | | | | | | | | | | | | | | | |
| Hexachlorocyclopentadiene | | | | | | | | | | | | | | | | | | | |
| 2,4,6-Trichlorophenol | | | | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | | | | | | | | | | | | | | | | | | | |
| 2-Chloronaphthalene | | | | | | | | | | | | | | | | | | | |
| 2-Nitroaniline | | | | | | | | | | | | | | | | | | | |
| Dimethylphthalate | | | | | | | | | | | | | | | | | | | |
| Acenaphthylene | | | | | | | | | | | | | | | | | | | |
| 3-Nitroaniline | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | | | | | | | | | | | | | | | | | | | |
| 2,4-Dinitrophenol | | | | | | | | | | | | | | | | | | | |
| 4-Nitrophenol | | | | | | | | | | | | | | | | | | | |
| Dibenzofuran | | | | | | | | | | | | | | | | | | | |
| 2,6-Dinitrotoluene | | | | | | | | | | | | | | | | | | | |

# TABLE D-1
## SOIL ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B-28-4.2-7.0<br>NT61F<br>10/7/2008 | B-28-5.0<br>NT61G<br>10/7/2008 | B-30-0.3-4.0<br>NT61D<br>10/7/2008 | B-30-8.0-10.5<br>NT61E<br>10/7/2008 | B-31-0.3-4.0 (c)<br>NT61C<br>10/7/2008 | B-31-8.0-10.0 (c)<br>NU11C<br>10/10/2008 | B-32-0.2-2.0<br>NT61A<br>10/7/2008 | B-32-8.0-10.5<br>NT61B<br>10/7/2008 | B-33-17.5-18.5<br>NU11B<br>10/10/2008 | B-36-19.3-20.0<br>NT85I<br>10/9/2008 | B-36-19.8<br>NT85H<br>10/9/2008 | B-38-21.5-22.4<br>NT85E<br>10/9/2008 | B-38-22.0<br>NT85D<br>10/9/2008 | B-38-22.4-23.0<br>NT85F<br>10/9/2008 | B-39-21.0-22.3<br>NT85J<br>10/9/2008 | B-40-24.5-26.0<br>NT63G<br>10/8/2008 | B-40-25.0<br>NT63H<br>10/8/2008 | B-41-16.5<br>NT85A<br>10/9/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-Dinitrotoluene | | | | | | | | | | | | | | | | | | | |
| Diethylphthalate | | | | | | | | | | | | | | | | | | | |
| 4-Chlorophenyl-phenylether | | | | | | | | | | | | | | | | | | | |
| Fluorene | | | | | | | | | | | | | | | | | | | |
| 4-Nitroaniline | | | | | | | | | | | | | | | | | | | |
| 4,6-Dinitro-2-Methylphenol | | | | | | | | | | | | | | | | | | | |
| N-Nitrosodiphenylamine | | | | | | | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | | | | | | | | | | | | | | | | | | | |
| Hexachlorobenzene | | | | | | | | | | | | | | | | | | | |
| Pentachlorophenol | | | | | | | | | | | | | | | | | | | |
| Phenanthrene | | | | | | | | | | | | | | | | | | | |
| Carbazole | 320 | | | | | | | | | | | | | | | | | | |
| Anthracene | | | | | | | | | | | | | | | | | | | |
| Di-n-Butylphthalate | 57,000 | | | | | | | | | | | | | | | | | | |
| Fluoranthene | | | | | | | | | | | | | | | | | | | |
| Pyrene | | | | | | | | | | | | | | | | | | | |
| Butylbenzylphthalate | | | | | | | | | | | | | | | | | | | |
| 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | | | | | | |
| Benzo(a)anthracene | | | | | | | | | | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | | | | | | | | | | | | | | | | | | | |
| Chrysene | | | | | | | | | | | | | | | | | | | |
| Di-n-Octyl phthalate | | | | | | | | | | | | | | | | | | | |
| Benzo(b)fluoranthene | | | | | | | | | | | | | | | | | | | |
| Benzo(k)fluoranthene | | | | | | | | | | | | | | | | | | | |
| Benzo(a)pyrene | | | | | | | | | | | | | | | | | | | |
| Indeno(1,2,3-cd)pyrene | | | | | | | | | | | | | | | | | | | |
| Dibenz(a,h)anthracene | | | | | | | | | | | | | | | | | | | |
| Benzo(g,h,i)perylene | | | | | | | | | | | | | | | | | | | |
| 1-Methylnaphthalene | | | | | | | | | | | | | | | | | | | |

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B-41-20.0-21.0 NT85B 10/9/2008 | B-44-17.5-18.5 NT85K 10/9/2008 | B-44-21.5-22.5 NU11A 10/10/2008 | B-45-8.0-10.0 NU11E 10/10/2008 | B-45-8.5 NU11D 10/10/2008 | B-47-21.5-21.9 NU11G 10/10/2008 | B-47-21.8 NU11F 10/10/2008 | B50A-15-16 PI35A 7/28/2009 | B51-5 PI35C 7/28/2009 | B51-15-16 PI35B 7/28/2009 | B52-6.5 PI35E 7/28/2009 | B52-15-16 PI35D 7/28/2009 | B53-15-16 PI35F 7/28/2009 | B54-4 PI35H 7/28/2009 | B54-15-16 PI35G 7/28/2009 | B-55-8-9 PJ46A 8/6/2009 | B-56-9-10 PJ46B 8/6/2009 | B57-1-2 PI16A 7/27/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-HCID (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline Range Organics | 30 | | | | | | | | | | | | | | | | | | |
| Diesel Range Organics | 2,000 | | | | | | | | | | | | | | | | | | |
| Motor Oil | 2,000 | | | | | | | | | | | | | | | | | | |
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | **2,000** | **130** | **400** | | | **140** J | | | | | | | | | | | | |
| Motor Oil | 2,000 | **480** | **130** | **860** | | | **310** | | | | | | | | | | | | |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 30 | | | | | 4.4 U | | 11 U | **60** | **3,200** | **1,600** | **760** | **12** | 5.5 U | **180** | **11** | 4.4 U | 3.8 U | |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 7 | | | | | | | | | | | | | | | | | | **7** |
| Cadmium | 0.69 | | | | | | | | | | | | | | | | | | 0.2 U |
| Chromium | 120,000 | | | | | | | | | | | | | | | | | | **13.2** |
| Copper | 36 | | | | | | | | | | | | | | | | | | **75.5** |
| Lead | 250 | | | | | | | | | | | | | | | | | | **59** J |
| Mercury | 0.07 | | | | | | | | | | | | | | | | | | **0.05** |
| Zinc | 100 | | | | | | | | | | | | | | | | | | **74** |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 25 (d) | | | | | 11 U | | **32** | 22 U | **460** | 120 U | **79** | **53** | 14 U | 17 U | | 11 U | 9.5 U | |
| Toluene | 580 | | | | | 11 U | | **48** | **81** | **2,200** | **700** | **110** | **26** | **18** | 17 U | | 11 U | 9.5 U | |
| Ethylbenzene | 2,400 | | | | | 11 U | | 27 U | **55** | **1,400** | **510** | **430** | **20** | 14 U | 17 U | | 11 U | 9.5 U | |
| m,p-Xylene | | | | | | 22 U | | 55 U | **170** | **3,800** | **1,200** | **530** | **62** | 27 U | 33 U | | 22 U | 19 U | |
| o-Xylene | | | | | | 11 U | | 27 U | 22 U | **1,700** | **640** | **440** | **180** | 14 U | 17 U | | **160** | 9.5 U | |
| Total Xylenes | 15,000 | | | | | ND | | ND | **170** | **5,500** | **1,840** | **970** | **242** | ND | ND | | **160** | ND | |
| **PCBs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8082** | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1016 | 1,000 | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1242 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1248 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1254 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1260 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1221 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1232 | | | | | | | | | | | | | | | | | | | |

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup<br>Levels (a) | B-41-20.0-21.0<br>NT85B<br>10/9/2008 | B-44-17.5-18.5<br>NT85K<br>10/9/2008 | B-44-21.5-22.5<br>NU11A<br>10/10/2008 | B-45-8.0-10.0<br>NU11E<br>10/10/2008 | B-45-8.5<br>NU11D<br>10/10/2008 | B-47-21.5-21.9<br>NU11G<br>10/10/2008 | B-47-21.8<br>NU11F<br>10/10/2008 | B50A-15-16<br>PI35A<br>7/28/2009 | B51-5<br>PI35C<br>7/28/2009 | B51-15-16<br>PI35B<br>7/28/2009 | B52-6.5<br>PI35E<br>7/28/2009 | B52-15-16<br>PI35D<br>7/28/2009 | B53-15-16<br>PI35F<br>7/28/2009 | B54-4<br>PI35H<br>7/28/2009 | B54-15-16<br>PI35G<br>7/28/2009 | B-55-8-9<br>PJ46A<br>8/6/2009 | B-56-9-10<br>PJ46B<br>8/6/2009 | B57-1-2<br>PI16A<br>7/27/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | **1,500,000** | **1,200** J | **5,000** | 60 U | | **500** | | | | | | | | | | | | |
| 2-Methylnaphthalene | 320,000 | **460,000** | **2,100** | **1,100** J | 60 U | | **150** J | | | | | | | | | | | | |
| 1-Methylnaphthalene | | **290,000** | **3,100** | **850** | 60 U | | **170** | | | | | | | | | | | | |
| Acenaphthylene | | 160,000 U | 64 U | **320** | 60 U | | **110** | | | | | | | | | | | | |
| Acenaphthene | 25,000 | **260,000** | **170** | **2,000** | 60 U | | **480** | | | | | | | | | | | | |
| Fluorene | 79,000 | **180,000** | **290** | **2,400** | 60 U | | **320** | | | | | | | | | | | | |
| Phenanthrene | | **570,000** | **2,000** J | **19,000** | **73** | | **1,200** | | | | | | | | | | | | |
| Anthracene | 2,300,000 | 160,000 U | **230** | **3,800** | 60 U | | **580** | | | | | | | | | | | | |
| Fluoranthene | | **200,000** | **830** J | **20,000** | **280** | | **1,900** | | | | | | | | | | | | |
| Pyrene | 140,000 | **220,000** | **700** J | **17,000** J | **230** J | | **1,600** J | | | | | | | | | | | | |
| Benzo(a)anthracene | | 160,000 U | **380** | **7,800** | **97** | | **1,000** | | | | | | | | | | | | |
| Chrysene | | 160,000 U | **530** J | **7,800** | **100** | | **1,100** | | | | | | | | | | | | |
| Benzo(b)fluoranthene | | 160,000 U | **200** J | **7,200** | **64** | | **490** | | | | | | | | | | | | |
| Benzo(k)fluoranthene | | 160,000 U | **290** | **7,300** | **71** | | **850** | | | | | | | | | | | | |
| Benzo(a)pyrene | 140 | 160,000 U | **380** | **9,700** | **78** | | **1,000** | | | | | | | | | | | | |
| Indeno(1,2,3-cd)pyrene | | 160,000 U | **160** | **2,900** | 60 U | | **370** | | | | | | | | | | | | |
| Dibenz(a,h)anthracene | | 160,000 U | 64 U | **890** | 60 U | | **91** | | | | | | | | | | | | |
| Benzo(g,h,i)perylene | | 160,000 U | **200** | **3,000** | 60 U | | **370** | | | | | | | | | | | | |
| Dibenzofuran | | 160,000 U | **510** J | **1,700** | 60 U | | **130** | | | | | | | | | | | | |
| TEQ | 140 | ND | **488** | **12,387** | **102** | | **1,291** | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | | | | |
| Phenol | 22,000 | | | | | | | | | | | | | | | | | | 63 U |
| Bis-(2-Chloroethyl) Ether | | | | | | | | | | | | | | | | | | | 63 U |
| 2-Chlorophenol | | | | | | | | | | | | | | | | | | | 63 U |
| 1,3-Dichlorobenzene | | | | | | | | | | | | | | | | | | | 63 U |
| 1,4-Dichlorobenzene | | | | | | | | | | | | | | | | | | | 63 U |
| Benzyl Alcohol | | | | | | | | | | | | | | | | | | | 320 U |
| 1,2-Dichlorobenzene | | | | | | | | | | | | | | | | | | | 63 U |
| 2-Methylphenol | | | | | | | | | | | | | | | | | | | 63 U |
| 2,2'-Oxybis(1-Chloropropane) | | | | | | | | | | | | | | | | | | | 63 U |
| 4-Methylphenol | | | | | | | | | | | | | | | | | | | 63 U |
| N-Nitroso-Di-N-Propylamine | | | | | | | | | | | | | | | | | | | 320 U |
| Hexachloroethane | | | | | | | | | | | | | | | | | | | 63 U |
| Nitrobenzene | | | | | | | | | | | | | | | | | | | 63 U |
| Isophorone | | | | | | | | | | | | | | | | | | | 63 U |
| 2-Nitrophenol | | | | | | | | | | | | | | | | | | | 63 U |
| 2,4-Dimethylphenol | | | | | | | | | | | | | | | | | | | 63 U |
| Benzoic Acid | | | | | | | | | | | | | | | | | | | 630 U |
| bis(2-Chloroethoxy) Methane | | | | | | | | | | | | | | | | | | | 63 U |
| 2,4-Dichlorophenol | | | | | | | | | | | | | | | | | | | 320 U |
| 1,2,4-Trichlorobenzene | | | | | | | | | | | | | | | | | | | 63 U |
| Naphthalene | | | | | | | | | | | | | | | | | | | **1,300** |
| 4-Chloroaniline | | | | | | | | | | | | | | | | | | | 320 U |
| Hexachlorobutadiene | | | | | | | | | | | | | | | | | | | 63 U |
| 4-Chloro-3-methylphenol | | | | | | | | | | | | | | | | | | | 320 U |
| 2-Methylnaphthalene | | | | | | | | | | | | | | | | | | | **2,800** |
| Hexachlorocyclopentadiene | | | | | | | | | | | | | | | | | | | 320 UJ |
| 2,4,6-Trichlorophenol | | | | | | | | | | | | | | | | | | | 320 U |
| 2,4,5-Trichlorophenol | | | | | | | | | | | | | | | | | | | 320 U |
| 2-Chloronaphthalene | | | | | | | | | | | | | | | | | | | 63 U |
| 2-Nitroaniline | | | | | | | | | | | | | | | | | | | 320 U |
| Dimethylphthalate | | | | | | | | | | | | | | | | | | | 63 U |
| Acenaphthylene | | | | | | | | | | | | | | | | | | | 63 U |
| 3-Nitroaniline | | | | | | | | | | | | | | | | | | | 320 U |
| Acenaphthene | | | | | | | | | | | | | | | | | | | 63 U |
| 2,4-Dinitrophenol | | | | | | | | | | | | | | | | | | | 630 U |
| 4-Nitrophenol | | | | | | | | | | | | | | | | | | | 320 U |
| Dibenzofuran | | | | | | | | | | | | | | | | | | | **580** |
| 2,6-Dinitrotoluene | | | | | | | | | | | | | | | | | | | 320 U |

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B-41-20.0-21.0 NT85B 10/9/2008 | B-44-17.5-18.5 NT85K 10/9/2008 | B-44-21.5-22.5 NU11A 10/10/2008 | B-45-8.0-10.0 NU11E 10/10/2008 | B-45-8.5 NU11D 10/10/2008 | B-47-21.5-21.9 NU11G 10/10/2008 | B-47-21.8 NU11F 10/10/2008 | B50A-15-16 PI35A 7/28/2009 | B51-5 PI35C 7/28/2009 | B51-15-16 PI35B 7/28/2009 | B52-6.5 PI35E 7/28/2009 | B52-15-16 PI35D 7/28/2009 | B53-15-16 PI35F 7/28/2009 | B54-4 PI35H 7/28/2009 | B54-15-16 PI35G 7/28/2009 | B-55-8-9 PJ46A 8/6/2009 | B-56-9-10 PJ46B 8/6/2009 | B57-1-2 PI16A 7/27/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-Dinitrotoluene | | | | | | | | | | | | | | | | | | | 320 U |
| Diethylphthalate | | | | | | | | | | | | | | | | | | | 63 U |
| 4-Chlorophenyl-phenylether | | | | | | | | | | | | | | | | | | | 63 U |
| Fluorene | | | | | | | | | | | | | | | | | | | **150** |
| 4-Nitroaniline | | | | | | | | | | | | | | | | | | | 320 U |
| 4,6-Dinitro-2-Methylphenol | | | | | | | | | | | | | | | | | | | 630 U |
| N-Nitrosodiphenylamine | | | | | | | | | | | | | | | | | | | 340 U |
| 4-Bromophenyl-phenylether | | | | | | | | | | | | | | | | | | | 63 U |
| Hexachlorobenzene | | | | | | | | | | | | | | | | | | | 63 U |
| Pentachlorophenol | | | | | | | | | | | | | | | | | | | 320 U |
| Phenanthrene | | | | | | | | | | | | | | | | | | | **1,900** |
| Carbazole | 320 | | | | | | | | | | | | | | | | | | **140** |
| Anthracene | | | | | | | | | | | | | | | | | | | **130** |
| Di-n-Butylphthalate | 57,000 | | | | | | | | | | | | | | | | | | **72** |
| Fluoranthene | | | | | | | | | | | | | | | | | | | **230** |
| Pyrene | | | | | | | | | | | | | | | | | | | **300** |
| Butylbenzylphthalate | | | | | | | | | | | | | | | | | | | 63 U |
| 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | | | | | | 320 U |
| Benzo(a)anthracene | | | | | | | | | | | | | | | | | | | **260** |
| bis(2-Ethylhexyl)phthalate | | | | | | | | | | | | | | | | | | | 63 U |
| Chrysene | | | | | | | | | | | | | | | | | | | **420** |
| Di-n-Octyl phthalate | | | | | | | | | | | | | | | | | | | 63 U |
| Benzo(b)fluoranthene | | | | | | | | | | | | | | | | | | | **130** |
| Benzo(k)fluoranthene | | | | | | | | | | | | | | | | | | | **130** |
| Benzo(a)pyrene | | | | | | | | | | | | | | | | | | | **120** |
| Indeno(1,2,3-cd)pyrene | | | | | | | | | | | | | | | | | | | 63 U |
| Dibenz(a,h)anthracene | | | | | | | | | | | | | | | | | | | 63 U |
| Benzo(g,h,i)perylene | | | | | | | | | | | | | | | | | | | 63 U |
| 1-Methylnaphthalene | | | | | | | | | | | | | | | | | | | **2,900** |

# TABLE D-1
## SOIL ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B57-10-15 | B57-15-16 | B58-1-2 | B58-15-16 | B59-1-2 | B60-1-2 | B60-15-16 | B61-1-2 | B62-1-2 | B63-1-2 | B64-1-2 | B65-1-2 | B66-1-2 | B67-1-2 | B68-1-2 | MW-11-4.5-5 | MW-14-15 | MW-17D-15.5-16.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PI16B/PI54A | PI16C | PI16D | PI16E | PI16K | PI16F | PI16G | PI16H | PI35I | PI35J | PI16L | PI16I | PI35K | PI16J | PI35L | PI99A | PJ11A | PJ11B/PJ23A |
| | | 7/27/2009 | 7/27/2009 | 7/27/2009 | 7/27/2009 | 7/27/2009 | 7/27/2009 | 7/27/2009 | 7/27/2009 | 7/28/2009 | 7/28/2009 | 7/27/2009 | 7/27/2009 | 7/28/2009 | 7/27/2009 | 7/28/2009 | 8/3/2009 | 8/4/2009 | 8/4/2009 |
| **NWTPH-HCID (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline Range Organics | 30 | | | | | | | | | | | | | | | | | | 20 U |
| Diesel Range Organics | 2,000 | **50** | | | | | | | | | | | | | | | | | **50** |
| Motor Oil | 2,000 | **100** | | | | | | | | | | | | | | | | | **100** |
| **NWTPH-DxSG (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Hydrocarbons | 2,000 | **100** | | | | | | | | | | | | | | | | | **400** |
| Motor Oil | 2,000 | **470** | | | | | | | | | | | | | | | | | **160** |
| **NWTPH-GX (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 30 | **20** | | | | | | | | | | | | | | | **250** | | |
| **TOTAL METALS (mg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method 6000/7000 series** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 7 | | | 5 U | | **7** | **7** | | **6** | 10 U | 5 U | **8** | **30** | **5** | **7** | **6** | | | **8** |
| Cadmium | 0.69 | | | 0.2 U | | 0.2 U | 0.2 U | | 0.2 U | 0.5 U | 0.2 U | 0.2 U | **0.4** | 0.2 U | 0.2 U | 0.2 U | | | 0.3 U |
| Chromium | 120,000 | | | **31.9** | | **38.5** | **28.5** | | **10.8** | **26** | **32.7** | **18.0** | **42.1** | **22.2** | **26.2** | **25.9** | | | **41.6** |
| Copper | 36 | | | **26.9** | | **33.5** | **29.8** | | **49.1** | **36.3** | **23.4** | **34.9** | **64.3** | **47.7** | **25.1** | **38.9** | | | **35.8** |
| Lead | 250 | | | **25** | | **67** | **37** | | **17** | **53** | **39** | **6** | **132** | **6** | **12** | **41** | | | **24** |
| Mercury | 0.07 | | | **0.59** | | **0.12** | **0.05** | | 0.02 U | **0.04** | **0.05** | **0.06** | **0.05** | **0.02** | **0.02** | **0.08** | | | **0.48** |
| Zinc | 100 | | | **58** | | **82** | **56** | | **31** | **94** | **57** | **42** | **104** | **47** | **41** | **71** | | | **61** |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 25 (d) | | | | | | | | | | | | | | | | **20** | | |
| Toluene | 580 | | | | | | | | | | | | | | | | **48** | | |
| Ethylbenzene | 2,400 | | | | | | | | | | | | | | | | **170** | | |
| m,p-Xylene | | | | | | | | | | | | | | | | | **140** | | |
| o-Xylene | | | | | | | | | | | | | | | | | **200** | | |
| Total Xylenes | 15,000 | | | | | | | | | | | | | | | | **340** | | |
| **PCBs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8082** | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1016 | 1,000 | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1242 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1248 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1254 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1260 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1221 | | | | | | | | | | | | | | | | | | | |
| PCB-Aroclor 1232 | | | | | | | | | | | | | | | | | | | |

