Revised Remedial Investigation Report

BOEING KENT SPACE CENTER FACILITY
South 208th Street
KENT, WASHINGTON

November 1, 2022

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This report was prepared by the staff of Dalton, Olmsted, & Fuglevand, Inc., under the supervision of the geologist/hydrogeologist whose seal and signature appear hereon.

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ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AO	Agreed Order No. DE 12820
AOC	Area of concern
ARAR	Relevant & appropriate regulations
ARI	Analytical Resources Inc.
bgs	below ground surface
Boeing	The Boeing Company
BTEX	benzene, toluene, ethylbenzene, xylenes
CCR	Covenants, Conditions, and Restrictions
CFU	colony forming unit
CLARC	Cleanup Levels and Risk Calculations
CSL	Cleanup screening level
CSM	conceptual site model
DOF	Dalton, Olmsted, and Fuglevand Inc.
Ecology	Washington State Department of Ecology
EDD	Electronic data deliverable
EIM	Environmental Information Management
EISC	wildlife environmental indicator screening concentrations
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
ISGP	Industrial Stormwater General Permit
KSC	Kent Space Center
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MTCA	Model Toxics Control Act
NDP	North Stormwater Detention Pond
NTU	nephelometric turbidity units
ORP	oxidation reduction potential
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCOC	Potential contaminant of concern
ppm	parts per million
QAPP	Quality assurance project plan
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RI	Remedial investigation
SCO	sediment cleanup objective
Site	Boeing Kent Space Center Facility
SMS	Washington State Sediment Management Standards
SVOC	semivolatile organic compound
SWMU	solid waste management unit

SWPPP	Stormwater Pollution Prevention Plan
TEE	Terrestrial Ecological Evaluation
TPH	Total petroleum hydrocarbons
USGS	United States Geological Survey
UST	Underground storage tank
VI	vapor intrusion
VOC	volatile organic compound
WAC	Washington Administrative Code

EXECUTIVE SUMMARY

This Revised Remedial Investigation report (RI) was prepared by Dalton, Olmsted, and Fuglevand (DOF) on behalf of the Boeing Company in partial fulfillment of the requirements of an Agreed Order between Boeing and the Washington State Department of Ecology (Ecology). The objectives of this RI are to fulfill the requirements of the 2016 Work Plan, characterize the nature and extent of contamination at the Site, and meet the general requirements for a RI as defined by MTCA under WAC 173-340-350. In doing so, the RI will meet the requirements of Section VII.A of the AO to investigate the subsurface soil and groundwater at the Site and characterize the concentration, chemical nature, extent, and the direction and rate of migration of dangerous constituents released into the environment at or from each of the SWMUs, AOCs, and other areas identified for further evaluation. All tasks identified in the RI Work Plan and tasks identified through data gaps evaluation after the 2017 draft RI Report have been completed and documented in this RI.

Land use has not significantly changed at the site since it was first developed. The site is industrial park, and local planning and zoning support continued similar types of use. Boeing sold approximately half of the parcels comprising the site to another party in 2019 and that portion of the site is undergoing redevelopment as industrial and business park property.

Geology at the site is consistent with conditions anticipated for this part of the Green River valley. The site is relatively flat and soil types are predominantly sand, sandy silts, and silt. Shallow groundwater is present at approximately 7 to 11 feet below ground surface and the depth to groundwater varies seasonally by several feet. Groundwater flow is predominantly to the north, but flat, varying in flow direction from northwest to northeast with a slow groundwater flow rate measured between 30 and 70 feet per year.

Groundwater is not currently a source of drinking water at the site. Groundwater and stormwater at the site discharge to Mill Creek during the wet season and heavy precipitation events. Mill Creek discharges to the Green River approximately 3.5 miles north of the site. During the dry season, groundwater and stormwater at the site also discharge to an on-property detention pond which is constructed with restricted outflow catch basins. Mill Creek has been the focus of several historical studies that found it did not meet Surface Water Quality criteria under WAC 173-201A-200 that would be expected to support aquatic life, nor did it meet recreational use levels.

Soil, soil vapor, ambient air, groundwater, and stormwater conveyance system sediment and water samples were collected as part of this RI and concurrent due diligence investigation. The majority of samples did not reveal concentrations above screening levels and no new sources of contamination were identified. The nature and extent of contamination at individual SWMUs and AOCs were each investigated. Where releases or sources were identified they have been addressed and the RI did not identify unaddressed contamination that presents an unacceptable risk at any SWMU or AOC.

Arsenic was the only constituent detected above screening levels in soil; however, the average arsenic soil concentration was 4.4 mg/kg. It should be noted that this portion of the Green River Valley is located in the footprint of a former copper smelter's arsenic fallout plume which was projected by Ecology to contain arsenic in the soil at concentrations of up to 20 mg/kg.

Groundwater samples were tested for VOCs, SVOCs, petroleum compounds, PCBs, and metals as part of the RI and identified relatively few detections above conservatively set screening levels protective of groundwater use, surface water, and vapor intrusion. No constituents were detected in groundwater above MTCA screening levels protective of the vapor intrusion to indoor air pathway which would be the receptor pathway of greatest concern for the site.

Vinyl chloride was detected above the 0.02 ug/L screening level in several groundwater samples ranging from 0.021 to 12.6 μg/L. While above the screening level, these values are not indicative of an unidentified source of contamination contributing to the detections. These values are low, confirming areas where vinyl chloride is detected are small, and may be declining naturally based on recent concentrations, geochemistry of the groundwater, and the absence of other possible parent chlorinated VOCs. Other VOCs were generally below screening levels.

PCBs were detected at very low concentrations (less than 0.05 μg/L) in several direct push borings near a stormwater detention pond at the site but were not detected in any groundwater samples collected from the 12 monitoring wells at the site.

Arsenic concentrations in groundwater collected as part of this RI varied widely from less than 2 to 266 μg/L, generally consistent with historical area results, and appear to reflect area-wide shallow groundwater conditions, not due to a site-specific source. The highest concentrations are present, in general, at the shallowest depths of approximately 10-15 feet.

Stormwater detention facilities on and offsite influence groundwater flow direction in variable ways depending on intensity of storm events, seasonal groundwater elevations, and flow controls to discharge water bodies connected to these facilities. Data collected from the Stormwater Conveyance System are generally consistent with regional and historical data, and with what might be expected for a similar industrial site that is well-maintained with underutilized parking and traffic. Sediment traps yielded low solids accumulation over the course of a full year, suggesting that the site has low sediment loading that would potentially contribute to contamination in downstream surface water bodies. A USGS study concluded that arsenic adsorbed to sediments in the Green River and are considered naturally-occurring.

Concentrations of contaminant detected in stormwater samples discharging from the Site are generally low and meeting Industrial Stormwater General Permit stormwater benchmarks. When zinc was identified above the benchmark, galvanized roofing materials were discovered and painted. These actions reduced the zinc concentrations to below the zinc benchmark during subsequent sampling events.

The nature and extent of contamination has been defined and no further evaluation is warranted to meet the objectives of the RI, as defined in the AO. Boeing is prepared to enter an environmental covenant for the property, as was completed for a portion of the property sold in 2019 and for the

Striker property, restricting the use of groundwater from the Site. Boeing plans to continue to operate under the ISGP as well, monitoring and maintaining the stormwater conveyance system at the Site for operations consistent with the industrial levels allowed under that permit.

At the request of Ecology, Boeing will conduct a focused Feasibility Study (FS) to evaluate a Monitored Natural Attenuation (MNA) remedy for arsenic in groundwater and an environmental covenant. In preparation for the FS Boeing will collect additional data in support of the FS to identify nature and extent of groundwater arsenic concentrations and downgradient location of arsenic re-adsorption zones and near stormwater management or surface water features.

The focused FS will utilize additional data collection to address the considerations listed above. Boeing will submit a Work Plan, consistent with the data collection plan noted above and Ecology’s June 1, 2022 letter (Ecology, 2022b) by August 30, 2022.

1.0 INTRODUCTION

This Revised Remedial Investigation report (RI) was prepared by Dalton, Olmsted, and Fuglevand (DOF) on behalf of the Boeing Company (Boeing) in partial fulfillment of the requirements of Agreed Order No. DE 12820 (AO; Ecology 2016a) between Boeing and the Washington State Department of Ecology (Ecology). The project site is the Boeing Kent Space Center (site) located on approximately 121 acres bounded by South 208th Street to the south, 68th Avenue South to the east, South 199th Place to the north, and by 59th Place South and a large distribution center to the west, in Kent, Washington (Figure 1). The Ecology Facility Site Identification number is 2099 and Cleanup Site Identification number is 12671.

1.1 Purpose and Objectives

In accordance with the AO, a work plan was prepared for the RI (Landau, 2016) and approved by Ecology in October 2016 (Ecology, 2016b). The RI was conducted in accordance with this work plan. A Draft RI Report was submitted to Ecology in December 2017 (DOF, 2017).

The RI objectives are as follows:

- Fulfill the requirements of the 2016 Work Plan,
- Characterize the nature and extent of contamination at the Site, and
- Meet the general requirements for a RI as defined by the Model Toxics Control Act (MTCA) Washington Administrative Code (WAC) 173-340-350.

Since that time Boeing worked in cooperation with Ecology to conduct supplemental RI investigative work and submitted a Revised RI in 2021 (DOF, 2021). Ecology provided comments on the 2021 RI in a letter to Boeing in February 2022 (Ecology, 2022a), after which, Boeing and DOF met with Ecology to discuss an appropriate way to revise the RI and address Ecology's comments. Ecology provided a second letter in June 2022 outlining a path to finalize the RI (Ecology, 2022b). This Revised RI Report includes results of supplemental investigations along with the originally performed RI investigation, and addresses comments provided by Ecology in 2022.

1.2 Report Organization

The main text is organized into ten sections as follows:

- **Section 1 – Introduction** presents information regarding the objectives and approach for the RI.
- **Section 2** – **Site Description** provides information regarding the site development, use, regulatory history, and environmental setting.
- **Section 3** – **Background and Environmental Investigation** provides background and a description of the fieldwork completed as part of this RI and areas of confirmed or suspected releases.

- **Section 4** – **Remedial Investigation Methodologies** provides a description of the methods used to collect environmental data and an assessment of the data quality.
- **Section 5** – **Conceptual Site Model** includes an evaluation of site-specific potential chemical transport and exposure pathways, including an assessment of beneficial use of groundwater and local surface water quality and use.
- **Section 6** – **Screening Levels** used in this RI are presented in this section.
- **Section 7** – **Nature and Extent of Contamination** presents analytical results of the RI in relation to the conceptual site model and screening levels.
- **Section 8** – **Conclusions** are summarized in this section along with recommendations for future actions.
- **Section 9** – **References** cited in the report.
- **Section 10** – DOF's standard reporting limitations are presented in the **Closing** section.

The RI report also includes multiple tables, figures, and appendices to support the analyses presented in the text.

2.0 SITE DESCRIPTION

The Site is located at 20403 68th Avenue South in Kent, Washington, and occupies 26 parcels of land; 13 of these parcels are currently owned by Boeing and operated by Boeing Defense, Space and Security. The remaining 13 parcels of land were sold by Boeing to Pacific Gateway (also referred to as Panattoni) in 2019. Site investigation has been conducted by several environmental consultants on behalf of Boeing, as referenced throughout this RI. Relevant contacts are presented in Table 1, and a listing of parcel ownership is included in Table 2.

The Site is located in the Green River Valley. The Green River is located approximately 0.3 miles west of the Site. The average elevation of the Site is approximately 25 to 30 feet above mean sea level. Surface topography at and in the vicinity of the Site is generally level and slopes slightly downward to the west-northwest toward the Green River (USGS, 1995). The Site is zoned I1 for Industrial Business District and I2 for Mixed Industrial District (Figure 2). The Site is located in Section 2, Township 22N, Range 4E and includes the tax parcels listed in Table 2.

2.1 Property Development and Use

The Site was developed in the late 1960s to support the National Aeronautics and Space Administration (NASA) Lunar Rover program and since has been primarily used for US Department of Defense projects. Boeing purchased the property from various entities in 1964. Based on available information, the property was previously used for farming and included private homes and out-buildings (Boeing 1990).

Multiple buildings were demolished between 2018 and 2019 in preparation for the partial sale of the property. A portion of the Site was sold to Panattoni in 2019 (approximately 52.7 acres of the 124 acre property) and is currently being developed with several new buildings (Boeing, 2019).

The current site layout is shown on Figure 3, including the portion of the property sold in 2019. Figure 4 shows the location of previous investigations and portions of property historically owned by Boeing prior to establishment of the AO.

Boeing's portion of the Site is currently used primarily for aerospace engineering, research and development, and light manufacturing. The Site currently operates as a large-quantity generator of dangerous waste under the Ecology Dangerous Waste Regulations (Chapter 173-303 WAC). The Boeing employees' tennis club is located in the northeastern corner of the Site.

As part of the conditions of the partial property sale, Boeing filed Covenants, Conditions, and Restrictions (CCR) on the property that require the following:

- No sensitive land use (residential, school, daycare, hospital, assisted living, medical office, extended stay hotel) or agricultural use.
- No drinking water wells or other use of groundwater under the property.
- Provisions related to stormwater management and protection; severance of stormwater infrastructure between Sale and Retained Properties; and compliance with all applicable laws and permits.

- Soil over-excavation and vapor barriers are required for new buildings in the area of former industrial buildings 18-42 and 18-43; vapor intrusion evaluations are required for new buildings in other areas.
- Future Owners to take necessary steps to record and comply with restrictive covenants, institutional controls, and soil management plans if so required.

A copy of the Declaration of Covenants, Conditions, Easements and Restrictions (CCR) is included in Appendix A.

The Site stormwater conveyance system is being modified and separated based on the 2019 partial property sale. Boeing's current property includes a stormwater detention pond in the northwestern portion of the Facility (North Detention Pond) that discharges to Mill Creek along the eastern Site boundary. On both the Boeing and the Panattoni portions of the Site, several new stormwater management features are being constructed as described further in Section 3.1.8.

2.2 Regulatory History

The Site is currently operating under a Resource Conservation and Recovery Act (RCRA) interim-status permit issued by the US Environmental Protection Agency (EPA). Boeing seeks to remove the Facility from coverage under the permit and entered into the AO with Ecology, the administrator of the RCRA corrective action program, as part of that process.

Work conducted under the AO is managed by the Boeing Remediation Group under project manager Todd Swoboda. The regulatory history for the Site, including known historical releases and cleanup actions, is presented in Table 3. Several areas on or neighboring the Site have been previously investigated under Ecology's Voluntary Cleanup Program (Figure 4).

2.3 Environmental Setting

This section describes the geologic and hydrogeologic information for the Site, along with general regional environmental features.

2.3.1 Physical and Hydrological Setting

The Site is located in the Green River Valley, situated between Seattle and Tacoma. The Green River originates on Mt. Rainier and flows generally northward in the Duwamish River which discharges to Elliott Bay in Seattle. The valley is approximately two miles wide and generally flat with higher glacial uplands defining the valley margins.

The Site is located at approximately 25 to 30 feet above mean sea level and is part of the Lower Mill Creek drainage basin as shown on the drainage system map for the area of Kent (Figure 5). This map includes stormwater detention facilities such as the North Stormwater Detention Pond (NDP) on the Site and similar detention ponds located south and northwest of the Site. Discharge areas and surface water bodies identified in the area surrounding the Site include:

- NDP (stormwater)
- City Stormwater Detention facility (immediately west and north of the NDP)
- Mill Creek and associated drainage ditch on 68th Avenue South

- The Green River

These areas are shown on Figures 1 and 5. The NDP is part of the Site's stormwater conveyance system. The drainage ditch connected to Mill Creek runs parallel and abuts the Site, receiving stormwater discharge from the Site, as well as from other stormwater discharges in the area. The Green River is located approximately 0.3 miles west of the Site. Mill Creek ultimately discharges to the Green River approximately 3.5 miles north of the Site via a tributary named Springbrook Creek.

2.3.2 Regional Studies

King County collected sediment samples in Mill Creek as part of its Lower Duwamish Waterway Source Control Report (King County, 2014). Samples were collected immediately upstream and downstream of the Site. Samples FS318 (upstream) and DT318 (downstream) contained Polychlorinated Biphenyls (PCB) sediment concentrations of 52 micrograms per kilogram (µg/kg) and 74 ug/kg, respectively and total polycyclic aromatic hydrocarbons (PAH) concentrations of 2,878 ug/kg and 5,117 ug/kg, respectively. The detected concentrations of both PCBs and PAHs in these samples are below the SMS sediment cleanup objectives (SCOs: 110 ug/kg for PCBs and 17,000 ug/kg for total PAHs) and the sediment cleanup screening levels (CSLs 2,500 ug/kg for PCBs and 30,000 ug/kg for total PAHs).

In 2005, Ecology conducted a study of zinc and copper concentrations in Lower Mill Creek based on the area being a heavily industrial area with many Industrial Stormwater General Permit (ISGP) holders discharging to the creek, and results of an earlier study conducted by King County in 2002-2003 that found that the Lower Mill Creek exhibited high fecal coliform bacteria, low dissolved oxygen, and high total nitrogen. The creek was assigned a Water Quality Index score of 1 in that study, where values under 40 are "of concern" and values above 80 are "likely meeting expectations for water quality" (Herrera, 2004). Specific results from the King County's Lower Mill Creek sampling location B317 showed:

- Temperature - 16.5 degrees C
- Dissolved Oxygen - 5.8 mg/L
- Alkalinity - 85.6 mg/L
- Turbidity - 13.1 NTU (during base flow) and 27.4 NTU (during storm flow)
- Median Total Suspended Solids - 6.6 mg/L (during base flow) and 31.5 mg/L (during storm flow)
- Hardness - 31.5 mg/L (during storm flow)
- Fecal coliform bacteria – 662 CFU/100 mL
- E. Coli Bacteria – 12,000 CFU/100 mL (during base flow)
- Total nitrogen - >1 mg/L

These results do not meet Surface Water Quality criteria under WAC 173-201A-200 that would be expected to support aquatic life, which specify minimum dissolved oxygen levels of 6.5 to 9.5 mg/L, amongst other criteria, nor do they meet recreational uses which specify fecal coliform levels of no more than 50-200 CFU/100 mL. This sampling location was less than one mile southeast on the portion of Mill Creek that flows past the Site as it continues north.

Ecology's later 2005 study of specific metals found levels of copper ranging from 0.67 to 14.1 µg/L and zinc ranging from 4 to 105 µg/L in surface water collected approximately 500 feet from the mouth of Mill Creek (Ecology, 2006).

As part of review of regional studies, a 44-acre area, approximately 3,000 feet to the south and southwest of the property was identified as being used by the City of Kent as sewage-treatment ponds from 1969 to 1973, depicted in (Figure 62). The ponds held up to 334 acre-feet of sewage water during operation. After 1973 regional sewage lines were installed but the sewage lagoons (ponds) were left in place (Ecology and Environment, 1991). The ponds were redeveloped as wetlands to restore habitat and improve stormwater quality prior to discharge to Mill Creek in the 1990s. At that time a Site Hazard Assessment summarized investigation of soil/sludge, surface water, and groundwater water that was found to contain low levels of PCBs and metals, including arsenic. Arsenic was detected as high as 73 ug/L in the lagoon surface water. The assessment stated water was expected to have leaked from the lagoons to groundwater (Ecology and Environment, 1991). Redevelopment included capping contaminated sediments as part of a Voluntary Cleanup. In 2007 Ecology issued a letter to the City of Kent stating it was removing the site from the Voluntary Cleanup Program due to inactivity (Ecology, 2007). The site remains on Ecology's list of cleanup sites (NW0092) with metals listed as contaminants confirmed in groundwater and surface water (Ecology, 2021d).

2.3.3 Geology

This section describes regional and Site geology.

2.3.3.1 Regional Geology

Regional geology was presented in the RI Work Plan and is summarized here (Landau, 2016). The Duwamish Valley is a north-south trending valley bounded on the west and east by glacial upland areas. The valley walls are relatively steep-sided and rise about 350 to 400 feet above the valley floor. The Duwamish/Green River Valley is part of a relict subglacial meltwater trough eroded during the retreat of the Puget lobe about 14,000 years ago (Dragovich et al. 1994). As the glacial ice retreated, meltwater streams issuing from the receding ice front laid down extensive deposits of stratified sand and gravel in the area. With the retreat of the glacial ice north of the Strait of Juan de Fuca, and rapid rise of sea level due to deglaciation, marine waters entered the Duwamish/Green River trough (Dragovich et al. 1994). During this time, the valley was being filled by marine, deltaic, and alluvial deposits from the ancestral Puyallup and Green rivers.

About 5,000 years ago, Mount Rainier erupted and a large volcanic mudflow, known as the Osceola Mudflow, swept down both the White River and Puyallup River valleys. The mudflow displaced the ancestral White River from its ancient channel northward to its present location near present-day Auburn, approximately 10 miles south of the Site. After the mudflow, rapid incision and erosion of the mudflow sediment within the White River Valley resulted in increased sediment loads and rapid delta formation. Where the White River joined the Duwamish/Green River trough, coarser-grained sediments were deposited in an alluvial fan that extended well out into the valley. The post-Osceola Mudflow river aggradation and delta progradation eventually filled the valley to near its present-day contours.

As the sediment load carried by the White River decreased, finer-grained deposits of silt, sandy silt, silty fine sand, and occasional layers of peat and organic silt were laid down by the White and Green rivers. The Green River sediments were finer-grained than the White River sediments and were dominated by finer overbank deposits of sands and silty sands. These deposits are characteristic of the current near-surface depositional environment in the valley.

Based on information obtained during previous environmental investigations, the Site is underlain by up to 10 feet of fill material underlain by alluvium. The fill generally consists of gravelly, silty sand and the alluvium generally consists of approximately 5 feet of clayey silt underlain by silty sand or sand with silt (Landau, 2002).

2.3.3.2 Site Geology

Additional geologic information was collected as part of the RI by visually logging borings conducted during the 2017 RI, other investigations performed since, and reviewing information from historical reports. Over 35 borings ranging in depth from 15 to 51 feet, were advanced since 2017, as shown in Figure 6. In addition, 12 monitoring wells were installed during the initial RI and subsequent investigations. Boring logs are included in Appendix B. Where available, historical boring logs were also reviewed. These have also been included in Appendix B for reference.

Visual logging performed during this RI revealed soils similar to those anticipated by the regional geology. Soils generally consisted of poorly graded sands and silts. Generally, the upper six to ten feet below grade was a poorly graded sand with some gravel and silt which is considered to be artificial fill brought in during construction of the Boeing Space Center. This observation is supported by the change in surface elevation from pre- and post-development topography (Landau, 2019b). Below the upper layer a silty sand and silt layer was frequently encountered, approximately two to four feet in thickness. It is thought that this silty sand and silt layer represents the original land surface. This silt layer was not continuous across all borings, and at some locations interbedded silts and sands were noted. Figure 7 shows the location of cross-sections A-A’, B-B’, and C-C’ which show soil lithology observed during this RI. The cross-sections are shown in Figures 8 and 9.

Deeper boring logs reviewed from historical Site investigations conducted on or neighboring the Site showed similar lithology. Fine to medium sands were consistently found near the surface grading to finer grained native silts and silty sands at greater depths. Approximately four of the Site boring logs reviewed extended to approximately 41 to 45 feet in depth. In addition, off-site logs were identified through Ecology’s well database (http://fortress.wa.gov/ecy/waterresources/map/WCLSWebMap) that included borings to a depth of 70 feet. These logs are included in Appendix B. The on-site and off-site deeper borings note similar geology with descriptions such as “unconsolidated sediments” and “silty sands and poorly-graded sands” from 0 to 60 feet below ground surface (bgs).

2.3.4 Hydrogeology

Regionally, the Puget Sound aquifer system is composed of unconsolidated alluvial, glacial, and interglacial sediments of Quaternary age (Vaccaro et al., 1998). This typically consists of alternating coarse- and fine-grained deposits serving as local aquifers and aquitards. The Green River valley is a glacially carved valley with infilled alluvial sediments.

In Western Washington, the glacial uplands are generally recharge areas where groundwater flows downward and towards the adjacent valleys. The valleys are generally groundwater discharge areas where groundwater discharges to surface water. Groundwater generally flows towards larger surface water features within these flow systems, such as the Green River. However, local minor surface water features can also influence shallow groundwater flow.

The near-surface groundwater at the Site is generally characterized as a shallow, single-aquifer system that is relatively flat (Landau, 2016). Historically shallow groundwater had been encountered between 7 and 11 feet bgs, which is generally consistent with the depths measured in monitoring wells as part of this RI, and the water table occurs at depths consistent with native soils.

Table 4 summarizes seasonal groundwater elevations measured at the 12 wells installed as part of this RI. All wells were surveyed to allow for translating measurements of depth to water to groundwater elevations. Survey data is included in Appendix C. Water levels were measured during wet and dry seasons in from 2017 through June 2021. Elevations measured during the wet season were 1.6 to 5.1 feet higher than during the dry season, depending on the area of the Site.

Groundwater elevation data were reviewed to determine groundwater flow patterns and rates at the Site. Figures 10 through 25 present the groundwater elevation data and flow direction for water level measurement events from May 2017 through June 2021. Groundwater flow was generally northward during these events.

As shown in the wet season groundwater elevation contour map and drainage map presented in Figures 26 through 28, groundwater flows towards the NDP and the City of Kent stormwater ponds, and towards the stormwater ditch on the east side of the Site along 68th Avenue South. In general, flow directions in the northern portion of the Site are more variable due to the influence of the City of Kent stormwater ponds and Boeing's NDP (Figures 29 through 31).

Groundwater flow rates have been calculated based on an assumed hydraulic conductivity of 1E-2 to 1E-3 cm/sec, consistent with the silty sands observed at the Site in shallow groundwater zone (Freeze & Cherry, 1979). Using the calculated average hydraulic gradients from May and September 2017, the linear velocities would range from 0.008 to 0.080 feet per day for May and 0.018 to 0.181 feet per day for September where:

$$V = Ki/n_e$$

Where: V= average linear velocity (feet/day)

K = hydraulic conductivity (feet/day)

i = hydraulic gradient (feet/feet)

n_e = effective porosity (fraction)

Calculations are summarized in Table 5. Actual flow paths are likely to be influenced by seasonal groundwater discharge to or from the ditch on 68th Avenue South and the NDP and City of Kent stormwater pond.

2.3.5 Geochemistry

The Green River valley where the Site is located was formerly a floodplain that received overbank flow from the river. The floodplain consisted of fine-grained sediments including silts and silty sands (see Section 2.3.3). These silts and silty sands contained high concentrations of organic matter present in the wetlands present in the floodplain. The valley was initially developed as agricultural farmlands as King County was growing in population.

The Kent Space Center was developed in the late 1960s, and the former farmlands were presumably covered with sandy artificial fill materials during construction to raise grades. Groundwater and soil samples indicate the Kent Space Center geochemistry is typical of the Green River Valley. Soil observations collected during the RI and other investigations indicate that the fill materials are sandier than the underlying siltier native soils.

Low flow groundwater samples were collected from 2017 to 2021 via direct push borings and groundwater monitoring wells. The field parameters measured included dissolved oxygen (DO), oxidation-reduction potential (ORP), turbidity, conductivity, temperature, and pH. Chemical parameters measured included nitrate, sulfate, and iron with additional parameters added in later years (total organic carbon was tested in 2018, with a suite of cations/anions tested in 2019 and 2020).

Results indicate groundwater onsite has a neutral pH, low conductivity, a DO of generally less than 1.0 mg/L, and a generally negative ORP. Field parameter results indicate the groundwater varies between slightly reducing and slightly oxidized conditions. Chemical analytical results are consistent with the field parameters, with nitrate, sulfate, and iron concentrations varying with the concentration of total organic carbon. Table 6 presents all of the general parameter readings collected during the RI. Dissolved metals were also measured in groundwater samples collected at the Site to better understand geochemical processes (Table 7).

These data indicate that the groundwater is consistent with what is to be expected of the regional geology and hydrogeology. Generally reducing conditions with some variability is typical of silty sands with limited bioavailable organic material at relatively shallow depths. Under these conditions, local recharge of oxygenated rain water or slightly higher amounts of organic material in the near vicinity of a well could lead to minor variations in general chemistry.