# TABLE D-1
## SOIL ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B57-10-15 PI16B/PI54A 7/27/2009 | B57-15-16 PI16C 7/27/2009 | B58-1-2 PI16D 7/27/2009 | B58-15-16 PI16E 7/27/2009 | B59-1-2 PI16K 7/27/2009 | B60-1-2 PI16F 7/27/2009 | B60-15-16 PI16G 7/27/2009 | B61-1-2 PI16H 7/27/2009 | B62-1-2 PI35I 7/28/2009 | B63-1-2 PI35J 7/28/2009 | B64-1-2 PI16L 7/27/2009 | B65-1-2 PI16I 7/27/2009 | B66-1-2 PI35K 7/28/2009 | B67-1-2 PI16J 7/27/2009 | B68-1-2 PI35L 7/28/2009 | MW-11-4.5-5 PI99A 8/3/2009 | MW-14-15 PJ11A 8/4/2009 | MW-17D-15.5-16.5 PJ11B/PJ23A 8/4/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PAHs (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 4,500 | | **100** | | **210** | | | **28** | | | | | | | | | | **160** | **1,900** |
| 2-Methylnaphthalene | 320,000 | | **180** | | **150** | | | **12** | | | | | | | | | | **81** | **1,400** |
| 1-Methylnaphthalene | | | **220** | | **130** | | | **7.2** | | | | | | | | | | **69** | **1,100** |
| Acenaphthylene | | | **12** | | **150** | | | **37** | | | | | | | | | | **36** | **180** |
| Acenaphthene | 25,000 | | **19** | | **140** J | | | **5.8** | | | | | | | | | | **74** | **3,300** |
| Fluorene | 79,000 | | **48** | | **370** J | | | **19** | | | | | | | | | | **100** | **2,900** |
| Phenanthrene | | | **260** J | | **1,800** J | | | **260** J | | | | | | | | | | **1,100** J | **14,000** J |
| Anthracene | 2,300,000 | | **39** | | **500** | | | **210** | | | | | | | | | | **250** J | **4,200** J |
| Fluoranthene | | | **120** J | | **2,000** J | | | **1,400** J | | | | | | | | | | **2,200** | **8,900** |
| Pyrene | 140,000 | | **130** | | **1,600** | | | **1,400** | | | | | | | | | | **1,600** | **7,700** |
| Benzo(a)anthracene | | | **82** | | **840** | | | **1,100** | | | | | | | | | | **780** | **4,200** |
| Chrysene | | | **120** | | **800** | | | **1,100** | | | | | | | | | | **820** | **4,400** |
| Benzo(b)fluoranthene | | | **55** J | | **610** J | | | **720** J | | | | | | | | | | **620** | **2,000** |
| Benzo(k)fluoranthene | | | **73** | | **570** | | | **720** | | | | | | | | | | **770** | **3,100** |
| Benzo(a)pyrene | 140 | | **96** | | **790** | | | **1,100** | | | | | | | | | | **700** | **4,200** |
| Indeno(1,2,3-cd)pyrene | | | **43** | | **260** | | | **360** | | | | | | | | | | **310** J | **1,700** J |
| Dibenz(a,h)anthracene | | | **29** J | | **130** J | | | **320** J | | | | | | | | | | **130** J | **810** J |
| Benzo(g,h,i)perylene | | | **43** | | **210** | | | **410** | | | | | | | | | | **280** | **1,500** |
| Dibenzofuran | | | **50** | | **170** J | | | **8.6** | | | | | | | | | | **90** | **1,400** |
| TEQ | 140 | | **125** | | **1,039** | | | **1,433** | | | | | | | | | | **969** | **5,425** |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D** | | | | | | | | | | | | | | | | | | | |
| Phenol | 22,000 | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | **460** |
| Bis-(2-Chloroethyl) Ether | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 2-Chlorophenol | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 1,3-Dichlorobenzene | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 1,4-Dichlorobenzene | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| Benzyl Alcohol | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| 1,2-Dichlorobenzene | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 2-Methylphenol | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 2,2'-Oxybis(1-Chloropropane) | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 4-Methylphenol | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | **400** |
| N-Nitroso-Di-N-Propylamine | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| Hexachloroethane | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| Nitrobenzene | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| Isophorone | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 2-Nitrophenol | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 2,4-Dimethylphenol | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| Benzoic Acid | | | | 590 U | | 640 U | 630 U | | 620 U | 610 U | 580 U | 590 U | 580 U | 640 U | 600 U | 650 U | | | 1,800 U |
| bis(2-Chloroethoxy) Methane | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 2,4-Dichlorophenol | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| 1,2,4-Trichlorobenzene | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| Naphthalene | | | | 59 U | | **270** | **69** | | **130** | 61 U | **130** | 59 U | 58 U | **180** | **71** | 65 U | | | **10,000** |
| 4-Chloroaniline | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| Hexachlorobutadiene | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 4-Chloro-3-methylphenol | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| 2-Methylnaphthalene | | | | 59 U | | 64 U | 63 U | | **410** | 61 U | **180** | 59 U | 58 U | **200** | **83** | 65 U | | | **6,700** |
| Hexachlorocyclopentadiene | | | | 300 UJ | | 320 UJ | 320 UJ | | 310 UJ | 310 U | 290 U | 300 UJ | 290 UJ | 320 U | 300 UJ | 320 U | | | 890 U |
| 2,4,6-Trichlorophenol | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| 2,4,5-Trichlorophenol | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| 2-Chloronaphthalene | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 2-Nitroaniline | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| Dimethylphthalate | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| Acenaphthylene | | | | 59 U | | 64 U | **180** | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | **1,100** |
| 3-Nitroaniline | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| Acenaphthene | | | | 59 U | | **100** | 63 U | | 62 U | 61 U | **370** | 59 U | 58 U | 64 U | 60 U | 65 U | | | **17,000** |
| 2,4-Dinitrophenol | | | | 590 U | | 640 U | 630 U | | 620 U | 610 U | 580 U | 590 U | 580 U | 640 U | 600 U | 650 U | | | 1,800 U |
| 4-Nitrophenol | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| Dibenzofuran | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | **210** | 59 U | 58 U | 64 U | 60 U | 65 U | | | **7,600** J |
| 2,6-Dinitrotoluene | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |

# TABLE D-1
# SOIL ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | B57-10-15 PI16B/PI54A 7/27/2009 | B57-15-16 PI16C 7/27/2009 | B58-1-2 PI16D 7/27/2009 | B58-15-16 PI16E 7/27/2009 | B59-1-2 PI16K 7/27/2009 | B60-1-2 PI16F 7/27/2009 | B60-15-16 PI16G 7/27/2009 | B61-1-2 PI16H 7/27/2009 | B62-1-2 PI35I 7/28/2009 | B63-1-2 PI35J 7/28/2009 | B64-1-2 PI16L 7/27/2009 | B65-1-2 PI16I 7/27/2009 | B66-1-2 PI35K 7/28/2009 | B67-1-2 PI16J 7/27/2009 | B68-1-2 PI35L 7/28/2009 | MW-11-4.5-5 PI99A 8/3/2009 | MW-14-15 PJ11A 8/4/2009 | MW-17D-15.5-16.5 PJ11B/PJ23A 8/4/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-Dinitrotoluene | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| Diethylphthalate | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 4-Chlorophenyl-phenylether | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| Fluorene | | | | 59 U | | **70** | 63 U | | 62 U | 61 U | **520** | 59 U | 58 U | 64 U | 60 U | 65 U | | | **14,000** |
| 4-Nitroaniline | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| 4,6-Dinitro-2-Methylphenol | | | | 590 U | | 640 U | 630 U | | 620 U | 610 U | 580 U | 590 U | 580 U | 640 U | 600 U | 650 U | | | 1,800 U |
| N-Nitrosodiphenylamine | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 4-Bromophenyl-phenylether | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 UJ |
| Hexachlorobenzene | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| Pentachlorophenol | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 UJ |
| Phenanthrene | | | | **120** | | **170** | **340** | | **350** | **250** | **3,600** | 59 U | 58 U | **190** | **100** | 65 U | | | **69,000** |
| Carbazole | 320 | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | **300** | 59 U | 58 U | 64 U | 60 U | 65 U | | | **3,400** |
| Anthracene | | | | 59 U | | 64 U | **94** | | 62 U | 61 U | **750** | 59 U | 58 U | 64 U | 60 U | 65 U | | | **22,000** |
| Di-n-Butylphthalate | 57,000 | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| Fluoranthene | | | | **110** | | **67** | **1,300** | | **150** | **390** | **2,900** | 59 U | 58 U | **160** | **260** | 65 U | | | **45,000** |
| Pyrene | | | | **110** | | 64 U | **1,500** | | **160** | **300** | **2,700** | 59 U | 58 U | **150** | **310** | 65 U | | | **40,000** |
| Butylbenzylphthalate | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 U |
| 3,3'-Dichlorobenzidine | | | | 300 U | | 320 U | 320 U | | 310 U | 310 U | 290 U | 300 U | 290 U | 320 U | 300 U | 320 U | | | 890 U |
| Benzo(a)anthracene | | | | 59 U | | 64 U | **720** | | **98** | **160** | **1,100** | 59 U | 58 U | **91** | **180** | 65 U | | | **18,000** |
| bis(2-Ethylhexyl)phthalate | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 UJ |
| Chrysene | | | | 59 U | | 64 U | **920** | | **160** | **180** | **1,100** | 59 U | 58 U | **140** | **190** | 65 U | | | **21,000** |
| Di-n-Octyl phthalate | | | | 59 U | | 64 U | 63 U | | 62 U | 61 U | 58 U | 59 U | 58 U | 64 U | 60 U | 65 U | | | 180 UJ |
| Benzo(b)fluoranthene | | | | 59 U | | 64 U | **500** | | **85** | **160** | **890** | 59 U | 58 U | **140** | **140** | 65 U | | | **13,000** |
| Benzo(k)fluoranthene | | | | 59 U | | 64 U | **840** | | **75** | **150** | **700** | 59 U | 58 U | **120** | **180** | 65 U | | | **7,200** |
| Benzo(a)pyrene | | | | 59 U | | 64 U | **680** | | **90** | **160** | **1,200** | 59 U | 58 U | **120** | **220** | 65 U | | | **18,000** |
| Indeno(1,2,3-cd)pyrene | | | | 59 U | | 64 U | **320** | | 62 U | **100** | **570** | 59 U | 58 U | **93** | **64** | 65 U | | | **5,600** |
| Dibenz(a,h)anthracene | | | | 59 U | | 64 U | **120** | | 62 U | 61 U | **220** | 59 U | 58 U | 64 U | 60 U | 65 U | | | **2,700** |
| Benzo(g,h,i)perylene | | | | 59 U | | 64 U | **320** | | 62 U | **120** | **680** | 59 U | 58 U | **120** | **62** | 65 U | | | **4,800** |
| 1-Methylnaphthalene | | | | 59 U | | **97** | 63 U | | **270** | 61 U | **180** | 59 U | 58 U | **120** | 60 U | 65 U | | | **5,500** |

Notes:

U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
E = The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
Bold indicates detected compound.
(a) See Tables 3 and 4 for criteria used to develop cleanup levels.
(b) Actual laboratory reporting limits may vary from the typical value based on laboratory dilutions.
(c) Samples collected from boring B-31A; no samples were collected from boring B-31B.
(d) Cleanup level for benzene revised based on revisions to Feasibility Study.

# TABLE D-2
# GROUNDWATER ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | Typical Laboratory Reporting Limit (b) | B-1 MK66I 2/27/2008 | B-2 MK66M 2/27/2008 | B-3 MK66J 2/27/2008 | B-6 MK66K 2/27/2008 | B-7 MK66L 2/27/2008 | B-8 MK82I 2/28/2008 | B-9 MK82J 2/28/2008 | B-10 MK82K 2/28/2008 | B-11 MK82L 2/28/2008 | B-12 MK82M 2/28/2008 | B-14 MK82N 2/28/2008 | B-18 ML02H 2/29/2008 | B-19 ML02I 2/29/2008 | B-26 NT63K 10/7/2008 | B-27 NT61L 10/7/2008 | B-38 NT85G 10/9/2008 | B-41 NT85C 10/9/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-HCID (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Gas | 0.8 | | | | | | | | | | | | | | | **>0.25** | 0.25 U | **>50** | 1.0 U |
| Diesel | 0.5 | | | | | | | | | | | | | | | 0.63 U | 0.63 U | **>120** | **>2.5** |
| Oil | 0.5 | | | | | | | | | | | | | | | 0.63 U | 0.63 U | **>120** | 2.5 U |
| **NWTPH-DxSG (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Organics | 0.5 | 0.25 | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | | | **310** | **3.6** |
| Motor Oil | 0.5 | 0.5 | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | | | **150** | 2.5 U |
| **NWTPH-GX (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 0.8 | 0.25 | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | **1.3** | 0.25 U | | | | |
| **BTEX (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 0.8 | 1.0 | | | | | | | | | | | | | | | | | |
| Toluene | 80 | 1.0 | | | | | | | | | | | | | | | | | |
| Ethylbenzene | 275 | 1.0 | | | | | | | | | | | | | | | | | |
| m,p-Xylene | 1,600 | 1.0 | | | | | | | | | | | | | | | | | |
| o-Xylene | 1,600 | 1.0 | | | | | | | | | | | | | | | | | |
| **PAHs (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 160 | 0.10 - 1.4 | 1.0 U | **43** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | **3.1** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| 2-Methylnaphthalene | 32 | 0.10 - 1.4 | 1.0 U | **5.1** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| 1-Methylnaphthalene | | 0.10 - 1.4 | 1.0 U | **3.2** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Acenaphthylene | | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Acenaphthene | 250 | 0.10 - 1.4 | 1.0 U | **1.5** | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Fluorene | 500 | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Phenanthrene | | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Anthracene | 4,800 | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Fluoranthene | 50 | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Pyrene | 100 | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Benzo(a)anthracene | | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Chrysene | | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Benzo(b)fluoranthene | | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Benzo(k)fluoranthene | | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Benzo(a)pyrene | 0.012 | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Indeno(1,2,3-cd)pyrene | | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Dibenz(a,h)anthracene | | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Benzo(g,h,i)perylene | | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Dibenzofuran | 32 | 0.10 - 1.4 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.4 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| TEQ | 0.012 | | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | | | | |

# TABLE D-2
## GROUNDWATER ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | Typical Laboratory Reporting Limit (b) | B-1 MK66I 2/27/2008 | B-2 MK66M 2/27/2008 | B-3 MK66J 2/27/2008 | B-6 MK66K 2/27/2008 | B-7 MK66L 2/27/2008 | B-8 MK82I 2/28/2008 | B-9 MK82J 2/28/2008 | B-10 MK82K 2/28/2008 | B-11 MK82L 2/28/2008 | B-12 MK82M 2/28/2008 | B-14 MK82N 2/28/2008 | B-18 ML02H 2/29/2008 | B-19 ML02I 2/29/2008 | B-26 NT63K 10/7/2008 | B-27 NT61L 10/7/2008 | B-38 NT85G 10/9/2008 | B-41 NT85C 10/9/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DISSOLVED METALS (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method 200.8/6010B/7470A** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 5 (c) | 0.5 - 10 | **29** | **12** | **20** | **4** | **40** | **3** | **25** | **2** | 10 U | 1 U | **4** | **3** | **1** | | | | |
| Cadmium | 5 | 2 | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | | | | |
| Chromium | 100 | 5 | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | | | | |
| Copper | 2.4 | 2 | | | | | | | | | | | | | | | | | |
| Lead | 8.1 | 1 | 1 U | 1 U | **26** | 1 U | 1 U | **1** | 1 U | 1 U | 1 U | 1 U | **2** | 1 U | 1 U | | | | |
| Mercury | 0.025 | 0.10 | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | | | | |
| Zinc | 81 | 10 | | | | | | | | | | | | | | | | | |
| **VOLATILES (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8260B** | | | | | | | | | | | | | | | | | | | |
| Chloromethane | 3 | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Bromomethane | | 0.5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | | | | |
| Vinyl Chloride | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Chloroethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Methylene Chloride | 5 | 0.5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | **1.3** | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | | | | |
| Acetone | 35 | 3 | 3.0 U | 3.0 U | 3.0 U | 3.0 U | **6.6** | **3.1** | **7.0** | 3.0 U | **4.8** | 3.0 U | **4.2** | 3.0 U | 3.0 U | | | | |
| Carbon Disulfide | 350 | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.4** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,1-Dichloroethene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,1-Dichloroethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| trans-1,2-Dichloroethene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| cis-1,2-Dichloroethene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Chloroform | 7 | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,2-Dichloroethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 2-Butanone | 2,400 | 2.5 - 3.0 | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | | | | |
| 1,1,1-Trichloroethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Carbon Tetrachloride | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Vinyl Acetate | | 1.0 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Bromodichloromethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,2-Dichloropropane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| cis-1,3-Dichloropropene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Trichloroethene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Dibromochloromethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,1,2-Trichloroethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Benzene | 0.8 | 0.2 | 0.2 U | **5.3** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.4** | 0.2 U | | | | |
| trans-1,3-Dichloropropene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 2-Chloroethylvinylether | | 1.0 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Bromoform | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 4-Methyl-2-Pentanone (MIBK) | | 2.5 | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | | | | |
| 2-Hexanone | | 2.5 | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | | | | |
| Tetrachloroethene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,1,2,2-Tetrachloroethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Toluene | 80 | 0.2 | 0.2 U | **2.2** | 0.2 U | 0.2 U | 0.2 U | **0.3** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.5** | 0.2 U | | | | |
| Chlorobenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Ethylbenzene | 700 | 0.2 | 0.2 U | **5.9** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.2** | 0.2 U | | | | |
| Styrene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Trichlorofluoromethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| m,p-Xylene | | 0.4 | 0.4 U | **5.7** | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | **1.1** | 0.4 U | | | | |
| o-Xylene | | 0.2 | 0.2 U | **2.5** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.5** | 0.2 U | | | | |
| Total Xylenes | 1,600 | | ND | **8.2** | ND | ND | ND | ND | ND | ND | ND | ND | ND | **1.6** | ND | | | | |
| 1,2-Dichlorobenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,3-Dichlorobenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,4-Dichlorobenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Acrolein | | 5.0 | 5.0 U | 5.0 U | 5 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | 5.0 U | | | | |
| Methyl Iodide | | 1.0 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| Bromoethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Acrylonitrile | | 1.0 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| 1,1-Dichloropropene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Dibromomethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,1,1,2-Tetrachloroethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,2-Dibromo-3-chloropropane | | 0.5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | | | | |
| 1,2,3-Trichloropropane | | 0.5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | | | | |

# TABLE D-2
## GROUNDWATER ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | Typical Laboratory Reporting Limit (b) | B-1 MK66I 2/27/2008 | B-2 MK66M 2/27/2008 | B-3 MK66J 2/27/2008 | B-6 MK66K 2/27/2008 | B-7 MK66L 2/27/2008 | B-8 MK82I 2/28/2008 | B-9 MK82J 2/28/2008 | B-10 MK82K 2/28/2008 | B-11 MK82L 2/28/2008 | B-12 MK82M 2/28/2008 | B-14 MK82N 2/28/2008 | B-18 ML02H 2/29/2008 | B-19 ML02I 2/29/2008 | B-26 NT63K 10/7/2008 | B-27 NT61L 10/7/2008 | B-38 NT85G 10/9/2008 | B-41 NT85C 10/9/2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| trans-1,4-Dichloro-2-butene | | 1.0 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | |
| 1,3,5-Trimethylbenzene | 400 | 0.2 | 0.2 U | **0.6** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,2,4-Trimethylbenzene | 400 | 0.2 | 0.2 U | **1.1** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.4** | 0.2 U | 0.2 U | **0.4** | 0.2 U | | | | |
| Hexachlorobutadiene | | 0.5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | | | | |
| Ethylene Dibromide | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Bromochloromethane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 2,2-Dichloropropane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 1,3-Dichloropropane | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| Isopropylbenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **1.2** | 0.2 U | | | | |
| n-Propylbenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **3.1** | 0.2 U | | | | |
| Bromobenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 2-Chlorotoluene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| 4-Chlorotoluene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | | | | |
| tert-Butylbenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **3.0** | 0.2 U | | | | |
| sec-Butylbenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **1.6** | 0.2 U | | | | |
| 4-Isopropyltoluene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.8** | **0.3** | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **0.3** | | | | |
| n-Butylbenzene | | 0.2 | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | **2.3** | 0.2 U | | | | |
| 1,2,4-Trichlorobenzene | | 0.5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | | | | |
| Naphthalene | 160 | 0.5 | 0.5 U | **68** | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | **6.5** | 0.5 U | 0.5 U | 0.5 U | 0.5 U | | | | |
| 1,2,3-Trichlorobenzene | | 0.5 | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | 0.5 U | | | | |