3.0 BACKGROUND AND ENVIRONMENTAL INVESTIGATION

Various environmental investigations and remedial actions have been historically conducted at the Site to characterize and evaluate soil, groundwater, soil gas, and stormwater conveyance system solids. Most of these were completed when old underground storage tanks (USTs) were removed or replaced, or when a portion of the Site was evaluated for potential property sale. These investigations were reviewed as part of developing the AO and RI Work Plan. Several additional investigations were performed in conjunction with the sale of a portion of the property and the demolition of several buildings since submittal of the draft RI in December 2017. These additional investigations are summarized in Section 3.2. A list of the primary historic environmental reports and communication is provided in Table 8. Figure 6 shows the location of soil and groundwater sample locations along with former and current groundwater monitoring wells. Figure 32 shows the locations of stormwater, stormwater solids, and surface water sampling locations.

3.1 Known and Suspected Releases

The AO established a number of Solid Waste Management Units (SWMUs) and Areas of Concern (AOC) that were the focus of this RI. Several additional areas were also identified in the RI Work Plan based on historical site use and past investigations. The known and suspected release areas are discussed below, along with historic and recent investigative work. The comprehensive results of investigations are presented in Section 7.0.

3.1.1 SWMU-88 and SWMU-89 (Building 18-43 Area)

SWMU-88 and SWMU-89 is the area of former USTs KS-25 and KS-26 in Building 18-43. The 1,000-gallon USTs were installed in 1977 and decommissioned in 1981 by removing the contents of the tanks, rinsing the interiors, and filling with sand (SAIC, 1991). While in use, the USTs were used to store microfiche process waste and therefore were presumed to contain arsenic, chromium, copper, lead, nickel, silver, and zinc. The RI Work Plan identified metals as the primary concern, however, during completion of the RI it was noted that microfiche film development primarily used silver compounds and/or diazonium salts to print images of facility drawings. There was no evidence of releases from these USTs.

No historical samples were collected at these SWMUs. Per the RI Work Plan, two soil borings (SB-1 and SB-2) were completed as part of this RI to a depth of 15 feet bgs. Two soil samples and two groundwater samples were collected and analyzed for metals. It should be noted that the groundwater samples were filtered for dissolved metals. Figure 33 shows the location of these borings. One additional soil sample (LAI4) was collected during the Due Diligence investigation performed by Landau in relation to partial property sale of the Site, west of the former microfiche area and analyzed for total metals.

Building 18-43 was demolished in September 2019 as part of preparation for sale for a portion of the property, making this area more accessible. Once the above ground structures were demolished, Boeing planned to remove the closed USTs, and collect additional information and data to support resolution of SWMUs 88/89 status for the RI. A Data Gaps Work Plan was sent to Ecology in August 2019 outlining additional work to be performed as a follow-up investigation (DOF, 2019a). On September 10, 2019, the demolition contractor notified Boeing that they had removed a large concrete structure, which was incorporated into the slab, while removing a column footing during demolition in the central-western portion of Building 18-43. DOF and Boeing were able to review the structure further and observed it was a timber-formed concrete vault consisting of two compartments. One side appeared to be a sump-like hollow area that had capacity of approximately 490 gallons. The other side of the structure was encased in concrete and revealed a stainless steel tank with a capacity of approximately 770 gallons.

The vault structure was approximately 11 feet long, six feet wide, and six feet tall/deep. The vault sidewalls were six to eight inches thick with only one perforation consisting of a three-inch diameter pipe exiting the top of the sump compartment (DOF, 2019b).

On September 12, 2019, DOF was on site to further document the structure removed, oversee excavation of where the tank was pulled from, and collect confirmation samples per the work plan. No obvious staining or odors were observed in the sidewalls or bottom of the excavation, nor were there any elevated photoionization detector readings. The soils encountered generally consisted of moist, brown, silty, sand with some gravel. In accordance with the work plan, one soil sample was collected from beneath the UST/vault along the bottom of the excavation and one sample on each sidewall of the excavation for a total of five samples. Figure 33 shows the approximate location of the soil excavation, the former vault location, and the soil confirmation sample locations from the base and sidewalls (DOF, 2019b). Results of this additional investigation were reported to Ecology on October 30, 2019 (DOF, 2019b) and are discussed in Section 7.1.1.

3.1.2 AOC-1 and AOC-3 (Building 18-54 Area)

AOC-1 and AOC-3 is the area of former USTs KS-5 and KS-6 on the west side of the Building 18-54. The 10,000-gallon carbon steel USTs contained fuel oil (Landau, 2016). Figure 34 shows sample locations at these two AOCs.

Soil samples were collected from this area in 1986 as part of UST removal. Those samples showed total petroleum hydrocarbon (TPH) concentrations in soil around the former UST as high as 11,000 parts per million (ppm), but the exact location of samples is not known (Landau, 2016). The RI Work Plan identified the potential contaminants of concern associated with AOC-1 and AOC-3 as diesel- and oil-range TPH. Media potentially impacted are soil and groundwater. Per the RI Work Plan, three soil borings (SB-3, SB-4, and SB-5) were completed as part of this RI to a depth of 15 feet bgs. Soil and groundwater samples were collected and analyzed for diesel- and oil-range hydrocarbons, and arsenic. Results are discussed in Section 7.1.2.

The depths of soil affected by the release would likely be restricted to the shallow depth of 9 to 12 feet in depth due the buoyancy of fuel oil. There are no estimates of the volume of the releases from these former USTs. The groundwater flow direction in the area of the former USTs would be to the north-northwest.

3.1.3 AOC-2 (Buildings 18-35 and 18-24 Area)

AOC-2 is the area of former UST KS-7 on the west side of former Buildings 18-35 and 18-24. This UST was an 840-gallon carbon steel tank. The tank was installed in 1965, removed (and replaced) in 1986, and subsequently removed in 2015. Diesel concentrations in soil were detected as high as 2,400 mg/kg during the 1986 removal and the extent of cleanup performed was not well documented. The RCRA Facility Assessment recommended additional soil sampling in this area (SAIC, 1991). While it was not well documented what fuel type(s) were stored in these tanks, it is likely that they served to fuel an emergency generator inside Building 18-35..

Several historical sampling events occurred in this area, as shown in Figure 35. Soil samples were collected in 1986 as part of UST removal, but the exact location of samples is not known. The replacement UST also called KS-7 was installed in 1988. This 850-gallon fiberglass tank was used to store diesel to fuel and emergency generator (Landau, 2016).

Soil samples were collected as part of the neighboring "Clearwater" property investigation in 2002-2003 (18-35-1 and 18-35-2). Figure 4 shows the Clearwater area. The Clearwater samples showed PCBs were detected at less than 1 ppm in the soil. Diesel and heavy oil were detected in several samples, but all were well below screening levels. Four groundwater samples were also collected as part of the Clearwater investigation (18-35-1 through 18-35-4). The Clearwater samples showed low level detections of benzene and vinyl chloride in groundwater, slightly above screening levels (Landau, 2003 and 2016).

Additional soil samples (S-1, S-2, and S-3) were collected in the area when the replacement UST was removed in 2015 (Landau, 2016). The tank was reportedly observed to be in good condition with no indication of leaks. Soil samples were collected from the sidewalls and bottom of the tank excavation (eight feet deep) and tested for diesel and oil range petroleum hydrocarbons, BTEX (benzene, toluene, ethylbenzene, and xylenes), and PAHs. Results of soil samples showed none of the compounds analyzed for were detected at concentrations greater than the laboratory reporting limits. Groundwater was not encountered (PBS, 2015). The 18-24 and 18-35 buildings were demolished in 2015. No additional potential sources of contamination were reported during demolition (DOF,2019). If there had been a release from the USTs, it is likely that the maximum depth of soil affected would extend to the water table, which was encountered at depths of 8.5 to 9.5 feet in depth during the RI sampling. There is no estimate of the volume of soil affected by the release from the older KS-7 UST.

Based on the use of the USTs, the RI Work Plan identified that potential contaminants of concern associated with AOC-2 are diesel- and oil-range TPH. Based on data from the 2015 UST removal report, no residual soil contamination was identified at the former UST location, but groundwater was not sampled (PBS 2015). Therefore, the potentially impacted medium is groundwater. In addition, the results of groundwater sampling and analysis near Buildings 18-24 and 18-35 for the Clearwater property indicated localized detections (locations 18-35-3 and 18-35-4) of the volatile organic compounds (VOCs) vinyl chloride and benzene. Therefore, groundwater samples collected from the AOC-2 area were also analyzed for vinyl chloride and benzene and the related analytes trichloroethene, *cis*-1,2-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, toluene, and xylenes. Three borings (SB-6, SB-7, and SB-8) were completed as part of this RI to a depth of 15 feet bgs.

Several additional temporary borings (LAI19, LAI37, LAI38, LAI39, and LAI40) were completed near former buildings 18-24 and 18-35 in late 2017 and mid-2018 as part of a due diligence property investigation (Landau, 2019b). Soil and groundwater samples were collected and analyzed for a VOCs at all locations and a broader suite of analytes at one location.

Based on due diligence property investigation results, this area was further investigated as part of a supplemental RI investigation in October 2018 that included multi-depth sampling to evaluate constituent concentrations variability in groundwater with depth. Samples were collected at three locations (SB-26, SB-27, and SB-28).

Results are discussed in Section 7.1.3.

3.1.4 Former Milling Machine Cooling Oil Release (Building 18-62 Area)

The former milling machine cooling oil release area is inside Building 18-62. Several historical sampling events occurred in this area, as shown in Figure 36. Investigations were conducted in 1995 and 2002, and a soil remediation project was performed to address diesel- and oil-range hydrocarbons in soil as an independent action in 2002 that led to a No Further Action (NFA) determination by Ecology for the area in 2003 (Landau, 2016).

Operations on the first floor of Building 18-62 included two profiler/milling machines formerly located in the north-central portion of the building (Figure 36). A leak associated with one of the machines resulted in a release of coolant to soil underlying the floor between the beds of the two adjacent profiling/milling machines. The coolant released was a two to six percent solution of 4000 Strong (Boeing MSD #68547), a mineral-oil based product (LAI, 2012). The “4000 Strong” mentioned in the RI Work Plan is Blasocut 4000 Strong cooling oil. A copy of the MSDS for Blasocut 4000 Strong is presented in Appendix D. Boeing conducted an initial soil investigation in the area of the leak and subsequently reported the release to Ecology on July 13, 1995. Based on an assessment that the release did not pose a potential threat to human health or the environment, health or the environment, further evaluation of the nature and extent was deferred until the machines were removed from the building (Landau, 2002a).

Operations at Building 18-62 were terminated, and the machines were removed from the building in early 2002. Remedial action conducted in 2002 removed soil containing concentrations of diesel-range, motor oil-range, and mineral oil-range TPH greater than the MTCA Method A soil cleanup levels. The remedial action included concrete removal, soil excavation, and disposal of soil with petroleum hydrocarbon concentrations greater than the applicable cleanup levels. The remedial action consisted of three phases of soil excavation, and approximately 458 tons of soil was excavated and disposed as solid waste at a non-hazardous landfill. Confirmation soil samples collected following the third phase of soil excavation indicated that the applicable cleanup levels were met at the limits of the remedial action area. The locations of the soil samples are shown on Figure 36.

Groundwater was not encountered beneath the building during the investigation or during the remedial action in the former milling machine area. Groundwater samples collected from monitoring wells located downgradient of the former milling machine area did not contain concentrations of diesel-range or motor oil-range TPH greater than the laboratory reporting limits, which were below the cleanup levels. The remedial action for the former milling machine area is documented in the Independent Remedial Action Report (Landau, 2002a). The remedial action report was submitted for Ecology review, and a No Further Action determination was subsequently issued by Ecology (2003a, b).

Based on the information in the Independent Remedial Action Report, no residual soil contamination is present within the former milling machine area. However, Ecology requested additional investigation of groundwater quality in the area of the former milling machines. The potential contaminants of concern for the former milling machine area are diesel-, oil-, and mineral oil-range TPH. The depth to groundwater was anticipated to be a between 7 and 11 feet bgs. Per the RI Work Plan, four borings (SB-

9, SB-10, SB-11, and SB-12) were completed as part of this RI to a depth of 15 feet bgs. Groundwater samples were collected and analyzed for diesel-range hydrocarbons, mineral oil, and arsenic.

The four borings were only sampled for groundwater based on the proposed scope-of-work described in the Ecology-approved RI Work Plan, and because soil sampling during removal of affected soils did not indicate any groundwater contamination associated with the release. The general direction of groundwater flow below Building 18-62 is to the north and north-northeast. The borings were advanced to 15 feet in depth as mineral oil is buoyant and would float on the water table if present.

One additional boring (SB-29) was completed in October 2018 immediately south of Building 18-62 near a due diligence sample location that showed low concentrations of vinyl chloride in groundwater (0.29 µg/L). Groundwater samples were collected at multiple depths at SB-29. Results are discussed in Section 7.1.4.

3.1.5 Former Jet Fuel USTs (Building 18-67 Area)

The former jet fuel USTs area is located west of Building 18-67. This area had seven USTs. Historical investigations were conducted in this area (Figure 37) including sampling in 1994, 1997, 1998, 1999, and 2001 as part of a Voluntary Cleanup Program remediation for petroleum and aromatic (BTEX) hydrocarbons that culminated in a NFA determination by Ecology in 2003. Soils within and around the tank cavity were overexcavated and groundwater was monitored quarterly surrounding the area for a year, after which the NFA was issued. The amount of jet fuel released is unknown (TetraTech, 1999). Jet Fuel is buoyant and so the maximum depth of affected soil is presumed to be near the water table.

Per the RI Work Plan, one boring (SB-13) was completed as part of this RI to a depth of 15 feet bgs to verify current conditions of groundwater quality in the area of the former UST. A groundwater sample was collected and analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), gasoline and diesel-range hydrocarbons, and arsenic, the potential contaminants of concern identified in the RI Work Plan for this area. The groundwater sample was collected from a screened direct-push probe from 8 to 12 feet in-depth. Results are discussed in Section 7.1.5.

3.1.6 Former UST KS-1 (Building 18-42 Area)

The former UST KS-1 area is located on the west side of Building 18-42. The UST contained diesel. Soil and water samples were historically collected from this area when the former UST was removed in 1993 (Figure 38). Initial soil samples collected were reported at a maximum concentration of 43,000 milligrams per kilograms [mg/kg] diesel. Additional soil was removed to bring the excavation to a maximum depth of 13 feet bgs (Landau, 2016).

Sampling at that time indicated low concentrations of diesel-range hydrocarbons (140 mg/kg) remained in soil after the tank removal and excavation, but groundwater was not further investigated. Diesel fuel is buoyant so it would be expected to extend only to the water table. The expected groundwater flow directions would be variable ranging from north-northeast to the northwest due to the influence of the City of Kent and NDP surface stormwater bodies on groundwater flow direction.

Per the RI Work Plan, three borings (SB-14, SB-15, and SB-16) were completed to a depth of 15 feet bgs as shown in Figure 38, to evaluate groundwater quality in the area of the former UST. The RI Work Plan identified the contaminant of concern for the former UST KS-1 area as diesel-range TPH. Groundwater samples were collected and analyzed for diesel-range hydrocarbons and arsenic. The water table was encountered just below 10 feet bgs and the screens extended to 15 feet bgs. None of the field observations suggested presence of soil contamination near the water table. Results are discussed in Section 7.1.6.

3.1.7 Former UST KS-3 (Building 18-41 Area)

The former UST KS-3 area was located near Building 18-41. The UST contained unleaded gasoline and had a capacity of 10,000 gallons. Soil samples were historically collected from this area when the former UST was removed in 1992 (Figure 39). During removal, approximately 10 to 15 cubic yards of gasoline affected soil was removed and disposed (Landau, 2016).

Sampling at that time indicated soil contamination had been removed but groundwater was not sampled. It is not known how deep the releases were, but gasoline is buoyant, and would float on the water table. The expected groundwater flow directions would be variable, ranging to the north-northeast to the northwest due to the influence of the City of Kent and NDP surface stormwater bodies on groundwater flow direction.

Per the RI Work Plan, four borings (SB-17, SB-18, SB-19, and SB-20) were completed as part of this RI to a depth of 15 feet bgs as shown in Figure 39 to evaluate groundwater quality in the area of the former UST. Groundwater samples were collected and analyzed for BTEX, gasoline-range hydrocarbons, and arsenic, the potential contaminants of concern identified for this area in the RI Work Plan. Results are discussed in Section 7.1.7. None of these four borings had field observations suggesting soil contamination. None of the deepest prior soil sample results exceeded the laboratory reporting limits (Landau, 2016) so no soil samples were conducted as part of the RI.

3.1.8 SWMU 86 (Stormwater System)

SWMU-86 is the Site stormwater conveyance system. The purpose of the storm water conveyance system is to route all stormwater from the facility roofs and parking lots to stormwater management areas, including the NDP, the eastern drainage channel, and Mill Creek. Stormwater is collected and conveyed to the NDP, or eastern drain ditch through outfalls. Stormwater at the operational areas of the Site either infiltrates into unpaved areas or is captured by the stormwater conveyance system and discharged to Mill Creek via the NDP located at the northwest corner of the Site, or via a series of detention ponds and outfalls along the eastern Site boundary (Landau, 2016). The KSC is covered by the Industrial Stormwater General Permit (ISGP) which was revised by Ecology on January 1, 2020 (permit number WAR-000481). Stormwater runoff at the KSC Site is monitored in accordance with the ISGP; however, Ecology requested that stormwater also be addressed in the RI.

The objective of the stormwater conveyance system sampling conducted under the RI was to confirm that the historical data that was summarized as part of developing the RI Work Plan was still representative of current system conditions (Ecology, 2016c).

In 2002, Boeing voluntarily analyzed catch basin solids for PCBs when the catch basins were cleaned out as part of routine maintenance required under the ISGP. In four of the 10 samples, PCBs were not detected above the laboratory reporting limits, which ranged from 6 µg/kg to 180 µg/kg. PCBs were detected in 5 of the 10 samples at concentrations ranging from 66 to 970 µg/kg; the PCB concentration in one sample was 1,400 µg/kg (Landau, 2016).

In 2010, the 54-inch-diameter culverts between the NDP and the outfalls at Mill Creek were cleaned (Figure 32). Each culvert is approximately 2,000 feet in length (Landau, 2016).

Solids sampling from the base of the NDP was conducted in 2011 by Boeing as part of construction and reconfiguration of the Site when several parcels were sold (Landau, 2011). Stormwater pond solids were tested for diesel- and heavy oil-range hydrocarbons, which were not detected, and for metals, which were generally low (Table 9).

The RI included sampling of stormwater and solids from four manholes and three outfalls (Figure 32). Additional investigation was completed after submission of the draft RI in 2017 to evaluate the influence of stormwater management features on groundwater. This work included installation of staff gauges in several stormwater discharge locations, additional rounds of water level elevation measurement and evaluation, review of stormwater management feature construction, and testing of groundwater immediately abutting the City of Kent and NDP stormwater management features (Figure 40). Groundwater samples were collected from four temporary well locations (NDP-1 through NDP-4) along the west and north side of the NDP and three temporary wells (SB-32, SB-33, and SB-34) on the south and east side of the NDP. In addition, four permanent wells were installed and sampled near the NDP (MW-8, MW-9, MW-10, and MW-12). Results are discussed in Section 7.1.8.

After the 2017 RI work was completed, Boeing sold a portion of the property and commenced construction on reconfiguration of the stormwater management system at the Site. The objective of the reconfiguration is to separate stormwater managed by the two different owners of the Site property. This work is currently underway.

The new components of the stormwater system are shown in Figure 41. Some parts of the older stormwater system have been adapted into this new system. One new biofiltration pond along with a filter media will serve the new system in addition to the NDP. The filter media is intended to treat the stormwater runoff to limit zinc concentrations in stormwater discharged to Mill Creek.

3.1.8.1 Facility Industrial Stormwater General Permit Requirements

A condition of the ISGP includes preparation of a stormwater pollution prevention plan or SWPPP. The current SWPPP is included in Appendix E. The May 2021 annual stormwater report was submitted to Ecology as required on May 15, 2021 (Boeing, 2021).

Under the ISGP, Boeing routinely samples stormwater for zinc, copper coliform, e. coli, diesel range TPH, and oil. Recent results are included in Table 10.

Of the various parameters monitored under the permit, there were two quarters in which there were exceedances of benchmarks in the 2020 reporting year. Zinc was reported at 139 mg/L and 161 mg/L in the second quarter and the third quarter of 2020 (respectively) at monitoring point 16.28. Zinc was also reported at monitoring point 20C at 155 mg/L during 2nd quarter 2020, and copper was reported at monitoring point 20C at 22.9 mg/L during second quarter 2020. Turbidity was reported at 85.4 mg/L and 39.7 mg/L during second quarter and fourth quarter (respectively) at outfall 20D. Boeing investigated the roofing materials on Buildings 18-61 and 18-62 and discovered exposed galvanized roofing materials. Boeing coated these materials, and has met the benchmark for zinc in subsequent quarters. Boeing investigated the construction activity occurring on the sale property and determined that there was some run-on of turbid water from those areas into outfall 20D. This issue was addressed, and the area has had no further turbidity exceedances.

Boeing also constructed a water quality pond (Pond A) in the south portion of the Site in the fourth quarter of 2020 as part of the divestiture/stormwater re-routing project. This pond began receiving stormwater in fourth quarter 2020 and is expected to ensure that stormwater discharges meet the ISGP benchmarks (Boeing, 2021).

3.1.9 Area-wide Arsenic

Area-wide arsenic concentrations in soil and groundwater were identified as a concern in the AO. Several historical investigations of arsenic were conducted at or near the Site prior to the AO between 2010 and 2012, including collection of 54 soil samples in 2010 and 2011, and an area wide evaluation of arsenic in 2012. These investigations did not identify a probable source of arsenic at the Site, showing variable concentrations in groundwater ranging from 3.3 to 115 micrograms per liter (µg/L) and low level soil concentrations generally below the MTCA Method A screening level of 20 mg/kg (Landau, 2016). Per the RI Work Plan, ten additional soil samples were collected as part of this RI for analysis of arsenic (SB-1 through SB-3 and at each monitoring well boring MW-1 through MW-7). Groundwater samples for arsenic were collected from monitoring wells and from borings across the Site as part of the RI Work Plan, RI data gaps investigation and Due Diligence assessment related to the partial sale of the property.

Boeing worked in cooperation with Ecology after the 2017 draft RI to further investigate and provide additional assessment of arsenic as part of revising the RI. Boeing collected additional samples, reviewed regional studies and nearby Site data, geochemistry, and historical use and potential influences at and near the Site. Boeing submitted a Technical Memorandum in 2021 (DOF, 2021a) to Ecology summarizing the results of various investigative activities and evaluation of regional and local arsenic conditions in soil, groundwater, and sediment/stormwater. That information is summarized in Section 7.2.5 of this report.

3.2 Additional Investigation Areas

In addition to investigating Corrective Actions SWMUs and AOCs under RCRA and identified in the AO and RI Work Plan, several additional investigations were performed after implementation of the RI Work Plan to address data gaps identified in cooperation with Ecology or in response to property sale and development work. These investigations are summarized below. Results are discussed in Section 7.2.

3.2.1 Property Sale Due Diligence and Preparation for Sale

In 2019, Landau prepared a Phase I and a Phase II ESA report for the Site, on behalf of Boeing real estate, in preparation for sale of a portion of the Site (Landau, 2019a and b). This work was conducted outside of the AO; however, the data have been included in this RI to provide a broader dataset and the reports were submitted to Ecology in 2019.

The investigation included collection of samples across the Site:

- 32 soil samples from 20 direct push borings tested for VOCs, SVOCs, TPH, and metals.

- 22 groundwater samples from temporary wells (borings) tested for VOCs, SVOCs, TPH, and metals.
- 7 groundwater samples from permanent groundwater wells tested for VOCs.
- 45 soil gas samples, including sub-slab vapor samples beneath existing buildings, tested for VOCs. Sampling soil vapor is a standard component of Boeing's due diligence Site assessment process and frequently used to evaluate the need for additional soil or groundwater sampling as well potential risks to existing or future buildings.
- 8 soil and sediment samples from current and proposed stormwater collection features (ponds/ditches) tested for PAHs, PCBs, and metals.

Figure 6 shows the location of Due Diligence soil and groundwater samples. Additional maps are included in Appendix F that show soil gas sample locations as well.

3.2.2 Building Demolition/Redevelopment Related Investigations

Boeing demolished several buildings in 2018 and 2019 as part of preparation for the sale of a portion of the property. Boeing and Ecology collaborated on several RI-related data collection efforts that arose as a result of demolition such as soil sampling near Buildings 18-25 and 18-28 and soil sampling near SWMU 88/89 under Building 18-43. This information was summarized in a memorandum to Ecology in October 2019 (DOF, 2019). The following buildings were demolished:

- Building 18-25 - Built in 1966 and is approximately 23,554 square feet. This is a one-story steel reinforced structure, concrete and brick exterior.
- Building 18-28 – Built in 1966 and is approximately 143,358 square feet. This is a two-story steel reinforced structure, with concrete and metal panel windows.
- Building 18-42 - Built in 1979 and is approximately 63,434 square feet. This is a one-story steel braced frame structure, concrete and insulated metal panel skin.
- Building 18-43 - Built in 1966 and is approximately 225,214 square feet. This is a one-story steel braced frame structure, concrete and insulated metal panel skin with steel roofing.
- Building 18-59 – Built in 1983 and is approximately 12,990 square feet. This is a one-story steel braced frame structure, with concrete and insulated metal panel skin.
- Building 18-67 - Built in 1981 and is approximately 8,530 square feet. This is one-story steel braced frame structure, concrete and insulated metal panel skin.

Boeing's Regulated Materials Management Team worked with NVL Laboratories to perform pre-construction sampling work that identified PCBs in select outdoor building materials and surface pavement caulking. This was identified as a potential source of low-level PCB concentrations detected during the RI (DOF, 2019).

Landau also conducted demolition soil monitoring in the area of Building 18-42 and 18-43 in 2019 in preparation for sale of a portion of the property (Landau, 2019c). Monitoring included a visual inventory of potential subsurface features prior to demolition of the building slab, completing environmental field screening of the exposed subgrade soil, laboratory analytical sampling (where warranted), and oversight of the removal of selected underground features. A summary of the monitoring and analytical results was provided to Ecology in a Technical Memorandum (Landau, 2019c).

3.2.2.1 Building 18-25 and Building 18-28 PCB Sampling

In 2019, building materials were sampled from several buildings at the Kent Space Center facility in preparation for demolition activities. The building materials sampling showed elevated levels of PCBs present in caulking material found on the exterior of Buildings 18-25 and 18-28 (Figure 43). In response to these results and site conditions surrounding these two buildings, shallow soil samples were collected adjacent to Buildings 18-25 and 18-28 prior to commencement of demolition activities that could disturb soil (DOF, 2019).

DOF conferred with Ecology to develop a sampling approach and on April 18, 2019, DOF collected ten shallow soil samples in the unpaved areas near the buildings. One discrete soil sample was collected at each side of Building 18-25 and six samples were collected around the perimeter of the larger Building 18-28.

The buildings were surrounded by an approximate five foot wide gravel strip with concrete curbing. A hand auger was used to collect soil samples at each sampling location from depths of approximately 0.2 to 1.5 feet below ground surface, immediately beneath the gravel landscaping. Sample collection methods followed those included in the RI Work Plan (Landau, 2016). The samples were analyzed for PCBs by EPA Method 8082 for Aroclors.

Composite samples were collected from 10 sublocations near Building 18-28 along the north, and northeastern sides of the building in response to reviewing the initial analytical results. These sub-samples were mixed and homogenized to form two composite samples.

Concentrations of PCBs were below the MTCA Method A industrial cleanup levels and reported to Ecology as part of the bimonthly status reports from July 2019 and September 2019.

3.2.2.2 Panattoni Pacific Gateway Redevelopment

A portion of the former Kent Space Center was sold to Panattoni/Pacific Gateway in late 2019. During redevelopment, several hydrocarbon releases were identified as shown in Figures 46 and 47.

The first release occurred in October 2020, when a truck and sideloader tipped over and spilled an estimated four gallons of diesel fuel and antifreeze into the soil in the future footprint of Pacific Center Building 1 according to a report that Panattoni submitted to Ecology concerning the spill (Vertex, 2020). A second contractor was brought on-site to excavate affected soil from an area measuring 26-feet long by 13-feet wide and 2-feet in depth. Soils from the spill area (40.61 tons) were excavated and removed and disposed at Columbia Ridge landfill. Soil confirmation samples were collected from each of the sidewalls, and two along the base and analyzed for diesel and oil range TPH, and glycols. Only the south sidewall sample contained oil range TPH at a maximum concentration of 544 mg/kg, and glycol at 534 mg/kg in concentration. These sample results suggest that the cleanup was completed in accordance with general practices (Vertex, 2020).