# TABLE D-2
# GROUNDWATER ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-1 OB80A 11/25/08 | MW-1 PK34B 08/12/09 | MW-2 OB80B 11/25/08 | MW-2 PK34A 08/12/09 | MW-3 OB80C 11/24/08 | MW-3 PK44A 08/13/09 | MW-4 OB80D 11/24/08 | MW-4 PK34C 08/12/09 | MW-5 OB80E 11/24/08 | MW-5 PK15A 08/11/09 | MW-5 QL46A 02/24/10 | MW-5 QU14A 4/22/2010 | MW-6 OB80F 11/25/08 | MW-6 PK34D 08/12/09 | MW-6 QU14C 4/22/2010 | MW-7D OB80G 11/24/08 | MW-7D PK34F 08/12/09 | MW-7D QU14E 4/22/2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-HCID (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Gas | 0.8 | | | | | | | | | | | | | | | | | | |
| Diesel | 0.5 | | | | | | | | | | | | | | | | | | |
| Oil | 0.5 | | | | | | | | | | | | | | | | | | |
| **NWTPH-DxSG (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Diesel Range Organics | 0.5 | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | | | | 0.25 U | 0.25 U | | 0.25 U | 0.25 U | 0.25 U |
| Motor Oil | 0.5 | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | | | | 0.50 U | 0.50 U | | 0.50 U | 0.50 U | 0.50 U |
| **NWTPH-GX (mg/L)** | | | | | | | | | | | | | | | | | | | |
| Gasoline | 0.8 | 0.25 U | 0.25 U | 0.25 U | 0.25 U | **0.37** | **0.28** | 0.25 U | 0.25 U | 0.25 U | 0.25 U | | | 0.25 U | 0.25 U | | 0.25 U | 0.25 U | 0.25 U |
| **BTEX (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | | |
| Benzene | 0.8 | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | 1.0 U |
| Toluene | 80 | | 1.0 U | | 1.0 U | | **22** | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | 1.0 U |
| Ethylbenzene | 275 | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | 1.0 U |
| m,p-Xylene | 1,600 | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | 1.0 U |
| o-Xylene | 1,600 | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | 1.0 U |
| **PAHs (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | | |
| Naphthalene | 160 | **5.6** | **0.13** | **7.8** | 0.10 U | **9.3** | 0.10 U | **4.4** | **0.29** | **1.7** | 0.10 U | | | **1.1** | **0.32** | | **0.58** | **1.9** | **2.3** |
| 2-Methylnaphthalene | 32 | **0.61** | 0.10 U | **0.85** | 0.10 U | **1.1** | 0.10 U | **0.45** | 0.10 U | **0.18** | 0.10 U | | | **0.13** | 0.10 U | | 0.10 U | **0.39** | **0.52** |
| 1-Methylnaphthalene | | **0.32** | 0.10 U | **0.44** | 0.10 U | **0.57** | 0.10 U | **0.29** | 0.10 U | **0.11** | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | **0.25** | **0.28** |
| Acenaphthylene | | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Acenaphthene | 250 | **0.15** | 0.10 U | **0.20** | 0.10 U | **0.30** | 0.10 U | **0.39** | **0.26** | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | **0.15** | **0.19** |
| Fluorene | 500 | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Phenanthrene | | 0.12 U | 0.10 U | 0.12 U | 0.10 U | **0.17** | 0.10 U | **0.27** | **0.32** | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Anthracene | 4,800 | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Fluoranthene | 50 | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Pyrene | 100 | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Benzo(a)anthracene | | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Chrysene | | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Benzo(b)fluoranthene | | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Benzo(k)fluoranthene | | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Benzo(a)pyrene | 0.012 | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Indeno(1,2,3-cd)pyrene | | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Dibenz(a,h)anthracene | | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Benzo(g,h,i)perylene | | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| Dibenzofuran | 32 | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.12 U | 0.10 U | 0.11 U | 0.10 U | | | 0.10 U | 0.10 U | | 0.10 U | 0.10 U | 0.11 U |
| TEQ | 0.012 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | | | ND | ND | | ND | ND | ND |

**TABLE D-2**
**GROUNDWATER ANALYTICAL RESULTS**
**NORTH LOT DEVELOPMENT**
**SEATTLE, WASHINGTON**

| | Cleanup Levels (a) | MW-1 OB80A 11/25/08 | MW-1 PK34B 08/12/09 | MW-2 OB80B 11/25/08 | MW-2 PK34A 08/12/09 | MW-3 OB80C 11/24/08 | MW-3 PK44A 08/13/09 | MW-4 OB80D 11/24/08 | MW-4 PK34C 08/12/09 | MW-5 OB80E 11/24/08 | MW-5 PK15A 08/11/09 | MW-5 QL46A 02/24/10 | MW-5 QU14A 4/22/2010 | MW-6 OB80F 11/25/08 | MW-6 PK34D 08/12/09 | MW-6 QU14C 4/22/2010 | MW-7D OB80G 11/24/08 | MW-7D PK34F 08/12/09 | MW-7D QU14E 4/22/2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DISSOLVED METALS (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method 200.8/6010B/7470A** | | | | | | | | | | | | | | | | | | | |
| Arsenic | 5 (c) | **7** | **2.4** | **3** | **1.2** | **5** | **1.3** | **6** | **4.6** | **58** | **17** | **26** | **33** | **6** | **1.2** | **1.7** | **4** | **2.0** | |
| Cadmium | 5 | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | | | 2 U | 2 U | | 2 U | 2 U | |
| Chromium | 100 | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | | | 5 U | 5 U | | 5 U | 5 U | |
| Copper | 2.4 | | 2 U | | 2 U | | 2 U | | 2 U | | 2 U | | | | 2 U | | | 2 U | |
| Lead | 8.1 | 1 U | 1 U | 1 U | 1 U | 2 U | 1 U | 2 U | 1 U | 1 U | 1 U | | | 1 U | 1 U | | 1 U | 1 U | |
| Mercury | 0.025 | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | | | 0.1 U | 0.1 U | | 0.1 U | 0.1 U | |
| Zinc | 81 | | 10 U | | 10 U | | 10 U | | 10 U | | 10 U | | | | 10 U | | | 10 U | |
| **VOLATILES (µg/L)** | | | | | | | | | | | | | | | | | | | |
| **Method SW8260B** | | | | | | | | | | | | | | | | | | | |
| Chloromethane | 3 | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Bromomethane | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | | | 0.5 U | | | 0.5 U | | |
| Vinyl Chloride | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Chloroethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Methylene Chloride | 5 | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | | | 0.5 U | | | 0.5 U | | |
| Acetone | 35 | 3.0 U | | **6.2** | | **27** | | **10** | | **3.6** | | | | **3.4** | | | **4.1** | | |
| Carbon Disulfide | 350 | 0.2 U | | 0.2 U | | 0.2 U | | **0.3** | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,1-Dichloroethene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,1-Dichloroethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| trans-1,2-Dichloroethene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| cis-1,2-Dichloroethene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Chloroform | 7 | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | **0.5** | | |
| 1,2-Dichloroethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 2-Butanone | 2,400 | 2.5 U | | 2.5 U | | **7.4** | | 2.5 U | | 2.5 U | | | | 2.5 U | | | 2.5 U | | |
| 1,1,1-Trichloroethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Carbon Tetrachloride | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Vinyl Acetate | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | | |
| Bromodichloromethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,2-Dichloropropane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| cis-1,3-Dichloropropene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Trichloroethene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Dibromochloromethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,1,2-Trichloroethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Benzene | 0.8 | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| trans-1,3-Dichloropropene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 2-Chloroethylvinylether | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | | |
| Bromoform | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 4-Methyl-2-Pentanone (MIBK) | | 2.5 U | | 2.5 U | | 2.5 U | | 2.5 U | | 2.5 U | | | | 2.5 U | | | 2.5 U | | |
| 2-Hexanone | | 2.5 U | | 2.5 U | | 2.5 U | | 2.5 U | | 2.5 U | | | | 2.5 U | | | 2.5 U | | |
| Tetrachloroethene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,1,2,2-Tetrachloroethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Toluene | 80 | **0.3** | | 0.2 U | | **0.9** | | **0.3** | | 0.2 U | | | | 0.2 U | | | **0.5** | | |
| Chlorobenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Ethylbenzene | 700 | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Styrene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Trichlorofluoromethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| m,p-Xylene | | 0.4 U | | 0.4 U | | 0.4 U | | 0.4 U | | 0.4 U | | | | 0.4 U | | | 0.4 U | | |
| o-Xylene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Total Xylenes | 1,600 | ND | | ND | | ND | | ND | | ND | | | | ND | | | ND | | |
| 1,2-Dichlorobenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,3-Dichlorobenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,4-Dichlorobenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Acrolein | | 5.0 U | | 5.0 U | | 5.0 U | | 5.0 U | | 5.0 U | | | | 5.0 U | | | 5.0 U | | |
| Methyl Iodide | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | | |
| Bromoethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Acrylonitrile | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | | |
| 1,1-Dichloropropene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Dibromomethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,1,1,2-Tetrachloroethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,2-Dibromo-3-chloropropane | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | | | 0.5 U | | | 0.5 U | | |
| 1,2,3-Trichloropropane | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | | | 0.5 U | | | 0.5 U | | |

# TABLE D-2
## GROUNDWATER ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-1 OB80A 11/25/08 | MW-1 PK34B 08/12/09 | MW-2 OB80B 11/25/08 | MW-2 PK34A 08/12/09 | MW-3 OB80C 11/24/08 | MW-3 PK44A 08/13/09 | MW-4 OB80D 11/24/08 | MW-4 PK34C 08/12/09 | MW-5 OB80E 11/24/08 | MW-5 PK15A 08/11/09 | MW-5 QL46A 02/24/10 | MW-5 QU14A 4/22/2010 | MW-6 OB80F 11/25/08 | MW-6 PK34D 08/12/09 | MW-6 QU14C 4/22/2010 | MW-7D OB80G 11/24/08 | MW-7D PK34F 08/12/09 | MW-7D QU14E 4/22/2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| trans-1,4-Dichloro-2-butene | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | 1.0 U | | | | 1.0 U | | | 1.0 U | | |
| 1,3,5-Trimethylbenzene | 400 | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,2,4-Trimethylbenzene | 400 | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Hexachlorobutadiene | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | | | 0.5 U | | | 0.5 U | | |
| Ethylene Dibromide | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Bromochloromethane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 2,2-Dichloropropane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,3-Dichloropropane | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Isopropylbenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| n-Propylbenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| Bromobenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 2-Chlorotoluene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 4-Chlorotoluene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| tert-Butylbenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| sec-Butylbenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 4-Isopropyltoluene | | 0.2 U | | **7.2** | | **130** | | **0.4** | | 0.2 U | | | | **0.4** | | | 0.2 U | | |
| n-Butylbenzene | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | 0.2 U | | | | 0.2 U | | | 0.2 U | | |
| 1,2,4-Trichlorobenzene | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | | | 0.5 U | | | 0.5 U | | |
| Naphthalene | 160 | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | | | 0.5 U | | | 0.5 U | | |
| 1,2,3-Trichlorobenzene | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | 0.5 U | | | | 0.5 U | | | 0.5 U | | |

# TABLE D-2
## GROUNDWATER ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-7S OB80H 11/24/08 | MW-7S PK34E 08/12/09 | MW-8 OB80I 11/25/08 | MW-8 PK15B 08/11/09 | Dup of MW-8 MW-88 PK15C 08/11/09 | MW-9D OB80J 11/25/08 | MW-9D PK34G 08/12/09 | MW-9D QL46C 02/24/10 | MW-9D QU14F 4/22/2010 | MW-9S OB80K 11/25/08 | MW-9S PK34H 08/12/09 | MW-9S QL46D 2/24/2010 | MW-10 PK44B 8/13/2009 | MW-11 PK44C 8/13/2009 | MW-12 PK44D 8/13/2009 | MW-13 PK44E 8/13/2009 | MW-14 PK44F 8/13/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-HCID (mg/L)** | | | | | | | | | | | | | | | | | | |
| Gas | 0.8 | | | | | | | | | | | | | | | | | |
| Diesel | 0.5 | | | | | | | | | | | | | | | | | |
| Oil | 0.5 | | | | | | | | | | | | | | | | | |
| **NWTPH-DxSG (mg/L)** | | | | | | | | | | | | | | | | | | |
| Diesel Range Organics | 0.5 | 0.25 U | 0.25 U | 0.25 U | | | **2.0** | **0.77** | **1.1** | **0.62** | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.25 U |
| Motor Oil | 0.5 | 0.50 U | 0.50 U | 0.50 U | | | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U | 0.50 U |
| **NWTPH-GX (mg/L)** | | | | | | | | | | | | | | | | | | |
| Gasoline | 0.8 | 0.25 U | 0.25 U | 0.25 U | 0.25 U | **0.25** | **9.7** | **2.2** | **2.9** | **2.7** | **0.54** | 0.25 U | 0.25 U | 0.25 U | 0.25 U | **0.30** | 0.25 U | 0.25 U |
| **BTEX (µg/L)** | | | | | | | | | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | | | | | | | | | |
| Benzene | 0.8 | | 1.0 U | | 1.0 U | 1.0 U | | **13** | **16** | **13** | | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Toluene | 80 | | 1.0 U | | 1.0 U | 1.0 U | | **3.1** | **1.4** | **1.0** | | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Ethylbenzene | 275 | | 1.0 U | | 1.0 U | 1.0 U | | **37** | **39** | **33** | | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| m,p-Xylene | 1,600 | | 1.0 U | | **1.1** | **1.2** | | **28** | **19** | **14** | | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| o-Xylene | 1,600 | | 1.0 U | | 1.0 U | 1.0 U | | **16** | **16** | **12** | | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| **PAHs (µg/L)** | | | | | | | | | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | | | | | | | | | |
| Naphthalene | 160 | **0.40** | **0.73** | **4.0** | 0.10 U | 0.10 U | **4,800** | **880** | | **1,600** | **16** | **0.99** | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| 2-Methylnaphthalene | 32 | 0.10 U | **0.19** | **0.47** | 0.10 U | 0.10 U | **660** | **230** | | **430** | **1.9** | **0.23** | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| 1-Methylnaphthalene | | 0.10 U | **0.10** | **0.28** | 0.10 U | 0.10 U | **360** | **130** | | **250** | **1.1** | **0.15** | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Acenaphthylene | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **13** | **2.6** | | **1.6** | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Acenaphthene | 250 | 0.10 U | 0.10 U | **0.11** | 0.10 U | 0.10 U | **240** | **120** | | **240** | **0.67** | **0.16** | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Fluorene | 500 | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **70** | **56** | | **100** | **0.19** | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Phenanthrene | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **95** | **73** | | **150** | **0.27** | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Anthracene | 4,800 | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **17** | **7.9** | | **8.4** | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Fluoranthene | 50 | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **20** | **4.7** | | **7.3** | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Pyrene | 100 | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **23** | **6.6** | | **7.7** | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Benzo(a)anthracene | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **6.2** | **0.36** | | **0.24** | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Chrysene | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **5.7** | **0.31** | | **0.19** | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Benzo(b)fluoranthene | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **2.6** | **0.10** | | 0.11 U | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Benzo(k)fluoranthene | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **3.1** | **0.10** | | 0.11 U | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Benzo(a)pyrene | 0.012 | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **5.5** | **0.15** | | 0.11 U | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Indeno(1,2,3-cd)pyrene | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **2.3** | 0.10 U | | 0.11 U | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Dibenz(a,h)anthracene | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 1.0 U | 0.10 U | | 0.11 U | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| Benzo(g,h,i)perylene | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **2.4** | 0.10 U | | 0.11 U | 0.12 U | 0.10 U | | 0.10 U | **0.14** | 0.10 U | 0.10 U | 0.10 U |
| Dibenzofuran | 32 | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U | **24** | **15** | | **14** E | 0.12 U | 0.10 U | | 0.10 U | 0.10 U | 0.10 U | 0.10 U | 0.10 U |
| TEQ | 0.012 | ND | ND | ND | ND | ND | **7.0** | **0.21** | | **0.026** | ND | ND | | ND | ND | ND | ND | ND |

# TABLE D-2
## GROUNDWATER ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | | | | | | Dup of MW-8 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MW-7S | MW-7S | MW-8 | MW-8 | MW-88 | MW-9D | MW-9D | MW-9D | MW-9D | MW-9S | MW-9S | MW-9S | MW-10 | MW-11 | MW-12 | MW-13 | MW-14 |
| | Cleanup | OB80H | PK34E | OB80I | PK15B | PK15C | OB80J | PK34G | QL46C | QU14F | OB80K | PK34H | QL46D | PK44B | PK44C | PK44D | PK44E | PK44F |
| | Levels (a) | 11/24/08 | 08/12/09 | 11/25/08 | 08/11/09 | 08/11/09 | 11/25/08 | 08/12/09 | 02/24/10 | 4/22/2010 | 11/25/08 | 08/12/09 | 2/24/2010 | 8/13/2009 | 8/13/2009 | 8/13/2009 | 8/13/2009 | 8/13/2009 |
| **DISSOLVED METALS (µg/L)** | | | | | | | | | | | | | | | | | | |
| **Method 200.8/6010B/7470A** | | | | | | | | | | | | | | | | | | |
| Arsenic | 5 (c) | **7** | **3.9** | **7** | **2.0** | **1.8** | **8** | **3.8** | | | **6** | **5.0** | | **4.9** | **2.6** | **1.8** | **2.2** | **2.5** |
| Cadmium | 5 | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | | | 2 U | 2 U | | 2 U | 2 U | 2 U | 2 U | 2 U |
| Chromium | 100 | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | 5 U | | | 5 U | 5 U | | 5 U | 5 U | 5 U | 5 U | 5 U |
| Copper | 2.4 | | 2 U | | 2 U | 2 U | | 2 U | | | | 2 U | | 2 U | 2 U | 2 U | 2 U | 2 U |
| Lead | 8.1 | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | | | 1 U | 1 U | | 1 U | **2** | **1** | 1 U | **1** |
| Mercury | 0.025 | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | | | 0.1 U | 0.1 U | | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U |
| Zinc | 81 | | 10 U | | 10 U | 10 U | | 10 U | | | | 10 U | | 10 U | 10 U | 10 U | 10 U | 10 U |
| **VOLATILES (µg/L)** | | | | | | | | | | | | | | | | | | |
| **Method SW8260B** | | | | | | | | | | | | | | | | | | |
| Chloromethane | 3 | 0.2 U | | 0.2 U | | | **0.2** | | | | 0.2 U | | | | | | | |
| Bromomethane | | 0.5 U | | 0.5 U | | | 0.5 U | | | | 0.5 U | | | | | | | |
| Vinyl Chloride | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Chloroethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Methylene Chloride | 5 | 0.5 U | | 0.5 U | | | 0.5 U | | | | 0.5 U | | | | | | | |
| Acetone | 35 | **8.4** | | **7.5** | | | 3.0 U | | | | 3.0 U | | | | | | | |
| Carbon Disulfide | 350 | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,1-Dichloroethene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,1-Dichloroethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| trans-1,2-Dichloroethene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| cis-1,2-Dichloroethene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Chloroform | 7 | 0.2 U | | 0.2 U | | | **0.2** | | | | 0.2 U | | | | | | | |
| 1,2-Dichloroethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 2-Butanone | 2,400 | 2.5 U | | 2.5 U | | | 2.5 U | | | | 2.5 U | | | | | | | |
| 1,1,1-Trichloroethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Carbon Tetrachloride | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Vinyl Acetate | | 1.0 U | | 1.0 U | | | 1.0 U | | | | 1.0 U | | | | | | | |
| Bromodichloromethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,2-Dichloropropane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| cis-1,3-Dichloropropene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Trichloroethene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Dibromochloromethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,1,2-Trichloroethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Benzene | 0.8 | 0.2 U | | **0.4** | | | **120** | | | | 0.2 U | | | | | | | |
| trans-1,3-Dichloropropene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 2-Chloroethylvinylether | | 1.0 U | | 1.0 U | | | 1.0 U | | | | 1.0 U | | | | | | | |
| Bromoform | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 4-Methyl-2-Pentanone (MIBK) | | 2.5 U | | 2.5 U | | | 2.5 U | | | | 2.5 U | | | | | | | |
| 2-Hexanone | | 2.5 U | | 2.5 U | | | 2.5 U | | | | 2.5 U | | | | | | | |
| Tetrachloroethene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,1,2,2-Tetrachloroethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Toluene | 80 | 0.2 U | | **0.9** | | | **60** E | | | | **0.3** | | | | | | | |
| Chlorobenzene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Ethylbenzene | 700 | 0.2 U | | **0.4** | | | **370** | | | | 0.2 U | | | | | | | |
| Styrene | | 0.2 U | | 0.2 U | | | **0.9** | | | | 0.2 U | | | | | | | |
| Trichlorofluoromethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| m,p-Xylene | | 0.4 U | | **1.8** | | | **310** | | | | 0.4 U | | | | | | | |
| o-Xylene | | 0.2 U | | **0.5** | | | **150** | | | | 0.2 U | | | | | | | |
| Total Xylenes | 1,600 | ND | | **2.3** | | | **460** | | | | ND | | | | | | | |
| 1,2-Dichlorobenzene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,3-Dichlorobenzene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,4-Dichlorobenzene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Acrolein | | 5.0 U | | 5.0 U | | | 5.0 U | | | | 5.0 U | | | | | | | |
| Methyl Iodide | | 1.0 U | | 1.0 U | | | 1.0 U | | | | 1.0 U | | | | | | | |
| Bromoethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Acrylonitrile | | 1.0 U | | 1.0 U | | | 1.0 U | | | | 1.0 U | | | | | | | |
| 1,1-Dichloropropene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Dibromomethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,1,1,2-Tetrachloroethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,2-Dibromo-3-chloropropane | | 0.5 U | | 0.5 U | | | 0.5 U | | | | 0.5 U | | | | | | | |
| 1,2,3-Trichloropropane | | 0.5 U | | 0.5 U | | | 0.5 U | | | | 0.5 U | | | | | | | |