A second incident at the proposed Building 1 took place in November 2020 when 35 gallons of hydraulic fluid were spilled from a piece of equipment. Figure 46 shows the location of the excavation, and the soil confirmation soil samples. An area measuring 25-feet by 20-feet and 1-foot deep was excavated. Soils from the spill area (22.4 tons) were excavated, removed, and disposed at Columbia Ridge landfill. A total of nine soil confirmation samples were collected from the base, sidewalls, and stockpiles and analyzed by diesel range TPH. Oil range TPH was reported in all soil samples up to 1,030 mg/kg, below the MTCA Method A cleanup levels (Vertex, 2020b).

A third incident involving an asphalt paver occurred on December 11, 2020. The paver spilled approximately four gallons of motor oil and coolant to the ground. Soils from the spill area (262.81 tons) were excavated and removed and disposed at Columbia Ridge landfill (Vertex, 2021b). Confirmation samples were collected on December 16, 2020, and analyzed for diesel and oil range TPH. Three of the soil confirmation samples contained oil range TPH at 2,200 mg/Kg, 2,300 mg/kg, and 3,800 mg/kg. A total of 262.81 tons of soil were excavated and disposed (Vertex, 2021a).

During redevelopment of the Pacific Center Building 4, hydrocarbons were noted in the soil. A contractor hired by Panattoni completed an excavation measuring 15 feet by 15 feet and 4 feet in depth after a gasoline odor was identified (Figure 47). Per Panattoni's Soil Management Plan, the impacted soil was excavated and confirmation soil samples were collected from the excavation by Panattoni's contractor (Vertex). Confirmation samples were collected from the excavation and analyzed for VOCs, gas, diesel and oil range TPH. Results showed concentrations of these constituents were low or not detected above reporting limits. The highest concentrations were gasoline at 10.9 mg/kg and diesel range hydrocarbons at 10.5 mg/kg, well below MTCA Method A screening levels. The stockpiled soil that was removed from the excavation will be properly profiled for offsite disposal at Waste Management's Columbia Ridge solid waste landfill (Panattoni, 2020).

3.2.2.3 Water Line Cleanup Building 18-51

In February 2020, a contractor working on a water valve replacement on a large aboveground storage tank used to store water for fire control discovered soil impacted by what appeared to diesel fuel (Figure 48). The excavation was being completed to allow for replacement of a sub-grade valve used to route water to and from the tank. An initial round of soil samples were collected from the sidewalls and sent for analysis for diesel range TPH, SVOCs, and selected metals. The analytical results from these samples indicated that affected soils exceeding MTCA Method A industrial cleanup levels for diesel range TPH remained in the base and sidewall samples (DOF, 2020).

Additional excavation was performed in early March 2020, and a concrete slab was encountered at approximately 8-feet in depth. Once this slab was removed, native silts were encountered, and additional confirmation samples were collected from the base and sidewalls of the deepened excavation and analyzed for the same suite of analyses. Results were reported to Ecology as part of the May 2020 bimonthly report.

3.2.3 Building 18-63 Investigation

Based on due diligence property investigation results, this area was further investigated as part of a supplemental RI investigation in October 2018.

Building 18-63 (Figure 42) construction was completed in 1994 and wastewater treatment operations were transferred from Building 18-62 to Building 18-63 in the same year (Landau, 2019). The building consisted of five metal finishing tank lines on the south side of the building for aluminum, steel, and titanium parts, adjacent painting facilities, a non-destructive inspection unit, wastewater treatment plant, boiler room, and hazardous materials storage area. The building was constructed with a basement that served as a containment sump for the operations areas. The walls and flooring were sealed with an impervious coating resistant to the hazardous materials used at the facility, and the floors were sloped to a central collection area from which liquid could be pumped out to the wastewater treatment plant.

Operations in Building 18-63 used acid solutions, alkaline solutions, aqueous degreasers, solvents, paints, dye penetrant, oils, and cyanide solutions (DOF, 2020). Wastewater treatment plant operations ceased in 2002 and Building 18-63 was demolished in 2005 (Landau, 2019). Decommissioning records for the former tank line and wastewater treatment plant operations at Building 18-63 were not located by Boeing. The Landau 2019 Phase 2 ESA reported that records reviewed indicated that the underground area of the former building footprint was backfilled with concrete rubble (Landau, 2019b).

Groundwater sampling was conducted near the former Building 18-63 as part of the 2002-2003 Clearwater property investigations (Landau, 2002b, 2003). Two wells (BSC-18-63-01 and BSC-18-63-02) were sampled for diesel and oil range TPH, dissolved metals, and VOCs. No constituents were detected above screening levels. Figure 42 shows the location of sample locations in this area.

Several additional temporary borings were completed near former Building 18-63 in late 2017 and mid-2018 as part of the Due Diligence property investigation (Landau, 2019b). As described by Landau:

- Soil samples were collected at five locations (LAI13, LAI14, LAI31, LAI32, and LAI35). All samples were tested for VOCs, and a broader list was tested at several of the locations. Results showed generally minor detections of various compounds and did not identify any new sources of contamination in this area.
- Groundwater samples were collected at eight temporary wells (LAI13, LAI14, LAI16, LAI31, LAI32, LAI35, LAI36, and LAI44) for a broad list of analytes and the seven permanent monitoring wells at the site were sampled for VOCs. Concentrations were generally low, though TPH and several VOCs were detected in the sample from LAI14 at concentrations above screening levels.
- Soil gas samples were collected during several different periods of the year from nine locations in this area (LAI13, LAI14, LAI16, LAI30, LAI31, LAI32, LAI33, LAI35, and LAI36) and tested for VOCs. Several VOCs were detected including 1,3-butadiene, benzene, and chloroform, at levels slightly above Ecology's MTCA Method C Sub-Slab Soil Gas Screening Level.

The October 2018 additional RI investigation included multi-depth sampling to evaluate constituent concentrations variability in groundwater with depth. Groundwater samples were collected at three locations (SB-29, SB-30, and SB-31) shown on Figure 42. The groundwater samples were analyzed for diesel and oil range TPH, dissolved metals (arsenic, copper, nickel, and zinc), and VOCs. Results are discussed in Section 7.2.3.

3.2.4 Building 18-59 and Transformer Area

This area was investigated as supplemental RI work after the 2017 Draft RI Report. Building 18-59 (Figure 44) was constructed in 1983 and used for chemical and material receiving and storage, and accumulation area for hazardous waste (Landau, 2019). The building was the central receiving and distribution center for hazardous materials. At the north end of the building, there was a covered outdoor storage area consisting of storage bays and blind spill containment sumps (Landau, 2019).

The 1991 RCRA Facility Assessment (RFA) identified this area as the Boeing Kent complex's "main containerized waste staging area", used for storage of flammable, corrosive, acidic, and oxidizing waste. This RCRA interim status unit was installed in 1986. Secondary containment in the area consisted of six-inch concrete berms and blind sumps. A transformer area was located south of Building 18-59. There are no records of release in this area and the potential for risk of release was deemed to be low in the RFA (SAIC, 1991).

This area received a clean closure certification from Ecology in 1998 after completing an inventory and removal of waste materials, decontamination (steam-cleaning) of the concrete floor and containment sumps, and sampling of concrete and underlying soil. Metals (beryllium, arsenic, and nickel) and PCBs were detected in soil beneath the concrete slab at concentrations greater than the performance standards. The detected concentrations of metals were less than published background concentrations and the detected concentrations of PCBs were less than the MTCA Method A cleanup level. A clean closure certification was accepted by Ecology in October 1998. The building was demolished in 2019 and no additional potential sources of contamination were reported during demolition.

Landau completed four borings for soil and groundwater sample collection near Building 18-59 (LAI21, LAI22, LAI41, and LAI42) as part of Due Diligence investigation in late 2017 and mid-2018. In addition, two borings (SB-21 and SB-22) for soil and groundwater sample collection were drilled west and south of Building 18-59 as part of the RI and samples were also collected at three locations (SB-23, SB-24, and SB-25) north of the former transformer area. These sampling locations were identified in collaboration with Ecology based on their close proximity to stormwater lines, an electrical substation, and Building 18-59. Results are discussed in Section 7.2.4. The 1998 Closure Report for Building 18-59 Container Storage Area (TetraTech, 1998) identified PCB concentrations in soil as high as 500 ug/kg, but did not include any groundwater sampling.

3.2.5 Vapor Intrusion Evaluation

In order to complete the vapor intrusion screening for the purposes of the RI, Boeing, DOF, and Ecology reviewed the soil gas data collected as part of the due diligence sampling along with data from soils and groundwater in April 2019. Indoor air data within Building 18-62 was identified as an additional line of evidence necessary to complete the RI and more fully evaluate the risk to indoor air consistent with Ecology's current approach to vapor intrusion mitigation. Soil or groundwater affected with VOCs in the vicinity of Building 18-62 could impact soil gas concentrations near or under the building, driving a need for vapor intrusion (VI) assessment. Building 18-62 was identified as a concern by Ecology in an April 25, 2019 email to Boeing, primarily based on soil gas results from sample locations LAI30 and LAI31 (Figure 45) where 1,3-butadiene, benzene, and chloroform were detected at concentrations above MTCA Method C soil gas screening levels during at least one sampling event.

Two indoor air sampling events were conducted by DOF in 2020 in accordance with the Revised 2019 RI Data Gaps Work Plan – Building 18-62 Vapor Intrusion Evaluation (DOF, 2019). Results were summarized in a May 2020 Technical Memorandum (DOF, 2020) and Ecology provided a letter in response confirming "Based on the reported 2020 sampling results, vapor intrusion associated with soil gas contamination detected at and in the vicinity of DP location LAI-31 is unlikely to be unacceptably impacting indoor air quality within Building 18-62" (Ecology, 2020).

4.0 REMEDIAL INVESTIGATION METHODOLOGIES

This section describes the environmental data collected and used to prepare this RI. The work performed included sampling and analysis of soil, groundwater, air, stormwater conveyance system solids, sediment and stormwater associated with the SWMUs and AOCs that were identified in the AO as areas where further investigation was warranted, or areas identified through Due Diligence or when buildings were demolished prior to redevelopment.

The RI field work conducted over the past few years used a phased approach and methods, generally consistent with the RI Work Plan (Landau, 2016). Initial work included collection of soil and groundwater grab samples from each of the locations identified in the AO using direct-push drilling and sampling techniques. The first phase also included collection of samples of solids, sediments, and stormwater from the stormwater conveyance system at locations downstream of the SWMUs and AOCs identified in Section 3. The second phase of the RI included the installation of monitoring wells at selected locations throughout the site to allow for the sampling and analysis of groundwater, and to monitor seasonal groundwater flow directions and gradients. The most recent work involved completion of additional sampling to address data gaps identified in the draft RI and parallel investigation and environmental sampling performed as part of property sale due diligence and redevelopment.

These investigations were performed by DOF unless otherwise noted below, following the methods described in the RI Work Plan and associated Sampling and Analysis Plan (Landau, 2016) and subsequent RI Data Gap Work Plan documents as approved by Ecology. Tables 11, 12, and 13 summarizes the locations, dates, depths, and analysis of various samples collected and analyzed as part of the RI since 2017.

4.1 RI Soil and Temporary Boring Groundwater Data Collection

Borings were hand cleared by vactor truck or hand-augering prior to commencing drilling as a safety precaution. Drilling was completed using a track or truck-mounted direct-push drill rig. Soil was continuously collected for screening, logging, and sampling via two-inch diameter macro samplers with acrylic liner.

Soil samples collected for non-volatile parameters were homogenized using decontaminated or disposable equipment prior to transferring to laboratory-supplied containers. Soil samples collected for volatile parameters were collected in accordance with US Environmental Protection Agency Method 5035A.

Grab groundwater samples were collected using a groundwater sampler consisting of a four-feet long, wire-wrapped, stainless-steel screen (0.010-inch slot size) with a retractable protective steel sheath or a disposable Schedule 40 PVC casing with five-foot long screen (0.010-inch slot size). Groundwater samples were collected via low-flow purging with a peristaltic pump and disposable tubing. Samples for dissolved metals were field-filtered using a 0.45 micron, in-line disposable filter.

4.2 RI Groundwater Monitoring Well Installation, Soil Sampling, and Groundwater Monitoring

DOF completed soil sampling, groundwater monitoring well installation, and development using a hollow-stem auger rig. Soil was continuously collected for screening, logging, and sampling via split spoon samplers. Each monitoring well was constructed with two-inch diameter, flush-threaded, Schedule 40 PVC pipe, and a five-feet long, 0.010-inch slotted screen set to intersect the water table. Filter pack consisted of pre-washed, pre-sized 20/40 silica sand. Full construction detail is provided in the well construction logs included in Appendix B. Each well was developed following the protocol in the RI Work Plan (Landau, 2016).

DOF completed water level elevation measurements and groundwater sampling from 2017 through June 2021. Water level elevations were measured using an electronic water level indicator prior to well purging and sampling. Each well was sampled following low flow sampling techniques via a peristaltic pump and dedicated tubing, as detailed in the RI Work Plan (Landau, 2016). Groundwater samples were collected directly into laboratory containers as soon as groundwater parameters stabilized. Samples for dissolved metals were field-filtered using a 0.45 micron, in-line disposable filter.

4.3 RI Stormwater Conveyance System Sampling

DOF deployed sediment trap samplers in the four manholes (20.237, 20.235, 16.12, and 15.10) on December 15, 2016, in cooperation with Boeing and their confined-space contractor Stericycle. Sediment trap samplers were Ecology-style open mouth bottle traps and were constructed and positioned per the 2009 Ecology Standard Operating Procedures for inline sediment traps, with some minor changes. Changes were made to mounting hardware in order to facilitate inspection and checking of solids accumulation levels in the bottles. The sediment traps were not bolted into place in the stormwater pipe, but were instead mounted to a stainless steel adjustable rod that was docked on a mounting plate near the top of the manhole. This allowed for a single confined space entry during installation with no confined space necessary for monitoring of the bottles.

DOF monitored rain events during December 2016 and mobilized to collect water samples from outfalls and manholes, but sufficient flow was not observed during field events to allow for sample collection during December. DOF monitored rain events and returned to collect samples on January 18 and 20, 2017. All seven stormwater sample locations identified in the RI Work Plan were sampled and submitted to Analytical Resources Inc. (ARI) for analyses. All samples were collected using a swing sampler. An additional water sample was collected from the NDP in December 2020, as requested by Ecology following the same methodology.

DOF completed the required sediment sampling between May 4 and June 29, 2017. Sediment samples in the vicinity of outfall OF16 and the NDP were collected in May 2017. Because of difficulty with stream bed armoring, the sample in the vicinity of outfall OF20 was collected during a second attempt in June 2017. Samples were collected from the upper 10 centimeters of the sediment surface using a decontaminated stainless steel spoon or swing sampler.

Sediment traps were periodically checked over the course of 2017. During several inspections, the water level in the larger stormwater pipes (20.237 and 20.235) appeared to be at a level consistent with the creek water level, indicating back flow may occur at times. The RI Work Plan recommended pulling the traps for sample collection after six months; however, field checks showed very little accumulation in the trap samplers after the initial six months, so the traps were left in place to collect additional solids. DOF removed the sediment trap samples in December 2017 and sent available sample volumes to the analytical laboratory for analysis.

4.4 RI Indoor Air Sampling

Indoor air samples were collected at Building 18-62 to document whether soil vapors below the building posed an inhalation hazard. Work was performed in accordance with the Ecology approved Revised 2019 RI Data Gaps Work Plan – Building 18-62 Vapor Intrusion Evaluation (DOF, 2019).

A building evaluation was performed to determine potential sources of VOC contamination. The purpose of the building evaluation was to identify building construction characteristics, heating and ventilation systems, and sources of potential sources of VOCs in the building by visual observation and through use of a PID as a screening tool. Possible sources of sample contamination were sealed or removed from the building, if identified during screening.

Sample collection locations were evaluated to determine if any obstructions or hazards would prevent sample collection. Outdoor sources of potential contamination and weather were documented during sampling.

Time-integrated indoor and outdoor ambient air samples were collected during two separate events using six-liter Summa vacuum canisters. The Summa canisters were equipped with dedicated and lab certified flow regulators. Samples were collected over an eight-hour period. Therefore, flow rates of the flow regulators were adjusted to fill the canisters over an eight-hour period.

The Summa canisters were returned to the laboratory within 12 hours of sampling in the original shipping container. The samples were analyzed by Eurofins Laboratory in Folsom, California for analysis of volatile organic compounds using EPA Method TO-15.

4.5 Due Diligence Sampling

Due diligence sampling was conducted by Landau in support of property disposition. Soil, groundwater, and soil gas samples were collected in multiple mobilizations between November 2017 and July 2018 (Landau, 2019c). Results of the abundant due diligence sampling effort add clarity to the RI dataset. Generally, results confirmed low concentrations of constituents tested across the Site and solidify the site characterization developed to date.

4.5.1 Soil and Sediment Sampling

Up to two soil samples were collected from 20 direct-push borings, for a total of 32 soil samples as shown in Appendix F. Shallow soil samples were generally collected at depths ranging from 1 to 3 feet bgs and deeper samples were generally collected at the depth of the groundwater table at approximately 8 to 10 feet bgs. The soil samples were placed in laboratory-supplied jars and submitted toARIfor laboratory analysis for VOCs, semivolatile organic compounds (SVOCs), TPH, and RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Soil samples for VOC and gasoline range TPH analysis were collected using EPA Method 5035 (Landau, 2019)

Sediment samples were collected from the Boeing Ditch (BD1 and BD2) and soil samples were collected from the planned stormwater ponds Tract D pond (TD1 – TD3) and the Tract E pond (TE1 – TE3). The ditch sediment samples were collected using hand tools from a depth of 0 to 10 centimeters (0.3 feet) bgs. The pond soil samples were collected using direct-push drilling techniques; boring and sample depths varied by location based on the anticipated depth of excavation. Two additional pond explorations were originally proposed (located approximately between locations TD3 and TE1) but were not completed due to time constraints (Landau, 2019).

The soil and sediment samples from stormwater feature locations were placed in laboratory-supplied jars and submitted to ARIfor laboratory analysis for PAHs, PCBs, diesel and oil range TPH, and RCRA 8 metals plus copper and zinc. Surface soil samples (0.5 to 1.5 feet bgs) collected from the Tract D and E exploration locations were also analyzed for gasoline range TPH (Landau, 2019).

4.5.2 Groundwater Samples

Groundwater grab samples were collected from first-encountered groundwater using temporary well screens placed in 21 direct-push borings; repeat groundwater sampling was conducted at one location (LAI32) to confirm the initial results, therefore a total of 22 grab samples were collected. Groundwater sampling locations are shown in Appendix F. Groundwater was generally encountered at a depth of approximately 10 feet bgs and the screened interval for grab samples was approximately 10 to 15 feet bgs. Groundwater grab samples were collected using a peristaltic pump, placed directly into laboratory-supplied sample containers, and submitted to ARI for laboratory analysis for VOCs, SVOCs, TPH, and/or RCRA 8 metals (dissolved; field-filtered). Duplicate groundwater samples were collected from selected locations and the samples were analyzed for diesel and oil range TPH, both with and without silica gel cleanup (Landau, 2019).

Groundwater samples were also collected from seven existing monitoring wells (MW-1 through MW-7) to supplement data collected during the RI. Samples were collected using low-flow groundwater sampling procedures and analyzed for VOCs. The depth to water was measured using an electronic tape at each existing groundwater monitoring well to calculate groundwater elevations for use in determining groundwater flow direction (Landau, 2019).

4.5.3 Soil Gas Sampling

Soil gas samples were collected at 34 locations (Figure 45). Repeat sampling was completed at least once at the following locations: LAI13, LAI14, LAI19, LAI20, LAI23, LAI27, LAI31, and LAI32, for a total of 45 samples. In general, repeat sampling was completed to verify concentrations detected during a prior sampling event. Of the 34 soil gas sampling locations, 28 sampling locations were outdoors. At these locations, permanent soil gas sampling implants were installed at a depth of 5 feet bgs in borings advanced using a direct-push drill rig. The sampling locations were completed with a permanent, flush-mount well monument. The remaining nine sampling locations (LAI23 through LAI29, LAI41, and LAI42) were completed indoors. At these locations, a rotary hammer was used to core through the concrete floor slab and sampling implants were installed just below the concrete slab (Landau, 2019).

Soil gas samples were collected in one-liter Summa canisters fitted with flow controllers to collect the soil gas samples over a period of approximately 5 minutes (flow rate of 200 milliliters/minute). The soil gas samples were submitted to Eurofins Air Toxics, Inc. of Folsom, California (Air Toxics) for analysis for VOCs by Method TO-15 (Landau, 2019).

One ambient air sample was collected outside during each primary soil gas sampling event. The samples were collected to assess general air quality at the Site. The samples were collected from the approximate upwind direction at the time of sampling. The ambient air samples were collected in six-liter Summa canisters fitted with a flow controller to collect the air sample over an eight-hour period.

Using Teflon® tubing, the air intake was placed approximately five feet above ground surface to approximate the breathing height of an adult human. The ambient air samples were collected over a similar period as the soil gas samples. The air samples were submitted to Air Toxics for analysis for VOCs by Method TO-15 (Landau, 2019).

4.6 Data Quality Assessment

Tables 11, 12, and 13 list the samples collected as part of the RI. RI samples were collected following the field and analytical methods described in the RI Work Plan and associated Quality Assurance Project Plan (QAPP) (Landau, 2016), and subsequent sampling plans approved by Ecology. The majority of samples were analyzed by Boeing's contracted environmental laboratory, Eurofins Lancaster Laboratories in Lancaster, Pennsylvania. Select samples were analyzed by ARI . DOF worked with the lab to attain reporting limits below screening levels included in the RI Work Plan.

Once the laboratories produced reports and Electronic Data Deliverables (EDDs) for the data produced as part of the RI, the data were reviewed and validated, consistent with the QAPP by EcoChem, Inc. Analytical and data validation reports have been submitted to Ecology as part of bimonthly progress reports. All data produced as part of this RI has also been uploaded to Ecology's Electronic Information System (EIM), in accordance with the requirements of the AO.

All data were found to be usable with only minor qualification required, as discussed in individual data validation memoranda submitted to Ecology previously with the RI data. Data tables included in this RI include data validation flags where data has been qualified.

Data collected as part of the parallel property sale Due Diligence work by Landau was also used in development of the RI (see Section 3.2.1). Focused data validation was performed by Landau as part of that work and a data validation memoranda was included in the Phase II ESA report. While a work plan was not reviewed by Ecology prior to conducting that sampling, samples were analyzed by one of the same labs used in the RI (ARI) using analytical methods also used in the RI. The large amount of data collected are useful in informing the overall RI, similar to historically collected data prior to the AO.

5.0 CONCEPTUAL SITE MODEL

A preliminary site conceptual model (CSM) was presented in the RI Work Plan (Landau, 2016), based on previous investigations at and near the Site. Using the new information collected as part of this RI, the conceptual model was updated and is described below.

The CSM combines the hydrogeologic conceptual model with possible receptors and exposure pathways. Human and environmental receptors are based on land use and identified activities at and near the Site, and determines if a receptor has the potential to be exposed to contamination caused by site releases. If a potential likely exposure to contamination is present, a complete exposure pathway is assumed to exist. A potentially complete pathway exists when exposure to contamination is considered possible but unlikely. An incomplete exposure pathway exists when there is no possible exposure.

Separate pathways are evaluated in the CSM for human health and ecological receptors that may have exposure pathways linked to releases. A block diagram visually depicting the CSM is presented in Figure 49. The block diagram illustrates the potential sources of contamination, generalized hydrogeologic information, and constituent distribution and transport at the Site that was evaluated as part of this RI.

5.1 Sources

The primary potential sources of contamination at the Site are historical aerospace-related operations and leaks from USTs that have been removed, as discussed in Section 3.1. This RI also included investigation of the stormwater conveyance system as a potential source of contamination if hazardous substances leave the Site.

5.2 Local Land Use

The current and future use of the Site is industrial. Based on WAC 173-340-200, the Site is defined as "*industrial property*," meaning a property that has been characterized by, or is to be committed to, traditional industrial uses, and that is zoned for industrial use under land use planning under the Revised Code of Washington (RCW), Chapter 36.70A (Growth Management Act) or zoned for industrial use and adjacent to properties currently used or designated for industrial purposes. In addition, the following criteria established under WAC 173-340-745(1) for identification of an industrial property allow for establishing industrial soil cleanup standards for the Site if it is expected that the Site will remain in industrial land use for the foreseeable future:

- The primary potential exposure is to adult employees of businesses located on the industrial property.
- Access to the industrial property by the general public is not allowed or is highly limited and controlled.
- Food is not grown on the property.
- Operations are characterized by use and storage of chemicals, noise, odors, and truck traffic.
- The land surface is primarily covered by buildings, structures, and paving, minimizing potential exposure to the soil. Part of the Site is currently unimproved but the majority of the Site is covered.

- Support facilities on the Site, such as offices and other facilities, are primarily intended to serve the industrial operations and not the general public.
- If necessary, additional institutional controls will be established at the Site in accordance with WAC 173-340-440 to limit potential exposure to residual hazardous substances. These institutional controls shall include, at a minimum, placement of a covenant on the property restricting use of area impacted with hazardous substances to industrial property uses.

The Site is located within the City of Kent's designated manufacturing/industrial center. The City of Kent's Comprehensive Plan adopted implementing zoning regulations under the Growth Management Act (Chapter 36.60A. Revised Code of Washington), which designated a manufacturing/industrial center and discourages and limits land uses other than manufacturing, high technology, and warehousing within the boundaries of the center.

5.3 Groundwater Beneficial Use

The highest beneficial use of groundwater at the Site was evaluated to determine whether human or environmental receptors have the potential to be exposed to potential contaminants of concern (PCOCs) in groundwater. The designation of the highest beneficial use of groundwater in a particular area is established by several different agencies, including Ecology, the Washington State Department of Health, and county and city governments. The requirements, rules, and guidance of each of these agencies were considered in the determination of the highest beneficial use of groundwater.

Public records for wells identified in the vicinity of the Site were reviewed as part of this RI. King County's Groundwater Protection Program Groundwater Well Data Search (http://green2.kingcounty.gov/groundwater/well-data-search.aspx) website was used to identify wells near the Site. Wells found are shown on Figure 50 and available data is summarized in Table 14. Water level data was available for one of the wells, the deepest one (155 feet); while water quality data was not available for any of them in King County's database.

Data for the City of Kent water supply (Supply ID 38150) was reviewed using the Sentry database (https://fortress.wa.gov/doh/eh/portal/odw/si/findwatersystem.aspx) to review water quality data for Site PCOCs identified in the RI Work Plan. No Site PCOCs were listed as having shown an exceedance in the Sentry samples. While specific well locations are not provided, this database shows that no supply wells are located in the same Section/Township/Range as the Site. All wells are in Section 22N, Range 5E or 6E.

These database reviews confirmed:

- Water quality records are not readily available for any sampling recorded at the nearest water wells identified in this RI.
- Historical City of Kent Sentry water quality data do not indicate elevated concentrations of Site PCOCs.

The City of Kent does not allow the installation of private wells in areas serviced by a municipal water purveyor, which includes the Site area (Kent City Code Section 11.06.800.F). Land use records, zoning, and public well records indicate that groundwater at the Site is not a current source of drinking water.

While it is possible that groundwater could be utilized as a drinking water source, the practical considerations limiting such uses include the continued use of septic systems in the Green River Valley, and the use of land for agriculture, which can introduce nitrates and coliform bacteria into the shallow groundwater. Additionally, Section 12.24.010 of the King County Department of Public Health Code limits the locations where potable water wells may be constructed relative to various infrastructure. Potable water wells may not be constructed within 100 feet of infrastructure including public roads, sewers, and utility lines; which would also severely restrict locations of any potential wells on Site. So while groundwater consumption is a potential future pathway, both legal and practical considerations suggest this scenario is highly unlikely. In addition, portions of the property now have covenants restricting groundwater use, as described in Section 2.1, and additional areas may be restricted via deed restrictions in the future.

5.4 Transport and Exposure Mechanisms

The potential contaminant migration pathways and media of concern remain unchanged from those established in the RI Work Plan. Additional site investigation conducted under this RI confirmed that the Site is generally underlain by poorly graded sand with silt fill material, below which a finer grained silt or silty sand is found. Groundwater was typically encountered at depths between 6.5 and 12 feet bgs, and slightly deeper (14 feet bgs) beneath buildings. Stormwater runoff from the Site either discharges to Mill Creek via a series of outfalls or infiltrates into unpaved areas.