# TABLE D-2
# GROUNDWATER ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-7S OB80H 11/24/08 | MW-7S PK34E 08/12/09 | MW-8 OB80I 11/25/08 | MW-8 PK15B 08/11/09 | Dup of MW-8 MW-88 PK15C 08/11/09 | MW-9D OB80J 11/25/08 | MW-9D PK34G 08/12/09 | MW-9D QL46C 02/24/10 | MW-9D QU14F 4/22/2010 | MW-9S OB80K 11/25/08 | MW-9S PK34H 08/12/09 | MW-9S QL46D 2/24/2010 | MW-10 PK44B 8/13/2009 | MW-11 PK44C 8/13/2009 | MW-12 PK44D 8/13/2009 | MW-13 PK44E 8/13/2009 | MW-14 PK44F 8/13/2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| trans-1,4-Dichloro-2-butene | | 1.0 U | | 1.0 U | | | 1.0 U | | | | 1.0 U | | | | | | | |
| 1,3,5-Trimethylbenzene | 400 | 0.2 U | | 0.2 U | | | **58** E | | | | 0.2 U | | | | | | | |
| 1,2,4-Trimethylbenzene | 400 | 0.2 U | | 0.2 U | | | **110** | | | | 0.2 U | | | | | | | |
| Hexachlorobutadiene | | 0.5 U | | 0.5 U | | | 0.5 U | | | | 0.5 U | | | | | | | |
| Ethylene Dibromide | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Bromochloromethane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 2,2-Dichloropropane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,3-Dichloropropane | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Isopropylbenzene | | 0.2 U | | 0.2 U | | | **20** E | | | | 0.2 U | | | | | | | |
| n-Propylbenzene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| Bromobenzene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 2-Chlorotoluene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 4-Chlorotoluene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| tert-Butylbenzene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| sec-Butylbenzene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 4-Isopropyltoluene | | 0.2 U | | **36** | | | 0.2 U | | | | 0.2 U | | | | | | | |
| n-Butylbenzene | | 0.2 U | | 0.2 U | | | 0.2 U | | | | 0.2 U | | | | | | | |
| 1,2,4-Trichlorobenzene | | 0.5 U | | 0.5 U | | | 0.5 U | | | | 0.5 U | | | | | | | |
| Naphthalene | 160 | 0.5 U | | 0.5 U | | | **7,400** | | | | **0.6** | | | | | | | |
| 1,2,3-Trichlorobenzene | | 0.5 U | | 0.5 U | | | 0.5 U | | | | 0.5 U | | | | | | | |

# TABLE D-2
# GROUNDWATER ANALYTICAL RESULTS
# NORTH LOT DEVELOPMENT
# SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-15D PK44G 8/13/2009 | MW-15D QL46B 2/24/2010 | MW-15D QU14B 4/22/2010 | MW-16D PK34I 08/12/09 | MW-16D QU14D 4/22/2010 | MW-17D PK34J 08/12/09 | MW-17D QL465 02/24/10 | MW-17D QU14G 4/22/2010 | MW-18D QU14H 4/22/2010 |
|---|---|---|---|---|---|---|---|---|---|---|
| **NWTPH-HCID (mg/L)** | | | | | | | | | | |
| Gas | 0.8 | | | | | | | | | |
| Diesel | 0.5 | | | | | | | | | |
| Oil | 0.5 | | | | | | | | | |
| **NWTPH-DxSG (mg/L)** | | | | | | | | | | |
| Diesel Range Organics | 0.5 | 0.25 U | | | 0.25 U | 0.25 U | 0.25 U | | | 0.25 U |
| Motor Oil | 0.5 | 0.50 U | | | 0.50 U | 0.50 U | 0.50 U | | | 0.50 U |
| **NWTPH-GX (mg/L)** | | | | | | | | | | |
| Gasoline | 0.8 | 0.25 U | | | 0.25 U | 0.25 U | 0.25 U | | | **0.26** |
| **BTEX (µg/L)** | | | | | | | | | | |
| **Method SW8021BMod** | | | | | | | | | | |
| Benzene | 0.8 | 1.0 U | | | 1.0 U | 1.0 U | 1.0 U | | | 1.0 U |
| Toluene | 80 | 1.0 U | | | 1.0 U | 1.0 U | 1.0 U | | | 1.0 U |
| Ethylbenzene | 275 | 1.0 U | | | 1.0 U | 1.0 U | 1.0 U | | | 1.0 U |
| m,p-Xylene | 1,600 | 1.0 U | | | 1.0 U | 1.0 U | 1.0 U | | | 1.0 U |
| o-Xylene | 1,600 | 1.0 U | | | 1.0 U | 1.0 U | 1.0 U | | | 1.0 U |
| **PAHs (µg/L)** | | | | | | | | | | |
| **Method SW8270D/SW8270DSIM** | | | | | | | | | | |
| Naphthalene | 160 | **1.8** | | | **0.28** | **1.1** | **8.3** | | | **1.2** |
| 2-Methylnaphthalene | 32 | **0.23** | | | 0.10 U | **0.26** | **3.1** | | | **0.30** |
| 1-Methylnaphthalene | | **0.20** | | | 0.10 U | **0.15** | **4.2** | | | **0.20** |
| Acenaphthylene | | 0.10 U | | | 0.10 U | 0.12 U | 0.10 U | | | 0.11 U |
| Acenaphthene | 250 | **0.31** | | | **0.27** | **0.18** | **6.5** | | | **0.27** |
| Fluorene | 500 | **0.19** | | | 0.10 U | 0.12 U | **3.9** | | | **0.13** |
| Phenanthrene | | **0.54** | | | **0.16** | 0.12 U | **10** | | | **0.26** |
| Anthracene | 4,800 | 0.10 U | | | 0.10 U | 0.12 U | **1.8** | | | 0.11 U |
| Fluoranthene | 50 | **0.13** | | | 0.10 U | 0.12 U | **1.6** | | | 0.11 U |
| Pyrene | 100 | **0.15** | | | 0.10 U | 0.12 U | **1.8** | | | 0.11 U |
| Benzo(a)anthracene | | 0.10 U | | | 0.10 U | 0.12 U | **0.16** | | | 0.11 U |
| Chrysene | | 0.10 U | | | 0.10 U | 0.12 U | **0.15** | | | 0.11 U |
| Benzo(b)fluoranthene | | 0.10 U | | | 0.10 U | 0.12 U | 0.10 U | | | 0.11 U |
| Benzo(k)fluoranthene | | 0.10 U | | | 0.10 U | 0.12 U | 0.10 U | | | 0.11 U |
| Benzo(a)pyrene | 0.012 | 0.10 U | | | 0.10 U | 0.12 U | 0.10 U | | | 0.11 U |
| Indeno(1,2,3-cd)pyrene | | 0.10 U | | | 0.10 U | 0.12 U | 0.10 U | | | 0.11 U |
| Dibenz(a,h)anthracene | | 0.10 U | | | 0.10 U | 0.12 U | 0.10 U | | | 0.11 U |
| Benzo(g,h,i)perylene | | 0.10 U | | | 0.10 U | 0.12 U | 0.10 U | | | 0.11 U |
| Dibenzofuran | 32 | **0.11** | | | 0.10 U | 0.12 U | **2.0** | | | 0.11 U |
| TEQ | 0.012 | ND | | | ND | ND | **0.02** | | | ND |

# TABLE D-2
## GROUNDWATER ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-15D PK44G 8/13/2009 | MW-15D QL46B 2/24/2010 | MW-15D QU14B 4/22/2010 | MW-16D PK34I 08/12/09 | MW-16D QU14D 4/22/2010 | MW-17D PK34J 08/12/09 | MW-17D QL465 02/24/10 | MW-17D QU14G 4/22/2010 | MW-18D QU14H 4/22/2010 |
|---|---|---|---|---|---|---|---|---|---|---|
| **DISSOLVED METALS (µg/L)** | | | | | | | | | | |
| **Method 200.8/6010B/7470A** | | | | | | | | | | |
| Arsenic | 5 (c) | **16.8** | 0.50 U | **14** | **7.2** | **2.1** | **13.5** | **6.6** | **9.3** | **1.6** |
| Cadmium | 5 | 2 U | | | 2 U | | 2 U | | | |
| Chromium | 100 | 5 U | | | 5 U | | 5 U | | | |
| Copper | 2.4 | 2 U | | | 2 U | | 2 U | | | |
| Lead | 8.1 | 1 U | | | 1 U | | 1 U | | | |
| Mercury | 0.025 | 0.1 U | | | 0.1 U | | 0.1 U | | | |
| Zinc | 81 | 10 U | | | 10 U | | 10 U | | | |
| | | | | | | | | | | |
| **VOLATILES (µg/L)** | | | | | | | | | | |
| **Method SW8260B** | | | | | | | | | | |
| Chloromethane | 3 | | | | | | | | | |
| Bromomethane | | | | | | | | | | |
| Vinyl Chloride | | | | | | | | | | |
| Chloroethane | | | | | | | | | | |
| Methylene Chloride | 5 | | | | | | | | | |
| Acetone | 35 | | | | | | | | | |
| Carbon Disulfide | 350 | | | | | | | | | |
| 1,1-Dichloroethene | | | | | | | | | | |
| 1,1-Dichloroethane | | | | | | | | | | |
| trans-1,2-Dichloroethene | | | | | | | | | | |
| cis-1,2-Dichloroethene | | | | | | | | | | |
| Chloroform | 7 | | | | | | | | | |
| 1,2-Dichloroethane | | | | | | | | | | |
| 2-Butanone | 2,400 | | | | | | | | | |
| 1,1,1-Trichloroethane | | | | | | | | | | |
| Carbon Tetrachloride | | | | | | | | | | |
| Vinyl Acetate | | | | | | | | | | |
| Bromodichloromethane | | | | | | | | | | |
| 1,2-Dichloropropane | | | | | | | | | | |
| cis-1,3-Dichloropropene | | | | | | | | | | |
| Trichloroethene | | | | | | | | | | |
| Dibromochloromethane | | | | | | | | | | |
| 1,1,2-Trichloroethane | | | | | | | | | | |
| Benzene | 0.8 | | | | | | | | | |
| trans-1,3-Dichloropropene | | | | | | | | | | |
| 2-Chloroethylvinylether | | | | | | | | | | |
| Bromoform | | | | | | | | | | |
| 4-Methyl-2-Pentanone (MIBK) | | | | | | | | | | |
| 2-Hexanone | | | | | | | | | | |
| Tetrachloroethene | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | | | | | | | | | | |
| Toluene | 80 | | | | | | | | | |
| Chlorobenzene | | | | | | | | | | |
| Ethylbenzene | 700 | | | | | | | | | |
| Styrene | | | | | | | | | | |
| Trichlorofluoromethane | | | | | | | | | | |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | | | | | | | | | | |
| m,p-Xylene | | | | | | | | | | |
| o-Xylene | | | | | | | | | | |
| Total Xylenes | 1,600 | | | | | | | | | |
| 1,2-Dichlorobenzene | | | | | | | | | | |
| 1,3-Dichlorobenzene | | | | | | | | | | |
| 1,4-Dichlorobenzene | | | | | | | | | | |
| Acrolein | | | | | | | | | | |
| Methyl Iodide | | | | | | | | | | |
| Bromoethane | | | | | | | | | | |
| Acrylonitrile | | | | | | | | | | |
| 1,1-Dichloropropene | | | | | | | | | | |
| Dibromomethane | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | | | | | | | | | | |
| 1,2-Dibromo-3-chloropropane | | | | | | | | | | |
| 1,2,3-Trichloropropane | | | | | | | | | | |

# TABLE D-2
## GROUNDWATER ANALYTICAL RESULTS
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Cleanup Levels (a) | MW-15D PK44G 8/13/2009 | MW-15D QL46B 2/24/2010 | MW-15D QU14B 4/22/2010 | MW-16D PK34I 08/12/09 | MW-16D QU14D 4/22/2010 | MW-17D PK34J 08/12/09 | MW-17D QL465 02/24/10 | MW-17D QU14G 4/22/2010 | MW-18D QU14H 4/22/2010 |
|---|---|---|---|---|---|---|---|---|---|---|
| trans-1,4-Dichloro-2-butene | | | | | | | | | | |
| 1,3,5-Trimethylbenzene | 400 | | | | | | | | | |
| 1,2,4-Trimethylbenzene | 400 | | | | | | | | | |
| Hexachlorobutadiene | | | | | | | | | | |
| Ethylene Dibromide | | | | | | | | | | |
| Bromochloromethane | | | | | | | | | | |
| 2,2-Dichloropropane | | | | | | | | | | |
| 1,3-Dichloropropane | | | | | | | | | | |
| Isopropylbenzene | | | | | | | | | | |
| n-Propylbenzene | | | | | | | | | | |
| Bromobenzene | | | | | | | | | | |
| 2-Chlorotoluene | | | | | | | | | | |
| 4-Chlorotoluene | | | | | | | | | | |
| tert-Butylbenzene | | | | | | | | | | |
| sec-Butylbenzene | | | | | | | | | | |
| 4-Isopropyltoluene | | | | | | | | | | |
| n-Butylbenzene | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | | | | | | | | | | |
| Naphthalene | 160 | | | | | | | | | |
| 1,2,3-Trichlorobenzene | | | | | | | | | | |

Notes:

U = Indicates the compound was undetected at the reported concentration
E = The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate
ND = Not detected.
Bold = detected compound.
mg/L = Milligrams per liter.
µg/L = Micrograms per liter.
Data for groundwater grab samples from borings (samples B-1 through B-38) are not considered representative of groundwater conditions, and are used only for screening purposes
(a) See Table 7 for criteria used to develop cleanup levels.
(b) Actual laboratory reporting limits may vary from the typical value based on laboratory dilutions
(c) Cleanup level of 21.3 µg/L will be used for the eastern portion of the Property due to the influence of upgradient, off-Property sources (i.e., wells MW-1, MW-5, MW-6, MW-7S, MW-7D, MW-9S, MW-9D, MW-15D, MW-16D, MW-17D, and MW-18D)

APPENDIX E

# Laboratory Analytical Results

**Analytical Resources, Incorporated**
Analytical Chemists and Consultants

March 10, 2010

Tim Syverson
Landau Associates, Inc.
130 Second Ave
Edmonds, WA 98020

**RE: Project: North Lot Development 1014001.040**
**ARI Job: QL46**

Dear Tim:

Please find enclosed a copy of the Chain-of-Custody (COC) record, sample receipt documentation, and analytical results for the project referenced above. Analytical Resources, Inc. (ARI) accepted five water samples and a trip blank February 25, 2010. The samples were received at cooler a temperature of 9.3°C. For further details regarding sample receipt, please refer to the enclosed Cooler Receipt Form.

The samples were analyzed for BETX, NWTPH-G, NWTPH-Dx, and Dissolved Metals, as requested on the COC.

Due to ARI's temporary inability to analyze Arsenic by the requested method, these requests were subcontracted to Fremont Analytical in Seattle, Washington. The report from Fremont has been included with this report in its entirety. Please refer to the enclosed case narrative from Fremont for analytical details.

No analytical complications were noted for the analyses performed at ARI.

Quality control analysis results are included for your review. An electronic copy of this report and all associated raw data will be kept on file at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC

Eric Branson
Project Manager
-for
Kelly Bottem
Client Services Manager
(206) 695-6211
kellyb@arilabs.com
www.arilabs.com



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

☒ Seattle/Edmonds (425) 778-0907
☐ Tacoma (253) 926-2493
☐ Spokane (509) 327-9737
☐ Portland (503) 542-1080
☐ ______

LANDAU ASSOCIATES

QL46

Date 2/24/10

Page 1 of 1

# Chain-of-Custody Record

Project Name NORTH LOT DEVELOPMENT Project No. 1014001.040

Project Location/Event SEATTLE, WA /

Sampler's Name CNV/ MCV

Project Contact TIM SYVERSON / ANNE HALVORSEN

Send Results To " "

Turnaround Time
☒ Standard
☐ Accelerated
☐ ______

| Sample I.D. | Date | Time | Matrix | No. of Containers | Dissolved Metals (AS) | NWTPH-Dx | BTEX + TPH-G / NWTPH-G | Observations/Comments |
|---|---|---|---|---|---|---|---|---|
| MW-5 - 2-24-10 | 2/24/10 | 1105 | H2O | 1 | X | | | |
| MW-15D - 2-24-10 | ↓ | 1028 | ↓ | 1 | X | | | |
| MW-9D - 2-24-10 | ↓ | 1205 | ↓ | 4 | | X | X | |
| MW-9S - 2-24-10 | ↓ | 1135 | ↓ | 4 | | X | X | |
| MW-~~17D~~ - 2-24-10 | ↓ | 1245 | ↓ | 1 | X | | | |

Observations/Comments

X Allow water samples to settle, collect aliquot from clear portion

X NWTPH-Dx - run acid wash/silica gel cleanup

___ run samples standardized to ______ product

___ Analyze for EPH if no specific product identified

VOC/BTEX/VPH (soil):
___ non-preserved
___ preserved w/methanol
___ preserved w/sodium bisulfate
___ Freeze upon receipt

X Dissolved metal water samples field filtered

Other ______

Special Shipment/Handling or Storage Requirements ON ICE

Method of Shipment PICK-UP

| Relinquished by | Received by | Relinquished by | Received by |
|---|---|---|---|
| Signature [signature] | Signature [signature] | Signature | Signature |
| Printed Name Christophe Venot | Printed Name Rich Hudson | Printed Name | Printed Name |
| Company LAI | Company ARI | Company | Company |
| Date 2/24/10 Time 1430 | Date 2/25/10 Time 1120 | Date ____ Time ____ | Date ____ Time ____ |

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

Rev 8/09

QL46:00002

**Analytical Resources, Incorporated**
Analytical Chemists and Consultants

# Cooler Receipt Form

ARI Client: Landau
COC No(s): ______________ NA
Assigned ARI Job No: QL46

Project Name: North Lot Development
Delivered by: Fed-Ex UPS (Courier) Hand Delivered Other: ______
Tracking No: ______________ NA

**Preliminary Examination Phase:**

| | | |
|---|---|---|
| Were intact, properly signed and dated custody seals attached to the outside of to cooler? | YES | (NO) |
| Were custody papers included with the cooler? | (YES) | NO |
| Were custody papers properly filled out (ink, signed, etc.) | (YES) | NO |
| Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) | 9.3 | |

If cooler temperature is out of compliance fill out form 00070F — Temp Gun ID#: 90941619

Cooler Accepted by: [signature] Date: 2/25/10 Time: 1330

***Complete custody forms and attach all shipping documents***

## Log-In Phase:

| | | | |
|---|---|---|---|
| Was a temperature blank included in the cooler? | | YES | (NO) |
| What kind of packing material was used? ... Bubble Wrap (Wet Ice) Gel Packs Baggies Foam Block Paper Other: ______ | | | |
| Was sufficient ice used (if appropriate)? | NA | ~~YES~~ AV | (NO) |
| Were all bottles sealed in individual plastic bags? | | YES | (NO) |
| Did all bottles arrive in good condition (unbroken)? | | (YES) | NO |
| Were all bottle labels complete and legible? | | (YES) | NO |
| Did the number of containers listed on COC match with the number of containers received? | | (YES) | NO |
| Did all bottle labels and tags agree with custody papers? | | (YES) | NO |
| Were all bottles used correct for the requested analyses? | | (YES) | NO |
| Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) | NA | (YES) | NO |
| Were all VOC vials free of air bubbles? | NA | YES | (NO) |
| Was sufficient amount of sample sent in each bottle? | | (YES) | NO |
| Date VOC Trip Blank was made at ARI | NA | 2/10/10 | |

Samples Logged by: AV Date: 2/25/10 Time: 1416

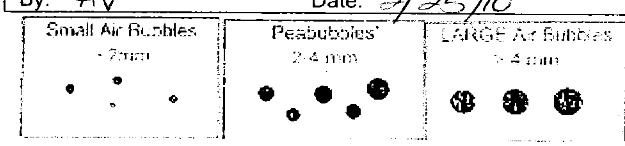
***** Notify Project Manager of discrepancies or concerns *****

| Sample ID on Bottle | Sample ID on COC | Sample ID on Bottle | Sample ID on COC |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

***Additional Notes, Discrepancies, & Resolutions:***

MW-9S-2-24-10 = 2 sm
TripBlanks = 2 pb

By: AV Date: 2/25/10




**Small → "sm"**
**Peabubbles → "pb"**
**Large → "lg"**
**Headspace → "hs"**

**PRESERVATION VERIFICATION 02/25/10**
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **QL46**

PC: Kelly
VTSR: 02/25/10

Inquiry Number: NONE
Analysis Requested: 02/25/10
Contact: Syverson, Tim
Client: Landau Associates, Inc.
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

Project #: 1014001.040
Project: North Lot Development
Sample Site:
SDG No:
Analytical Protocol: In-house

| LOGNUM ARI ID | CLIENT ID | CN >12 | WAD >12 | NH3 <2 | COD <2 | FOG <2 | MET <2 | PHEN <2 | PHOS <2 | TKN <2 | NO23 <2 | TOC <2 | S2 >9 | AK102 <2 | Fe2+ <2 | DMET FLT | DOC FLT | PARAMETER | ADJUSTED TO | LOT NUMBER | AMOUNT ADDED | DATE/BY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10-4679 **QL46A** | MW-5-2-24-10 | | | | | | DIS Pass | | | | | | | | | Y | | | | | | |
| 10-4680 **QL46B** | MW-15D-2-24-10 | | | | | | DIS Fail | | | | | | | | | Y | | | | | | |
| 10-4683 **QL46E** | MW-17D-2-24-10 | | | | | | DIS Pass | | | | | | | | | Y | | | | | | |

Checked By AV Date 2/25/10

**PRESERVATION VERIFICATION 02/25/10**
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **QL46**

PC: Kelly
VTSR: 02/25/10

Inquiry Number: NONE
Analysis Requested: 02/25/10
Contact: Syverson, Tim
Client: Landau Associates, Inc.
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

Project #: 1014001.040
Project: North Lot Development
Sample Site:
SDG No:
Analytical Protocol: In-house

| LOGNUM ARI ID | CLIENT ID | CN >12 | WAD >12 | NH3 <2 | COD <2 | FOG <2 | MET <2 | PHEN <2 | PHOS <2 | TKN <2 | NO23 <2 | TOC <2 | S2 >9 | AK102 <2 | Fe2+ <2 | DMET FLT | DOC FLT | PARAMETER | ADJUSTED TO | LOT NUMBER | AMOUNT ADDED | DATE/BY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10-4679 **QL46A** | MW-5-2-24-10 | | | | | | DIS Pass | | | | | | | | | Y | | | | | | |
| 10-4680 **QL46B** | MW-15D-2-24-10 | | | | | | Fail | | | | | | | | | Y | | | <2 | I5277 | 2.5mL | 2/25/10 KM |
| 10-4683 **QL46E** | MW-17D-2-24-10 | | | | | | DIS Pass | | | | | | | | | Y | | | | | | |