The **pathways** of potential concern at the Site, as shown in Figure 49 are:

- Leaching of potential soil contaminants from soil to groundwater.
- Possible discharge of shallow groundwater to nearby surface water bodies (NDP and Mill Creek) including infiltration of groundwater through stormwater conveyances.
- Potential volatilization of volatile contaminants in soil or groundwater to soil gas and air with migration into buildings.
- Transport of potential contaminants to surface water via the stormwater conveyance system.

Assessment of these pathways identified the **media** of potential concern to be soil, groundwater, air, stormwater conveyance system solids, and surface/stormwater, as was described in detail in the RI Work Plan (Landau, 2016).

Potential **receptors** include those that could contact the media of potential concern via the pathways. Based on current and anticipated future land use of the Site potential receptors are:

- Site workers – Current use of the Site is industrial, though commercial use could be considered in the future. Workers include construction and industrial working at the Site. Workers could contact contaminated soil in areas where the ground surface is not paved or otherwise covered, or could inhale contaminated soil particulates (or soil gas if working below ground on utility lines or inside buildings affected by vapor intrusion), or could contact contaminated groundwater (utility work, etc).

- Terrestrial ecological receptors (i.e., wildlife) – Most of the Site is paved or covered with buildings; however, undeveloped and vegetated areas are present on and neighboring the Site, as discussed below. Wildlife are considered potential receptors for the Site.
- Freshwater benthic and aquatic organisms – Based on the Site's proximity to Mill Creek, benthic organisms in sediment and aquatic organisms in Mill Creek are considered potential receptors if contaminants present at the Site migrate to the creek above screening levels. Ecological receptors could contact contaminated water or sediments, or feed on organisms directly contacting contaminants.
- Site visitors, while having potential exposures similar to workers, are not likely to be exposed to Site soils, groundwater, or volatilization to indoor air long enough to pose an issue.

Under MTCA, a terrestrial ecological evaluation (TEE) is required unless the Site is shown to be exempt under WAC 173-340-7491. The Site was assessed following the TEE procedures under WAC 173-340-7491 and- 7492. The Site does not qualify for an exemption to the TEE (based on undeveloped land on and near the Site) so a simplified TEE was performed under WAC 173-340-7492(2), as shown in Table 15.

Comparing the known soil concentrations of PCBs to the wildlife environmental indicator screening concentrations (EISC), none of the PCB soil results exceed 650 ug/kg which is the EISC table from the MTCA regulations (Table MTCA Table 749-3). The only other EISC applicable for the Site is for trivalent arsenic of 7 mg/kg. Arsenic concentrations in the soil exceed 7 mg/kg. As described in more detail in Section 7.2.5 arsenic in the soil at the Site is likely associated with aerial deposition from the ASARCO smelter plume and regional background. The highest arsenic soil concentration at the Site was an estimated concentration of 18.1 mg/kg which is below the 20 mg/kg concentration that Ecology estimated occurs at the Site due to the ASARCO plume and the average concentration at the Site is 4.4 mg/kg.

Based on scoring results, per WAC 173-340-7492(1)(d) the soil cleanup values in MTCA Table 749-2 still apply for screening of Site data. These values were incorporated in the screening levels used for the Site.

6.0 RI SCREENING LEVELS

This section outlines the screening levels used in this RI. Screening levels were established for affected media appropriate for the land use and relevant exposure pathways identified in the CSM.

The Site meets criteria established in WAC 173-340-200 and 173-340-745 for a site to be defined as an industrial property, as described in Section 5. Although there is a potential for the property to be used sometime in the future for residential use (and therefore residential exposure was considered in the CSM as a potentially complete exposure pathway), the property and surrounding industrial park are industrial and are expected to remain industrial or commercial for the foreseeable future, and institutional controls will be evaluated for inclusion as part of any cleanup action, to restrict use of affected areas of the property to industrial uses. Use of the property may also include non-residential "commercial" uses.

Screening levels must be protective of the pathways established in the CSM, including the following media exposure pathways:

- Groundwater – groundwater-to-surface water pathway;
- Groundwater – incidental ingestion and dermal contact by construction workers (that work below ground) of hazardous substances that are present in groundwater;
- Groundwater – inhalation by current or future site workers of volatile hazardous substances migrating to ambient or indoor air;
- Groundwater – direct contact by future human receptors using groundwater as a primary drinking water source;
- Soil – incidental ingestion or dermal contact by site construction workers (that work below ground) with hazardous substances that are present in subsurface soil;
- Soil – exposure by site workers through inhalation of hazardous substances that are present in surface soil that have migrated as windblown or fugitive dust during construction activities;
- Soil – inhalation by current or future site workers of volatile hazardous substances migrating to indoor or ambient air;
- Soil – contact by terrestrial wildlife with hazardous substances that are present in soil;
- Soil – groundwater pathway (protective of a groundwater level that accounts for all groundwater-related pathways including use as a drinking water supply);
- Soil – direct contact by current and future human receptors;
- Stormwater Conveyance System Solids – If contaminants at the site exceed screening levels and reach surface waters or sediments (e.g., through stormwater runoff), benthic organisms may be exposed to hazardous substances present in the biologically active zone of sediment or contaminated organisms may be ingested as prey, as well as incidental ingestion of contaminated sediment, by higher trophic-level organisms (e.g., foraging fish, aquatic birds, etc.); and

- Stormwater - If contaminants at the site exceed screening levels and reach surface water (e.g., through stormwater runoff), aquatic organisms may be exposed to hazardous substances in surface water, or aquatic organisms contaminated by hazardous substances may be ingested as prey by higher trophic-level organisms in the food chain (e.g., foraging fish, aquatic birds, marine mammals, etc.), or surface water and aquatic organisms contaminated by hazardous substances may be incidentally ingested by site workers.

PCOCs were identified in the RI Work Plan (Landau, 2016) based on the potential sources identified in the AO and those detected in historical sampling and remediation, as discussed in Section 3. Additional Site data have become available since the draft RI Report was submitted and has been used to screen for additional PCOCs. PCOCs evaluated as part of the RI are as follows:

- Metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc);
- Petroleum hydrocarbons;
- VOCs;
- SVOCs including PAHs and 1,4-dioxane; and
- PCBs.

The RI Work Plan (Landau, 2016) identified screening levels that were used in the RI Work Plan to screen existing data and to evaluate proposed reporting limits for analytical data collected during the RI. These screening levels were reviewed and updated where necessary, as described in the subsections below.

6.1 Soil Screening Levels

Soil screening levels developed in the RI Work Plan were based on MTCA Method B cleanup levels; however, given the industrial nature of the Site, MTCA Method C levels are appropriate, but do not change the screening levels for the Site. Soil screening levels developed in the RI Work Plan were reviewed and updated in this RI by determining the lower values between the following:

- MTCA Method C - Industrial Cleanup Level based on direct contact/ingestion obtained from the CLARC database website (Ecology, 2021).
- MTCA Method A Soil Cleanup Levels for Industrial Land Use (MTCA Table 745-1) for constituents with no available Method C cleanup levels.
- Soil cleanup levels protective of groundwater (Ecology, 2021). These are generally the driving criteria for the Site and protective of Method B groundwater.
- Levels protective of terrestrial ecological receptors (WAC 173-340-900 Table 749-2).

MTCA Method B – Residential Cleanup Level based on direct contact/ingestion obtained from the CLARC database website (Ecology, 2021) are included in the screening tables for reference as well.

Cleanup levels also include consideration of natural background concentrations in soil (WAC 173-340-709) and therefore RI screening levels were adjusted up where relevant. The RI soil screening levels are presented in Table 16.

6.2 Groundwater Screening Levels

Groundwater screening levels were developed in the RI Work Plan to be protective of drinking water and surface water. As discussed in Section 5 the Site is zoned industrial, groundwater at the Site is not a current source of drinking water.

Groundwater screening levels were developed in the RI Work Plan and reviewed and updated in this RI by determining the lower of the value between the following:

- MTCA groundwater table values obtained from the CLARC website (Ecology, 2021):
    - MTCA Method A levels for constituents that do not have a Method B level available; and
    - MTCA standard Method B levels based on drinking water, established by the Federal maximum contaminant levels (MCL) concentration unless this level is insufficiently protective.
- MTCA groundwater values protective of indoor air[1] obtained from the CLARC database (Ecology, 2021). Both the Method B and C groundwater vapor intrusion levels are used (the former – Method B – provide a comparison to concentrations protective of an unrestricted building use). These values were not initially included in the RI Work Plan screening levels but have been included for consideration in the RI.

In addition, surface water standards were considered as part of screening groundwater data in this RI based on the potential for groundwater from the Site to discharge to surface water, including consideration of:

- Surface water applicable or relevant and appropriate regulations (ARARs):
    - Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A) – Acute and Chronic effects, Aquatic Life, Freshwater;
    - National Recommended Water Quality Criteria (Clean Water Act §304) – Freshwater, Acute and Chronic effects, Aquatic Life and for the Protection of Human Health, Consumption of Water and Organisms and Consumption of Organisms Only; and
    - National Toxics Rule (40 Code of Federal Regulations 131) – Freshwater, Acute and Chronic effects, Aquatic Life, and Human Health, Consumption of Water and Organisms.
- MTCA Method B Surface Water levels, calculated using CLARC tables (levels are established by the ARAR concentration unless this level is insufficiently protective) (Ecology, 2017).

The RI groundwater screening levels are presented in Table 17.

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[1] Apply to VOCs and shallow groundwater.

6.3 Stormwater Conveyance System Screening Levels

The RI Work Plan (Landau, 2016) established screening levels for material sampled in relation to the stormwater conveyance system, for both solids and stormwater. These values were reviewed and updated in this RI.

As described in the Work Plan, there are no screening criteria under MTCA or Sediment Management Standards (SMS) for stormwater conveyance system solids. Given that stormwater at the Site discharges to Mill Creek the screening levels used to evaluate these stormwater conveyance system data in this RI provide conservative values to use in evaluating potential sources of contamination to Mill Creek. For solids, the levels were based on the SMS, WAC 173-240 (which MTCA references) and consider:

- Freshwater sediment cleanup objectives (SCOs; WAC 173-204-340), the concentration below which effects to biological resources are unlikely.
- Freshwater sediment cleanup screening levels (CSL; WAC 173-204-53), the concentration above which minor adverse biological effects may be expected.

Similarly, for stormwater data collected as part of the RI, the RI Work Plan proposed screening levels based on:

- MTCA Method B levels for fresh surface water, protective of aquatic organisms and human ingestion of water and aquatic organisms.

The stormwater conveyance system is subject to routine maintenance as required by the site Stormwater Pollution Prevention Plan, which includes catch basin and system-wide periodic cleaning, and water is monitored as part of the site ISGP permit for:

- Copper, zinc, coliform, E. Coli, diesel TPH, turbidity, pH and oil.

The ISGP benchmarks have been applied in screening stormwater data.

Tables 18 and 19 summarize the different stormwater conveyance system screening levels used to evaluate data in this RI.

6.3.1 Evaluation of Surface Water and Sediment

Under WAC 173-340-730 Surface Water Cleanup Standards "*Surface water cleanup levels shall be based on estimates of the highest beneficial use and the reasonable maximum exposure expected to occur under both current and potential future site use conditions. The classification and the highest beneficial use of a surface water body, determined in accordance with chapter 173-201A WAC, shall be used to establish the reasonable maximum exposure for that water body*." Therefore the status of Mill Creek was further evaluated as part of this RI to determine applicability of the surface water screening levels used in the RI Work Plan. This assessment is summarized in Section 2.3.2.

Groundwater screening levels protective of surface water were conservatively used to screen results of groundwater investigation performed as part of the RI to evaluate the potential for groundwater to impact nearby surface water or sediment.

7.0 NATURE AND EXTENT OF CONTAMINATION

This section presents and compares analytical results to screening levels and historical results to refine the list of COPCs and media of concern. The rationale and scope of investigation for each area was determined based on historical investigation, site use, and collaboration with Ecology on RI approach as discussed in Section 3. The results of this evaluation are also used to determine if data gaps exist or further action is warranted for the different areas of concern identified in the AO. Soil results are summarized in Tables 20a (metals), 20b (TPH), 20c (VOCs), 20d (SVOCs), and 20e (PCBs), sorted by each area of investigation. Groundwater results are summarized in Tables 21a (metals), 21b (TPH), 21c (VOCs), 21d (SVOCs), and 21e (PCBs), sorted by each area of investigation.

7.1 SWMUs and AOCs

Results are discussed by SWMU and area of concern or data gap investigation in the following subsections.

7.1.1 SWMU-88 and SWMU-89 (Building 18-43 Area)

Figure 33 shows the location of SWMU-88 and SWMU-89 and the soil and groundwater sample locations in this area.

7.1.1.1 Soil Results

Two soil samples were collected during the original RI sampling (SB-1 and SB-2), five soil samples collected during building demolition in September 2019 ("T1" samples), and Due Diligence investigation sampling (LAI4) was performed as shown in Figure 33. These soil samples were analyzed for metals likely to be associated with past use of these USTs or vaults that were subsequently identified.

As shown in Table 20a, none of the soil samples contained metals exceeding the screening levels in Table 16, or Ecology background concentrations for the Puget Sound, except for copper, arsenic, and silver. Arsenic was detected exceeding the Puget Sound background concentration of 7.3 mg/kg at a high of 9.52 mg/kg (LAI4). This value is still lower than the expected background concentration for this area of the ASARCO arsenic plume of 20 mg/kg and the Site average soil concentration is 4.4 mg/kg; see discussion in Section 7.2.5. Copper was detected slightly above the screening level based on the Puget Sound background level of 36 mg/kg at SB-1 (37.6 mg/kg) and SB-2 (42.7 mg/kg). However, these levels are well below the screening levels protective of all exposure pathways except groundwater and copper was not detected above screening levels at either SB-1 or SB-2 (Table 21a). Silver was detected above the screening level (0.027 mg/kg) at concentrations between 0.05 and 1.95 mg/kg. The screening level is driven by protection of groundwater; however, silver was not detected in groundwater in any samples collected as part of the RI or due diligence sampling at the Site.

7.1.1.2 Groundwater Results

Only two groundwater samples for dissolved metals were collected during the RI and Due Diligence investigation sampling (LAI4). Table 21a includes the groundwater sample analytical results for these data. Arsenic concentrations exceeded the screening level for arsenic with a maximum concentration of 193 µg/L. Please see Section 7.2.5 for additional discussion of arsenic concentrations in shallow groundwater.

7.1.1.3 Summary and Conclusions

Based on the soil and groundwater analytical results, there are no impacts to soil or groundwater based on the past use of this building in the production of microfiche. As discussed in Section 3.1.1 the two primary methods for producing microfiche involved the use of black and white photography using silver, and diazo printing which does not use metals. Arsenic is attributed to area wide concentrations in the Green River valley, as discussed in Section 7.2.5. No further action is necessary in regard to these two SWMUs.

7.1.2 AOC-1 and AOC-3 (Building 18-54 Area)

Figure 34 shows the location of AOC-1 and AOC-3 and the soil and groundwater sample locations in this area.

7.1.2.1 Soil Results

Three soil samples were collected during the original RI sampling (SB-3, SB-4, and SB-5) and analyzed for diesel and oil range TPH, and arsenic.

Neither diesel or oil range TPH were reported above the laboratory reporting limit for these analytes. Arsenic was reported at a concentration of 6.71 mg/kg in the sample from SB-3, below the Puget Sound background concentration for arsenic of 7.3 mg/kg.

7.1.2.2 Groundwater Results

Groundwater samples were collected from the three RI borings, SB-3, SB-4, and SB-5.

Neither diesel or oil range TPH were reported above the laboratory reporting limit for these analytes in the three groundwater samples. Arsenic was reported in the groundwater sample from SB-3 at a concentration of 51.1 µg/L, above the screening level.

7.1.2.3 Summary and Conclusions

Based on the soil and groundwater analytical results, no impacts to soil or groundwater were identified based on the past use of these USTs. The only metal present in groundwater is attributed to area wide arsenic contamination in the Green River valley, as discussed further in Section 7.2.5. No further action is necessary in regard to these two AOCs.

7.1.3 AOC-2 (Buildings 18-35 and 18-24 Area)

Figure 35 shows the location of AOC-2 and the soil and groundwater sample locations in this area.

7.1.3.1 Soil Results

Soil samples were collected in 1986 as part of UST removal in this area. Those samples showed TPH concentrations in soil around the former UST as high as 2,400 ppm, but the exact location of samples is not known. Additional soil samples (S-1, S-2, and S-3) were collected in the area when the replacement UST was removed in 2015 and no contaminants were detected in those samples (Landau, 2016).

Additional sampling was conducted in this area of the Site as part of the 2002-2003 Clearwater property investigations (Landau, 2002). PCBs were detected at less than 1 ppm in the soil sample 18-24-1 (994 ug/kg). Diesel and heavy oil were detected in several samples, but all were well below current RI screening levels.

Soil sampling was also performed in late 2017 and mid-2018 as part of a due diligence property investigation (Landau, 2019b). Results showed generally minor detections of various compounds and did not identify any new sources of contamination in this area.

No additional soil sampling was performed in this area as part of the RI.

7.1.3.1 Groundwater Results

Sampling was conducted in this area of the Site as part of the 2002-2003 Clearwater property investigations (Landau, 2002). That sampling detected vinyl chloride concentrations at a high of 2.2 µg/L (location 18-35-4), along with other minor VOC detections (Landau, 2003). There was no direct source identified for the minor VOC detections.

RI sampling conducted in January 2017 from three borings (SB-6, SB-7, and SB-8) detected vinyl chloride concentrations at a high of 0.19 µg/L (locations SB-6 and SB-8), along with a few other VOCs at concentrations below screening levels.

Groundwater samples were collected at one temporary well as part of the 2017 due diligence sampling (LAI19) for a broad list of analytes, which found TPH and the VOC 1,1-dichloroethene in the sample at concentrations above screening levels. Based on the due diligence property investigation results, this area was further investigated as part of a supplemental RI investigation in October 2018 and multiple groundwater depth intervals were sampled.

The 2018 data gaps investigation confirmed that concentrations of constituents of potential concern in this area do not increase with depth, and are generally bounded. Vinyl chloride (12 µg/L) was detected on the northern end of the former building 18-24 area at temporary boring SB-26, approximately 100 feet south of the NDP. This location was sampled at multiple depths that showed lower and non-detect results in the underlying depth intervals. Other VOCs were either very low or not detected in the Building 18-24 area.

Arsenic ranged from not detected to over 200 µg/L in samples collected in this area.

7.1.3.2 Summary and Conclusions

The recent soil and groundwater data did not change the conclusions about this area made in the draft RI or in the neighboring historical Clearwater evaluations. Recent concentrations are not indicative of an unidentified source of contamination. Values are low and decrease with depth, confirming the area where vinyl chloride is detected is small, and may be declining naturally as concentrations from the RI samples are an order of magnitude lower than detected during the historical Clearwater investigation.

Based on these groundwater analytical results, there are no impacts to soil or groundwater based on the past use of these USTs that warrant action. The arsenic present in groundwater is attributed to area wide arsenic contamination in the Green River valley, as discussed in Section 7.2.5.

7.1.4 Former Milling Machine Cooling Oil Release (Building 18-62 Area)

Figure 36 shows the location of Building 18-62 and the soil and groundwater sample locations in this area.

7.1.4.1 Soil Results

Investigations were historically conducted in 1995 and 2002 in this area, and a soil remediation project was performed to address diesel- and oil-range hydrocarbons in soil as an independent action in 2002 that led to a NFA determination by Ecology for the area in in 2003 (Landau, 2016). Remedial action removed soil containing concentrations of diesel-range, motor oil-range, and mineral oil-range TPH greater than the MTCA Method A soil cleanup levels.

7.1.4.2 Groundwater Results

Four borings were sampled surrounding the former location of the milling machines as part of the RI, SB-9, SB-10, SB-11, and SB-12 as shown in Figure 36. Diesel and oil range TPH were detected in groundwater samples from below the reporting limit to a maximum estimated concentration of 0.29 mg/L, below the screening level of 0.5 mg/L. Historical data showed similar low level or non-detect values for TPH in the area of the area of Building 18-62.

Dissolved arsenic was found in a groundwater sample from SB-12 at concentration of 266 µg/L. Additional groundwater sampling was conducted immediately south of the former milling machines area as part of 2018 data gaps sampling (SB-29) and 2017-2018 due diligence sampling. SB-29 showed an elevated level of arsenic as high as 229 µg/L in the shallowest groundwater, but was sampled at three additional depth intervals that showed concentrations declining with depth, to 8.2 µg/L in the 37-41 feet bgs sample interval.

7.1.4.4 Summary and Conclusions

Based on these groundwater analytical results, there are no impacts to groundwater based on the past releases from the operation of these milling machines. Past soil samples collected prior to the RI showed that past releases from milling operations were successfully remediated (Ecology, 2003a and 2003b). The arsenic present in groundwater is attributed to area wide arsenic contamination in the Green River valley, as described in Section 7.2.5. No further action is necessary in regard to this AOC.

7.1.5 Former Jet Fuel UST Area (Building 18-67 Area)

Figure 37 shows the location of AOC-2 and the soil and groundwater sample locations in this area.

7.1.5.1 Soil Results

Historical investigations were conducted in this area as part of a Voluntary Cleanup Program remediation for petroleum and aromatic (BTEX) hydrocarbons that culminated in a NFA determination by Ecology in 2003 (Ecology, 2003).

7.1.5.2 Groundwater Results

A groundwater sample was collected as part of the RI (SB-13), adjacent to the former locations of the jet fuel USTs that were installed just west of the former location of Building 18-67. The sample did not contain concentrations of TPH above laboratory reporting limits. Dissolved arsenic was reported in the groundwater sample at 16.7 µg/L.

7.1.5.3 Summary and Conclusions

Based on these groundwater analytical results, there are no impacts to groundwater based on the past releases from the historic use of these USTs. Past soil samples collected prior to the RI showed that any past releases were successfully remediated (Ecology, 2003). The arsenic present in groundwater is attributed to area wide arsenic contamination in the Green River valley, as described in Section 7.2.5. No further action is necessary in regard to this area.

7.1.6 Former UST KS-1 (Building 18-42 Area)

Figure 38 shows the location of former UST KS-1 and sampling locations in this area.

7.1.6.1 Soil Results

Soil samples were historically collected from this area when the former UST was removed and soil excavated in 1993. Sampling at that time indicated low concentrations of diesel-range hydrocarbons (140 mg/kg) remained in soil after the tank removal and excavation, but groundwater was not further investigated.

7.1.6.2 Groundwater Results

Three borings were located around the former location of the KS-1 UST as part of the RI. Diesel range TPH was detected at low concentrations in all three groundwater samples at concentrations ranging from 0.25 mg/L to 0.42 mg/L, which are below the screening level of 0.5 mg/L.

Dissolved arsenic was detected in the groundwater sample from SB-14 at a concentration of 105 μg/L.

7.1.6.3 Summary and Conclusions

Based on these groundwater analytical results, there are no impacts to groundwater based on the past releases from the historic use of this UST. Past soil samples collected prior to the RI showed that any past releases were successfully remediated (Landau, 2016). The arsenic present in groundwater is attributed to area wide arsenic contamination in the Green River valley, as discussed in Section 7.2.5. No further action is necessary in regard to this area.

7.1.7 Former KS-3 UST Area (Building 18-41 Area)

Figure 39 shows the location of former UST KS-3 and the groundwater sampling locations in this area.

7.1.8.1 Soil Results

Soil samples were historically collected from this area when the former UST and surrounding soils were removed in 1992. Sampling at that time indicated soil contamination had been removed (Landau, 2016).

7.1.8.2 Groundwater Results

Four borings (SB-17, SB-18, SB-19, and SB-20) for groundwater sampling were completed in this area as part of this RI. Toluene was the only aromatic hydrocarbon detected in a single sample from SB-19 at a concentration of 0.8 μg/L, below the screening level of 2 μg/L. All other BTEX components were below the laboratory reporting limit. Gasoline range TPH was not detected above the laboratory reporting limit in any of the four samples. Arsenic was reported in the groundwater sample from SB-17 as below the laboratory reporting limit.

7.1.7.3 Summary and Conclusions

Based on these groundwater analytical results, there are no impacts to groundwater based on the past releases from the historic use of this UST. Soil samples collected prior to the RI showed that any past releases were successfully remediated (Landau, 2016). No further action is necessary in regard to this area.

7.1.8 SWMU 86 (Stormwater Conveyance System)

Figure 32 shows the former layout of the stormwater conveyance system at the Site prior to sale of a portion of the Site and reconfiguration of the stormwater conveyance system. Stormwater conveyance system sampling conducted under the RI was intended to confirm that the historical data that was summarized as part of developing the RI Work Plan was still representative of current system conditions (Ecology, 2016c). Therefore, sampling included stormwater and solids from four manholes and three outfalls, and subsequent evaluation of the primary stormwater detention pond onsite in the northwest corner (NDP).

7.1.8.1 Stormwater Solids Results

Sediment trap samplers placed in Manholes 20.237, 20.235, 16.12, and 15.10 were in place nearly one full year in 2017 (Figure 32). Traps were installed and positioned per Ecology guidance and regularly checked to ensure positioning was correct for capture of sediment during storm events. Over the year, the trap samplers captured a very small volume of solids, consistent with the general visual observations of site conditions made over the year during inspections, which indicate limited volume of solids is contributed to stormwater from the Site runoff in the stormwater conveyance system.

Sediment trap samplers were removed in December 2017 and the solids contents submitted to the laboratory for analysis. At the time of sample collection, the samples all showed at least a measurable amount of accumulation in the bottles, and more than observed during previous sampler checks during the past year. The laboratory reported that the volume was sufficient to allow for the following analyses (prioritized based on the RI Work Plan criteria):

- Manhole 20.237M - PCBs, Metals, PAHs, and TPH;
- Manhole 20.235M - PCBs;
- Manhole 16.12M - No analyses; and,
- Manhole 15.10M - PCBs, Metals, PAHs, and TPH.

Stormwater conveyance system solids were also sampled at three locations at the Site (Outfall 20/20B, Outfall 16, and the NDP). Results of stormwater conveyance system sampling from the manholes and from the three outfall locations (Outfall 20/20B, Outfall 16, and the NDP) are shown in Table 9.

TPH as diesel was detected slightly above the diesel screening level in two of the three sediment trap samples. TPH as both diesel and oil were only detected at low levels, below the screening levels, at the outfall solids sampling locations. PAHs were detected at low levels in the solids samples, but below screening levels and at least an order of magnitude below concentrations detected in Mill Creek by King County in 2014 (King County, 2014).

PCBs were detected in each sediment trap solids sample at concentrations ranging from 206.8 ug/kg to 1977 ug/kg. These concentrations are similar to the levels detected prior to cleaning of the stormwater conveyance system in 2002. PCBs were also detected in the solids sample collected from the NDP (189.5 ug/kg). Notably, PCBs were not detected in either of the solids samples collected from the two outfalls leading offsite (OF-20 and OF-16).

Similar to PCBs, metals concentrations were higher in the solids samples from sediment traps samples than in the outfall location samples. All metals results from the two outfall solids samples (OF-20 and OF-16) were below screening levels. The highest concentrations were detected in the sediment trap solids sample collected from Manhole 20.237M, upstream of Outfall OF-20. Several metals were above screening levels in the stormwater samples, but all were well below the Washington ISGP benchmark values.

7.1.8.2 Stormwater Results

Results of stormwater sampled at four manholes (MH 20.235, MH 20.237, MH 16.12, and MH 15.10) and three outfalls at the Site (Outfall 20/20B, Outfall 16, and in the NDP) are shown in Table 22. An additional sample was collected from the NDP in 2020 to confirm current conditions. These data show that results are consistent with those anticipated by earlier studies, conditions expected at an industrial site operating under an IGSP, and meet industrial stormwater benchmarks, where applicable. Specifically:

- Petroleum hydrocarbons were not detected.
- VOCs were not detected except for low level detections of acetone, chloromethane, and methylene chloride, well below screening levels.
- SVOCs were not detected except for low level detections of naphthalene, phenanthrene, pyrene, fluoranthene, and chrysene, well below screening levels.
- PCBs were only detected in one sample, from MH 20.235, at 0.012 µg/L. This location is downstream of the NDP where there was a detection of PCBs in the solids sample collected as part of the RI. PCBs were not detected in the stormwater sample collected at the Outfall 20, downstream of MH 20.235, nor in the solids sample collected at Outfall 20, nor in the stormwater samples collected in the NDP in 2017 and 2020.
- No metals were detected above the industrial stormwater benchmarks or surface water based screening levels except for arsenic, as shown in Table 22.

7.1.8.3 Additional Evaluation – North Detention Pond

The NDP is located at the downgradient end of the Site on Boeing’s property. The NDP is part of the Site stormwater system (SWMU-86) and appears to act as a detention pond, and a source of groundwater discharge depending on the season. The NDP is influenced by changes in surface water elevation in the nearby City of Kent’s North and South Stormwater Ponds. While not interconnected by piping, all three ponds can discharge to Mill Creek during periods of high water. This area was further evaluated after the draft RI as part of Data Gaps investigation.

Figure 26 is a plan view map of the stormwater drainage to Mill Creek and the areas that contribute input to the ponds. Figure 27 and 28 are water table maps illustrating the influence of the general geology near the NDP and the influence of the stormwater ponds on local groundwater flow directions in the north of the Site during a dry and a wet season elevation measurement event. Figure 29 shows the location of a cross-section drawn to show the relationship between these ponds, and discharges to Mill Creek. Figures 30 and 31 are cross-sections drawn to demonstrate seasonal flow differences. Figure

40 shows the location of the direct-push groundwater sample locations, and nearby groundwater wells near the NDP.

Groundwater grab samples were collected from direct-push borings in June and December of 2020 near the NDP and two groundwater monitoring wells were installed on the berm separating the NDP from the City of Kent's South stormwater pond in 2021.

Hydrology

Figures 30 and 31 show the relative difference between dry and wet season groundwater and stormwater flows. In the dry season all the stormwater ponds would be static as the water levels would be below the invert elevations of their respective outflow points. The majority of groundwater flow would likely bypass the ponds and follow the regional groundwater flow to the north.

During periods of higher rainfall during the wet season, both the City of Kent's stormwater ponds and NDP are expected to have high water levels, with discharge to Mill Creek through their respective outflow points. Flow restrictors at the outflow points regulate the discharge of stormwater to Mill Creek to the east of the Site. During these high periods of stormwater elevation, surface water in the City ponds would infiltrate shallow groundwater causing discharge of groundwater to the NDP as reflected in the measured water elevations shown in Figure 28 and conceptually shown in Figure 31. The catchment areas of the City of Kent's stormwater ponds are larger than the current catchment area of the NDP which means that the relative elevation of the City ponds are higher than the NDP elevation. This was observed during the wet season water level measurements recorded in the latter months of 2020.

North Stormwater Detention Pond Groundwater Results

Tables 21a through 21e include the groundwater analytical results associated with the four NDP direct-push sample locations (NDP 1-4), three borings conducted along the south and east side of the NDP (SB-32, SB-33, and SB-34), and two new monitoring wells (MW-11 and MW-12).

Neither diesel nor oil range TPH were detected above screening levels.

Dissolved arsenic was detected in groundwater grab samples from the direct-push NDP borings with concentrations below the reporting limit to as high as 223 µg/L (NDP-4). Arsenic concentrations at the newly installed monitoring wells MW-11 and MW-12 were lower, 70.8 and 9.31 µg/L, respectively, in samples collected in June 2021.

The VOC vinyl chloride was detected above the screening level (0.029 µg/L) at several of the direct push sample locations with low concentrations ranging between <0.02 and 0.54 µg/L. The highest detection was in the shallowest sample collected at SB-33, where it was an order of magnitude lower in concentration in the sample interval 10 feet deeper.

SVOCs were not detected above screening levels.

PCBs as Aroclors were reported in direct-push groundwater samples from NDP-2 and NDP-4 at a maximum total concentration of 0.042 µg/L in the groundwater sample from NDP-2. However, PCBs were not detected above the reporting limit in samples collected from the subsequently installed groundwater monitoring wells MW-11 and MW-12 in June 2021. Groundwater monitoring wells are constructed and designed with filter-packed sand to minimize turbidity in the groundwater samples collected from the well. Direct push detections were so low it was anticipated that sample results at permanent wells would likely be non-detect. PCBs were not detected in the groundwater samples collected from the groundwater monitoring wells, including MW-11 and MW-12 which were installed at the approximate location of direct-push borings NDP-2 and NDP-4.

7.1.8.4 Conclusions and Summary

The data collected as part of the RI are generally consistent with regional and historical data, and with what might be expected for a similar industrial site that is well maintained with underutilized parking and traffic. Results of the sediment trap samples do not change this conclusion. While PCBs and metals were detected in the solids samples onsite above the RI screening levels, the solids, stormwater, and adjacent groundwater sampling results do not indicate that concentrations or volumes present are transporting hazardous substances offsite or impacting soil or groundwater quality at the Site.

The low accumulation in sediment traps over the course of a full year provide evidence that the Site has low solids loading that would potentially contribute to contamination in downstream surface water bodies. Concentrations detected in stormwater samples discharging from the Site are generally low and meeting ISGP stormwater benchmarks. While the stormwater sample results did not meet surface water based screening levels in all cases, the results do not indicate an unknown source of contamination atypical of industrial stormwater. In addition, the Lower Mill Creek surface water body that the Site discharges to has been assessed for quality in historical studies that have shown that the water would not meet Surface Water Quality standards for Washington, as discussed above in Section 2.3.2. Therefore, no additional action is warranted to address surface water quality.

Potential sources of PCBs, metals, oils, and sediment that might get into the stormwater conveyance system are building materials, landscaping, and vehicular traffic onsite. No significant industrial operations currently occur outside the buildings onsite. The majority of the Site is impervious (buildings, paving, concrete) with some areas of landscaping or grass covered lots. The majority of buildings are steel which may have zinc oxide paints on siding and roofs. The majority of parking onsite is administrative, with some delivery vehicles and outdoor forklift traffic. Additionally, some areas of the Site are subleased for commercial parking of vehicles. Most of the Site is enclosed by chain link fence, a potential source of zinc. Traffic is relatively low compared to other industrial facilities and parking is underutilized. Sediment buildup and oil leaks from the current use are expected to be low.

A potential source of PCBs was identified in the building materials from several buildings that were abated and demolished, as discussed in Section 7.2.2. This potential source material was removed and the stormwater system is currently being reconfigured for the revised property layout and use.

There is no indication of a known or suspected release of PCBs from manufacturing or processing areas at the Site. Other low-level sources of PCBs that have shown to be generally prevalent and challenging to eliminate in Washington include de-icers and paints used on roads on public and private property. Several studies have been conducted in Washington to evaluate these types of background levels and sources including:

- Seattle Public Utilities published a study in 2009 that showed PCBs were prevalent in street sweeping solids collected throughout the City, particularly in industrial neighborhoods where the study found PCBs in 87% of samples collected at concentrations ranging from 34 to 910 µg/kg and over 1 ppm in one sample (SPU and Herrera, 2009).

- The City of Spokane published a study in 2015 summarizing results of testing nearly 50 samples of municipal products for PCBs (City of Spokane, 2015). PCBs were detected in all but two of the products that were sampled in the parts per trillion to ppm range.
- Ecology published a similar study in 2016 that evaluated the presence of PCBs in 201 consumer products (in 216 total samples). Three samples contained total PCBs over one ppm, 10 samples contained PCBs over 0.1 ppm, and 156 samples contained PCBs over 0.001 ppm (1 part per billion) (Ecology, 2016d).

7.2 Additional Investigation Areas

In addition to investigating Corrective Actions SWMUs and AOCs under RCRA and identified in the AO and RI Work Plan, several additional investigations were performed after implementation of the RI Work Plan to address data gaps identified in cooperation with Ecology or in response to property sale and development work. Evaluations of these areas are summarized below.

7.2.1 Property Sale Due Diligence and Preparation for Sale

Between 2017 and 2019, Landau provided support to Boeing Real Estate in the form of due diligence Phase II ESA investigation and soil monitoring during demolition of buildings in preparation for partial property sale. This work was conducted outside of the AO; however, the data have been included in this RI to provide a broader dataset. The reports were submitted to Ecology in 2019 and then used to inform and develop data gaps investigations in cooperation with Ecology that are described in this RI. Soil and groundwater results from this investigation are included in the summary soil and groundwater Tables 20 and 21 of this RI.

7.2.2 Building Demolition/Redevelopment Related Investigations

Boeing and Ecology collaborated on several RI-related data collection efforts that arose as a result of demolition. Boeing's Regulated Materials Management Team worked with NVL Laboratories to perform pre-construction sampling work that identified PCBs in select outdoor building materials and surface pavement caulking and identified as a potential source of low level PCB concentrations detected during the RI. This information was summarized in a memorandum to Ecology in October 2019 (DOF, 2019).

A summary of PCB results for each building is provided below and subsequent RI related sampling information.

<u>Building 18-25</u>

All of the caulking associated with the exterior brick facade masonry seams and windows of the building were found to contain total PCB concentrations over 50 ppm. Due to extent of caulking and the difficulty of segregating exterior building material during demolition, the exterior material was managed and disposed of as PCB bulk product waste.

In response to the building materials results, and to assess site conditions surrounding this building, shallow soil samples were collected adjacent to Building 18-25 prior to commencement of demolition activities that could disturb soil (DOF, 2019).

Table 20e lists the PCB analytical results for the soil samples collected. Only one (HA2) of the four initial hand auger soil samples collected around the base of Building 18-25 contained detectable concentrations of total PCBs at an estimated concentration of 13.2 ug/kg. The other three samples did not contain PCBs exceeding the laboratory reporting limits.

Building 18-28

The majority of the caulking associated with the exterior facade masonry seams and windows of the building were found to contain total PCB concentrations over 50 ppm. For demolition purposes it was assumed that all of the exterior caulking (approximately 50,000 linear feet) had regulated levels of PCBs (over 50 ppm). Sampling of exterior concrete approximately 6 inches on either side of the building joint was conducted to evaluate PCBs in concrete on every side of the building. Concrete did not contain detectable levels of PCBs. Similar to Building 18-25, due to the difficulty of segregating exterior building materials during demolition, exterior building materials were managed and disposed of as PCB bulk product waste.

In response to these results and to assess site conditions surrounding this building, shallow soil samples were collected adjacent to Building 18-28 prior to commencement of demolition activities that could disturb soil (DOF, 2019).

The six hand auger samples surrounding Building 18-28 all contained PCBs that exceeded the reporting limit in all samples ranging from 15.3 ug/kg to 177.8 ug/kg at HA6. A composite sample was then collected along the northern side of the building near HA-5 and it contained PCBs at a concentration of 98.5 ug/kg. The northeastern composite sample contained 49.5 ug/kg of total PCBs. It is not known why soil samples from the north and northeastern sides of Building 18-28 contained elevated PCB concentrations.

Building 18-42

None of the exterior caulking or paint coatings were found to contain detectable levels of PCBs.

Building 18-43

Each observed type of paint and caulking was sampled for PCBs on the exterior of the building, but only one type of caulk material was identified to contain total PCB concentrations over 50 ppm. The other identified paint and caulking materials did not contain detectable levels of PCBs. Approximately 1,000 linear feet of concrete joint sealant was found to be present on the vertical concrete seams on the outside of the structure. This material was segregated by cutting approximately 6 inches on either side of the joint and then managed and disposed of as PCB bulk product waste.

Building 18-59

None of the exterior caulking or paint coatings were found to contain detectable levels of PCBs.

Building 18-67

None of the exterior caulking or paint coatings were found to contain detectable levels of PCBs.

Utility Tunnel and Concrete Panel

A utility tunnel between buildings 18-43 and 18-41 was scheduled to be removed. Joint material to be disturbed was sampled and found to contain total PCB concentrations over 50 ppm. The utility trench concrete and joint material was managed and disposed of as PCB bulk product waste during removal. Additional concrete joint material sampling was performed where similar joint and concrete panels in drive lanes and parking areas were observed around the 18-42 and 18-43 buildings, but results showed the joint material did not contain detectable levels of PCBs.

7.2.2.1 Summary

While PCBs were detected in caulking removed from both Buildings 18-25 and 18-28, the distribution of PCBs in surface soils near these buildings differed significantly. Despite the detections of PCBs, the concentrations of PCBs are below the MTCA Method A industrial cleanup levels and should not affect the future use of these parcels of land.

To further evaluate the potential for PCBs, Boeing also collected additional groundwater data for PCBs throughout the Site at existing monitoring wells and several direct push borings. PCBs were only detected in the northwest area of the Site at SB-22, NDP-2, and NDP-4 (Figure 6) at very low concentrations (0.008 to 0.042 µg/L) and were not detected in any groundwater well (Table 21e).

7.2.2.2 Panattoni Pacific Center Redevelopment

During redevelopment, several hydrocarbon releases occurred as shown in Figures 46 and 47, and discussed in Section 3.2.2. Based on the cleanup responses performed, no additional remediation is warranted in these areas.

7.2.2.3 Water Line Cleanup Building 18-51

During water valve replacement work on the aboveground water storage tank adjacent to building 18-51 used for the Site fire hydrant system, soil impacted by what appeared to diesel fuel was discovered. The area was excavated, as practicable adjacent to the tank, and soil samples collected.

Figure 48 shows the location of the sidewall and bottom soil confirmation samples and the extent of the excavation surrounding the valve box. Results of the sidewall and bottom soil sample analyses are included in Tables 20a through 20d.

The northern sidewall sample collected at 4-feet in depth contained diesel range TPH at a concentration of 4,260 mg/kg. This sample was collected adjacent to the foundation of the water tank. The northwest sidewall sample at a depth of five feet contained diesel range TPH at a concentration of 60.3 mg/kg. The remainder of the sidewall samples were below the laboratory reporting limits.

A bottom sample at seven feet in depth contained diesel range TPH at a concentration of 2,050 mg/kg. This soil was subsequently overexcavated to a depth of 10-feet and two additional bottom samples were collected that contained diesel range TPH at a concentration of 1,210 mg/kg and 1,290 mg/kg. These concentrations are below the MTCA Method A industrial use cleanup level of 2,000 mg/kg. In addition, none of the arsenic soil sample analytical results exceeded the Puget Sound area natural background of 7.3 mg/kg. Several of the soil confirmation samples exceeded their respective screening level concentrations for SVOCs, including naphthalene (reported with VOCs); however, screening levels are driven by protection of groundwater. SVOCs were not detected above screening levels in groundwater sampling conducted throughout the Site.

The source of the TPH as diesel encountered in the water line backfill is unknown. TPH was monitored in groundwater across the site, as shown in Table 21b and only detected infrequently and at levels near the screening level. Because the diesel impacted backfill in the northern sidewall is inaccessible, these soils will remain in place until the adjacent water tank is decommissioned at some point in the future, thereby allowing access to the remaining soils.

7.2.3 Building 18-63 Investigation

The area of former Building 18-63 (Figure 42) was investigated during several phases of due diligence because it is at the far south end of the Site near areas of property previously sold by Boeing. No new sources of contamination were identified as part of the due diligence work; however, TPH and several VOCs were detected in the sample from LAI14 at concentrations above screening levels.

Based on these results, a supplemental RI investigation in October 2018 included multi-depth sampling to evaluate constituent concentrations variability in groundwater with depth. Groundwater samples were collected at three locations (SB-29, SB-30, and SB-31) shown on Figure 42.

Low concentrations of diesel and oil range petroleum hydrocarbons were detected in groundwater samples above the screening level, at SB-31 with a maximum concentration of diesel range petroleum hydrocarbons at 0.839 mg/L, and oil range at 0.709 mg/L. Similar but lower concentrations were noted in the groundwater samples from SB-30.

Dissolved metals were detected in groundwater samples from all three borings with the highest arsenic concentration being the shallowest groundwater sample from SB-29 at 229 µg/L.

Low level VOCs were detected at SB-31 and vinyl chloride was detected at SB-30, at 0.042 µg/L, slightly above the screening level of 0.029 µg/L, but an order of magnitude lower than the concentration detected at nearby LAI14 (7.92 µg/L).

7.2.3.1 Conclusions and Summary

Generally, the highest soil or groundwater concentrations were detected in the central portion of the former Building 18-63 area, at temporary borings LAI-14 and LAI-32, with other data points surrounding those with lower or non-detect concentrations. The data gaps investigation confirmed that concentrations of constituents of potential concern in this area are isolated and do not increase with depth.

Based on this summary of historical building information and available data, additional RI data gaps associated Building 18-63 were not identified. The arsenic present in groundwater is attributed to area wide arsenic contamination in the Green River valley, as discussed in Section 7.2.5. The data from the RI do not support additional investigation or the need for remedial actions at former Building 18-63.

7.2.4 Building 18-59 and Transformer Area

Soil and groundwater samples from both areas were collected during the RI as well as the due diligence investigation performed by Landau in 2017-2018, as discussed in Section 3.2.4.

7.2.4.1 Soil Results

During the earlier due diligence investigation, Landau completed four borings near Building 18-59 including LAI21, LAI22, LAI41, and LAI42. Samples from these borings were analyzed for TPH, Metals, VOCs, and SVOCs. TPH, VOCs, and SVOCs were below screening levels. Metals concentrations were generally low and consistent with levels observed at other areas of the Site.

PCBs were detected only in RI soil samples SB-22 (20.3 ug/kg) and SB-23 (8.4 ug/kg). Both of these are below the concentrations detected in the stormwater system solids samples collected as part of the RI. SB-21, SB-24, and SB-25 did not contain PCBs above the laboratory reporting levels.

7.2.4.2 Groundwater Results

Petroleum hydrocarbons were not detected in samples from this area. Arsenic was detected in samples from LAI21 and LAI22 at concentrations of 120 µg/L and 269 µg/L, respectively. SVOCs were not reported above the reporting limit in LAI21 and LAI22.

The groundwater sample from RI boring SB-22 contained total PCBs at a concentration of 0.008 µg/L, near the limit of analytical detection and below the standard reporting limit. None of the other four groundwater samples contained PCBs above their respective reporting limits.

7.2.4.3 Conclusions and Summary

The area around Building 18-59 and the former transformer area show relatively low concentrations of TPH and PCBs given the historic presence of transformers in this area. The dissolved arsenic present in groundwater is attributed to area wide arsenic concentrations in the Green River valley, as described further in Section 7.2.5. Based on the due diligence and RI sample results, there is no reason for additional investigation or remediation in this area.

7.2.5 Site Wide Arsenic in Soil and Groundwater

Boeing worked in cooperation with Ecology after the 2017 draft RI to further investigate and provide additional assessment of arsenic as part revising the RI. Results of the RI soil samples show sporadic and variable concentrations of arsenic in Site soils. Similar patterns in dissolved-phase arsenic concentrations are observed in groundwater sample results. Boeing collected additional samples, reviewed regional studies and nearby site data, geochemistry, and historical use and potential influences at and near the Site. Boeing submitted a Technical Memorandum in 2021 (DOF, 2021a) to Ecology summarizing the results of various investigative activities and evaluation of regional and local arsenic conditions in soil, groundwater, and sediment/stormwater. That information is summarized in the following subsections.

7.2.5.1 Historical Context

As discussed in Section 2, the Site and regional area were largely used for agricultural purposes from the 1930s onwards. The KSC development began in the late 1960s, and fill material was brought on-site during construction of the facility (Landau, 2010).

This area of the Green River valley was affected by atmospheric fallout and deposition of arsenic from the former ASARCO lead smelter located in Ruston, Washington that was in operation from 1889 to 1986. The fallout plume extends throughout the Pierce and King County areas, decreasing in concentration with distance from the former smelter. The KSC Site and surrounding area is located in the footprint of this plume where Ecology expects soil arsenic concentrations up to 20 mg/kg in the upper six inches of soil, abutting an area where concentrations are expected to be in the range of 20 to 40 mg/kg (Ecology, 2021). See Figure 51. However, those upper soils were likely buried deeper than six inches as part of fill and raising grades for development at locations such as the Site.

7.2.5.2 Regional Arsenic Concentrations

The United States Geologic Survey (USGS) conducted a study documenting the chemical load that the Green River transports into the Lower Duwamish Waterway from 2013 through 2017 and collected and analyzed the sediment for various chemicals, including arsenic. The report concluded that arsenic occurs naturally in sediments and watershed soils in the Green River valley. Arsenic was present in the Green River sediments at concentrations ranging from 6.6 to 28 mg/kg (USGS, 2018). These arsenic concentrations are similar to those reported for Site stormwater conveyance system solids sample results at the KSC Site (Table 9).

Data for other nearby sites in the Green River valley was obtained from Ecology's EIM system and reviewed for arsenic data. Sediment samples from King County, and the City of Kent contained arsenic at concentrations ranging from 3.0 mg/kg to 56 mg/kg.

At another Green Valley site located south of the Kent Space Center (the former Qualex photofinishing site) groundwater samples were collected from five groundwater monitoring wells over a number of years. Arsenic concentrations ranged from 1.18 µg/L to 60 µg/L.

7.2.5.3 Site-Specific Data

Arsenic in soil was analyzed from 63 shallow soil samples collected at the Site. Arsenic concentrations in these samples varied from 1.55 to 18.1 mg/kg (see Table 20a). The average arsenic soil concentration was 4.4 mg/kg. Only eight of these samples exceed the Puget Sound background arsenic concentration of 7.3 mg/kg (Ecology, 1994). None of the soil samples exceeded the soil arsenic concentration of 20 mg/kg expected in this area of the ASARCO plume. Values are consistent with historical data from nearby areas such as the former Striker property where two of 12 soil samples were also above 7.3 mg/kg but below 20 mg/kg.

No high concentration source areas for arsenic were identified in soil. The two samples (SB-1 and SB-2) that had detectable concentrations above 7.3 mg/kg were collected near the water table from locations beneath a building; whereas other samples were collected from shallower zones, generally 2.5 feet bgs. It is not expected that arsenic in soil presents a risk to the receptors identified in the CSM or creates a complete pathway for exposure because most of the Site is paved or under buildings, the depth of these higher concentration samples was greater than 10 feet bgs, and concentrations are relatively low and not indicative of a direct release.

Groundwater samples were collected over the course of the RI from across the Site from temporary direct-push borings as well as groundwater monitoring wells. As with the arsenic concentrations measured in the soil samples, dissolved arsenic concentrations in groundwater are highly variable across the Site. Many of the groundwater samples were collected from just at or below the groundwater table, but a significant number of samples were also collected from direct-push borings at multiple depths (Table 21a). Results show:

- Concentrations ranged from below detection limits to 266 µg/L;

- The average concentration was 61 µg/L; and
- The 90% upper confidence interval concentration is 70.8 µg/L.

It should be noted that the arsenic concentrations are measured in parts-per-billion, approximately one to two orders of magnitude lower than the measured soil arsenic concentrations. Figures 52 and 62 show the dissolved arsenic concentrations described above using color-coding to depict the highest concentration detected at each sample location. As shown, dissolved arsenic concentrations vary widely across the Site, even for samples taken relatively close together, or in areas that have only been used as parking lots. Figure 60 shows arsenic groundwater iso-concentrations contours from a recent site-wide sampling event. Figure 62 shows a broader view of the highest concentrations detected historically near and at the site.

Figure 53 shows a chart plotting dissolved arsenic concentrations versus the groundwater sample collection depth. The highest dissolved arsenic concentrations are present, in general, at the shallowest depths of approximately 10-15 bgs. The groundwater table was typically encountered at the approximate depth of the former agricultural land surface. The former land surface is easily identified by the presence of silts and silty sands at depths of 8 to 13 feet below the current land surface as described in the Phase I Environmental Site Assessment (Landau, 2010). The former land surface would have been exposed to arsenic fall-out from the ASARCO for over 70 years prior to construction of the KSC facility as discussed in Section 7.2.5.

Stormwater was also sampled for arsenic several times as part of the RI. Samples were collected from the NDP as well as several outfall locations near Mill Creek (Figure 32). Results of stormwater sampling showed much lower arsenic concentrations ranging from not detected to 0.562 µg/L (Table 22), as would be expected if the oxidation condition has a strong influence on the dissolved phase concentrations.

Previous investigations of arsenic did not identify a probable source at the Site, showing variable concentrations in groundwater (Boeing, 2011 and 2012). As part of this RI, historical data previously presented to Ecology in relation to the former Striker property and southern City of Kent sewage lagoon site have been included in this RI to provide history and context. The 2011 and 2012 memoranda that presented available data and assessment of nature and extent are included in Appendix G. Additional data are available upon request related to offsite sites reviewed.

7.2.5.3 Arsenic Geochemistry

Arsenic is a heavy metal that can easily be dissolved and transported in groundwater under reducing conditions known to be prevalent both at the Site and the Green River valley. Groundwater samples collected at the Site generally have been collected using low-flow sampling techniques where the water is purged at a low rate, while general water quality parameters, including oxidation/reduction potential (ORP), are measured using a flow-through cell. In addition, some groundwater samples were tested for total organic carbon (TOC), and other geochemical parameters. The primary control on reduction/oxidation is the presence of dissolved oxygen in a given groundwater sample. However, dissolved oxygen can be consumed by microbial degradation of organic carbon. Dissolved oxygen readings less than 1.0 mg/L are typically considered to represent anaerobic conditions. Dissolved oxygen readings at this Site are generally less than 1.0 mg/L and should be considered anaerobic (see Table 6).

ORP readings, typically measured in millivolts, are another indication of whether groundwater conditions are aerobic or anaerobic. Negative ORP readings are typical of anaerobic conditions. Under anaerobic conditions, insoluble ferric iron (Fe^{3+}) is converted to soluble ferrous (Fe^{2+}) iron. During some of the sampling events, groundwater was measured for both dissolved arsenic and ferrous iron. Figure 54 is a graph showing arsenic concentrations compared to ferrous iron concentrations. Ferrous iron concentrations at the Site vary from 2.5 mg/L to 107 mg/L, with arsenic concentrations corresponding to higher iron concentrations, as expected. ORP measurements at the Site collected from groundwater monitoring wells are typically negative as summarized in Table 6. ORP readings from direct-push borings are also generally below -100 millivolts. Figure 55 is a graph showing arsenic concentrations compared to ORP readings at the Site. The majority of higher arsenic concentrations correspond to lower ORP values, as might be expected if anaerobic conditions are influencing arsenic concentrations. A map showing average ORP readings compared to highest arsenic concentrations at the Site is shown on Figure 56.

Iron oxides containing arsenic can be dissolved in groundwater in the presence of total organic carbon, whether from naturally occurring organic matter (as in the case of former wetlands) or from anthropogenic sources of organic carbon, such as agricultural land use or releases of TPH. It is important to note that TOC concentrations in soil are typically reported in percentages, and that 1% TOC is equivalent to 10,000 mg/kg. TOC was measured in groundwater samples collected on-site from direct-push borings and groundwater wells. Values range from 2.5 mg/L to 66 mg/L.

Figure 57 is a graph plotting dissolved arsenic concentrations versus TOC at the KSC Site between 2017 and 2020. Arsenic is consistently found to be higher at locations where TOC was also higher at the KSC Site.

Figure 58 is an Eh—pH diagram which illustrates which form of dissolved arsenic would form under the reduction/oxidation (REDOX) conditions present at the KSC Site. This figure shows types of arsenic species likely to be present on-site. Dissolved arsenic is likely to be predominantly present in the trivalent form and present as an uncharged hydroxy ion at negative ORP readings. The widespread presence of naturally occurring TOC, when degraded by microbial processes, establishes anaerobic conditions that solubilize ferrous iron and promote migration of dissolved arsenic species. Arsenic is less mobile under aerobic conditions because the charged arsenate species that predominate with higher oxygen concentrations are more easily adsorbed on aquifer materials, or on sediments (Herath, et al, 2016). This is shown by the low concentrations of arsenic present in the stormwater samples collected during the RI, which were orders of magnitude lower than those observed in groundwater.

7.2.5.2 Anthropogenic Source Evaluation

Anthropogenic sources of TOC can come from fuel releases. At the KSC Site several small releases occurred and cleanups have been completed to address those releases. Approximate locations of cleanup actions are shown on Figure 59 and described in more detail in earlier sections of this report. No major unaddressed fuel or hydrocarbon releases are known to be present at the Site. Groundwater samples collected as part of the RI were frequently tested for TPH and found only lower-level detections of TPH remain at the Site (see Table 21b). Recent TPH and arsenic concentrations in groundwater are shown together on Figure 60, along with historic cleanup areas. Results of soil data collected and analyzed for TPH during the RI are also shown on Figure 61, along with recent arsenic concentrations in groundwater.

7.2.5.3 2022 Ecology Study

In January 2022, Ecology released guidance concerning the natural background concentration of arsenic in groundwater in Washington State (Ecology, 2022). The guidance discusses that arsenic geochemistry varies depending on climate and geology, and notes that the western United States has, in general, higher concentrations of dissolved arsenic in groundwater than other regions of the US.