Checked By AV Date 2/25/10

QL46:00005

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG


Sample ID: MW-9D-2-24-10
SAMPLE

Lab Sample ID: QL46C
LIMS ID: 10-4681
Matrix: Water
Data Release Authorized:
Reported: 03/09/10

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 02/24/10
Date Received: 02/25/10

Date Analyzed: 03/01/10 23:18
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | GAS ID |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | 16 | |
| 108-88-3 | Toluene | 1.0 | 1.4 | |
| 100-41-4 | Ethylbenzene | 1.0 | 39 | |
| 179601-23-1 | m,p-Xylene | 1.0 | 19 | |
| 95-47-6 | o-Xylene | 1.0 | 16 | |
| | Gasoline Range Hydrocarbons | 0.25 | 2.9 | GRO |

| BETX Surrogate Recovery | |
|---|---|
| Trifluorotoluene | 106% |
| Bromobenzene | 103% |

| Gasoline Surrogate Recovery | |
|---|---|
| Trifluorotoluene | 106% |
| Bromobenzene | 103% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**BETX by Method SW8021BMod**
**TPHG by Method NWTPHG**
Page 1 of 1

**Sample ID: MW-9S-2-24-10**
**SAMPLE**

Lab Sample ID: QL46D
LIMS ID: 10-4682
Matrix: Water
Data Release Authorized:
Reported: 03/09/10

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 02/24/10
Date Received: 02/25/10

Date Analyzed: 03/01/10 22:53
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | GAS ID |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | < 1.0 U | |
| 108-88-3 | Toluene | 1.0 | < 1.0 U | |
| 100-41-4 | Ethylbenzene | 1.0 | < 1.0 U | |
| 179601-23-1 | m,p-Xylene | 1.0 | < 1.0 U | |
| 95-47-6 | o-Xylene | 1.0 | < 1.0 U | |
| | Gasoline Range Hydrocarbons | 0.25 | < 0.25 U | --- |

**BETX Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 102% |
| Bromobenzene | 98.6% |

**Gasoline Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 103% |
| Bromobenzene | 101% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**BETX by Method SW8021BMod**
**TPHG by Method NWTPHG**


**Sample ID: Trip Blanks**
**SAMPLE**

Lab Sample ID: QL46F
LIMS ID: 10-4684
Matrix: Water
Data Release Authorized:
Reported: 03/09/10

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 02/24/10
Date Received: 02/25/10

Date Analyzed: 03/01/10 21:39
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | GAS ID |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | < 1.0 U | |
| 108-88-3 | Toluene | 1.0 | < 1.0 U | |
| 100-41-4 | Ethylbenzene | 1.0 | < 1.0 U | |
| 179601-23-1 | m,p-Xylene | 1.0 | < 1.0 U | |
| 95-47-6 | o-Xylene | 1.0 | < 1.0 U | |
| | Gasoline Range Hydrocarbons | 0.25 | < 0.25 U | --- |

**BETX Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 100% |
| Bromobenzene | 94.7% |

**Gasoline Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 100% |
| Bromobenzene | 95.9% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

# BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: QL46
Matrix: Water

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040

| Client ID | TFT | BBZ | TOT OUT |
|---|---|---|---|
| MB-030110 | 99.9% | 98.9% | 0 |
| LCS-030110 | 104% | 101% | 0 |
| LCSD-030110 | 97.8% | 94.7% | 0 |
| MW-9D-2-24-10 | 106% | 103% | 0 |
| MW-9S-2-24-10 | 102% | 98.6% | 0 |
| Trip Blanks | 100% | 94.7% | 0 |

| | LCS/MB LIMITS | QC LIMITS |
|---|---|---|
| (TFT) = Trifluorotoluene | (79-120) | (80-120) |
| (BBZ) = Bromobenzene | (79-120) | (80-120) |

Log Number Range: 10-4681 to 10-4684

**FORM II BETX**

ANALYTICAL RESOURCES INCORPORATED

# TPHG WATER SURROGATE RECOVERY SUMMARY

ARI Job: QL46
Matrix: Water

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040

| Client ID | TFT | BBZ | TOT OUT |
|---|---|---|---|
| MB-030110 | 100% | 100% | 0 |
| LCS-030110 | 105% | 103% | 0 |
| LCSD-030110 | 99.4% | 96.4% | 0 |
| MW-9D-2-24-10 | 106% | 103% | 0 |
| MW-9S-2-24-10 | 103% | 101% | 0 |
| Trip Blanks | 100% | 95.9% | 0 |

| | LCS/MB LIMITS | QC LIMITS |
|---|---|---|
| (TFT) = Trifluorotoluene | (80-120) | (80-120) |
| (BBZ) = Bromobenzene | (80-120) | (80-120) |

Log Number Range: 10-4681 to 10-4684

FORM II TPHG

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
**BETX by Method SW8021BMod**


**Sample ID: LCS-030110**
**LAB CONTROL SAMPLE**

Lab Sample ID: LCS-030110
LIMS ID: 10-4681
Matrix: Water
Data Release Authorized:
Reported: 03/09/10

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 03/01/10 18:40
LCSD: 03/01/10 19:04
Instrument/Analyst LCS: PID3/MH
LCSD: PID3/MH

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0
LCSD: 1.0

| Analyte | LCS | Spike Added-LCS | LCS Recovery | LCSD | Spike Added-LCSD | LCSD Recovery | RPD |
|---|---|---|---|---|---|---|---|
| Benzene | 5.12 | 5.30 | 96.6% | 4.90 | 5.30 | 92.5% | 4.4% |
| Toluene | 37.7 | 41.2 | 91.5% | 35.9 | 41.2 | 87.1% | 4.9% |
| Ethylbenzene | 9.39 | 10.0 | 93.9% | 8.93 | 10.0 | 89.3% | 5.0% |
| m,p-Xylene | 39.3 | 42.3 | 92.9% | 37.5 | 42.3 | 88.7% | 4.7% |
| o-Xylene | 14.2 | 14.9 | 95.3% | 13.5 | 14.9 | 90.6% | 5.1% |

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

**BETX Surrogate Recovery**

| | LCS | LCSD |
|---|---|---|
| Trifluorotoluene | 104% | 97.8% |
| Bromobenzene | 101% | 94.7% |

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
TPHG by Method NWTPHG


Sample ID: LCS-030110
LAB CONTROL SAMPLE

Lab Sample ID: LCS-030110
LIMS ID: 10-4681
Matrix: Water
Data Release Authorized:
Reported: 03/09/10

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 03/01/10 18:40
LCSD: 03/01/10 19:04
Instrument/Analyst LCS: PID3/MH
LCSD: PID3/MH

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0
LCSD: 1.0

| Analyte | LCS | Spike Added-LCS | LCS Recovery | LCSD | Spike Added-LCSD | LCSD Recovery | RPD |
|---|---|---|---|---|---|---|---|
| Gasoline Range Hydrocarbons | 0.98 | 1.00 | 98.0% | 0.94 | 1.00 | 94.0% | 4.2% |

Reported in mg/L (ppm)

RPD calculated using sample concentrations per SW846.

**TPHG Surrogate Recovery**

| | LCS | LCSD |
|---|---|---|
| Trifluorotoluene | 105% | 99.4% |
| Bromobenzene | 103% | 96.4% |

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod
TPHG by Method NWTPHG


**Sample ID: MB-030110**
**METHOD BLANK**

Lab Sample ID: MB-030110
LIMS ID: 10-4681
Matrix: Water
Data Release Authorized:
Reported: 03/09/10

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: NA
Date Received: NA

Date Analyzed: 03/01/10 19:29
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | GAS ID |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | < 1.0 U | |
| 108-88-3 | Toluene | 1.0 | < 1.0 U | |
| 100-41-4 | Ethylbenzene | 1.0 | < 1.0 U | |
| 179601-23-1 | m,p-Xylene | 1.0 | < 1.0 U | |
| 95-47-6 | o-Xylene | 1.0 | < 1.0 U | |
| | Gasoline Range Hydrocarbons | 0.25 | < 0.25 U | --- |

**BETX Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 99.9% |
| Bromobenzene | 98.9% |

**Gasoline Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 100% |
| Bromobenzene | 100% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

**ORGANICS ANALYSIS DATA SHEET**
**TOTAL DIESEL RANGE HYDROCARBONS**
NWTPHD by GC/FID-Silica and Acid Cleaned

Matrix: Water

ANALYTICAL RESOURCES INCORPORATED

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
1014001.040

Data Release Authorized:
Reported: 03/02/10

| ARI ID | Sample ID | Extraction Date | Analysis Date | EFV DL | Range | RL | Result |
|---|---|---|---|---|---|---|---|
| MB-022610 10-4681 | Method Blank HC ID: --- | 02/26/10 | 03/01/10 FID4A | 1.00 1.0 | Diesel | 0.25 | < 0.25 U |
| | | | | | Motor Oil | 0.50 | < 0.50 U |
| | | | | | o-Terphenyl | | 91.5% |
| QL46C 10-4681 | MW-9D-2-24-10 HC ID: **DRO** | 02/26/10 | 03/01/10 FID4A | 1.00 1.0 | **Diesel** | **0.25** | **1.1** |
| | | | | | Motor Oil | 0.50 | < 0.50 U |
| | | | | | o-Terphenyl | | 97.8% |
| QL46D 10-4682 | MW-9S-2-24-10 HC ID: --- | 02/26/10 | 03/01/10 FID4A | 1.00 1.0 | Diesel | 0.25 | < 0.25 U |
| | | | | | Motor Oil | 0.50 | < 0.50 U |
| | | | | | o-Terphenyl | | 91.5% |

Reported in mg/L (ppm)

EFV-Effective Final Volume in mL.
DL-Dilution of extract prior to analysis.
RL-Reporting limit.

Diesel quantitation on total peaks in the range from C12 to C24.
Motor Oil quantitation on total peaks in the range from C24 to C38.
HC ID: DRO/RRO indicate results of organics or additional hydrocarbons in ranges are not identifiable.

FORM I

ANALYTICAL RESOURCES INCORPORATED

# CLEANED TPHD SURROGATE RECOVERY SUMMARY

Matrix: Water

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
1014001.040

| Client ID | OTER | TOT OUT |
|---|---|---|
| MB-022610 | 91.5% | 0 |
| LCS-022610 | 100% | 0 |
| LCSD-022610 | 94.6% | 0 |
| MW-9D-2-24-10 | 97.8% | 0 |
| MW-9S-2-24-10 | 91.5% | 0 |

| | LCS/MB LIMITS | QC LIMITS |
|---|---|---|
| (OTER) = o-Terphenyl | (51-120) | (41-121) |

Prep Method: SW3510C
Log Number Range: 10-4681 to 10-4682

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**NWTPHD by GC/FID-Silica and Acid Cleaned**


**Sample ID: LCS-022610**
**LCS/LCSD**

Lab Sample ID: LCS-022610
LIMS ID: 10-4681
Matrix: Water
Data Release Authorized:
Reported: 03/02/10

QC Report No: QL46-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: 02/24/10
Date Received: 02/25/10

Date Extracted LCS/LCSD: 02/26/10

Date Analyzed LCS: 03/01/10 20:57
LCSD: 03/01/10 21:24
Instrument/Analyst LCS: FID/MS
LCSD: FID/MS

Sample Amount LCS: 500 mL
LCSD: 500 mL
Final Extract Volume LCS: 1.0 mL
LCSD: 1.0 mL
Dilution Factor LCS: 1.00
LCSD: 1.00

| Range | LCS | Spike Added-LCS | LCS Recovery | LCSD | Spike Added-LCSD | LCSD Recovery | RPD |
|---|---|---|---|---|---|---|---|
| Diesel | 2.72 | 3.00 | 90.7% | 2.45 | 3.00 | 81.7% | 10.4% |

**TPHD Surrogate Recovery**

| | LCS | LCSD |
|---|---|---|
| o-Terphenyl | 100% | 94.6% |

Results reported in mg/L
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

# TOTAL DIESEL RANGE HYDROCARBONS-EXTRACTION REPORT

Matrix: Water
Date Received: 02/25/10

ARI Job: QL46
Project: North Lot Development
1014001.040

| ARI ID | Client ID | Samp Amt | Final Vol | Prep Date |
|---|---|---|---|---|
| 10-4681-022610MB1 | Method Blank | 500 mL | 1.00 mL | 02/26/10 |
| 10-4681-022610LCS1 | Lab Control | 500 mL | 1.00 mL | 02/26/10 |
| 10-4681-022610LCSD1 | Lab Control Dup | 500 mL | 1.00 mL | 02/26/10 |
| 10-4681-QL46C | MW-9D-2-24-10 | 500 mL | 1.00 mL | 02/26/10 |
| 10-4682-QL46D | MW-9S-2-24-10 | 500 mL | 1.00 mL | 02/26/10 |

Fremont Analytical

2930 Westlake Ave N Suite 100
Seattle, WA 98109
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

**Analytical Resources, Inc.**
**Attn: Kelly Bottem**
4611 South 134th Place, Suite 100
Tukwila, WA 98168

**RE: North Lot Development**
**Fremont Project No: CHM100309-13**
**ARI Project No: QL46**

March 10th, 2010

**Kelly:**

Enclosed are the analytical results for the ***North Lot Development*** water samples delivered to Fremont Analytical on Tuesday March 9th, 2010.

**Sample Receipt:**
The samples were received in good condition - in the proper containers (3 - 1L Polys, preserved with $HNO_3$), properly sealed, labeled and within holding time. The samples were received in a cooler with wet ice, with a cooler temperature of 2.7°C, which is within the laboratory recommended cooler temperature range (<4°C - 10°C). There were no sample receipt issues to report.

**Sample Analysis:**
Examination of these samples was conducted for the presence of the following:

- ***Dissolved Metals (As) by EPA Method 200.8***

This application was performed under Washington State Department of Ecology accreditation parameters. All appropriate Quality Assurance / Quality Control method parameters have been applied. There were no sample analysis issues to report.

Please contact the laboratory if you should have any questions about the results,

Thank you for using Fremont Analytical!

Sincerely,

M. Clements

Michelle Clements
Lab Manager / Sr. Chemist

mclements@fremontanalytical.com

2930 Westlake Ave. N., Suite 100
Seattle, WA 98109

T: 206.352.3790
F: 206.352.7178
email: info@fremontanalytical.com

# Analysis of Dissolved Metals by EPA Method 200.8

**Project: North Lot Development**
**Client: ARI**
**Client Project #: QL46**
**Lab Project #: CHM100309-13**

| EPA 200.8 (µg/L) | MRL | Method Blank | LCS | MW-5-2-24-10 | MW-15D-2-24-10 |
|---|---|---|---|---|---|
| Date Extracted | | 3/9/10 | 3/9/10 | 3/9/10 | 3/9/10 |
| Date Analyzed | | 3/9/10 | 3/9/10 | 3/9/10 | 3/9/10 |
| Matrix | | | | Water | Water |
| Arsenic (As) | 0.50 | nd | 95% | **26** | nd |

"nd" Indicates no detection at the listed reporting limits
"int" Indicates that interference prevents determination
"J" Indicates estimated value
"MRL" Indicates Method Reporting Limit
"LCS" Indicates Laboratory Control Sample
"MS" Indicates Matrix Spike
"MSD" Indicates Matrix Spike Duplicate
"RPD" Indicates Relative Percent Difference

Acceptable RPD is determined to be less than 20%
Acceptable Recovery Limits:
LCS, LCSD, MS, MSD: 85% to 115%
Spike Concentration:
As = 100 µg/L

2930 Westlake Ave. N., Suite 100
Seattle, WA 98109

T: 206.352.3790
F: 206.352.7178
email: info@fremontanalytical.com

# Analysis of Dissolved Metals by EPA Method 200.8

**Project: North Lot Development**
**Client: ARI**
**Client Project #: QL46**
**Lab Project #: CHM100309-13**

| | | | Duplicate | | MS | MSD | |
|---|---|---|---|---|---|---|---|
| **EPA 200.8 (µg/L)** | **MRL** | **MW-17D-2-24-10** | **MW-17D-2-24-10** | **RPD %** | *Batch 100309-9-1* | *Batch 100309-9-1* | **RPD %** |
| Date Extracted | | 3/9/10 | 3/9/10 | | 3/9/10 | 3/9/10 | |
| Date Analyzed | | 3/9/10 | 3/9/10 | | 3/9/10 | 3/9/10 | |
| Matrix | | Water | Water | | Water | Water | |
| Arsenic (As) | 0.50 | **6.6** | **5.7** | 14% | 95% | 95% | 0% |

"nd" Indicates no detection at the listed reporting limits
"int" Indicates that interference prevents determination
"J" Indicates estimated value
"MRL" Indicates Method Reporting Limit
"LCS" Indicates Laboratory Control Sample
"MS" Indicates Matrix Spike
"MSD" Indicates Matrix Spike Duplicate
"RPD" Indicates Relative Percent Difference

Acceptable RPD is determined to be less than 20%
Acceptable Recovery Limits:
LCS, LCSD, MS, MSD: 85% to 115%
Spike Concentration:
As = 100 µg/L

SUBCONTRACTOR ANALYSIS REQUEST
CUSTODY TRANSFER 03/09/10

ANALYTICAL RESOURCES INCORPORATED

ARI Project: QL46

Laboratory: Fremont Analytical
Lab Contact: Sample Receiving
Lab Address: 2930 Westlake Ave N.
Seattle, WA 98103
Phone: 206-352-3790
Fax:

EIM Excel EDD

ARI Client: Landau Associates, Inc.
Project ID: North Lot Development
ARI PM: Kelly Bottem
Phone: 206-695-6211
Fax: 206-695-6201

Analytical Protocol: In-house
Special Instructions:

Requested Turn Around: 03/11/10
~~Fax~~ Results (Y/N): email
KellyB@ARILABS.com & Eric@ARILABS.com

**Limits of Liability.** *Subcontractor is expected to perform all requested services in accordance with appropriate methodology following Standard Operating Procedures that meet standards for the industry. The total liability of ARI, its officers, agents, employees, or sucessors, arising out of or in connection with the requested services, shall not exceed the negotiated amount for said services. The agreement by the Subcontractor to perform services requested by ARI releases ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Subcontractor.*

| ARI ID | Client ID/ Add'l ID | Sampled | Matrix | Bottles | Analyses |
|---|---|---|---|---|---|
| 10-4679-QL46A | MW-5-2-24-10 | 02/24/10 11:05 | Water | 1 | Metals (Sub) |
| Special Instructions: As | | | | | |
| 10-4680-QL46B | MW-15D-2-24-10 | 02/24/10 10:28 | Water | 1 | Metals (Sub) |
| Special Instructions: As | | | | | |
| 10-4683-QL46E | MW-17D-2-24-10 | 02/24/10 12:45 | Water | 1 | Metals (Sub) |
| Special Instructions: As | | | | | |

SPECIAL RL = 0.5 PPB

| Carrier | | Airbill | | Date | |
|---|---|---|---|---|---|
| Relinquished by [signature] | Company ARI | | Date 3/9/10 | | Time 1630 |
| Received by [signature] | Company FA | | Date 3/9/10 | | Time |

CHM100301-13

**Analytical Resources, Incorporated**
Analytical Chemists and Consultants

May 11, 2010

Tim Syverson
Landau Associates, Inc.
130 Second Ave
Edmonds, WA 98020

RECEIVED
MAY 13 2010
LANDAU ASSOCIATES, INC.

**RE: Project: North Lot Development 1014001.040**
**ARI Job: QU14**

Dear Tim:

Please find enclosed a copy of the Chain-of-Custody (COC) record, sample receipt documentation, and analytical results for the project referenced above. Analytical Resources, Inc. (ARI) accepted eight water samples and a trip blank on April 23, 2010. The samples were received at cooler a temperature of 4.2°C. For further details regarding sample receipt, please refer to the enclosed Cooler Receipt Form. Per Landau Associates, samples were allowed to settle and sample aliquot was collected from the clear portion.

The samples were analyzed for NWTPH-G plus BTEX, SIM PAHs, NWTPH-Dx, and Dissolved Metals, as requested on the COC.

The SIM PAHs method blank contained Naphthalene. All associated samples that contain analyte have been flagged with a "B" qualifier.

No analytical complications were noted for the analyses performed at ARI.