The guidance notes that: "Groundwater arsenic concentrations > 10 µg/L are more typically the result of geochemical changes in iron oxide. Arsenic may be released by reactions of iron oxide with natural or anthropogenic organic carbon (e.g., petroleum products)." As described in this RI, the shallow soils at the Site have high concentrations of naturally occurring organic carbon due to their depositional environment. The anaerobic conditions promoted by this organic carbon correlate with dissolved arsenic mobilized in some areas of shallow groundwater at the Site.

The guidance also acknowledged: "In terms of higher naturally occurring arsenic levels, the key variables are typically: 1) groundwater geochemistry (reduced conditions), and 2) increased soil organic matter / content. If the groundwater is geochemically reduced (less than 50 mV oxidation- reduction potential), then it will oxidize the soil organic matter. This geochemical trigger results in the release of arsenic from iron oxides (reductive desorption and dissolution). Low- lying topography, with flat groundwater gradients, may also result in higher arsenic (i.e., not enough dilution; Smedley and Kinniburgh 2002)." The KSC Site has both reduced conditions and low-lying topography with relatively flat groundwater gradients.

Ecology's study largely evaluated arsenic concentrations in municipal groundwater supply wells, which typically range in depth over several hundreds of feet and tap aquifers that are likely to have entirely different geochemistry than shallower groundwater monitoring wells. These differences in geochemistry could impact the validity of applying background groundwater arsenic concentrations determined for municipal supply wells to shallower groundwater aquifers.

7.2.5.4 Summary and Conclusions

As expected, dissolved arsenic correlates with TOC, ferrous iron, and ORP because microbial degradation of TOC is likely responsible for establishing and maintaining REDOX conditions present in the shallow groundwater.

The former agricultural land surface received airborne arsenic fallout from the ASARCO smelter. Soils containing hydrocarbon releases occurred but have been remediated and do not appear to continue to drive groundwater REDOX. TOC in native soils likely promotes REDOX conditions in the shallow groundwater which allows native and ASARCO-plume arsenic in the soil to mobilize in shallow groundwater. These conditions result in variable dissolved arsenic concentrations across the Site and in the larger area. Ecology has recognized similar conditions at the nearby Qualex site in Kent, where a NFA determination for arsenic was issued for that site (Ecology, 2019). The NFA stated that:

> "Arsenic concentrations ranged from 4.7 to 51 µg/L... As regional background levels have been observed to be higher than MTCA Method A CUL it is unlikely that concentrations at the Site will ever be observed below the Method A CUL."

No specific arsenic releases have been identified at the Site via historical records review or site investigation. Several other sites, including the large former sewage lagoons to the south (Figure 62), also detected arsenic and may have had a significant impact on regional groundwater conditions as well as being a source of contamination.

In summary, the conceptual site model for arsenic at this Site shows that:

- Arsenic is present in the Site soils at sporadic and variable concentrations, and appears to be within the ranges of anthropogenic background values of regional and abutting areas.
- Soil and stormwater data do not indicate an arsenic release from operations of the KSC Site.
- Arsenic in shallow groundwater is mobilized due to anaerobic degradation of TOC which favors the migration of dissolved arsenic as an uncharged hydroxy-complex in the trivalent (As^{3+}) form (Herath, et al, 2016).
- Geochemistry, particularly TOC and REDOX, are expected to have a large influence on the extent of elevated arsenic concentrations in groundwater and re-adsorption downgradient of higher concentration areas.
- Groundwater containing arsenic can conceivably discharge to surface water via storm water conveyances, or through groundwater discharge to surface water.
- Surface waters are aerobic, unlike the anaerobic groundwater, and the trivalent form of arsenic will convert to As(V) oxidation state and form negatively charged hydroxyions which are likely to adsorb to particulate matter and mineral surfaces (Herath, et al, 2016).

The results of the stormwater sampling performed as part of the RI support this model as the concentrations in stormwater samples are orders of magnitude lower than those observed in groundwater. The USGS study of the Green River also supports the change in arsenic mobility due to the change in REDOX conditions from anaerobic groundwater to aerobic surface water. The bulk of arsenic loading to the Duwamish Waterway is attributable to downstream transport of particulate-bound arsenic during storm events (USGS, 2018).

7.3 Site-Wide Groundwater Monitoring

In addition to focused sampling of various areas of the Site, groundwater monitoring wells across the Site were often used throughout the RI to confirm findings of the focused sampling efforts discussed in the sections above. The permanent wells provided an opportunity to collect multiple rounds of samples for potential contaminants of concern. This section summarizes findings of groundwater sampling conducted using the groundwater monitoring well network.

7.3.1 Total Petroleum Hydrocarbons

Results are summarized in Table 21b. Petroleum hydrocarbons were generally not detected above screening levels in any of the groundwater samples. Oil range TPH was detected slightly above the screening level (0.500 mg/L) once each at wells MW-1 and MW-9, but was below that screening level during all other sampling events. Neither gasoline or diesel range TPH were ever detected above screening levels at any of the RI monitoring wells.

7.3.2 VOCs

Results are summarized in Table 21c. Vinyl chloride was the only VOC detected above a screening level and it was only detected at concentrations between 0.021 and 0.165 µg/L at wells MW-1, MW-4, MW-8, and MW-10, slightly above the screening level (0.02 µg/L). While above the screening level, these values are not indicative of an unidentified source of contamination contributing to the detections. These values are low, confirming areas where vinyl chloride is detected is small, and may be declining naturally as concentrations are an order of magnitude lower than detected during the Clearwater investigation. No other VOCs analyzed for were detected above screening levels at these locations.

7.3.3 SVOCs

Results are summarized in Table 21d. SVOCs, including 1,4-dioxane, were not detected above screening levels at any wells.

7.3.4 PCBs

Results are summarized in Table 21e. PCBs were not detected at any wells.

7.3.5 Metals

Results are summarized in Table 21a. Groundwater samples analyzed for dissolved cadmium, chromium, lead, mercury, nickel, selenium, silver and zinc did not show detections above screening levels.

Copper was occasionally detected at concentrations between 2.1 and 39.8 µg/L with a mean of 4.2 µg/L where detected. These concentrations are well below Method B groundwater screening level protective of drinking water (640 µg/L) and generally below the surface water screening level as well (11 µg/L).

Arsenic concentrations at the Site were discussed in depth in Section 7.2.5.

8.0 CONCLUSIONS

The objectives of this RI are to fulfill the requirements of the 2016 Work Plan, characterize the nature and extent of contamination at the Site, and meet the general requirements for a RI as defined by MTCA under WAC 173-340-350. In doing so, the RI will meet the requirements of Section VII.A of the AO to investigate the subsurface soil and groundwater at the Site and characterize the concentration, chemical nature, extent, and the direction and rate of migration of dangerous constituents released into the environment at or from each of the SWMUs, AOCs, and other areas identified for further evaluation.

- All tasks identified in the RI Work Plan and tasks identified through data gaps evaluation have been completed and documented in this RI.

The overall conclusions of the RI are summarized below:

- Land use has not significantly changed at the Site since it was first developed, is industrial, and local planning and zoning support continued similar types of use.
- Geology at the Site is consistent with conditions anticipated for this Kent river valley. The Site is relatively flat and soil types are predominantly poorly-graded sands, sandy silts, and silts.
- Shallow groundwater is present at approximately 7 to 11 feet bgs and the depth to groundwater varies seasonally by several feet. Groundwater flow is predominantly to the north, but fairly flat, varying in flow direction from Northwest to Northeast with a slow groundwater flow rate anticipated on the order of under 100 feet per year.
- Stormwater detention facilities on and offsite influence groundwater flow direction in variable ways depending on intensity of storm events, seasonal groundwater elevations, and flow controls to discharge water bodies connected to these facilities.
- Groundwater is not a current source of drinking water at the Site and regional wells do not indicate concentrations of PCOCs at levels of concern in groundwater.
- The majority of soil and groundwater samples collected as part of the RI did not reveal concentrations above screening levels or identify any new sources of contamination.
    - The nature and extent of contamination at individual SWMUs and AOCs were each investigated. Where releases or sources were identified they have been addressed and the RI did not identify unaddressed contamination that presents an unacceptable risk at any SWMU or AOC.
    - Sitewide monitoring of groundwater wells confirmed that the only PCOCs detected above screening levels in groundwater were vinyl chloride and arsenic. Vinyl chloride results show that, where detected, concentrations are low and may be declining naturally based on recent concentrations, geochemistry of the groundwater, and the absence of other possible parent chlorinated VOCs. Soil and stormwater data do not indicate an arsenic release from operation of the KSC facility. Arsenic groundwater concentrations appear related to geochemical conditions documented in this RI as described in Section 7.2.5.

- Groundwater concentrations do not warrant active remedial action because:
    - Detected concentrations are relatively low in comparison to drinking and surface water based screening levels;
    - No chlorinated VOCs were detected in any of the samples collected in the downgradient storm water bodies (Section 7.1.8); and
    - The Site is in an industrial area where the shallow groundwater is not used for drinking purposes (Section 5 above); therefore, the contamination is not considered to pose a threat or potential threat to human health or the environment. Additionally, Boeing is willing to file an environmental covenant for the property to restrict the use of groundwater from the Site.
    - The nearest surface water body is Mill Creek, which discharges to the Green River approximately 3.5 miles north of the Site. Mill Creek has been the focus of several historical studies that found it did not meet Surface Water Quality criteria under WAC 173-201A-200 that would be expected to support aquatic life, which specify minimum dissolved oxygen levels of 6.5 to 9.5 mg/L, amongst other things, nor did it meet recreational uses which specify fecal coliform levels of no more than 50-200 CFU/100 mL. Once groundwater is discharged to a surface water body (stormwater ponds, eastern stormwater ditch, or Mill Creek) atmospheric oxygen quickly restores aerobic conditions to the surface water, as shown by data collected during the stormwater system investigations and in studies by others (USGS, 2018) and (King County, 2021).

Boeing is prepared to enter an environmental covenant for the property, as was completed for a portion of the property and for the Striker property, restricting the use of groundwater from the Site. Boeing plans to continue to operate under the ISGP as well, monitoring and maintaining the stormwater conveyance system at the Site for operations consistent with the industrial levels allowed under that permit.

The nature and extent of contamination has been defined and no further evaluation beyond the scope of the RI Work Plan is warranted in order to meet the objectives of the RI, as defined in the AO. At the request of Ecology, Boeing will conduct a focused Feasibility Study (FS) to evaluate a Monitored Natural Attenuation (MNA) remedy for arsenic in groundwater and an environmental covenant. In preparation for the focused FS Boeing will collect additional data in support of the FS to identify nature/extent of groundwater arsenic concentrations and downgradient location of arsenic re-adsorption zones and near stormwater management or surface water features.

The focused FS will utilize additional data collection to address the considerations listed above. Boeing submitted a FS Work Plan, consistent with the data collection plan noted above and Ecology's June 1, 2022 letter (Ecology, 2022b) in August, 2022.

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10.0 CLOSING

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

Tables

Table 1
Site Contacts
Remedial Investigation
Boeing Kent Space Center

Title	Name	Address	Phone Number	Email Address
Project Consultant	Dalton, Olmsted, & Fuglevand	1001 SW Klickitat Way, Suite 200 B Seattle, WA 98134	(206) 731-7550	ngray@dofnw.com
Property Owner	Boeing	20402 68th Ave S, Kent, WA 98032	--	--
Facility Operations	Paul Yount, Boeing	Kent, WA	(206) 669-1490	paul.d.yount@boeing.com
Project Manager	Todd Swoboda, Boeing	Seattle, WA	(425) 919-7486	todd.a.swoboda@boeing.com

Table 2
Site Tax Parcels
Remedial Investigation
Boeing Kent Space Center

Site Parcel Number	Current Owner
6600070090	Boeing
6600070120	Boeing
6600070130	Boeing
6600070140	Boeing
6600070150	Boeing
6600070160	Pacific Gateway
6600070170	Pacific Gateway
6600070180	Pacific Gateway
6600070190	Pacific Gateway
6600070200	Boeing
6600070210	Boeing
6600070220	Boeing
6600070230	Pacific Gateway
6600070240	Pacific Gateway
6600070250	Pacific Gateway
6600070260	Boeing
6600070270	Pacific Gateway
6600070300	Pacific Gateway
6600070310	Pacific Gateway
6600070320	Pacific Gateway
0222049064	Boeing
0222049069	Boeing
0222049072	City of Kent
0222049074	Boeing
0222049075	Pacific Gateway
0222049076	Pacific Gateway
0222049077	Boeing
0222049078	Boeing

Notes:
Source= https://gismaps.kingcounty.gov/parcelviewer2/
Date accessed 5/24/2021

Table 3
Regulatory Chronology
Remedial Investigation
Boeing Kent Space Center

Date	Description	Associated SWMU or AOC
November 1980	Boeing notified the EPA of hazardous waste activities at the KSC property and filed a Part A permit application.	--
March 1981	UST KS-25 and UST KS-26 were 1,000-gallon stainless steel USTs located beneath the west-central portion of Building 18-43 that were formerly used to store microfiche process waste. The USTs were installed in 1977 and were closed in place in March 1981 by removing the contents of the tanks, rinsing the interiors, and filling with sand. There are no known releases associated with the USTs; however, no soil or groundwater sampling was conducted during the UST closure activities. The potential contaminants of concern associated with the microfiche process waste are arsenic, chromium, copper, lead, nickel, silver, and zinc, and these metals will be included in the list of analytes for investigation of this area.	SWMU-88 and SWMU-89
June 17, 1981	The Part A permit was issued	--
October 25, 1983	The Part A permit was revised	--
January 30, 1986	The Part A permit was revised	--
1986	UST KS-5 and UST KS-6 were 10,000-gallon carbon steel USTs, formerly used to store fuel oil, that were removed in 1986. The installation dates for the USTs are not known. The tanks are shown on a facility drawing dated 1966 and were located near the southwest corner of Building 18-54. During the tank removal, soil samples were collected from the sides of the excavation and TPH were detected in soil near AOC-1 (2,400 ppm) and AOC-3 (11,000 ppm). Records regarding the tank removal and the locations of the soil samples are not available. The associated potential contaminants of concern are diesel- and oil-range TPH.	AOC-1 and AOC-3
May 19, 1988	The Part A permit was revised	--
1988	A RCRA Part B permit application for TSD of hazardous waste was submitted; however, finalization of a Part B permit for TSD status for the Facility was never pursued.	--
1990	EPA initiated corrective action for the Facility by notifying Boeing of a pending RFA	--
August 1991	RFA Completed	--
1992	KS-3 was a 10,000-gallon UST formerly located near the northwest corner of Building 18-41 that was removed in 1992. The UST stored unleaded gasoline, which was dispensed through a pump located within the footprint of the tank. During the tank removal, approximately 10 to 15 cubic yards of gasoline-stained soil was removed. Soil confirmation samples were collected from the base and sidewalls of the excavation and analyzed for gasoline-range TPH, BTEX, and lead. Gasoline-range TPH and BTEX were not detected at concentrations greater than the laboratory reporting limits. Lead was detected in soil at concentrations below the MTCA Method A cleanup level. Groundwater was not encountered or sampled.	UST KS-3, Building 18-41
1992	Boeing began communications with Ecology requesting procedural closure of regulated units at the Facility. Ecology responded that it could not make a determination on procedural closure at that time.	--
1993	Ecology stated that it could no longer procedurally close regulated units. Ecology notified Boeing that, if Boeing did not intend to seek final status for the KSC as a dangerous waste TSD facility, closure plans would need to be submitted for the regulated units at the Facility. Boeing subsequently began closure of the regulated units at the Facility.	--

Table 3
Regulatory Chronology
Remedial Investigation
Boeing Kent Space Center

Date	Description	Associated SWMU or AOC
1993	KS-1 was a 200-gallon diesel UST formerly located on the west side of Building 18-42 that was removed in 1993. The UST stored fuel for an emergency generator inside the building and was removed after a failed integrity test. Upon removal, the tank was noted to be in poor condition. 6 soil samples were collected from the excavation during tank removal. The detected concentrations of diesel-range TPH were greater than the MTCA Method A cleanup level in the samples from the north and east sidewalls and from the bottom of the excavation, with a maximum detected concentration of 53,000 mg/kg. Additional soil was subsequently removed and the excavation was extended laterally and deepened to 13 ft bgs. The detected concentrations of TPH in soil samples collected from the base and sidewalls of the final excavation were all less than the Method A cleanup levels, with a maximum concentration of diesel-range TPH of 140 mg/kg. Groundwater was noted entering the excavation at a depth of approximately 12 feet. A water sample collected directly from the excavation indicated a concentration of diesel-range TPH of 3.9 mg/L, which is greater than the MTCA Method A cleanup level.	UST KS-1, Building 18-42
1995	A milling machine cooling oil release in Building 18-62 was reported to Ecology on July 13, 1995. An independent cleanup was conducted and no further action opinion was issued by Ecology.	--
1997	RCRA closure completed for a storage tank in Building 18-67. Jet fuel had been released from USTs and cleanup completed under Ecology's Voluntary Cleanup Program.	--
1998	RCRA closure completed for a container storage area in Building 18-59	--
1999	RCRA closure completed for2 storage tanks in Building 18-62	--
2001	all eight of the regulated units identified in the 1991 RFA had received clean closure certification from Ecology	--
1995-2002	Historical operations at Building 18-62 included various machining operations on the first floor and office space on the second floor. Operations on the first floor of Building 18-62 included two profiler/milling machines formerly located in the north-central portion of the building. A leak associated with one of the machines resulted in a release of coolant to soil underlying the floor between the beds of the two adjacent profiling/milling machines. The coolant released was a 2 to 6 percent solution of 4000 Strong (Boeing MSD #68547), a mineral-oil based product. Boeing conducted an initial soil investigation in the area of the leak and subsequently reported the release to Ecology on July 13, 1995. Based on an assessment that the release did not pose a potential threat to human health or the environment, further evaluation of the nature and extent was deferred until the machines were removed from the building. Additional investigation of soil and groundwater quality was completed in 2002. to document the extent of soil contamination associated with the release, and the collection and laboratory analysis of groundwater samples along the north side of Building 18-62 at locations hydraulically downgradient of the coolant release area. Remedial action was conducted in 2002 to remove soil containing concentrations of diesel-range, motor oil-range, and mineral oil-range TPH greater than the MTCA Method A soil cleanup levels. The remedial action included concrete removal, soil excavation, and disposal of soil. Approximately 458 tons of soil was excavated and disposed offsite. Confirmation soil samples indicated that the applicable cleanup levels were met at the limits of the remedial action area. Groundwater was not encountered beneath the building during the investigation or remedial action in the former milling machine area. The groundwater samples collected downgradient did not contain concentrations of diesel-range or motor oil-range TPH greater than the laboratory reporting limit. An Independent Remedial Action Report was submitted for Ecology review, and a No Further Action determination was subsequently issued by Ecology.	Former Milling Machine Area, Building 18-62

Table 3
Regulatory Chronology
Remedial Investigation
Boeing Kent Space Center

Date	Description	Associated SWMU or AOC
2002	Stormwater at the site either infiltrates into unpaved areas, or is accumulated by the storm sewer system and discharged to Mill Creek via the North Detention Pond located at the northwest corner of the site or via a series of detention ponds and outfalls along the eastern site boundary. Catch basins, which collect solids transported by site stormwater, are located throughout the storm sewer system. During one maintenance event in 2002, 10 solids samples were voluntarily collected from catch basins throughout the storm sewer system and analyzed for PCBs. In 4 of the 10 samples, PCBs were not detected above the laboratory reporting limits, which ranged from 6 µg/kg to 180 µg/kg. PCBs were detected in 5 of the 10 samples at concentrations ranging from 66 to 970 µg/kg; the PCB concentration in one sample was 1,400 µg/kg. In 2010, the 54-inch-diameter culverts between the North Detention Pond and the outfalls at Mill Creek (each culvert being approximately 2,000 ft in length) were cleaned. The potential contaminants of concern identified by Ecology for stormwater discharged via the storm sewer system are metals (total and dissolved), PAHs, PCBs, VOCs, gasoline-range TPH, diesel-range TPH, and oil-range TPH.	SWMU 86
1994-2003	Seven USTs located on the west side of Building 18-67, consisting of one waste jet fuel UST and six jet fuel USTs were removed in 1994. At the time of the removal, the tanks were observed to be in good condition; however, evidence of minor soil contamination was observed in the area of pipe connections associated with the waste fuel UST at the south end of the tank area. Petroleum hydrocarbons and benzene were detected in water samples collected directly from the tank excavation. A remedial action was completed that consisted of overexcavation of soils within and around the tank cavity. TPH and BTEX constituents were not detected at concentrations greater than laboratory reporting limits in any of the confirmation soil samples. Diesel-range TPH was detected above the MTCA Method A groundwater cleanup level in a sample of standing water collected from the excavation. A soil and groundwater investigation was completed in 1997. TPH was detected in 5 of the 17 soil samples, but at concentrations below Method A cleanup levels. TPH were not detected at concentrations greater than the laboratory reporting limits in any of the 4 groundwater samples. Benzene was detected in one groundwater sample but at a concentration less than the Method A cleanup level. Four quarterly groundwater monitoring events were completed between February 1998 and January 1999. Gasoline-range TPH and BTEX were not detected at concentrations greater than the laboratory reporting limits in any of the groundwater samples. Diesel-range TPH was detected in one sample during the January 1999 sampling event at a concentration less than the Method A cleanup level. Based on the results of the quarterly groundwater monitoring, Ecology issued a No Further Action determination for the former UST area under the Voluntary Cleanup Program. Groundwater conditions were also investigated in 2001 during a Phase II environmental site assessment completed for a portion of the site. Groundwater samples were collected from 3 of the 4 monitoring wells installed in October 1997. TPH and VOCs were not detected at concentrations greater than the laboratory reporting limits. Dissolved copper and nickel were detected at concentrations less than the screening levels identified at the time.	Jet fuel USTs, Building 18-67
2003	As part of property transactions, Boeing completed independent, voluntary cleanup action and received No Further Action determination from Ecology's Hazardous Waste and Toxics Reduction Program for soil and groundwater at portions of the site known as the Clearwater property.	--

Table 3

Regulatory Chronology

Remedial Investigation

Boeing Kent Space Center

Date	Description	Associated SWMU or AOC
2010-2012	Investigations completed in 2010 and 2011 at the former Boeing parcel known as the Striker Property, to the west and south of the current site, detected dissolved arsenic in groundwater at concentrations ranging from 0.3 to 114 µg/L. 54 soil samples were collected and analyzed for arsenic with detected concentrations of arsenic less than the MTCA Method A soil cleanup level (20 mg/kg), except for one at 20.1 mg/kg. In 2012, Boeing collected additional groundwater samples to document dissolved arsenic concentrations in shallow groundwater at locations in and around the site including locations that are hydraulically upgradient and downgradient of the site based on overall shallow groundwater flow to the west-northwest toward the Green River. The groundwater samples were collected at the site, at the Western Processing site (located to the northeast of the site), and on City of Kent property. The selected City of Kent locations included the closest upgradient, accessible locations that appeared to be the least affected by development/human activities. The selected Western Processing wells consisted of a background/upgradient well, and a shallow downgradient well that are part of the Western Processing monitoring network, but that have not been affected by activities at the Western Processing site. Dissolved arsenic was detected at concentrations above the laboratory reporting limit in 14 of the 18 groundwater samples, at concentrations ranging from 3.3 to 115 µg/L. Of the detected dissolved arsenic concentrations, 11 were greater than the screening level of 5 µg/L.	Site-Wide Arsenic in Soil and Groundwater
2013	As part of property transactions, Boeing completed independent, voluntary cleanup action and received No Further Action determination from Ecology's Hazardous Waste and Toxics Reduction Program for soil and groundwater at portions of the site known as the Striker property.	--
2013	Ecology removed the Striker property, which included a portion of the Clearwater property, from the footprint of the RCRA Interim Status facility.	--
October 8, 2014	Ecology issued a PLP determination letter to Boeing.	--
November 2015	UST KS-7 was an 840-gallon carbon steel UST used to store fuel oil that was installed in 1965 and removed in 1986 from the west side of former Building 18-35. Records indicate that after removal of the UST, soil samples were collected from the sides of the excavation and TPH was detected at a concentration of 2,400 ppm. The locations of the samples were not identified. Boeing records indicate that an 850-gallon fiberglass UST was installed in 1988 at the same location as the original KS-7. The newer UST stored diesel fuel and served an emergency generator located on the west side of Building 18-35. The generator was taken out of service in 2015 in preparation for demolition of the building, and KS-7 was removed on November 10, 2015. The UST site assessment report indicates that the tank was observed to be in good condition following removal and there was no indication of a release from the UST. Three soil samples were collected from the sidewalls and bottom of the tank excavation and were analyzed for diesel- and oil-range TPH. The bottom sample was also analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs). None of the compounds analyzed for were detected at concentrations greater than the laboratory reporting limits. Groundwater was not encountered during the tank removal. Based on the use of the USTs (both designated as KS-7), the associated potential contaminants of concern are diesel- and oil-range TPH. Based on data from the 2015 UST removal report, no residual soil contamination was identified at the former UST location, but groundwater was not sampled. Results of groundwater sampling and analysis near Buildings 18-24 and 18-35 for the Clearwater property in 2002 and 2003 indicated localized detections (locations 18-35-3 and 18-35-4) of the volatile organic compounds (VOCs) vinyl chloride and benzene at concentrations slightly greater than the current MTCA Method B groundwater cleanup levels.	AOC-2
January 2016	Boeing entered into Agreed Order No, DE 12820	--
July 2016	Ecology Review Draft RI Work Plan, Boeing Kent Space Center Facility	--
September 2016	Letter from Byung Maeng, Ecology, to Nick Garson, Boeing, RE: Ecology Comments on the Boeing Kent Space Center RI Draft Work Plan, dated July 29, 2016	--
October 2016	Remedial Investigation Work Plan approved by Ecology	--
December 2017	Draft Remedial Investigation Report submitted	--
July 2018	Boeing Notification of Project Coordinator change from Byung Maeng to Ed Jones	--

Table 3
Regulatory Chronology
Remedial Investigation
Boeing Kent Space Center

Date	Description	Associated SWMU or AOC
November 2018	Ecology issued comment letter regarding Draft RI Report and RI addenda	--
December 2019	Boeing submitted letter to Ecology providing advanced notice of Boeing's planned sale of a portion of the Kent Space Center property	--
January 2020	Boeing provided copy of recorded Covenants, Conditions, Easements, and Restrictions, related to the sale of a portion of the Kent Space Center property, to Ecology ; Ecology approved 2019 RI Data Gaps Work Plan - Building 18-24 & 18-59 via letter to Boeing; Boeing provided a letter to Ecology with notification of the change in designated Boeing project coordinator from Lindsey Erickson to Todd Swoboda	--
August 2020	Boeing provided a notification letter to Ecology for a project coordinator change from Todd Swoboda to Lindsey Erickson	--
September 2020	Ecology notified Boeing that there would be a change in Ecology Site Manager from Ed Jones to Li Ma.	--
January 2021	Boeing submitted a Notification of Project Coordinator Change to Ecology making Todd Swoboda the coordinator again	--
August 31, 2021	Boeing submitted Draft Revised Remedial Investigation (RI) Report to Ecology	--
February 24, 2022	Ecology provided comments to Boeing via email on the 2021 Draft Revised Remedial Investigation (RI) Report	--
June 1, 2022	Ecology provided comments in, response to a May 11, 2022 meeting, to Boeing via email on the 2021 Draft Revised Remedial Investigation (RI)Report. The comment letter included Ecology's request for Boeing to submit a Work Plan for additional data collection to support the FS.	--

Notes:

MTCA Model Toxic Control Act
RIWP- Remedial Investigations Work Plan
TSD- Treatment, Storage & Disposal
VOCs- volatile organic compound
TPH- Total petroleum hydrocarbons
ppm- parts per million
PAHs- polucyclic aromatic hydrocarbons
RCRA- Resources Conservation and Recovery Act
RFA- RCRA facility assessment
BTEX- Benzene, toluene, ethylbenzene, xylenes
µg/kg - micrograms per kilogram
mg/kg- milligrams per kilograms
bgs- below ground surface
EPA- US Environmental Protection Agency
KSC- Kent Space Center
UST- Underground storage tank
PCBs- polychlorinated biphenyls

Table 4

Water Level Elevations

Remedial Investigation
Boeing Kent Space Center

Location Name	Measuring Point Elevation (feet)	Event Date	Depth to Water Elevation (feet)	Water Elevation (feet)
MW-1	29.59	5/3/2017	8.30	21.29
		9/28/2017	12.99	16.60
		10/24/2018	13.24	16.35
		3/14/2019	10.40	19.19
		6/18/2019	11.93	17.66
		8/7/2019	12.69	16.90
		9/10/2019	12.87	16.72
		10/22/2019	11.20	18.39
		11/18/2019	10.71	18.88
		12/17/2019	10.61	18.98
		12/23/2019	9.36	20.23
		1/7/2020	8.13	21.46
		3/6/2020	8.10	21.49
MW-2	28.58	5/3/2017	8.53	20.05
		9/28/2017	10.20	18.38
		10/24/2018	10.41	18.17
		3/14/2019	9.09	19.49
		6/18/2019	9.74	18.84
		8/7/2019	9.95	18.63
		9/10/2019	10.09	18.49
		10/22/2019	9.86	18.72
		11/18/2019	9.69	18.89
		12/17/2019	9.65	18.93
		12/23/2019	9.15	19.43
		1/7/2020	8.70	19.88
		3/6/2020	8.51	20.07
MW-3	28.47	5/3/2017	6.11	22.36
		9/28/2017	8.96	19.51
		10/24/2018	9.03	19.44
		3/14/2019	6.89	21.58
		6/18/2019	8.32	20.15
		8/7/2019	8.63	19.84
		9/10/2019	8.71	19.76
		10/22/2019	7.98	20.49
		11/18/2019	7.89	20.58
		12/17/2019	7.46	21.01
		12/23/2019	5.22	23.25
		1/7/2020	5.00	23.47
		3/6/2020	6.35	22.12
MW-4	28.86	5/3/2017	6.12	22.74
		9/28/2017	8.59	20.27
		10/24/2018	8.62	20.24
		3/14/2019	6.92	21.94
		6/18/2019	8.32	20.54
		8/7/2019	8.50	20.36
		9/10/2019	8.39	20.47
		10/22/2019	7.44	21.42
		11/18/2019	7.57	21.29
		12/17/2019	7.30	21.56
		12/23/2019	5.99	22.87
		1/7/2020	5.91	22.95
		3/6/2020	6.29	22.57
		6/2/2020	7.29	21.57

Table 4
Water Level Elevations
Remedial Investigation
Boeing Kent Space Center

Location Name	Measuring Point Elevation (feet)	Event Date	Depth to Water Elevation (feet)	Water Elevation (feet)
MW-5	29.83	5/3/2017	6.30	23.53
		9/28/2017	8.83	21.00
		10/24/2018	8.24	21.59
		3/14/2019	6.38	23.45
		6/18/2019	7.72	22.11
		8/7/2019	8.16	21.67
		9/10/2019	8.30	21.53
		10/22/2019	7.41	22.42
		11/18/2019	7.43	22.40
		12/17/2019	7.44	22.39
		12/23/2019	6.42	23.41
		1/7/2020	6.04	23.79
		3/6/2020	5.26	24.57
		6/2/2020	6.55	23.28
		12/7/2020	6.44	23.39
		6/9/2021	7.28	22.55
		10/28/2021	9.85	19.98
MW-6	29.17	5/3/2017	7.44	21.73
		9/28/2017	11.74	17.43
		10/24/2018	11.79	17.38
		3/14/2019	9.00	20.17
		6/18/2019	10.65	18.52
		8/7/2019	11.45	17.72
		9/10/2019	11.64	17.53
		10/22/2019	9.89	19.28
		11/18/2019	9.81	19.36
		12/17/2019	9.60	19.57
		12/23/2019	6.71	22.46
		1/7/2020	6.35	22.82
	29.68	3/6/2020	7.86	21.82
		6/2/2020	9.48	20.20
		12/7/2020	9.26	20.42
		12/11/2020	9.02	20.66
		6/9/2021	9.82	19.86
		10/28/2021	11.60	18.08
MW-7	27.92	5/3/2017	6.77	21.15
		9/28/2017	11.01	16.91
		10/24/2018	11.11	16.81
		3/14/2019	8.41	19.51
		6/18/2019	9.98	17.94
		8/7/2019	10.89	17.03
		9/10/2019	10.69	17.23
		10/22/2019	8.75	19.17
		11/18/2019	8.89	19.03
		12/17/2019	8.71	19.21
		12/23/2019	6.02	21.90
		1/7/2020	6.00	21.92
	28.26	3/6/2020	6.97	21.29
		6/2/2020	8.35	19.91
		12/7/2020	8.46	19.80
		12/11/2020	8.12	20.14
		6/9/2021	8.73	19.53
		10/28/2021	9.26	19.00

Table 4
Water Level Elevations
Remedial Investigation
Boeing Kent Space Center

Location Name	Measuring Point Elevation (feet)	Event Date	Depth to Water Elevation (feet)	Water Elevation (feet)
MW-8	28.08	6/2/2020	8.06	20.02
		12/7/2020	8.12	19.96
		12/11/2020	7.93	20.15
		6/9/2021	8.44	19.64
		10/28/2021	8.73	19.35
MW-9	29.6	6/2/2020	9.70	19.90
		12/7/2020	9.69	19.91
		12/11/2020	9.50	20.10
		6/9/2021	10.05	19.55
		10/28/2021	10.82	18.78
MW-10	29.12	6/2/2020	6.75	22.37
		12/7/2020	5.52	23.60
		6/9/2021	6.20	22.92
		10/28/2021	5.69	23.43
MW-11	28.87	6/9/2021	9.52	19.35
		10/28/2021	9.55	19.32
MW-12	26.85	6/9/2021	7.40	19.45
		10/28/2021	7.83	19.02
SG-1	16.78	8/7/2019	0.64	17.42
		9/10/2019	1.62	18.40
		10/22/2019	4.6	21.38
		11/18/2019	3.05	19.83
		12/17/2019	3.19	19.97
		12/23/2019	5.65	22.43
		1/7/2020	4.5	21.28
		3/6/2020	4.05	20.83
		6/2/2020	3.2	19.98
		12/7/2020	3.2	19.98
		12/11/2020	--	20.03
		6/9/2021	3.00	19.78
		10/28/2021	3.45	20.23
SG-2	17.34	8/7/2019	0.48	17.82
		9/10/2019	1.59	18.93
		10/22/2019	2.35	19.69
		11/18/2019	1.05	18.39
		12/17/2019	1.0	18.34
		12/23/2019	--[1]	23.79
		1/7/2020	3.5	20.84
		3/6/2020	2.2	19.54
		6/2/2020	1.3	18.64
		12/7/2020	1.1	18.44
		6/9/2021	0.50	17.84
		10/28/2021	--[4]	--[4]
SG-3	19.79	8/7/2019	0.58	20.37
		9/10/2019	2.5	22.29
		10/22/2019	2.2	21.99
		11/18/2019	1.15	20.94
		12/17/2019	1.25	21.04
		12/23/2019	3.76	23.55
		1/7/2020	2.98	22.77
		3/6/2020	1.82	21.61
		6/2/2020	1.3	21.09
		12/7/2020	1.05	20.84
		6/9/2021	0.00	19.79
		10/28/2021	2.00	21.79
City of Kent Pond[3]		12/11/2020	--	20.63
		6/8/2021	--	19.83

Table 4

Water Level Elevations

Remedial Investigation
Boeing Kent Space Center

Location Name	Measuring Point Elevation (feet)	Event Date	Depth to Water Elevation (feet)	Water Elevation (feet)
Temporary Borings[2]				
NDP-1	27.35	6/8/2020	8.22	19.13
NDP-2	27.25	6/8/2020	10	17.25
		12/11/2020	--	20.11
NDP-3	27.19	6/8/2020	10.3	16.89
		12/11/2020	--	20.13
NDP-4	29.4	6/8/2020	10.1	19.3
		12/11/2020	--	20.56

Notes:

Measuring point = top of casing for wells
Datum= NAVD88
-- = not available

1. No Measurement recorded. SG-2 underwater during this round of data collection surface water elevation at least 23.79' as top of surveyed staff gauge was fully submerged.
2. Measurements collected at temporarily screened borings not intended for use in calculating gradient.
3. City of Kent Pond water level surface elevation collected at edge of water at south central bank of pond.

Table 5
Groundwater Flow Estimations
Remedial Investigation
Boeing Kent Space Center

Quarter	**Well Pair**		**Head difference (ft)**	**Distance (ft)**	**Estimated Horizontal Hydraulic Gradient (i)**	Estimated Horizontal Groundwater Velocity (V)=(ft/day) (Using K = 28.3 feet/day)	**Estimated Horizontal Groundwater Velocity** (V)=(ft/day) (Using K = 2.83 ft/day
					Magnitude		
May-17	MW-1	MW-6	0.44	1016	4.33E-04	0.049	0.005
	MW-1	MW-3	1.07	1712	6.3E-04	0.071	0.007
	MW-1	MW-4	1.45	2196	6.6E-04	0.075	0.007
	MW-1	MW-5	2.24	1997	1.1E-03	0.127	0.013
May 2017 Average						**0.080**	**0.008**
September-17	MW-1	MW-6	0.83	1016	8.2E-04	0.093	0.009
	MW-1	MW-3	2.91	1712	1.7E-03	0.193	0.019
	MW-1	MW-4	3.67	2196	1.7E-03	0.189	0.019
	MW-1	MW-5	4.4	1997	2.2E-03	0.250	0.025
September 2017 Average						**0.181**	**0.018**

Notes:

Hydraulic values estimated based on literature values for silty sands.

Average effective porosity	0.250		n_e	
Average hydraulic conductivity	0.010	cm/s	K	0.01 cm/sec=28.3 ft/day
	0.001	cm/s	K	0.001 cm/sec=2.83 ft/day

$V=Ki/n_e$

Table 6
Groundwater Quality Field Parameters
Remedial Investigation
Boeing Kent Space Center

Site ID	Date	Depth (ft)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Turbidity (NTU)
MW-1	5/4/2017	11-16	6.35	1092	0.46	-18.6	11.5
	6/19/2019		6.5	1269	0.11	37.4	3.07
	9/20/2019		6.63	1380	0	-118	0.04
	12/18/2019		6.53	1408	0.15	-132	4.37
	3/3/2020		6.61	1415	0.15	-117.2	12.2
MW-2	5/3/2017	6.9-11.9	6.58	608	0.29	7.5	9.6
	6/19/2019		6.56	697	0.1	5.6	0.02
	9/20/2019		6.69	794	0	-136	0.37
	12/18/2019		6.61	809	0.18	-142	6.14
	3/5/2020		6.65	638	0.23	-93.1	5.45
MW-3	5/3/2017	7.7-12.7	6.77	149	0.12	-8.1	2.6
	6/19/2019		6.66	261	0.09	34.8	0.02
	9/20/2019		6.86	294	0	-104	1.66
	12/17/219		6.73	290.6	0.21	-112	2.92
	3/4/2020		6.73	281.5	0.14	-92.1	6.22
MW-4	5/3/2017	7.7-12.7	6.81	310	1.52	-9.5	15.8
	6/19/2019		6.68	435	0.09	13.5	5.12
	9/23/2019		6.84	550	0	-147	9.2
	12/17/2019		6.76	507	0.23	-142	20.5
	3/5/2020		6.87	382	0.13	-147.8	2.4
	6/2/2020		6.73	422	0.2	-128	5
MW-5	5/3/2017	10.2-15.2	6.46	407	1.8	4	11.4
	6/19/2019		6.49	401	0.27	74.9	6.21
	9/23/2019		6.64	430	0	-6	1.04
	12/17/2019		6.52	564	0.52	40.1	32.8
	3/4/2020		6.55	510	0.56	-60.5	5.58
	6/2/2020		6.41	395	0.95	16.5	7.02
	12/8/2020		6.54	441	0.83	7	10
MW-6	5/4/2017	8.7-13.7	6.2	397	0.6	-6.3	14.3
	6/19/2019		6.32	371	0.08	71.5	15
	9/20/2019		6.62	560	0	-79	4.74
	12/18/2019		6.39	549	0.18	-42.2	10.8
	3/4/2020		6.51	620	0.16	-28.6	8.96
	6/3/2020		6.7	768	0.34	-135	--
	12/9/2020		6.5	6069	0.36	-126	6.74

Table 6
Groundwater Quality Field Parameters

Remedial Investigation
Boeing Kent Space Center

Site ID	Date	Depth (ft)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Turbidity (NTU)
MW-7	5/4/2017	8.8-13.8	6.5	483	1.28	-5.1	9.8
	6/19/2019		6.6	544	0.09	51.9	13.1
	9/19/2019		6.71	704	0	-136	5.4
	12/18/2019		6.68	673	0.18	-138	14.2
	3/4/2020		6.76	628	0.27	-135.2	13.8
	6/3/2020		6.78	495	0.19	-149	4.09
	12/8/2020		6.67	607	0.32	-102.5	7.5
	6/10/2021		6.71	498	0.09	-59.2	7.49
	10/28/2021		6.79	269	0.17	-105.1	3.62
MW-8	6/3/2020	7-12	6.43	487	1.14	-57.3	--
	12/9/2020		6.58	680	0.2	-57.6	3.25
	6/10/2021		6.64	745	0.15	-67.8	4.53
	10/28/2021		6.62	373	0.15	-90	6.4
MW-9	6/3/2020	10-15	6.43	874	0.41	-35.8	3.09
	12/9/2020		6.53	1046	0.2	-110.7	4.7
	6/10/2021		6.51	1249	0.07	-65.8	7.15
	10/28/2021		6.56	566	0.14	-69.8	3.33
MW-10	6/2/2020	10-15	6.56	315	0.35	-29.6	4.7
	12/8/2020		6.68	261	0.17	-21.3	1.56
MW-11	6/10/2021	10-15	6.31	780	0.28	-5	5
	10/28/2021		6.56	423	0.31	12.1	2.31
MW-12	6/10/2021	10-15	6.16	255	2.4	73	8
	10/28/2021		6.55	210	2.3	76.9	2.3

Table 6
Groundwater Quality Field Parameters
Remedial Investigation
Boeing Kent Space Center

Site ID	Date	Depth (ft)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Turbidity (NTU)
NDP-1	6/8/2020	8-13	7.2	298	--	--	210
	12/11/2020	7-12	6.33	328	0.81	-35.7	44
NDP-2	6/8/2020	8-13	7.3	157	--	--	357
	12/10/2020	7-12	5.98	33.2	4.89	68.6	180
	12/11/2020	15-19	6.62	203	0.61	-105	210
NDP-3	6/8/2020	8-13	7.2	210	--	--	118
	12/10/2020	7-12	6.77	36	0.5	-621	67.8
NDP-4	6/8/2020	9-14	7.4	975	--	--	105
	12/10/2020	7-12	6.61	851	0.4	-118.9	294
	12/11/2020	17-21	6.46	468	0.34	-106	231
SB-1	1/24/2017	11-15	6.6	347	--	--	178
SB-2	1/24/2017	11-15	6.6	292	--	--	37.3
SB-3	1/27/2017	8-12	6.91	92.5	--	--	234
SB-4	1/27/2017	8-12	6.46	105	--	--	21
SB-5	1/27/2017	10-14	6.93	77.5	--	--	74
SB-6	1/24/2017	8-12	6.6	386	--	--	468
SB-7	1/24/2017	10-14	6.44	389	--	--	455
SB-8	1/24/2017	8-12	6.23	458	--	--	290
SB-9	1/25/2017	8-12	6.73	137	--	--	27
SB-10	1/25/2017	11-15	6.7	286	--	--	20.8
SB-11	1/25/2017	11-15	6.7	312	--	--	87
SB-12	1/25/2017	11-15	6.62	315	--	--	280
SB-13	1/26/2017	8-12	6.9	126	--	--	136
SB-14	1/26/2017	11-15	6.5	142	--	--	1.6
SB-15	1/26/2017	11-15	6.6	135	--	--	482
SB-16	1/26/2017	11-15	6.38	148	--	--	38.4
SB-17	1/26/2017	9.5-13.5	7.21	93.6	--	--	578
SB-18	1/27/2017	11-15	6.48	125	--	--	37.1
SB-19	1/25/2017	10-14	6.96	219	--	--	151
SB-20	1/27/2017	10-14	6.68	121	--	--	291
SB-21	5/7/2018	10-15	6.5	628	3.2	-103.2	51.4
SB-22	5/7/2018	10-15	6.7	600	--	--	147
SB-23	5/7/2018	10-15	6.67	487	0.29	-132.3	16.1
SB-24	5/7/2018	9-14	6.61	503	--	--	113
SB-25	5/7/2018	10-15	6.57	495	--	--	136
SB-26	10/2/2018	10-15	6.8	502	0.58	-86.2	83
		20-24	6.73	570	0.16	-48	43.9
		29-33	6.32	691	0.57	-17.1	562
		38-42	6.73	1025	0.39	-39.6	622
SB-27	10/3/2018	12-17	6.78	545	0.23	-49.7	97.8
		22-26	7.05	416	0	-23.1	622
		31-35	7.09	1207	0	-39.1	579
		40-44	7.16	572	0.47	-43.1	454
SB-28	10/2/2018	14-18	6.85	763	3.45	12	21.5
		23-27	7.15	471	0.2	-32.3	227
		32-36	6.87	469	0.18	-37.6	846
SB-29	10/4/2018	10-15	6.81	878	0	-100.4	103
		20-23	6.81	1541	0.4	-68.8	630
		30-35	6.87	1558	0	-85	172
		37-41	7.28	1819	0.44	-87.2	841
SB-30	10/4/2018	10-15	6.93	316	1.98	-35.1	552
		25-29	6.96	722	0.23	-61.5	322
		34-38	7.1	639	0.08	-111.9	639

Table 6
Groundwater Quality Field Parameters
Remedial Investigation
Boeing Kent Space Center

Site ID	Date	Depth (ft)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)	Turbidity (NTU)
SB-31	10/5/2018	10-15	8.61	4227	0.49	-190	113
		20-24	8.32	424	0.22	-141.5	309
		29-33	7.62	707	0.46	-100.1	62
SB-32	2/25/2020	10-15	6.85	685	1.48	-26.4	553
		20-25	6.57	572	0.33	-96.5	366
SB-33	2/25/2020	10-15	6.58	666	0.19	-88.5	622
		20-25'	6.62	652	0.21	-123.6	640
SB-34	2/26/2020	10-15	6.65	730	0.1	-145.7	21.9
		20-25	6.68	600	0.8	-133	388

Notes:
uS/cm = microSiemens per centimeter
mg/L = milligrams per liter
mV = millivolts
NTU = nephelometric turbidity unit
-- = not available

Table 7
Groundwater Geochemistry
Remedial Investigation
Boeing Kent Space Center

Sample Date	Depth (ft. bgs)	Location ID	TOC (mg/L)	Chloride (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Sulfate (mg/L)	Sulfide (mg/L)	Alkalinity (mg/L)	TDS (mg/L)	Calcium (mg/L)	Ferric Iron (mg/L)	Ferrous Iron (mg/L)	Total Iron (mg/L)	Potassium (mg/L)	Sodium (mg/L)
5/4/2017	11-16	MW-1	--	--	0.1 UJ	--	1.4 J	--	-	--	--	--	4.5[1]	--	--	--
9/20/2019	11-16		64.6	65	0.10 U	2 UJ	1.0 U	2.0 U	489	701	115	10.0 U	106	97.8	3.41	57.8
9/20/2019	11-16 (dup)		65.1	65.3	0.10 U	2 UJ	1.0 U	2.0 U	491	678 J	110	10.0 U	107	93.7	3.17	55.3
3/3/2020	11-16		66	61.9 J	0.10 U	0.10 U	1.0 U	2.0 U	503 J	695	110	5.0 U	97.4	92.6	3.06	54.7
3/3/2020	11-16 (dup)		64.4	62 J	0.10 U	0.10 U	1.0 U	2.0 U	497 J	689	116	10.0 U	105	93.6	3.29	57.4
5/3/2017	6.9-11.9	MW-2	--	--	0.1 UJ	--	0.1 UJ	--	-	--	--	--	6.5[1]	--	--	--
9/20/2019	6.9-11.9		24.1	3.2	0.10 U	0.10 UJ	1.0 U	2.0 U	312	374	67.6	5.0 U	65.5	56.4	2.9	22.4
3/5/2020	6.9-11.9		19.2	2.8	0.10 U	0.10 U	1.0 U	2.0 U	275	338	57.4	5.0 U	63.8	60.6	2.33	17.7
5/3/2017	7.7-12.7	MW-3	--	--	0.1 UJ	--	0.1 UJ	--	-	--	--	--	4.5[1]	--	--	--
9/20/2019	7.7-12.7		10.4	3.6	0.10 U	0.10 UJ	1.0 U	2.0 U	122	196	28.2	1.0 U	15.7	14.8	1.5	8.34
3/4/2020	7.7-12.7		6.7	5.8	0.10 U	0.10 U	1.0 U	2.0 U	111	178	28.1	1.0 U	16.2	15	1.23	6.43
5/3/2017	7.7-12.7	MW-4	--	--	0.1 UJ	--	3.1 J	--	-	--	--	--	4.8[1]	--	--	--
9/23/2019	7.7-12.7		29.5	3.0	0.10 U	0.10 U	1.0 U	2.0 U	215	306	45.6	5.0 U	52.9	49.8	2.79 J	18.5
3/5/2020	7.7-12.7		17.1	2.8	0.10 U	0.10 U	1.0 U	2.0 U	153	257	35.4	2.0 U	33.3	32.1	1.48	10.7
5/3/2017	10.2-15.2	MW-5	--	--	1.6	--	36.7	--	-	--	--	--	1.5[1]	--	--	--
9/23/2019	10.2-15.2		2.5	2.4	0.15	0.10 U	25.0	2.0 U	223	288	38.9	0.5 U	3.08	3.32	4.7 J	34.4
3/4/2020	10.2-15.2		1.0 U	3	4.8	0.10 U	75	2.0 U	174	306	42.8	0.21 U	0.10 U	0.206 U	2.21	16.8
5/4/2017	8.7-13.7	MW-6	--	--	0.1 UJ	--	14.6 J	--	-	--	--	--	6[1]	--	--	--
9/20/2019	8.7-13.7		5.6	9.3	0.10 U	0.10 UJ	15.1	2.0 U	213	292	48.6	5.0 U	40.3	37.0	1.22	20.1
3/4/2020	8.7-13.7		13.5	9.8 J	0.10 U	0.10 U	18.4 J	2.0 U	243	338	56.9	5.0 U	45.4	42.8	0.949	17.6
5/4/2017	8.8-13.8	MW-7	--	--	0.1 UJ	--	1.2 J	--	-	--	--	--	4.3[1]	--	--	--
9/19/2019	8.8-13.8		27	5.9 J	0.10 U	0.10 UJ	1.0 U	2.0 U	292	359	54.7	5.0 U	46.5	40.4	1.58	31.1
3/4/2020	8.8-13.8		26.4	4.5	0.10 U	0.10 U	1.0 U	2.0 U	288	345	56	5.0 U	41.1	40	1.32	25.7
10/2/2018	10-15	SB-26	12.8	--	--	--	--	--	--	--	--	--	--	--	--	--
10/3/2018	12-17	SB-27	8.9	--	--	--	--	--	--	--	--	--	--	--	--	--
10/3/2018	23-27		4.0	--	--	--	--	--	--	--	--	--	--	--	--	--
10/3/2018	23-27 (dup)		4.0	--	--	--	--	--	--	--	--	--	--	--	--	--
10/4/2018	10-15	SB-29	33.6	--	--	--	--	--	--	--	--	--	--	--	--	--
10/4/2018	10-15	SB-30	21.2	--	--	--	--	--	--	--	--	--	--	--	--	--
10/5/2018	10-15	SB-31	7.0	--	--	--	--	--	--	--	--	--	--	--	--	--
7/18/2018	9.5-14.5	LAI44	17.22	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes and Abbreviations

1. Values recorded with field kit.

TOC = total organic carbon

-- not analyzed

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

mg/L = milligrams per liter

Table 8
Historical Investigations
Remedial Investigation
Boeing Kent Space Center

Date	Title	Author
8/1/1991	RCRA Facility Assessment PR/VSI	SAIC
8/26/1992	Building 18-62 Process Tank Line Subsurface Environmental Investigation Report	Groundwater Technology
11/4/1992	Closure Report, UST KS-3, Kent Space Center	Groundwater Technology
11/29/1993	Tanks Removal and Site Assessment, UST KS-1, Boeing Space Center	Groundwater Technology
9/3/1997	Letter from Ecoogy to Boeing RE: Ecology's Acceptance of Certification for Boeing Kent Space Center, Building 18-67 2000 Gallon Waste Jet Fuel UST	Ecology
9/1/1998	Closure Report, Building 18-59 Container Storage Area, Boeing Space Center	Tetra Tech
4/1/1999	Final Report, Soil and Groundwater Assessment, Former Jet Fuel UST Installation Area, Building 18-67, Boeing Space Center	Tetra Tech
1/30/2002	Phase I Environmental Site Assessment Report, Boeing Clearwater	Landau
6/5/2002	Phase II Environmental Site Assessment, Boeing Clearwater	Landau
11/13/2002	Indepenedent Remedial Action Report, Boeing Space Center, Building 18-62	Landau
7/10/2003	Letter from Roger Nye, Ecology, to Paul Johansen, Boeing RE: Independent Remedial Actions, Clearwater Property at the Boeing Space Center	Ecology
11/21/2003	Letter from Landau to Paul Johansen, Boeing, RE: Additional Groundwater Sampling and Analysis, Clearwater Property at The Boeing Company Space Center (WAD 061670766)	Landau
12/11/2003	Letter from Ecoogy to Boeing RE: Clearwater Property NFA	Ecology
11/30/2010	Report, Phase I Environnmental Assessment, Boeing Striker Property	Landau
12/6/2010	Technical Memo: Phase II Environmental Site Assessment Findings, Boeing Striker Property	Landau
4/29/2011	Supplemental Phase II Environmental Site Assessment Findings, Boeing Striker Property	Landau
7/15/2011	Phase II Environmental Site Assessment, Striker Property South, Boeing Space Center, 20403 68th Avenue South	Landau
9/2/2011	Indepenedent Remedial Action Report, Former Diesel Generator/Aboveground Storage Tank KSA-46 Area, Boeing Space Center	Landau
10/11/2011	Letter from Joe Flaherty, Boeing, to Byung Maeng, Ecology RE: Evaluation of Arsenic in Groundwater, Striker Property South, Boeing Space Center	Boeing
12/12/2011	Technical Memo: North Detention Pond Sampling Results, Boeing Striker Property	Landau
3/16/2012	Letter from Joe Flaherty, Boeing, to Byung Maeng, Ecology RE: Additional Evaluation of Arsenic in Groundwater, Boeing Space Center Area	Boeing
12/17/2012	Technical Memo: North Detention Pond/Tract X Excavation, Boeing Kent Space Center	Landau
11/18/2015	Underground Storage Tank Removal an Site Assessment Report, Kent Space Center	PBS
3/17/2016	Email from Nick Garson, Boeing, to Byung Maeng, Ecology, RE: Boeing Kent Space Center -Response to Ecology Request for Storm Sewer Sampling	Boeing
10/12/2016	Final RI Work Plan, Boeing Kent Space Center Facility	Landau
12/28/2017	Draft Remedial Investigation Report	DOF
2/19/2018	Remedial Investigation Report Addendum	DOF
1/25/2019	Phase I Environmental Site Assessment Boeing Kent Space Center Property	Landau
1/25/2019	Phase II Investigation Report Boeing Kent Space Center	Landau
4/11/2019	Remedial Investigations Data Gap memorandum	Boeing
5/20/2019	Remedial Investigation Data Gap Work Plan - Groundwater Conceptual Model	DOF
6/7/2019	RI Data Gap Work Plan - Building 18-28 PCB Soil Sampling	DOF
8/5/2019	Revised 2019 RI Data Gap Work Plan - Building 18-62 Vapor Intrusion Evaluation	DOF
8/9/2019	RI Data Gap Work Plan - SWMU 88/89 Sampling	DOF
10/14/2019	Demolition Materials Sampling and Management memorandum	Boeing
10/31/2019	2019 RI Data Gaps Work Plan - SWMU 88/89 Sampling Memorandum	DOF
11/25/2019	2019 RI Data Gaps Work Plan - Building 18-24 and 18-59	DOF
1/28/2020	2020 RI Data Gaps Supplemental Information - Building 18-62 & 18-63	DOF
4/7/2020	2020 Remaining RI Data Gaps Work Plan	DOF
4/22/2020	Soil Gas Investigation Report, Pacific Gateway at West Valley, 20403 68th Avenue South	Vertex
5/13/2020	2020 Remaining RI Data Gaps Work Plan and Addendum - North Detention Pond Area SAP	DOF
5/11/2020	Technical Memorandum: Kent Space Center Consolidation - 18-51 Water Tank Valve Unforseen Site Condition	DOF
5/15/2020	Technical Memorandum: Building 18-62 Vapor Intrusion Evaluation - Boeing Kent Space Center Facility	DOF
10/27/2020	Soil Gas Investigation Report, Pacific Gateway at West Valley, 20403 68th Avenue South	Vertex
11/19/2020	2020 Remaining RI Data Gaps Work Plan - Revised North Detention Pond Area Sampling and Analysis Plan	DOF
4/23/2021	RI Data Gaps Work Plan Addendum - North Detention Pond Area Monitoring Well Installation SAP	DOF
4/30/2021	Site-Wide and Regional Arsenic in Soil, Sediment , and Groundwater - Boeing Kent Space Center Memorandum	DOF