Quality control analysis results are included for your review. An electronic copy of this report and all associated raw data will be kept on file at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC

Kelly Bottem
Client Services Manager
(206) 695-6211
kellyb@arilabs.com
www.arilabs.com



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

QU14

LANDAU ASSOCIATES

☒ **Seattle/Edmonds** (425) 778-0907
☐ **Tacoma** (253) 926-2493
☐ **Spokane** (509) 327-9737
☐ **Portland** (503) 542-1080
☐ ______

Date 04/22/10
Page 1 of 1

# Chain-of-Custody Record

Project Name NORTH LOT DEVELOPMENT Project No. 1014001.040
Project Location/Event SEATTLE, WA / GW SAMPLING
Sampler's Name CNV/DHF
Project Contact TIM SYVERSON / ANNE HALVORSEN
Send Results To " "

Turnaround Time
☒ Standard
☐ Accelerated
☐ ______

**Testing Parameters**

| Sample I.D. | Date | Time | Matrix | No. of Containers | Dissolved Arsenic (200.7/6010/7471) | NWTPH-Gx and BTEX (8021) | NWTPH-Dx | SIM PAHs (8270D-SIM) |
|---|---|---|---|---|---|---|---|---|
| MW-5-04-22-10 | 04/22/10 | 0820 | AQ | 1 | X | | | |
| MW-15D-04-22-10 | ↓ | 0850 | ↓ | 1 | X | | | |
| MW-6-04-22-10 | ↓ | 1120 | ↓ | 1 | X | | | |
| MW-16D-04-22-10 | ↓ | 1150 | ↓ | 7 | X | X | X | X |
| MW-7D-04-22-10 | ↓ | 0930 | ↓ | 6 | | X | X | X |
| MW-9D-04-22-10 | ↓ | 0940 | ↓ | 6 | | X | X | X |
| MW-17D-04-22-10 | ↓ | 1215 | ↓ | 1 | X | | | |
| MW-18D-04-22-10 | ↓ | 1020 | ↓ | 7 | X | X | X | X |
| TRIP BLANKS | 4/19/10 | n/a | ↓ | 2 | | X | | ~~X~~ |

KD 4/23/10

**Observations/Comments**

X Allow water samples to settle, collect aliquot from clear portion
X NWTPH-Dx - run acid wash/silica gel cleanup
__ run samples standardized to ______ product
__ Analyze for EPH if no specific product identified
VOC/BTEX/VPH (soil):
__ non-preserved
__ preserved w/methanol
__ preserved w/sodium bisulfate
__ Freeze upon receipt
X Dissolved metal water samples field filtered
Other ______

Special Shipment/Handling or Storage Requirements: ON ICE
Method of Shipment: PICK-UP

| Relinquished by | Received by | Relinquished by | Received by |
|---|---|---|---|
| Signature: [signature] | Signature: [signature] | Signature | Signature |
| Printed Name: DYLAN FRAZER | Printed Name: Rich Hudson | Printed Name | Printed Name |
| Company: LANDAU | Company: ARI | Company | Company |
| Date 4/23/10 Time 0900 | Date 4/23/10 Time 1015 | Date Time | Date Time |

**WHITE COPY** - Project File **YELLOW COPY** - Laboratory **PINK COPY** - Client Representative

Rev 8/09

**PRESERVATION VERIFICATION 04/23/10**
Page 1 of 1

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: **QU14**

PC: Kelly
VTSR: 04/23/10

Inquiry Number: NONE
Analysis Requested: 04/23/10
Contact: Syverson, Tim
Client: Landau Associates, Inc.
Logged by: AV
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

Project #: 1014001.040
Project: North Lot Development
Sample Site:
SDG No:
Analytical Protocol: In-house

| LOGNUM ARI ID | CLIENT ID | CN >12 | WAD >12 | NH3 <2 | COD <2 | FOG <2 | MET <2 | PHEN <2 | PHOS <2 | TKN <2 | NO23 <2 | TOC <2 | S2 >9 | AK102 <2 | Fe2+ <2 | DMET FLT | DOC FLT | PARAMETER | ADJUSTED TO | LOT NUMBER | AMOUNT ADDED | DATE/BY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10-10317 **QU14A** | MW-5-04-22-10 | | | | | | DIS PASS | | | | | | | | | Y | | | | | | |
| 10-10318 **QU14B** | MW-15D-04-22-10 | | | | | | DIS | | | | | | | | | Y | | | <2 | 1109100 | 2.5mL | 4/23/10 MH |
| 10-10319 **QU14C** | MW-6-04-22-10 | | | | | | DIS PASS | | | | | | | | | Y | | | | | | |
| 10-10320 **QU14D** | MW-16D-04-22-10 | | | | | | DIS | | | | | | | | | Y | | | | | | |
| 10-10323 **QU14G** | MW-17D-04-22-10 | | | | | | DIS | | | | | | | | | Y | | | | | | |
| 10-10324 **QU14H** | MW-18D-04-22-10 | | | | | | DIS | | | | | | | | | Y | | | | | | |

Checked By AV Date 4/23/10

**Analytical Resources, Incorporated**
Analytical Chemists and Consultants

# Cooler Receipt Form

ARI Client: Landau

COC No(s): ______ **(NA)**

Assigned ARI Job No: QU14

Project Name: North Lot Development

Delivered by: Fed-Ex UPS **(Courier)** Hand Delivered Other: ______

Tracking No: ______ **(NA)**

**Preliminary Examination Phase:**

| | | |
|---|---|---|
| Were intact, properly signed and dated custody seals attached to the outside of to cooler? | **(YES)** | NO |
| Were custody papers included with the cooler? | **(YES)** | NO |
| Were custody papers properly filled out (ink, signed, etc.) | **(YES)** | NO |
| Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry) | 4.2 | |

If cooler temperature is out of compliance fill out form 00070F — Temp Gun ID#: 90941619

Cooler Accepted by: [signature] Date: 4/23/10 Time: 1120

***Complete custody forms and attach all shipping documents***

## Log-In Phase:

Was a temperature blank included in the cooler? ...... YES **(NO)**

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

| | | | |
|---|---|---|---|
| Was sufficient ice used (if appropriate)? | NA | **(YES)** | NO |
| Were all bottles sealed in individual plastic bags? | | YES | **(NO)** |
| Did all bottles arrive in good condition (unbroken)? | | **(YES)** | NO |
| Were all bottle labels complete and legible? | | **(YES)** | NO |
| Did the number of containers listed on COC match with the number of containers received? | | **(YES)** | NO |
| Did all bottle labels and tags agree with custody papers? | | **(YES)** | NO |
| Were all bottles used correct for the requested analyses? | | **(YES)** | NO |
| Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) | NA | **(YES)** | NO |
| Were all VOC vials free of air bubbles? | NA | YES | **(NO)** |
| Was sufficient amount of sample sent in each bottle? | | **(YES)** | NO |
| Date VOC Trip Blank was made at ARI | NA | 4/19/10 | |

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

Samples Logged by: AV Date: 4/23/10 Time: 1158

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

| Sample ID on Bottle | Sample ID on COC | Sample ID on Bottle | Sample ID on COC |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

***Additional Notes, Discrepancies, & Resolutions:***

MW-16D-04-22-10 = 1pb, MW-9D-04-22-10 = 2pb
MW-18D-04-22-10 = 1sm

By: AV Date: 4/23/10

| Small Air Bubbles ~2mm | Peabubbles' 2-4 mm | LARGE Air Bubbles > 4 mm | |
|---|---|---|---|
| | | | Small → "sm" |
| | | | Peabubbles → "pb" |
| | | | Large → "lg" |
| | | | Headspace → "hs" |

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**PNAs by SW8270D-SIM GC/MS**


**Sample ID: MW-16D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14D
LIMS ID: 10-10320
Matrix: Water
Data Release Authorized:
Reported: 04/30/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Extracted: 04/27/10
Date Analyzed: 04/29/10 12:27
Instrument/Analyst: NT11/PK

Sample Amount: 425 mL
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result |
|---|---|---|---|
| **91-20-3** | **Naphthalene** | **0.12** | **1.1 B** |
| **91-57-6** | **2-Methylnaphthalene** | **0.12** | **0.26** |
| **90-12-0** | **1-Methylnaphthalene** | **0.12** | **0.15** |
| 208-96-8 | Acenaphthylene | 0.12 | < 0.12 U |
| **83-32-9** | **Acenaphthene** | **0.12** | **0.18** |
| 86-73-7 | Fluorene | 0.12 | < 0.12 U |
| 85-01-8 | Phenanthrene | 0.12 | < 0.12 U |
| 120-12-7 | Anthracene | 0.12 | < 0.12 U |
| 206-44-0 | Fluoranthene | 0.12 | < 0.12 U |
| 129-00-0 | Pyrene | 0.12 | < 0.12 U |
| 56-55-3 | Benzo(a)anthracene | 0.12 | < 0.12 U |
| 218-01-9 | Chrysene | 0.12 | < 0.12 U |
| 205-99-2 | Benzo(b)fluoranthene | 0.12 | < 0.12 U |
| 207-08-9 | Benzo(k)fluoranthene | 0.12 | < 0.12 U |
| 50-32-8 | Benzo(a)pyrene | 0.12 | < 0.12 U |
| 193-39-5 | Indeno(1,2,3-cd)pyrene | 0.12 | < 0.12 U |
| 53-70-3 | Dibenz(a,h)anthracene | 0.12 | < 0.12 U |
| 191-24-2 | Benzo(g,h,i)perylene | 0.12 | < 0.12 U |
| 132-64-9 | Dibenzofuran | 0.12 | < 0.12 U |

Reported in µg/L (ppb)

| SIM Semivolatile Surrogate Recovery | |
|---|---|
| d10-2-Methylnaphthalene | 69.0% |
| d14-Dibenzo(a,h)anthracene | 77.0% |

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**PNAs by SW8270D-SIM GC/MS**


**Sample ID: MW-7D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14E
LIMS ID: 10-10321
Matrix: Water
Data Release Authorized:
Reported: 04/30/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Extracted: 04/27/10
Date Analyzed: 04/29/10 12:57
Instrument/Analyst: NT11/PK

Sample Amount: 450 mL
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result |
|---|---|---|---|
| **91-20-3** | **Naphthalene** | **0.11** | **2.3 B** |
| **91-57-6** | **2-Methylnaphthalene** | **0.11** | **0.52** |
| **90-12-0** | **1-Methylnaphthalene** | **0.11** | **0.28** |
| 208-96-8 | Acenaphthylene | 0.11 | < 0.11 U |
| **83-32-9** | **Acenaphthene** | **0.11** | **0.19** |
| 86-73-7 | Fluorene | 0.11 | < 0.11 U |
| 85-01-8 | Phenanthrene | 0.11 | < 0.11 U |
| 120-12-7 | Anthracene | 0.11 | < 0.11 U |
| 206-44-0 | Fluoranthene | 0.11 | < 0.11 U |
| 129-00-0 | Pyrene | 0.11 | < 0.11 U |
| 56-55-3 | Benzo(a)anthracene | 0.11 | < 0.11 U |
| 218-01-9 | Chrysene | 0.11 | < 0.11 U |
| 205-99-2 | Benzo(b)fluoranthene | 0.11 | < 0.11 U |
| 207-08-9 | Benzo(k)fluoranthene | 0.11 | < 0.11 U |
| 50-32-8 | Benzo(a)pyrene | 0.11 | < 0.11 U |
| 193-39-5 | Indeno(1,2,3-cd)pyrene | 0.11 | < 0.11 U |
| 53-70-3 | Dibenz(a,h)anthracene | 0.11 | < 0.11 U |
| 191-24-2 | Benzo(g,h,i)perylene | 0.11 | < 0.11 U |
| 132-64-9 | Dibenzofuran | 0.11 | < 0.11 U |

Reported in µg/L (ppb)

**SIM Semivolatile Surrogate Recovery**

| | |
|---|---|
| d10-2-Methylnaphthalene | 67.7% |
| d14-Dibenzo(a,h)anthracene | 59.7% |

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**PNAs by SW8270D-SIM GC/MS**


**Sample ID: MW-9D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14F
LIMS ID: 10-10322
Matrix: Water
Data Release Authorized:
Reported: 04/30/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Extracted: 04/27/10
Date Analyzed: 04/29/10 13:26
Instrument/Analyst: NT11/PK

Sample Amount: 470 mL
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result |
|---|---|---|---|
| **91-20-3** | **Naphthalene** | **0.11** | **130 SB** |
| **91-57-6** | **2-Methylnaphthalene** | **0.11** | **120 S** |
| **90-12-0** | **1-Methylnaphthalene** | **0.11** | **97 S** |
| **208-96-8** | **Acenaphthylene** | **0.11** | **1.6** |
| **83-32-9** | **Acenaphthene** | **0.11** | **94 S** |
| **86-73-7** | **Fluorene** | **0.11** | **56 E** |
| **85-01-8** | **Phenanthrene** | **0.11** | **57 S** |
| **120-12-7** | **Anthracene** | **0.11** | **8.4** |
| **206-44-0** | **Fluoranthene** | **0.11** | **7.3** |
| **129-00-0** | **Pyrene** | **0.11** | **7.7** |
| **56-55-3** | **Benzo(a)anthracene** | **0.11** | **0.24** |
| **218-01-9** | **Chrysene** | **0.11** | **0.19** |
| 205-99-2 | Benzo(b)fluoranthene | 0.11 | < 0.11 U |
| 207-08-9 | Benzo(k)fluoranthene | 0.11 | < 0.11 U |
| 50-32-8 | Benzo(a)pyrene | 0.11 | < 0.11 U |
| 193-39-5 | Indeno(1,2,3-cd)pyrene | 0.11 | < 0.11 U |
| 53-70-3 | Dibenz(a,h)anthracene | 0.11 | < 0.11 U |
| 191-24-2 | Benzo(g,h,i)perylene | 0.11 | < 0.11 U |
| **132-64-9** | **Dibenzofuran** | **0.11** | **14 E** |

Reported in µg/L (ppb)

**SIM Semivolatile Surrogate Recovery**

| | |
|---|---|
| d10-2-Methylnaphthalene | 68.0% |
| d14-Dibenzo(a,h)anthracene | 40.0% |

**ORGANICS ANALYSIS DATA SHEET**
**PNAs by SW8270D-SIM GC/MS**


ANALYTICAL RESOURCES INCORPORATED

**Sample ID: MW-9D-04-22-10**
**DILUTION**

Lab Sample ID: QU14F
LIMS ID: 10-10322
Matrix: Water
Data Release Authorized:
Reported: 04/30/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Extracted: 04/27/10
Date Analyzed: 04/30/10 15:57
Instrument/Analyst: NT11/PK

Sample Amount: 470 mL
Final Extract Volume: 0.5 mL
Dilution Factor: 300

| CAS Number | Analyte | RL | Result |
|---|---|---|---|
| **91-20-3** | **Naphthalene** | **32** | **1,600 B** |
| **91-57-6** | **2-Methylnaphthalene** | **32** | **430** |
| **90-12-0** | **1-Methylnaphthalene** | **32** | **250** |
| 208-96-8 | Acenaphthylene | 32 | < 32 U |
| **83-32-9** | **Acenaphthene** | **32** | **240** |
| **86-73-7** | **Fluorene** | **32** | **100** |
| **85-01-8** | **Phenanthrene** | **32** | **150** |
| 120-12-7 | Anthracene | 32 | < 32 U |
| 206-44-0 | Fluoranthene | 32 | < 32 U |
| 129-00-0 | Pyrene | 32 | < 32 U |
| 56-55-3 | Benzo(a)anthracene | 32 | < 32 U |
| 218-01-9 | Chrysene | 32 | < 32 U |
| 205-99-2 | Benzo(b)fluoranthene | 32 | < 32 U |
| 207-08-9 | Benzo(k)fluoranthene | 32 | < 32 U |
| 50-32-8 | Benzo(a)pyrene | 32 | < 32 U |
| 193-39-5 | Indeno(1,2,3-cd)pyrene | 32 | < 32 U |
| 53-70-3 | Dibenz(a,h)anthracene | 32 | < 32 U |
| 191-24-2 | Benzo(g,h,i)perylene | 32 | < 32 U |
| 132-64-9 | Dibenzofuran | 32 | < 32 U |

Reported in µg/L (ppb)

| **SIM Semivolatile Surrogate Recovery** | |
|---|---|
| d10-2-Methylnaphthalene | D |
| d14-Dibenzo(a,h)anthracene | D |

**ORGANICS ANALYSIS DATA SHEET**
**PNAs by SW8270D-SIM GC/MS**
Page 1 of 1

**ANALYTICAL RESOURCES INCORPORATED**

**Sample ID: MW-18D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14H
LIMS ID: 10-10324
Matrix: Water
Data Release Authorized:
Reported: 04/30/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Extracted: 04/27/10
Date Analyzed: 04/29/10 13:55
Instrument/Analyst: NT11/PK

Sample Amount: 470 mL
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result |
|---|---|---|---|
| **91-20-3** | **Naphthalene** | **0.11** | **1.2 B** |
| **91-57-6** | **2-Methylnaphthalene** | **0.11** | **0.30** |
| **90-12-0** | **1-Methylnaphthalene** | **0.11** | **0.20** |
| 208-96-8 | Acenaphthylene | 0.11 | < 0.11 U |
| **83-32-9** | **Acenaphthene** | **0.11** | **0.27** |
| **86-73-7** | **Fluorene** | **0.11** | **0.13** |
| **85-01-8** | **Phenanthrene** | **0.11** | **0.26** |
| 120-12-7 | Anthracene | 0.11 | < 0.11 U |
| 206-44-0 | Fluoranthene | 0.11 | < 0.11 U |
| 129-00-0 | Pyrene | 0.11 | < 0.11 U |
| 56-55-3 | Benzo(a)anthracene | 0.11 | < 0.11 U |
| 218-01-9 | Chrysene | 0.11 | < 0.11 U |
| 205-99-2 | Benzo(b)fluoranthene | 0.11 | < 0.11 U |
| 207-08-9 | Benzo(k)fluoranthene | 0.11 | < 0.11 U |
| 50-32-8 | Benzo(a)pyrene | 0.11 | < 0.11 U |
| 193-39-5 | Indeno(1,2,3-cd)pyrene | 0.11 | < 0.11 U |
| 53-70-3 | Dibenz(a,h)anthracene | 0.11 | < 0.11 U |
| 191-24-2 | Benzo(g,h,i)perylene | 0.11 | < 0.11 U |
| 132-64-9 | Dibenzofuran | 0.11 | < 0.11 U |

Reported in µg/L (ppb)

**SIM Semivolatile Surrogate Recovery**

| | |
|---|---|
| d10-2-Methylnaphthalene | 61.7% |
| d14-Dibenzo(a,h)anthracene | 76.0% |

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**PNAs by SW8270D-SIM GC/MS**


**Sample ID: MB-042710**
**METHOD BLANK**

Lab Sample ID: MB-042710
LIMS ID: 10-10320
Matrix: Water
Data Release Authorized:
Reported: 04/30/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: NA
Date Received: NA

Date Extracted: 04/27/10
Date Analyzed: 04/29/10 10:49
Instrument/Analyst: NT11/PK

Sample Amount: 500 mL
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result |
|---|---|---|---|
| **91-20-3** | **Naphthalene** | **0.10** | **0.15** |
| 91-57-6 | 2-Methylnaphthalene | 0.10 | < 0.10 U |
| 90-12-0 | 1-Methylnaphthalene | 0.10 | < 0.10 U |
| 208-96-8 | Acenaphthylene | 0.10 | < 0.10 U |
| 83-32-9 | Acenaphthene | 0.10 | < 0.10 U |
| 86-73-7 | Fluorene | 0.10 | < 0.10 U |
| 85-01-8 | Phenanthrene | 0.10 | < 0.10 U |
| 120-12-7 | Anthracene | 0.10 | < 0.10 U |
| 206-44-0 | Fluoranthene | 0.10 | < 0.10 U |
| 129-00-0 | Pyrene | 0.10 | < 0.10 U |
| 56-55-3 | Benzo(a)anthracene | 0.10 | < 0.10 U |
| 218-01-9 | Chrysene | 0.10 | < 0.10 U |
| 205-99-2 | Benzo(b)fluoranthene | 0.10 | < 0.10 U |
| 207-08-9 | Benzo(k)fluoranthene | 0.10 | < 0.10 U |
| 50-32-8 | Benzo(a)pyrene | 0.10 | < 0.10 U |
| 193-39-5 | Indeno(1,2,3-cd)pyrene | 0.10 | < 0.10 U |
| 53-70-3 | Dibenz(a,h)anthracene | 0.10 | < 0.10 U |
| 191-24-2 | Benzo(g,h,i)perylene | 0.10 | < 0.10 U |
| 132-64-9 | Dibenzofuran | 0.10 | < 0.10 U |

Reported in µg/L (ppb)

**SIM Semivolatile Surrogate Recovery**

| | |
|---|---|
| d10-2-Methylnaphthalene | 70.0% |
| d14-Dibenzo(a,h)anthracene | 83.3% |

# SIM SW8270 SURROGATE RECOVERY SUMMARY

Matrix: Water

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040

| Client ID | MNP | DBA | TOT OUT |
|---|---|---|---|
| MB-042710 | 70.0% | 83.3% | 0 |
| LCS-042710 | 71.0% | 73.7% | 0 |
| MW-16D-04-22-10 | 69.0% | 77.0% | 0 |
| MW-7D-04-22-10 | 67.7% | 59.7% | 0 |
| MW-9D-04-22-10 | 68.0% | 40.0% | 0 |
| MW-9D-04-22-10 DL | D | D | 0 |
| MW-18D-04-22-10 | 61.7% | 76.0% | 0 |

| | LCS/MB LIMITS | QC LIMITS |
|---|---|---|
| (MNP) = d10-2-Methylnaphthalene | (36-101) | (30-106) |
| (DBA) = d14-Dibenzo(a,h)anthracene | (42-121) | (10-130) |

Prep Method: SW3520C
Log Number Range: 10-10320 to 10-10324

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**PNAs by SW8270D-SIM GC/MS**
Page 1 of 1

**Sample ID: LCS-042710**
**LAB CONTROL SAMPLE**

Lab Sample ID: LCS-042710
LIMS ID: 10-10320
Matrix: Water
Data Release Authorized:
Reported: 04/30/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: NA
Date Received: NA

Date Extracted LCS/LCSD: 04/27/10
Date Analyzed LCS: 04/29/10 11:18
Instrument/Analyst LCS: NT11/PK

Sample Amount LCS: 500 mL
Final Extract Volume LCS: 0.50 mL
Dilution Factor LCS: 1.00

| Analyte | LCS | Spike Added | Recovery |
|---|---|---|---|
| Naphthalene | 2.27 | 3.00 | 75.7% |
| 2-Methylnaphthalene | 2.15 | 3.00 | 71.7% |
| 1-Methylnaphthalene | 2.17 | 3.00 | 72.3% |
| Acenaphthylene | 2.11 | 3.00 | 70.3% |
| Acenaphthene | 2.21 | 3.00 | 73.7% |
| Fluorene | 2.29 | 3.00 | 76.3% |
| Phenanthrene | 2.41 | 3.00 | 80.3% |
| Anthracene | 2.35 | 3.00 | 78.3% |
| Fluoranthene | 2.62 | 3.00 | 87.3% |
| Pyrene | 2.43 | 3.00 | 81.0% |
| Benzo(a)anthracene | 2.42 | 3.00 | 80.7% |
| Chrysene | 2.44 | 3.00 | 81.3% |
| Benzo(b)fluoranthene | 2.65 | 3.00 | 88.3% |
| Benzo(k)fluoranthene | 2.70 | 3.00 | 90.0% |
| Benzo(a)pyrene | 2.36 | 3.00 | 78.7% |
| Indeno(1,2,3-cd)pyrene | 2.63 | 3.00 | 87.7% |
| Dibenz(a,h)anthracene | 2.27 | 3.00 | 75.7% |
| Benzo(g,h,i)perylene | 2.50 | 3.00 | 83.3% |
| Dibenzofuran | 2.09 | 3.00 | 69.7% |

Reported in µg/L (ppb)

**SIM Semivolatile Surrogate Recovery**

| | |
|---|---|
| d10-2-Methylnaphthalene | 71.0% |
| d14-Dibenzo(a,h)anthracene | 73.7% |

**ANALYTICAL RESOURCES INCORPORATED**

**ORGANICS ANALYSIS DATA SHEET**
**BETX by Method SW8021BMod**
**TPHG by Method NWTPHG**


**Sample ID: MW-16D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14D
LIMS ID: 10-10320
Matrix: Water
Data Release Authorized: VD
Reported: 04/28/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Analyzed: 04/27/10 09:36
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | GAS ID |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | < 1.0 U | |
| 108-88-3 | Toluene | 1.0 | < 1.0 U | |
| 100-41-4 | Ethylbenzene | 1.0 | < 1.0 U | |
| 179601-23-1 | m,p-Xylene | 1.0 | < 1.0 U | |
| 95-47-6 | o-Xylene | 1.0 | < 1.0 U | |
| | Gasoline Range Hydrocarbons | 0.25 | < 0.25 U | --- |

**BETX Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 99.9% |
| Bromobenzene | 96.6% |

**Gasoline Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 105% |
| Bromobenzene | 102% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**BETX by Method SW8021BMod**
**TPHG by Method NWTPHG**
Page 1 of 1

**Sample ID: MW-7D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14E
LIMS ID: 10-10321
Matrix: Water
Data Release Authorized: VTS
Reported: 04/28/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Analyzed: 04/27/10 10:00
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | GAS ID |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | < 1.0 U | |
| 108-88-3 | Toluene | 1.0 | < 1.0 U | |
| 100-41-4 | Ethylbenzene | 1.0 | < 1.0 U | |
| 179601-23-1 | m,p-Xylene | 1.0 | < 1.0 U | |
| 95-47-6 | o-Xylene | 1.0 | < 1.0 U | |
| | Gasoline Range Hydrocarbons | 0.25 | < 0.25 U | --- |

| BETX Surrogate Recovery | |
|---|---|
| Trifluorotoluene | 103% |
| Bromobenzene | 98.9% |

| Gasoline Surrogate Recovery | |
|---|---|
| Trifluorotoluene | 108% |
| Bromobenzene | 104% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**BETX by Method SW8021BMod**
**TPHG by Method NWTPHG**


**Sample ID: MW-9D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14F
LIMS ID: 10-10322
Matrix: Water
Data Release Authorized: VTS
Reported: 04/28/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Analyzed: 04/27/10 10:25
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | 13 | |
| 108-88-3 | Toluene | 1.0 | 1.0 | |
| 100-41-4 | Ethylbenzene | 1.0 | 33 | |
| 179601-23-1 | m,p-Xylene | 1.0 | 14 | |
| 95-47-6 | o-Xylene | 1.0 | 12 | |
| | | | | GAS ID |
| | Gasoline Range Hydrocarbons | 0.25 | 2.7 | GRO |

**BETX Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 106% |
| Bromobenzene | 103% |

**Gasoline Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 110% |
| Bromobenzene | 107% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**BETX by Method SW8021BMod**
**TPHG by Method NWTPHG**


**Sample ID: MW-18D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14H
LIMS ID: 10-10324
Matrix: Water
Data Release Authorized: VT
Reported: 04/28/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Analyzed: 04/27/10 10:50
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | < 1.0 U | |
| 108-88-3 | Toluene | 1.0 | < 1.0 U | |
| 100-41-4 | Ethylbenzene | 1.0 | < 1.0 U | |
| 179601-23-1 | m,p-Xylene | 1.0 | < 1.0 U | |
| 95-47-6 | o-Xylene | 1.0 | < 1.0 U | |
| | | | | GAS ID |
| | **Gasoline Range Hydrocarbons** | **0.25** | **0.26** | **GRO** |

| **BETX Surrogate Recovery** | |
|---|---|
| Trifluorotoluene | 106% |
| Bromobenzene | 102% |

| **Gasoline Surrogate Recovery** | |
|---|---|
| Trifluorotoluene | 110% |
| Bromobenzene | 106% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**BETX by Method SW8021BMod**
**TPHG by Method NWTPHG**


**Sample ID: Trip Blanks**
**SAMPLE**

Lab Sample ID: QU14I
LIMS ID: 10-10325
Matrix: Water
Data Release Authorized: VTS
Reported: 04/28/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Analyzed: 04/27/10 09:11
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | GAS ID |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | < 1.0 U | |
| 108-88-3 | Toluene | 1.0 | < 1.0 U | |
| 100-41-4 | Ethylbenzene | 1.0 | < 1.0 U | |
| 179601-23-1 | m,p-Xylene | 1.0 | < 1.0 U | |
| 95-47-6 | o-Xylene | 1.0 | < 1.0 U | |
| | Gasoline Range Hydrocarbons | 0.25 | < 0.25 U | --- |

**BETX Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 103% |
| Bromobenzene | 99.3% |

**Gasoline Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 106% |
| Bromobenzene | 101% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**BETX by Method SW8021BMod**
**TPHG by Method NWTPHG**
Page 1 of 1

**Sample ID: MB-042710**
**METHOD BLANK**

Lab Sample ID: MB-042710
LIMS ID: 10-10320
Matrix: Water
Data Release Authorized: VTS
Reported: 04/28/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: NA
Date Received: NA

Date Analyzed: 04/27/10 08:01
Instrument/Analyst: PID3/MH

Purge Volume: 5.0 mL
Dilution Factor: 1.00

| CAS Number | Analyte | RL | Result | GAS ID |
|---|---|---|---|---|
| 71-43-2 | Benzene | 1.0 | < 1.0 U | |
| 108-88-3 | Toluene | 1.0 | < 1.0 U | |
| 100-41-4 | Ethylbenzene | 1.0 | < 1.0 U | |
| 179601-23-1 | m,p-Xylene | 1.0 | < 1.0 U | |
| 95-47-6 | o-Xylene | 1.0 | < 1.0 U | |
| | Gasoline Range Hydrocarbons | 0.25 | < 0.25 U | --- |

**BETX Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 97.9% |
| Bromobenzene | 97.6% |

**Gasoline Surrogate Recovery**

| | |
|---|---|
| Trifluorotoluene | 102% |
| Bromobenzene | 102% |

BETX values reported in µg/L (ppb)
Gasoline values reported in mg/L (ppm)

GAS: Indicates the presence of gasoline or weathered gasoline.
GRO: Positive result that does not match an identifiable gasoline pattern.

Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

ANALYTICAL RESOURCES INCORPORATED

# TPHG WATER SURROGATE RECOVERY SUMMARY

ARI Job: QU14
Matrix: Water

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040

| Client ID | TFT | BBZ | TOT OUT |
|---|---|---|---|
| MB-042710 | 102% | 102% | 0 |
| LCS-042710 | 107% | 104% | 0 |
| LCSD-042710 | 108% | 104% | 0 |
| MW-16D-04-22-10 | 105% | 102% | 0 |
| MW-7D-04-22-10 | 108% | 104% | 0 |
| MW-9D-04-22-10 | 110% | 107% | 0 |
| MW-18D-04-22-10 | 110% | 106% | 0 |
| Trip Blanks | 106% | 101% | 0 |

| | LCS/MB LIMITS | QC LIMITS |
|---|---|---|
| (TFT) = Trifluorotoluene | (80-120) | (80-120) |
| (BBZ) = Bromobenzene | (80-120) | (80-120) |

Log Number Range: 10-10320 to 10-10325

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**BETX by Method SW8021BMod**


**Sample ID: LCS-042710**
**LAB CONTROL SAMPLE**

Lab Sample ID: LCS-042710
LIMS ID: 10-10320
Matrix: Water
Data Release Authorized: VTS
Reported: 04/28/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 04/27/10 07:12
LCSD: 04/27/10 07:37
Instrument/Analyst LCS: PID3/MH
LCSD: PID3/MH

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0
LCSD: 1.0

| Analyte | LCS | Spike Added-LCS | LCS Recovery | LCSD | Spike Added-LCSD | LCSD Recovery | RPD |
|---|---|---|---|---|---|---|---|
| Benzene | 4.79 | 5.30 | 90.4% | 4.76 | 5.30 | 89.8% | 0.6% |
| Toluene | 35.8 | 41.2 | 86.9% | 35.9 | 41.2 | 87.1% | 0.3% |
| Ethylbenzene | 9.23 | 10.0 | 92.3% | 9.15 | 10.0 | 91.5% | 0.9% |
| m,p-Xylene | 37.1 | 42.3 | 87.7% | 36.7 | 42.3 | 86.8% | 1.1% |
| o-Xylene | 13.6 | 14.9 | 91.3% | 13.6 | 14.9 | 91.3% | 0.0% |

Reported in µg/L (ppb)

RPD calculated using sample concentrations per SW846.

**BETX Surrogate Recovery**

| | LCS | LCSD |
|---|---|---|
| Trifluorotoluene | 103% | 103% |
| Bromobenzene | 100% | 100% |

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**TPHG by Method NWTPHG**


**Sample ID: LCS-042710**
**LAB CONTROL SAMPLE**

Lab Sample ID: LCS-042710
LIMS ID: 10-10320
Matrix: Water
Data Release Authorized: VTS
Reported: 04/28/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040
Date Sampled: NA
Date Received: NA

Date Analyzed LCS: 04/27/10 07:12
LCSD: 04/27/10 07:37
Instrument/Analyst LCS: PID3/MH
LCSD: PID3/MH

Purge Volume: 5.0 mL

Dilution Factor LCS: 1.0
LCSD: 1.0

| Analyte | LCS | Spike Added-LCS | LCS Recovery | LCSD | Spike Added-LCSD | LCSD Recovery | RPD |
|---|---|---|---|---|---|---|---|
| Gasoline Range Hydrocarbons | 1.05 | 1.00 | 105% | 1.00 | 1.00 | 100% | 4.9% |

Reported in mg/L (ppm)

RPD calculated using sample concentrations per SW846.

**TPHG Surrogate Recovery**

| | LCS | LCSD |
|---|---|---|
| Trifluorotoluene | 107% | 108% |
| Bromobenzene | 104% | 104% |

ANALYTICAL RESOURCES INCORPORATED

# BETX WATER SURROGATE RECOVERY SUMMARY

ARI Job: QU14
Matrix: Water

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
Event: 1014001.040

| Client ID | TFT | BBZ | TOT OUT |
|---|---|---|---|
| MB-042710 | 97.9% | 97.6% | 0 |
| LCS-042710 | 103% | 100% | 0 |
| LCSD-042710 | 103% | 100% | 0 |
| MW-16D-04-22-10 | 99.9% | 96.6% | 0 |
| MW-7D-04-22-10 | 103% | 98.9% | 0 |
| MW-9D-04-22-10 | 106% | 103% | 0 |
| MW-18D-04-22-10 | 106% | 102% | 0 |
| Trip Blanks | 103% | 99.3% | 0 |

| | LCS/MB LIMITS | QC LIMITS |
|---|---|---|
| (TFT) = Trifluorotoluene | (79-120) | (80-120) |
| (BBZ) = Bromobenzene | (79-120) | (80-120) |

Log Number Range: 10-10320 to 10-10325

**FORM II BETX**

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**TOTAL DIESEL RANGE HYDROCARBONS**
NWTPHD by GC/FID-Silica and Acid Cleaned
Page 1 of 1
Matrix: Water

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040

Data Release Authorized: VD
Reported: 04/28/10

| ARI ID | Sample ID | Extraction Date | Analysis Date | EFV DL | Range | RL | Result |
|---|---|---|---|---|---|---|---|
| MB-042610 | Method Blank | 04/26/10 | 04/27/10 | 1.00 | Diesel | 0.25 | < 0.25 U |
| 10-10320 | HC ID: --- | | FID4B | 1.0 | Motor Oil | 0.50 | < 0.50 U |
| | | | | | o-Terphenyl | | 72.3% |
| QU14D | MW-16D-04-22-10 | 04/26/10 | 04/27/10 | 1.00 | Diesel | 0.25 | < 0.25 U |
| 10-10320 | HC ID: --- | | FID4B | 1.0 | Motor Oil | 0.50 | < 0.50 U |
| | | | | | o-Terphenyl | | 75.5% |
| QU14E | MW-7D-04-22-10 | 04/26/10 | 04/27/10 | 1.00 | Diesel | 0.25 | < 0.25 U |
| 10-10321 | HC ID: --- | | FID4B | 1.0 | Motor Oil | 0.50 | < 0.50 U |
| | | | | | o-Terphenyl | | 77.9% |
| QU14F | MW-9D-04-22-10 | 04/26/10 | 04/27/10 | 1.00 | **Diesel** | **0.25** | **0.62** |
| 10-10322 | HC ID: **DRO** | | FID4B | 1.0 | Motor Oil | 0.50 | < 0.50 U |
| | | | | | o-Terphenyl | | 73.8% |
| QU14H | MW-18D-04-22-10 | 04/26/10 | 04/27/10 | 1.00 | Diesel | 0.25 | < 0.25 U |
| 10-10324 | HC ID: --- | | FID4B | 1.0 | Motor Oil | 0.50 | < 0.50 U |
| | | | | | o-Terphenyl | | 76.6% |

Reported in mg/L (ppm)

EFV-Effective Final Volume in mL.
DL-Dilution of extract prior to analysis.
RL-Reporting limit.

Diesel quantitation on total peaks in the range from C12 to C24.
Motor Oil quantitation on total peaks in the range from C24 to C38.
HC ID: DRO/RRO indicate results of organics or additional hydrocarbons in ranges are not identifiable.

# CLEANED TPHD SURROGATE RECOVERY SUMMARY

Matrix: Water

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040

| Client ID | OTER | TOT OUT |
|---|---|---|
| MB-042610 | 72.3% | 0 |
| LCS-042610 | 78.9% | 0 |
| MW-16D-04-22-10 | 75.5% | 0 |
| MW-7D-04-22-10 | 77.9% | 0 |
| MW-9D-04-22-10 | 73.8% | 0 |
| MW-18D-04-22-10 | 76.6% | 0 |

| | LCS/MB LIMITS | QC LIMITS |
|---|---|---|
| (OTER) = o-Terphenyl | (51-120) | (41-121) |

Prep Method: SW3510C
Log Number Range: 10-10320 to 10-10324

ANALYTICAL RESOURCES INCORPORATED

**ORGANICS ANALYSIS DATA SHEET**
**NWTPHD by GC/FID-Silica and Acid Cleaned**


**Sample ID: LCS-042610**
**LAB CONTROL**

Lab Sample ID: LCS-042610
LIMS ID: 10-10320
Matrix: Water
Data Release Authorized: VTS
Reported: 04/28/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

Date Extracted: 04/26/10
Date Analyzed: 04/27/10 22:06
Instrument/Analyst: FID/MS

Sample Amount: 500 mL
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00

| Range | Lab Control | Spike Added | Recovery |
|---|---|---|---|
| Diesel | 2.11 | 3.00 | 70.3% |

| TPHD Surrogate Recovery | |
|---|---|
| o-Terphenyl | 78.9% |

Results reported in mg/L

FORM III

ANALYTICAL RESOURCES INCORPORATED

# TOTAL DIESEL RANGE HYDROCARBONS-EXTRACTION REPORT

ARI Job: QU14
Matrix: Water
Project: North Lot Development
Date Received: 04/23/10
1014001.040

| ARI ID | Client ID | Samp Amt | Final Vol | Prep Date |
|---|---|---|---|---|
| 10-10320-042610MB1 | Method Blank | 500 mL | 1.00 mL | 04/26/10 |
| 10-10320-042610LCS1 | Lab Control | 500 mL | 1.00 mL | 04/26/10 |
| 10-10320-QU14D | MW-16D-04-22-10 | 450 mL | 1.00 mL | 04/26/10 |
| 10-10321-QU14E | MW-7D-04-22-10 | 475 mL | 1.00 mL | 04/26/10 |
| 10-10322-QU14F | MW-9D-04-22-10 | 445 mL | 1.00 mL | 04/26/10 |
| 10-10324-QU14H | MW-18D-04-22-10 | 440 mL | 1.00 mL | 04/26/10 |

ANALYTICAL RESOURCES INCORPORATED

**INORGANICS ANALYSIS DATA SHEET**
**DISSOLVED METALS**


**Sample ID: MW-5-04-22-10**
**SAMPLE**

Lab Sample ID: QU14A
LIMS ID: 10-10317
Matrix: Water
Data Release Authorized:
Reported: 05/11/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

| Prep Meth | Prep Date | Analysis Method | Analysis Date | CAS Number | Analyte | RL | µg/L | Q |
|---|---|---|---|---|---|---|---|---|
| 200.8 | 04/26/10 | 200.8 | 05/06/10 | **7440-38-2** | **Arsenic** | 1 | 33 | |

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
DISSOLVED METALS


Sample ID: MW-15D-04-22-10
SAMPLE

Lab Sample ID: QU14B
LIMS ID: 10-10318
Matrix: Water
Data Release Authorized:
Reported: 05/11/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

| Prep Meth | Prep Date | Analysis Method | Analysis Date | CAS Number | Analyte | RL | µg/L | Q |
|---|---|---|---|---|---|---|---|---|
| 200.8 | 04/26/10 | 200.8 | 05/10/10 | **7440-38-2** | **Arsenic** | 4 | **14** | |

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

**INORGANICS ANALYSIS DATA SHEET**
**DISSOLVED METALS**
Page 1 of 1

**Sample ID: MW-6-04-22-10**
**SAMPLE**

Lab Sample ID: QU14C
LIMS ID: 10-10319
Matrix: Water
Data Release Authorized:
Reported: 05/11/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

| Prep Meth | Prep Date | Analysis Method | Analysis Date | CAS Number | Analyte | RL | µg/L | Q |
|---|---|---|---|---|---|---|---|---|
| 200.8 | 04/26/10 | 200.8 | 05/06/10 | **7440-38-2** | **Arsenic** | 0.5 | **1.7** | |

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

**INORGANICS ANALYSIS DATA SHEET**
**DISSOLVED METALS**


**Sample ID: MW-16D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14D
LIMS ID: 10-10320
Matrix: Water
Data Release Authorized:
Reported: 05/11/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

| Prep Meth | Prep Date | Analysis Method | Analysis Date | CAS Number | Analyte | RL | µg/L | Q |
|---|---|---|---|---|---|---|---|---|
| 200.8 | 04/26/10 | 200.8 | 05/06/10 | **7440-38-2** | **Arsenic** | 0.5 | **2.1** | |

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

**INORGANICS ANALYSIS DATA SHEET**
**DISSOLVED METALS**


**Sample ID: MW-17D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14G
LIMS ID: 10-10323
Matrix: Water
Data Release Authorized:
Reported: 05/11/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

| Prep Meth | Prep Date | Analysis Method | Analysis Date | CAS Number | Analyte | RL | µg/L | Q |
|---|---|---|---|---|---|---|---|---|
| 200.8 | 04/26/10 | 200.8 | 05/06/10 | **7440-38-2** | **Arsenic** | 0.5 | **9.3** | |

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

**INORGANICS ANALYSIS DATA SHEET**
**DISSOLVED METALS**


**Sample ID: MW-18D-04-22-10**
**SAMPLE**

Lab Sample ID: QU14H
LIMS ID: 10-10324
Matrix: Water
Data Release Authorized:
Reported: 05/11/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: 04/22/10
Date Received: 04/23/10

| Prep Meth | Prep Date | Analysis Method | Analysis Date | CAS Number | Analyte | RL | µg/L | Q |
|---|---|---|---|---|---|---|---|---|
| 200.8 | 04/26/10 | 200.8 | 05/06/10 | **7440-38-2** | **Arsenic** | 0.5 | **1.6** | |

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

**INORGANICS ANALYSIS DATA SHEET**
**DISSOLVED METALS**
Page 1 of 1

**Sample ID: METHOD BLANK**

Lab Sample ID: QU14MB
LIMS ID: 10-10317
Matrix: Water
Data Release Authorized:
Reported: 05/11/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: NA
Date Received: NA

| Prep Meth | Prep Date | Analysis Method | Analysis Date | CAS Number | Analyte | RL | µg/L | Q |
|---|---|---|---|---|---|---|---|---|
| 200.8 | 04/26/10 | 200.8 | 05/06/10 | 7440-38-2 | Arsenic | 0.2 | 0.2 | U |

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

**INORGANICS ANALYSIS DATA SHEET**
**DISSOLVED METALS**
Page 1 of 1

**Sample ID: LAB CONTROL**

Lab Sample ID: QU14LCS
LIMS ID: 10-10317
Matrix: Water
Data Release Authorized:
Reported: 05/11/10

QC Report No: QU14-Landau Associates, Inc.
Project: North Lot Development
1014001.040
Date Sampled: NA
Date Received: NA

**BLANK SPIKE QUALITY CONTROL REPORT**

| Analyte | Analysis Method | Spike Found | Spike Added | % Recovery | Q |
|---|---|---|---|---|---|
| Arsenic | 200.8 | 23.5 | 25.0 | 94.0% | |

Reported in µg/L

N-Control limit not met
Control Limits: 80-120%

APPENDIX F

# Development of Cleanup Levels

# APPENDIX F
# DEVELOPMENT OF CLEANUP STANDARDS

This appendix develops cleanup standards for chemical constituents that were detected in affected media at the North Lot Property (Property) in Seattle, Washington. Cleanup standards consist of: 1) cleanup levels defined by regulatory criteria that are adequately protective of human health and the environment and; 2) the point of compliance at which the cleanup levels must be met. The cleanup levels are used in Section 4.0 of the main text of this report as the basis for identifying the nature and extent of contamination and will be used in the Feasibility Study as the basis for developing media-specific remedial action objectives (RAOs) for the cleanup action.

## DEVELOPMENT OF CLEANUP LEVELS

Cleanup levels for affected media developed under the Washington State Model Toxics Control Act (MTCA) represent the concentration of constituents of concern that are protective of human health and the environment for identified potential exposure pathways, based on the highest beneficial use (HBU) and the reasonable maximum exposure (RME) for each affected medium. The process for developing cleanup levels consists of identifying the HBU and RME for affected media, and determining the cleanup levels for the constituents of concern detected in affected media.

Numerical cleanup levels are developed only for Property soil and groundwater because these are the only media that appear to be affected by releases due to historical operations at the Property or on surrounding properties.

### Exposure Pathways

Potential exposure pathways must be identified for both human and environmental impacts. The potential exposure pathways are presented below by medium. No surface water or sediments are present at the Property; therefore, only groundwater and soil are discussed in this appendix.

#### *Groundwater*

Groundwater at or potentially affected by the Property is not currently used for drinking water and is not a reasonable future source of drinking water. The Property is located in a commercial/ industrial area with no hydraulically downgradient areas to the west and northwest, based on area and regional groundwater flow information, that have the potential to be used as sources of drinking water. Groundwater quality in the downtown Seattle area is generally poor because groundwater has been impacted by a number of industrial/commercial sources. In addition, municipal water for domestic purposes is provided from other sources. However, groundwater at Safeco Field, located approximately

0.35 mile south of the Property, is reportedly used for irrigation purposes and, depending on the pumping rate, this use may influence groundwater at the Property; therefore, there is potential for exposure to groundwater. Therefore, the potential exposure pathways for Property groundwater are:

- Human ingestion of constituents from the Property in groundwater
- Human or aquatic life contact with or ingestion of constituents from the Property transported to marine surface water.

***Soil***

The potential exposure pathways for Property soil are:

- Human contact (dermal, incidental ingestion, or inhalation) with constituents in soil at the Property
- Human ingestion of constituents leached from Property soil to groundwater
- Contact by terrestrial plants and animals with contamination from the Property in soil or groundwater.

The Property is currently approximately 95 percent paved. Trees are located in the northwestern portion of the Property and along the northern and western Property boundaries. A limited area of exposed soil [a circular area approximately 4 feet (ft) in diameter] is present around each of the trees. The remainder of the Property is paved. After redevelopment, the Property will be almost entirely covered with buildings and pavement.

There is less than 1.5 acres of contiguous undeveloped area contained within the Property and within 500 ft of the Property. Therefore, the Property meets the exclusion criterion for a terrestrial ecological evaluation in accordance with WAC 173-340-7491(c)(1) and human contact and ingestion are the only applicable pathways for Property soil.

**Identification of Property Highest Beneficial Use and Reasonable Maximum Exposure**

MTCA specifies the development of cleanup levels based on the HBU for the affected media (soil and groundwater) and the RME that may occur for each affected medium. For example, under MTCA the HBU for soil is assumed to be unrestricted unless it can be demonstrated that industrial use is the present and expected future Property use. Similarly, the RME associated with soil is typically either direct ingestion of soil or the ingestion of groundwater affected by constituents leached from soil, whichever represents the greatest potential exposure.

The HBU and RME provide the basis for establishing media-specific cleanup levels under MTCA regulations. The HBU establishes the use scenario for the affected media, such as the use of groundwater for domestic purposes. The RME then establishes the most conservative exposure scenario that is reasonable for the identified HBU, such as ingestion of drinking water for affected groundwater, which provides the basis for calculating a cleanup level for a given contaminant in a given medium. The remainder of this section identifies the HBU and RME for Property soil and groundwater.

***Groundwater***

The HBU for groundwater is considered to be drinking water [WAC 173-340-720(1)(a)]. Groundwater at the Property is not used as drinking water; however, cleanup levels were developed based on drinking water in order to provide a conservative evaluation of the detected constituents. At Ecology's request, discharge to marine surface water was also considered, due to the proximity of the site to Elliott Bay and the potential for groundwater capture in local storm and sewer drains. The RME for groundwater is the more conservative of ingestion of drinking water, ingestion of marine organisms, and exposure of marine organisms affected by constituents from the Property.

***Soil***

The HBU for soil is considered to be unrestricted land use. Redevelopment plans for the Property include upper story residential use. Based on a soil HBU of unrestricted use, the RME for soil is the more conservative of: 1) direct ingestion of soil, 2) protection of groundwater as drinking water, or 3) protection of groundwater as marine surface water and the associated exposures described in the preceding section.

**Determination of Cleanup Levels**

Cleanup levels were developed for constituents detected in soil and/or groundwater as discussed in the Remedial Investigation report. For the reasons previously discussed, numerical criteria are not developed for sediment, surface water, or air.

***Groundwater***

Groundwater screening criteria were developed for detected constituents using standard MTCA Method B [WAC 173-340-720(4)] requirements. Under MTCA Method B, potable groundwater cleanup levels must be at least as stringent as all of the following:

- Concentrations established under state and federal laws
- Concentrations protective of surface water beneficial uses unless hazardous substances are not likely to reach surface water
- Concentrations determined using MTCA equation 720-1 or 720-2 if sufficiently protective, health-based criteria have not been established under applicable state and federal laws.

Cleanup levels were established for constituents detected in groundwater based on these requirements. In addition, groundwater cleanup levels were developed for constituents that were detected in soil but that were not detected in groundwater for use in the calculation of a contaminant concentration in soil protective of groundwater. Although MTCA allows for a maximum carcinogenic risk of $10^{-5}$ for constituents for which health-based criteria, such as maximum contaminant levels (MCLs) or National Recommended Water Quality Criteria for protection of human health, have been established under applicable state or federal laws, cleanup levels were based on a maximum carcinogenic risk of $10^{-6}$. For drinking water, cleanup levels were set at the lowest of the federal and state MCLs, federal MCLGs if applicable, state secondary MCLs, and the MTCA Method B formula values (calculated using MTCA equation 720-1 for non-carcinogens and equation 720-2 for carcinogens). For marine surface water, cleanup levels were set at the lowest of state and federal water quality criteria promulgated under Chapter 173-201A WAC, Section 304 of the Clean Water Act, the National Toxics Rule, and the MTCA Method B formula values (calculated using MTCA equation 730-1 for non-carcinogens and equation 730-2 for carcinogens). If no federal or state criteria were available, the MTCA Method B formula value was used as the cleanup level. Because total petroleum hydrocarbons (TPH) and lead do not have health-based criteria, MTCA Method A cleanup levels for groundwater were used for these constituents. Cleanup levels for non-carcinogenic constituents were evaluated based on total site risk and were adjusted downward, as necessary, to achieve a hazard index less than or equal to 1. Criteria used to establish total site risk for non-carcinogenic constituents are presented in Table E-1 (for soil) and Table E-2 (for groundwater). Cleanup levels for carcinogenic constituents were also evaluated for total site risk and were adjusted downward, as necessary, to achieve a total carcinogenic risk of less than or equal to $10^{-6}$; criteria used to establish total carcinogenic risk are presented in Table E-3. Cleanup levels were adjusted up to established natural background concentrations, where appropriate. The cleanup level for arsenic was adjusted upward to the area background level based on the background level calculated at the nearby Union Station site. Groundwater cleanup levels and the basis for their development are presented in Table 4 of the Feasibility Study report.

***Soil***

Soil screening criteria were developed for unrestricted land uses in accordance with WAC-173-340-740 using MTCA Method B soil cleanup levels. Under MTCA Method B, soil cleanup levels must be at least as stringent as all of the following:

- Concentrations established under applicable state and federal laws
- Concentrations protective of terrestrial ecological receptors
- Concentrations protective of direct human contact with soil
- Concentrations protective of groundwater.

These criteria were considered during development of soil cleanup levels, which were developed for all constituents detected in soil.

There are no detected constituents for which concentrations have been established under applicable state and federal laws. As previously described, the Property qualifies for an exclusion from a terrestrial ecological evaluation. Therefore, the cleanup levels were set at the lower of the concentration protective of direct human contact and the concentration protective of groundwater, and then, if appropriate, adjusted for natural background (Ecology 1994[1]). For most constituents, standard MTCA Method B formula values protective of direct human contact were determined in accordance with WAC 173-340-740(3) using MTCA equations 740-1 and 740-2. For lead and for TPH results from methods NWTPH-Gx and NWTPH-Dx, cleanup levels were set at the Method A soil cleanup levels for unrestricted land uses because no Method B value exists. Soil screening criteria protective of groundwater were determined using the fixed parameter, three-phase partitioning model in accordance with WAC 173-340-747(4) for all constituents except TPH. The three-phase model provides a conservative estimate of the concentration of a constituent in soil that is protective of groundwater. MTCA also allows an empirical demonstration that contaminant concentrations in soil are protective of groundwater [WAC 173-340-747(a)]. An empirical demonstration of groundwater protection was performed for copper and zinc in soil, as presented in Appendix H of the Remedial Investigation report. The soil cleanup levels for non-carcinogenic constituents were evaluated based on total site risk and were adjusted downward, where necessary, in order to achieve a hazard index less than or equal to 1. Criteria used to establish total site risk for non-carcinogenic constituents are presented in Table E-1. Cleanup levels for carcinogenic constituents were also evaluated for total site risk and were adjusted downward, as necessary, to achieve a total carcinogenic risk of less than or equal to $10^{-6}$; criteria used to establish total carcinogenic risk are presented in Table E-3. The soil cleanup levels for metals were adjusted to be no less than natural background in accordance with WAC 173-340-740(5)(c). Soil screening criteria and the basis for their development are presented in Table 1 of the Feasibility Study report.

## POINTS OF COMPLIANCE

Under MTCA, the point of compliance is the point or location on the site where the cleanup levels must be attained. The point(s) of compliance for affected media will be selected by the Washington State Department of Ecology and presented in the Property cleanup action plan. However, it is necessary to identify proposed point(s) of compliance to develop, and evaluate the effectiveness of, cleanup action alternatives in the Feasibility Study. As a result, the anticipated points of compliance for

[1] Ecology. 1994. *Natural Background Soil Metals Concentrations in Washington State*. Publication No. 94-115. Toxics Cleanup Program, Washington State Department of Ecology. October.

soil and groundwater are identified in this section. Points of compliance for sediment, surface water, and air are not discussed because these are not media of concern based on existing Property conditions.

**Soil**

The point of compliance for soil in WAC 173-340-740(6) is throughout the site. MTCA recognizes that for those cleanup actions that involve containment of hazardous substances, the soil cleanup levels will typically not be met throughout the site [WAC 173-340-740(6)(f)], however, such cleanup actions comply with cleanup standards if they meet the specific criteria including permanence to the maximum extent practicable, protection of human health, protection of terrestrial ecological receptors, provision of institutional controls, compliance monitoring, and specification of containment measures in a draft cleanup action plan. Specific actions will be proposed and described in the Feasibility Study.

**Groundwater**

The standard point of compliance for potable groundwater is throughout the site when the HBU is drinking water [WAC 173-340-720(8)(b)]. However, MTCA allows for a conditional point of compliance when it is not practicable to meet the cleanup level throughout the site within a reasonable restoration time frame [WAC 173-340-720(8)(c). It is anticipated that the Property boundary will be the conditional point of compliance for Property groundwater. The achievement of cleanup levels in groundwater will be measured at the conditional point of compliance using a network of monitoring wells at the boundaries of the Property. Specific actions will be proposed and described in the Feasibility Study. The compliance monitoring locations and duration will be determined during development of the cleanup action plan and/or remedial design.

# TABLE F-1
## TOTAL NON-CARCINOGENIC SITE RISK: SOIL
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | | | | | Toxic Effects | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte (a) | Soil Cleanup Level | Adjusted Soil Cleanup Level | Constituent Concentration in Soil at HQ = 1 (b) | HQ at Adjusted Cleanup Level (c) | Hepatotoxicity: HQ Risk at CUL | Hemotoxicity: HQ Risk at CUL | Nephrotoxicity: HQ Risk at CUL | Skin Lesions: HQ Risk at CUL | Neurotoxicity: HQ Risk at CUL | Developmental Toxicity: HQ Risk at CUL | Proteinuria: HQ Risk at CUL | Mortality: HQ Risk at CUL | Gastrointestinal Toxicity: HQ Risk at CUL | Weight: HQ Risk at CUL |
| **PAHs (µg/kg)** | | | | | | | | | | | | | | |
| Naphthalene | 4.5 | 4.5 | 1,600 | 2.81E-03 | | | | | | | | | | 2.81E-03 |
| Acenaphthene | 98 | 25 | 4,800 | 5.21E-03 | 5.21E-03 | | | | | | | | | |
| Fluorene | 100 | 79 | 3,200 | 2.47E-02 | | 2.47E-02 | | | | | | | | |
| Fluoranthene | 630 | 49 | 3,200 | 1.53E-02 | 1.53E-02 | 1.53E-02 | 1.53E-02 | | | | | | | |
| Pyrene | 660 | 140 | 2,400 | 5.83E-02 | | | 5.83E-02 | | | | | | | |
| **TOTAL METALS (mg/L)** | | | | | | | | | | | | | | |
| Arsenic | 0.034 | 0.034 | 24 | 1.42E-03 | | | | 1.42E-03 | | | | | | |
| Lead (d) | | | | | | | | | | | | | | |
| Mercury | 0.07 | 0.07 | 24 | 2.92E-03 | | | 2.92E-03 | | 2.92E-03 | | | | | |
| Cadmium | 1 | 1 | 80 | 1.25E-02 | | | | | | | 1.25E-02 | | | |
| Copper | 24,000 | 80 | 24,000 | 3.33E-03 | | | | | | | | | 3.33E-03 | |
| Zinc | 3,000 | 105 | 3,000 | 3.50E-02 | 3.50E-02 | | | | | | | | | |
| **BTEX (µg/kg)** | | | | | | | | | | | | | | |
| Toluene | 4.60 | 0.58 | 6,400 | 9.06E-05 | 9.06E-05 | | 9.06E-05 | | 9.06E-05 | | | | | |
| Ethylbenzene | 6.10 | 2.38 | 8,000 | 2.98E-04 | 2.98E-04 | | 2.98E-04 | | | | | | | |
| **SEMIVOLATILES (µg/kg)** | | | | | | | | | | | | | | |
| Di-n-butylphthalate | 57 | 57 | 8,000 | 7.13E-03 | | | | | | | | 7.13E-03 | | |
| Phenol | 22 | 22 | 48,000 | 4.58E-04 | | | | | | 4.58E-04 | | | | |
| **Total HI at Soil CUL** | | | | | **5.59E-02** | **4.00E-02** | **7.70E-02** | **1.42E-03** | **3.01E-03** | **4.58E-04** | **1.25E-02** | **7.13E-03** | **3.33E-03** | **2.81E-03** |

**TOTAL SITE RISK SUMMARY FOR SOIL AND GROUNDWATER**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Total HI at Soil CUL | 0.0559 | 0.0400 | 0.0770 | 0.00142 | 0.00301 | 0.000458 | 0.0125 | 0.00713 | 0.00333 | 0.00281 |
| Total HI at Groundwater CUL (e) | 0.948 | 0.860 | 0.799 | 0.0121 | 0.125 | 0.438 | (f) | (f) | (f) | 1.00 |
| **Total HI for Soil and Groundwater** | **1.00** | **0.90** | **0.88** | **0.014** | **0.13** | **0.44** | **0.013** | **0.007** | **0.0033** | **1.00** |

Notes:
HQ = Hazard Quotient.
HI = Hazard Index.
CUL = Cleanup Level.
µg/kg = Micrograms per kilogram.
mg/L = Milligrams per liter.
(a) Non-carcinogenic analyte detected in soil.
(b) Constituent concentration in soil at HQ = 1 is equal to the direct contact soil cleanup level.
(c) HQ at Adjusted Cleanup Level = adjusted soil cleanup level divided by the constituent concentration in soil at HQ = 1.
(d) No toxicity data available; Method A Unrestricted Soil Cleanup Level used.
(e) Total HI at Groundwater CUL calculated in Table F-2.
(f) No associated HQ risk for groundwater under this toxic effect.

# TABLE F-2
## TOTAL NON-CARCINOGENIC SITE RISK: GROUNDWATER
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | | | | | Toxic Effects | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Analyte (a)** | **Groundwater Cleanup Level** | **Adjusted Groundwater Cleanup Level** | **Constituent Concentration in Groundwater at HQ = 1 (b)** | **HQ at Adjusted Cleanup Level (c)** | **Hepatotoxicity: HQ Risk at CUL** | **Hemotoxicity: HQ Risk at CUL** | **Nephrotoxicity: HQ Risk at CUL** | **Skin Lesions: HQ Risk at CUL** | **Neurotoxicity: HQ Risk at CUL** | **Developmental Toxicity: HQ Risk at CUL** | **Weight: HQ Risk at CUL** |
| **PAHs (µg/L)** | | | | | | | | | | | |
| Naphthalene | 160 | 160 | 160 | 1.00E+00 | | | | | | | 1.00E+00 |
| Acenaphthene | 640 | 250 | 960 | 2.60E-01 | 2.60E-01 | | | | | | |
| Fluorene | 640 | 500 | 640 | 7.81E-01 | | 7.81E-01 | | | | | |
| Fluoranthene | 90 | 50 | 640 | 7.81E-02 | 7.81E-02 | 7.81E-02 | 7.81E-02 | | | | |
| Pyrene | 480 | 100 | 480 | 2.08E-01 | | | 2.08E-01 | | | | |
| **DISSOLVED METALS (µg/L)** | | | | | | | | | | | |
| Arsenic | 0.058 | 0.058 | 4.8 | 1.21E-02 | | | | 1.21E-02 | | | |
| Lead (d) | | | | | | | | | | | |
| **BTEX (µg/L)** | | | | | | | | | | | |
| Toluene | 640 | 80 | 640 | 1.25E-01 | 1.25E-01 | | 1.25E-01 | | 1.25E-01 | | |
| Ethylbenzene | 700 | 275 | 800 | 3.44E-01 | 3.44E-01 | | 3.44E-01 | | | | |
| **VOLATILES (µg/L)** | | | | | | | | | | | |
| Methylene Chloride | 5 | 3 | 480 | 6.25E-03 | 6.25E-03 | | | | | | |
| Acetone | 800 | 35 | 800 | 4.38E-02 | 4.38E-02 | | 4.38E-02 | | | | |
| Carbon Disulfide | 800 | 350 | 800 | 4.38E-01 | | | | | | 4.38E-01 | |
| Chloroform | 7.2 | 7.2 | 80 | 9.00E-02 | 9.00E-02 | | | | | | |
| Styrene | 1.5 | 1.5 | 1600 | 9.38E-04 | 9.38E-04 | 9.38E-04 | | | | | |
| **Total HI at Groundwater CUL (e)** | | | | | **9.48E-01** | **8.60E-01** | **7.99E-01** | **1.21E-02** | **1.25E-01** | **4.38E-01** | **1.00E+00** |

Notes:
HQ = Hazard Quotient.
HI = Hazard Index.
CUL = Cleanup Level.
µg/L = Micrograms per liter.
(a) Non-carcinogenic analyte detected in groundwater.
(b) Constituent concentration in groundwater at HQ = 1 is equal to the direct contact groundwater cleanup level.
(c) HQ at Adjusted Cleanup Level = adjusted groundwater cleanup level divided by the constituent concentration in groundwater at HQ = 1.
(d) No toxicity data available; Method A Unrestricted Soil Cleanup Level used.
(e) Total HI at soil CUL calculated in Table F-1.

# TABLE F-3
## TOTAL CARCINOGENIC SITE RISK: SOIL AND GROUNDWATER
## NORTH LOT DEVELOPMENT
## SEATTLE, WASHINGTON

| | Analyte (a) | Cleanup Level (b) | Concentration at Carcinogenic Risk = $1x10^{-6}$ (b)(c) | Carcinogenic Risk at Cleanup Level (d) |
|---|---|---|---|---|
| SOIL | Benzene | 0.0045 | 18 | 2.5E-10 |
| | cPAHs (TEQ) | 0.14 | 0.14 | 1.0E-06 |
| | Arsenic | 0.034 | 0.67 | 5.1E-08 |
| | Carbazole | 0.32 | 50 | 6.4E-09 |
| | Dioxins/Furans (TEQ) | 2.7E-07 | 1.1E-05 | 2.5E-08 |
| GROUNDWATER | Benzene | 0.8 | 0.8 | 1.0E-06 |
| | cPAHs (TEQ) | 0.012 | 0.012 | 1.0E-06 |
| | Arsenic | 0.058 | 0.058 | 1.0E-06 |
| | Chloromethane | 3 | 3 | 1.0E-06 |
| | Methylene Chloride | 3 | 6 | 5.0E-07 |
| | Chloroform | 7.2 | 7.2 | 1.0E-06 |
| | **TOTAL RISK** | | | **6.58E-06** |

Notes:
TEQ = Toxicity Equivalency Quotient.
(a) Carcinogenic analyte detected in soil or groundwater.
(b) Units for soil anaytes are mg/kg ; units for groundwater analytes are µg/L.
(c) Concentration at carcinogenic risk = 1E-06 is equal to the direct contact cleanup level for a carcinogen.
(d) Carcinogenic risk at cleanup level = (cleanup level divided by the concentration at which the risk is 1E-06) x 1E-06.