Table 9
Stormwater Conveyance System Solids Results
Remedial Investigation
Boeing Kent Space Center

Sample Date	Location	Sample Location ID	TPH (mg/kg)		Metals (mg/kg)										
			Diesel	Oil	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
		SMS Sediment Screening Level	**340**	**3600**	**14**	**--**	**2.1**	**72**	**400**	**360**	**0.66**	**26**	**11**	**0.57**	**3200**
RI Results															
12/20/2017	Manhole 20.237M	MH-20.237M	**428**	**2240**	**71.1**	--	**3.39**	**87.3**	**220**	**189**	**0.435**	**46.5**	27.3 U	**1.73 J**	**1200**
5/8/2019		MH-20.237M	INSUFFICIENT VOLUME												
12/20/2017	Manhole 20.236M	MH-20.236M	INSUFFICIENT VOLUME												
5/8/2019		MH-20.236M	INSUFFICIENT VOLUME												
12/20/2017	Manhole 16.12M	MH-16.12M	INSUFFICIENT VOLUME												
5/8/2019		MH-16.12M	INSUFFICIENT VOLUME												
12/20/2017	Manhole 15.10M	MH-15.10M	**534**	**2570**	**20.2**	--	**2.4**	**58.7**	**157**	**93.4**	**0.217**	**44.6**	11.4 U	**0.67 J**	**1390**
5/8/2019		MH-15.10M	INSUFFICIENT VOLUME												
5/4/2017	Outfall-North Detention Pond	OF-DP-0.3	**20.8**	**103**	**38.4**	--	**1.41**	**45.1**	**195**	**50.5**	**0.1721**	**35.2**	**1.59**	**0.29 J**	**415**
6/29/2017	Outfall-Mill Creek 20/20B	OF-20	**9.72**	**20.8**	**3.8**	--	**0.13**	**13.2**	**21.9**	**9.85**	**0.04481**	**11.4**	**0.71 J**	**0.05 J**	**44.1**
5/4/2017	Outfall- East Drainage Ditch 16	OF-16-0.3	**19.7**	**89**	**3.01**	--	**0.31**	**18.7**	**29.2**	**9.02**	0.02258 U	**15.7**	**0.94**	**0.08 J**	**109**
2018 Due Diligence															
7/20/2018	Southeast Ditch	BD1	6.17 U	12.3 U	**3.58**	**58.8**	0.12 U	**16.1**	**21.8**	**4.57**	**0.0515**	--	0.61 U	0.24 U	**34.1**
7/20/2018	Southeast Ditch	BD2	5.31 U	10.6 U	**2.53**	**41.8**	0.10 U	**11.1**	**16.5**	**2.69**	**0.0408**	--	0.52 U	0.21 U	**28.0**
Historical Offsite Sample Results															
Feb 2014	Off-Site	DT318	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb 2014		FS318	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb 2014		CS318	--	--	--	--	--	--	--	--	--	--	--	--	--
Historical Storm System Sample Results															
9/17/2002	Catch basin	CB 14.12C	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 14.7C	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 16.5C	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 20.156C	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 16.21C	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 16.19C	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 17.6C	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 20.169C	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 17.9C	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 18.13C	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011	North Detention Pond	NDP-1(0-0.5)	88 U	180 U	**21**	--	**1.7**	**49**	**295**	**132**	**0.33**	--	--	--	**400**
11/1/2011		NDP-2(0-1)	50 U	100 U	**10.1**	--	**0.7**	**21.3**	**63.4**	**27.8**	**0.06**	--	--	--	**147**
11/1/2011		NDP-2(1-2)	--	--	**5.2 J**	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-3(0-1)	50 U	100 U	**6.7**	--	**0.6**	**17.9**	**62.7**	**36.6**	**0.07**	--	--	--	**122**
11/1/2011		NDP-4(0-1)	50 U	100 U	**13.2**	--	**0.5**	**20.5**	**51.6**	**27.1**	**0.07**	--	--	--	**144**
11/1/2011		NDP-4(1-2)	--	--	**4.2**	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-5(0-1)	50 U	100 U	**7.6**	--	**0.2**	**19.5**	**40.4**	**15.8**	**0.07**	--	--	--	**67**
11/1/2011		NDP-5(1-2)	--	--	**5.8**	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-6(0-1)	50 U	100 U	**10.8**	--	**0.2**	**17**	**50.3**	**26.7**	**0.05**	--	--	--	**87**
11/1/2011		NDP-6(1-2)	--	--	**4**	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-7(0-1)	50 U	100 U	**6.6**	--	**0.3**	**17.4**	**45.7**	**14.2**	**0.09**	--	--	--	**65**
11/1/2011		NDP-8(0-1)	50 U	100 U	**6.4**	--	0.1 U	**20.3**	**42.3**	**12**	**0.05**	--	--	--	**57**
11/1/2011		NDP-9(0-1)	50 U	100 U	**5.9**	--	**0.2**	**15.7**	**30.6**	**66.8 J**	**0.04**	--	--	--	**62**
11/1/2011		NDP-10(0-1)	50 U	100 U	**7**	--	0.2 U	**17**	**30.7**	**9.8**	**0.05**	--	--	--	**54**
11/1/2011		NDP-11(0-1)	50 U	100 U	**6.7**	--	**0.2**	**16.7**	**29.4**	**88.3**	**0.05**	--	--	--	**50**
11/1/2011		NDP-12(0-1)	50 U	100 U	**5.7**	--	0.1 U	**22.4**	**20.5**	**7.3**	0.02 U	--	--	--	**40**

Notes and Abbreviations

Bolded values are detections

Grey Box indicates above most stringent screening level

TPH = Total petroleum hydrocarbons

cPAH = Carcinogenicpolycyclic Aromatic Hydrocarbons

TEQ = Toxicity Equivalence

Per SMS, total PAHs represents the sum of 1-methylnaphthalene, 2-methylnaphthalene , acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[a]pyrene, benzo[g,h,i]perylene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d] pyrene, naphthalene phenanthrene, pyrene, and total benzofluoranthenes [b+j+k]

PCBs = Polychlorinated Biphenyls

VOCs = Volatile Organic Compounds

SVOCs = Semi Volatile Organic Compounds

ug/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

-- not analyzed

Table 9
Stormwater Conveyance System Solids Results
Remedial Investigation
Boeing Kent Space Center

Sample Date	Location	Sample Location ID	PCBs (µg/kg)									
			Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs
		SMS Sediment Screening Level	--									110
RI Results												
12/20/2017	Manhole 20.237M	MH-20.237M	19.5 U	19.5 U	19.5 U	19.5 U	**84.6**	**199**	**71.7**	--	--	**355.3**
5/8/2019		MH-20.237M	51.1 U	51.1 U	51.1 U	51.1 U	51.1 U	**343**	**144 J**	51.1 U	51.1 U	**487 J**
12/20/2017	Manhole 20.236M	MH-20.236M	150 U	150 U	150 U	150 U	150 U	**1480**	**497**	--	--	**1977**
5/8/2019		MH-20.236M	114 U	114 U	114 U	114 U	114 U	**1470**	**391**	114 U	114 U	**1861**
12/20/2017	Manhole 16.12M	MH-16.12M	INSUFFICIENT VOLUME									
5/8/2019		MH-16.12M	393 U	393 U	393 U	393 U	393 U	**224 J**	393 U	393 U	393 U	**224 J**
12/20/2017	Manhole 15.10M	MH-15.10M	19.4 U	19.4 U	19.4 U	19.4 U	48.4 U	**126**	**80.8**	--	--	**206.8**
5/8/2019		MH-15.10M	52.3 U	52.3 U	52.3 U	52.3 U	52.3 U	**439**	**137**	52.3 U	52.3 U	**576**
5/4/2017	Outfall-North Detention Pond	OF-DP-0.3	19.5 U	19.5 U	19.5 U	19.5 U	19.5 U	**122**	**67.5**	--	--	**189.5**
6/29/2017	Outfall-Mill Creek 20/20B	OF-20	18.3 U	18.3 U	18.3 U	18.3 U	18.3 U	18.3 U	18.3 U	18.3 U	18.3 U	ND
5/4/2017	Outfall- East Drainage Ditch 16	OF-16-0.3	17.6 U	17.6 U	17.6 U	17.6 U	17.6 U	17.6 U	17.6 U	--	--	ND
2018 Due Diligence												
7/20/2018	Southeast Ditch	BD1	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	ND
7/20/2018	Southeast Ditch	BD2	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	ND
Historical Offsite Sample Results												
Feb 2014	Off-Site	DT318	--	--	--	--	--	--	--	--	--	**74.4**
Feb 2014		FS318	--	--	--	--	--	--	--	--	--	**51.8**
Feb 2014		CS318	--	--	--	--	--	--	--	--	--	**128**
Historical Storm System Sample Results												
9/17/2002	Catch basin	CB 14.12C	--	--	--	--	--	--	--	--	--	**1400**
9/17/2002		CB 14.7C	--	--	--	--	--	--	--	--	--	130 U
9/17/2002		CB 16.5C	--	--	--	--	--	--	--	--	--	**180**
9/17/2002		CB 20.156C	--	--	--	--	--	--	--	--	--	6 U
9/17/2002		CB 16.21C	--	--	--	--	--	--	--	--	--	ND
9/17/2002		CB 16.19C	--	--	--	--	--	--	--	--	--	14 U
9/17/2002		CB 17.6C	--	--	--	--	--	--	--	--	--	**320**
9/17/2002		CB 20.169C	--	--	--	--	--	--	--	--	--	**180**
9/17/2002		CB 17.9C	--	--	--	--	--	--	--	--	--	**66**
9/17/2002		CB 18.13C	--	--	--	--	--	--	--	--	--	**970**
11/1/2011	North Detention Pond	NDP-1(0-0.5)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-2(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-2(1-2)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-3(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-4(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-4(1-2)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-5(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-5(1-2)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-6(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-6(1-2)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-7(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-8(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-9(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-10(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-11(0-1)	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-12(0-1)	--	--	--	--	--	--	--	--	--	--

Notes and Abbreviations

Bolded values are detections

Grey Box indicates above most stringent screening level

TPH = Total petroleum hydrocarbons

cPAH = Carcinogenicpolycyclic Aromatic Hydrocarbons

TEQ = Toxicity Equivalence

Per SMS, total PAHs represents the sum of 1-methylnaphthalene, 2-methylnaphthalene , acenapht
benzo[a]pyrene, benzo[g,h,i]perylene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, in

PCBs = Polychlorinated Biphenyls

VOCs = Volatile Organic Compounds

SVOCs = Semi Volatile Organic Compounds

ug/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration
-- not analyzed

Table 9
Stormwater Conveyance System Solids Results
Remedial Investigation
Boeing Kent Space Center

Sample Date	Location	Sample Location ID	SVOCs (µg/kg)																		
			2-Methylnaphthalene	Acenaphthylene	Ace-naphthene	Anthra-cene	Dibenzo-furan	Naphth-alene	Phen-anthrene	Pyrene	Fluorene	Fluoranthene	Benzo(g,h,i) perylene	Benzo(a) anthracene	Benzo(a) pyrene	Indeno(1,2,3-cd) pyrene	Dibenzo(a,h)anthracene	Chrysene	Total Benzofluoranthenes	Total PAHs	cPAH TEQ using TEF
		SMS Sediment Screening Level	**--**	**--**	**--**	**--**	**200**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**17000**	**--**
RI Results																					
12/20/2017	Manhole 20.237M	MH-20.237M	**125 J**	136 U	136 U	136 U	**78.4 J**	**179**	**393**	**723**	136 U	**567**	**711**	**197**	**351**	**311**	**91.1 J**	**591**	**697**	**4936.1**	**416.8**
5/8/2019		MH-20.237M	INSUFFICIENT VOLUME																		
12/20/2017	Manhole 20.236M	MH-20.236M	INSUFFICIENT VOLUME																		
5/8/2019		MH-20.236M	INSUFFICIENT VOLUME																		
12/20/2017	Manhole 16.12M	MH-16.12M	INSUFFICIENT VOLUME																		
5/8/2019		MH-16.12M	INSUFFICIENT VOLUME																		
12/20/2017	Manhole 15.10M	MH-15.10M	**76.2 J**	144 U	144 U	144 U	144 U	**141 J**	**412**	**809**	144 U	**557**	**618**	**158**	**214**	**250**	144 U	**432**	**497**	**4164.2**	**259.1**
5/8/2019		MH-15.10M	INSUFFICIENT VOLUME																		
5/4/2017	Outfall-North Detention Pond	OF-DP-0.3	**4.99**	**5.01**	4.94 U	**3.92 J**	**3.43 J**	**9.02**	**23**	**41.7**	**3.57 J**	**38.1**	**61**	**13.8**	**21**	**29.4**	**8.47**	**42.6**	**66.6**	**372.2**	**26.6**
6/29/2017	Outfall-Mill Creek 20/20B	OF-20	4.87 U	4.87 U	**2.46 J**	4.87 U	4.87 U	**3.42 J**	**10.6**	**14.6**	**3.37 J**	**13.8**	**5.53**	**5.5**	**5.11**	**4.06 J**	4.87 U	**9.01**	**9.95**	**87.4**	**6.6**
5/4/2017	Outfall- East Drainage Ditch 16	OF-16-0.3	**2.38 J**	4.72 U	4.72 U	**6.04**	4.72 U	4.72 U	**33.6**	**101**	**3.14 J**	**113**	**87.9**	**47.6**	**62.3**	**70.5**	**16.8**	**97.3**	**158**	**799.6**	**76.8**
2018 Due Diligence																					
7/20/2018	Southeast Ditch	BD1	4.74 U	4.74 U	4.74 U	4.74 U	4.74 U	4.74 U	**8.13**	**12.40**	4.74 U	**15.40**	**11.30**	**5.26**	**7.29**	**16.30**	**11.70**	**10.50**	**21.10**	**119.4**	NC
7/20/2018	Southeast Ditch	BD2	4.81 U	4.74 U	4.81 U	4.81 U	4.81 U	4.81 U	**4.96**	**5.67**	4.81 U	**6.04**	**5.28**	4.81 U	4.81 U	**12.5**	**10.8**	**4.88**	9.63 U	**50.1**	NC
Historical Offsite Sample Results																					
Feb 2014	Off-Site	DT318	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**5117**
Feb 2014		FS318	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**2878**
Feb 2014		CS318	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**8396**
Historical Storm System Sample Results																					
9/17/2002	Catch basin	CB 14.12C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 14.7C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 16.5C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 20.156C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 16.21C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 16.19C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 17.6C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 20.169C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 17.9C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/17/2002		CB 18.13C	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011	North Detention Pond	NDP-1(0-0.5)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-2(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-2(1-2)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-3(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-4(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-4(1-2)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-5(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-5(1-2)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-6(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-6(1-2)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-7(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-8(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-9(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-10(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-11(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2011		NDP-12(0-1)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes and Abbreviations

Bolded values are detections

Grey Box indicates above most stringent screening level

TPH = Total petroleum hydrocarbons

cPAH = Carcinogenicpolycyclic Aromatic Hydrocarbons

TEQ = Toxicity Equivalence

Per SMS, total PAHs represents the sum of 1-methylnaphthalene, 2-methylnaphthalene , acenapht
benzo[a]pyrene, benzo[g,h,i]perylene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, in

PCBs = Polychlorinated Biphenyls

VOCs = Volatile Organic Compounds

SVOCs = Semi Volatile Organic Compounds

ug/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration
-- not analyzed

Table 10

Industrial Stormwater Sampling Results[3,4]

Remedial Investigation

Boeing Kent Space Center

Quarterly Date	1Q2020			2Q2020			3Q2020			4Q2020				1Q2021		
Outfall ID	**16**	**20C**	**20D**	**16**	**20C**	**20D**	**16**	**20C**	**20d**	**16**	**20C**	**20D**	**SP-18**	**SP-18**	**20C**	**20D**
Dissolved Zinc (ug/L)	36.2	31.5	16.0	127	150	18.2	212	nd	nd	7.74	17.9	14.8	2.06	5.22	29.2	12.1
Dissolved Copper (ug/L)	--	--	--	--	15.3	--	--	--	--	0.732	1.58	0.634	10.4	2.13	1.49	--
Total Zinc (ug/L)	--	--	--	--	--	--	--	--	--	--	--	--	18.0	50.1	--	--
Total Copper (ug/L)	--	--	--	--	--	--	--	--	--	--	--	--	3.88	10.9	--	--
Fecal Coliforrm (cfu/100 mL)	--	--	--	--	--	--	--	--	--	7	--	--	140	20	--	--
E. Coli (cfu/100mL)	--	--	--	--	--	--	--	--	--	1	--	--	44	24	--	--
TPH-Dx (mg/L)	--	--	--	--	--	--	--	--	--	--	--	--	0.165	<0.100	--	--
Oil Sheen	--	--	--	--	--	--	--	--	--	--	--	--	none	none	--	--

Notes:

1. -- = Parameter not measured
2. nd = no discharge
3. Starting in 4Q2020, the stormwater sampling points were modifed due to redevelopment activities.
4. Turbidity and pH not included.

Table 11
Sampling Information - Groundwater

Remedial Investigation
Boeing Kent Space Center

Date	Area	Site ID	Sample Depth (feet)	Temporary Boring/ Monitoring Well	TPH-G	TPH-D	TPH-O	mineral oil	BTEX	VOC	SVOCs/ PAHs	1,4-Dioxane	TOC	PCBs	Metals											Geochemistry
															Arsenic	Barium	Chromium	Silver	Copper	Lead	Nickel	Zinc	Cadmium	Selenium	Mercury	
Monitoring Wells																										
5/4/2017	north	MW-1	11-16	monitoring well	--	X	X	--	--	--	--	--	--	--	X	--	X	X	X	X	X	X	X	X	X	X
11/14/2017			11-16	monitoring well	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/19/2019			11-16	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
9/20/2019			11-16	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12/18/2019			11-16	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
3/3/2020			11-16	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5/3/2017	northeast	MW-2	6.9-11.9	monitoring well	--	X	X	--	--	--	--	--	--	--	X	--	X	X	X	X	X	X	X	X	X	X
11/14/2017			6.9-11.9	monitoring well	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/18/2019			6.9-11.9	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
9/20 &10/2/19			6.9-11.9	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12/18/2019			6.9-11.9	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
3/5/2020			6.9-11.9	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5/3/2017	east	MW-3	7.7-12.7	monitoring well	--	X	X	--	--	--	--	--	--	--	X	--	X	X	X	X	X	X	X	X	X	X
11/14/2017			7.7-12.7	monitoring well	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/18/2019			7.7-12.7	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
9/20 &10/2/19			7.7-12.7	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12/17/2019			7.7-12.7	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
3/4/2020			7.7-12.7	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5/3/2017	south	MW-4	7.7-12.7	monitoring well	--	X	X	--	--	--	--	--	--	--	X	--	X	X	X	X	X	X	X	X	X	X
11/14/2017			7.7-12.7	monitoring well	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/18/2019			7.7-12.7	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
9/23/2019			7.7-12.7	monitoring well	X	X	X		X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12/17/2019			7.7-12.7	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
3/5/2020			7.7-12.7	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6/2/2020			7.7-12.7	monitoring well	--	--	--	--	X	X	--	X	--	--	X	X	--	--	--	--	--	--	--	--	--	--
5/3/2017	southwest	MW-5	10.2-15.2	monitoring well	--	X	X	--	--	--	--	--	--	--	X	--	X	X	X	X	X	X	X	X	X	X
11/14/2017			10.2-15.2	monitoring well	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/18/2019			10.2-15.2	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
9/23/2019			10.2-15.2	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12/17/2019			10.2-15.2	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
3/4/2020			10.2-15.2	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6/2/2020			10.2-15.2	monitoring well	--	--	--	--	--	--	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--
12/8/2020			10.2-15.2	monitoring well	--	--	--	--	--	--	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--

Table 11
Sampling Information - Groundwater
Remedial Investigation
Boeing Kent Space Center

Date	Area	Site ID	Sample Depth (feet)	Temporary Boring/ Monitoring Well	TPH-G	TPH-D	TPH-O	mineral oil	BTEX	VOC	SVOCs/ PAHs	1,4-Dioxane	TOC	PCBs	Metals											Geochemistry
															Arsenic	Barium	Chromium	Silver	Copper	Lead	Nickel	Zinc	Cadmium	Selenium	Mercury	
5/4/2017	west	MW-6	8.7-13.7	monitoring well	--	X	X	--	--	--	--	--	--	--	X	--	X	X	X	X	X	X	X	X	X	X
11/14/2017			8.7-13.7	monitoring well	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/19/2019			8.7-13.7	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
9/20 &10/2/19			8.7-13.7	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12/18/2019			8.7-13.7	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
3/4/2020			8.7-13.7	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6/3/2020			8.7-13.7	monitoring well	--	--	--	--	--	--	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--
12/9/2020			8.7-13.7	monitoring well	--	--	--	--	--	--	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--
5/4/2017	northwest	MW-7	8.8-13.8	monitoring well	--	X	X	--	--	--	--	--	--	--	X	--	X	X	X	X	X	X	X	X	X	X
11/14/2017			8.8-13.8	monitoring well	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
06/19/2019			8.8-13.8	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
9/19/2019			8.8-13.8	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12/18/2019			8.8-13.8	monitoring well	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
3/4/2020			8.8-13.8	monitoring well	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6/3/2020			8.8-13.8	monitoring well	--	--	--	--	--	--	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--
12/8/2020			8.8-13.8	monitoring well	--	--	--	--	--	--	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--
6/10/2021			8.8-13.8	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
10/28/2021			8.8-13.8	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
6/3/2020	northwest	MW-8	7.0-12.0	monitoring well	--	X	X	--	X	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	--
12/9/2020			7.0-12.0	monitoring well	--	X	X	--	X	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	--
6/10/2021			7.0-12.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
10/28/2021			7.0-12.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
6/3/2020	northwest	MW-9	10.0-15.0	monitoring well	--	X	X	--	X	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	--
12/9/2020			10.0-15.0	monitoring well	--	X	X	--	X	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	--
6/10/2021			10.0-15.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
6/10/2021			10.0-15.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
10/28/2021			10.0-15.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
6/2/2020	south	MW-10	10.0-15.0	monitoring well	--	X	X	--	X	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	--
12/8/2020			10.0-15.0	monitoring well	--	X	X	--	X	X	X	X	--	X	X	X	X	X	X	X	X	X	X	X	X	--
6/10/2021			10.0-15.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
6/10/2021	northwest	MW-11	10.0-15.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
10/28/2021			10.0-15.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
6/10/2021	northwest	MW-12	12.0-17.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--
10/28/2021			12.0-17.0	monitoring well	--	--	--	--	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--	--

Table 11
Sampling Information - Groundwater
Remedial Investigation
Boeing Kent Space Center

Date	Area	Site ID	Sample Depth (feet)	Temporary Boring/ Monitoring Well	TPH-G	TPH-D	TPH-O	mineral oil	BTEX	VOC	SVOCs/ PAHs	1,4-Dioxane	TOC	PCBs	Metals											Geochemistry
															Arsenic	Barium	Chromium	Silver	Copper	Lead	Nickel	Zinc	Cadmium	Selenium	Mercury	
Temporary Borings																										
1/24/2017	SWMU 88/89	SB-1	11-15	temporary boring	--	--	--	--	--	--	--	--	--	--	X	--	X	X	X	X	X	X	--	--	--	--
1/24/2017	SWMU 88/89	SB-2	11-15	temporary boring	--	--	--	--	--	--	--	--	--	--	X	--	X	X	X	X	X	X	--	--	--	--
1/27/2017	AOC-1/3	SB-3	8-12	temporary boring	--	X	X	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
1/27/2017	AOC-1/3	SB-4	8-12	temporary boring	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/27/2017	AOC-1/3	SB-5	10-14	temporary boring	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/24/2017	AOC-2/18-24/18-35	SB-6	8-12	temporary boring	--	X	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/24/2017	AOC-2/18-24/18-35	SB-7	10-14	temporary boring	--	X	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/24/2017	AOC-2/18-24/18-35	SB-8	8-12	temporary boring	--	X	--	--	X	X	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
1/25/2017	18-62 Milling	SB-9	8-12	temporary boring	--	X	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/25/2017	18-62 Milling	SB-10	11-15	temporary boring	--	X	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/25/2017	18-62 Milling	SB-11	11-15	temporary boring	--	X	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/25/2017	18-62 Milling	SB-12	11-15	temporary boring	--	X	--	X	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
1/26/2017	18-67 UST	SB-13	8-12	temporary boring	X	X	--	--	X	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
1/26/2017	KS-1	SB-14	11-15	temporary boring	--	X	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
1/26/2017	KS-1	SB-15	11-15	temporary boring	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/26/2017	KS-1	SB-16	11-15	temporary boring	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/26/2017	KS-3	SB-17	9.5-13.5	temporary boring	X	--	--	--	X	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
1/27/2017	KS-3	SB-18	11-15	temporary boring	X	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/25/2017	KS-3	SB-19	10-14	temporary boring	X	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/27/2017	KS-3	SB-20	10-14	temporary boring	X	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB-21	10-15	temporary boring	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB-22	10-15	temporary boring	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB-23	10-15	temporary boring	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB-24	9-14	temporary boring	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB-25	10-15	temporary boring	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
10/2/2018	AOC-2/18-24/18-35	SB-26	10-15	temporary boring	--	X	X	--	X	X	X	--	X	--	X	--	--	--	X	--	X	X	--	--	--	X
10/2/2018	AOC-2/18-24/18-35		20-24	temporary boring	--	X	X	--	X	X	X	--	--	--	X	--	--	--	X	--	X	X	--	--	--	--
10/2/2018	AOC-2/18-24/18-35		29-33	temporary boring	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/2/2018	AOC-2/18-24/18-35		38-42	temporary boring	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/3/2018	AOC-2/18-24/18-35	SB-27	12-17	temporary boring	--	X	X	--	X	X	X	--	X	--	X	--	--	--	X	--	X	X	--	--	--	X
10/3/2018	AOC-2/18-24/18-35		22-26	temporary boring	--	X	X	--	X	X	X	--	--	--	X	--	--	--	X	--	X	X	--	--	--	X
10/3/2018	AOC-2/18-24/18-35		31-35	temporary boring	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/3/2018	AOC-2/18-24/18-35		40-44	temporary boring	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 11
Sampling Information - Groundwater
Remedial Investigation
Boeing Kent Space Center

Date	Area	Site ID	Sample Depth (feet)	Temporary Boring/ Monitoring Well	TPH-G	TPH-D	TPH-O	mineral oil	BTEX	VOC	SVOCs/ PAHs	1,4-Dioxane	TOC	PCBs	Metals											Geochemistry
															Arsenic	Barium	Chromium	Silver	Copper	Lead	Nickel	Zinc	Cadmium	Selenium	Mercury	
10/2/2018	AOC-2/18-24/18-35	SB-28	14-18	temporary boring	--	X	X	--	X	X	X	--	--	--	X	--	--	--	X	--	X	X	--	--	--	--
10/3/2018	AOC-2/18-24/18-35		23-27	temporary boring	--	X	X	--	X	X	X	--	X	--	X	--	--	--	X	--	X	X	--	--	--	--
10/4/2018	18-63	SB-29	10-15	temporary boring	--	X	X	--	X	X	--	--	X	--	X	--	--	--	X	--	X	X	--	--	--	X
10/4/2018	18-63		20-25	temporary boring	--	X	X	--	X	X	--	--	--	--	X	--	--	--	X	--	X	X	--	--	--	--
10/4/2018	18-63		30-35	temporary boring	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
10/4/2018	18-63		37-41	temporary boring	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
10/4/2018	18-63	SB-30	10-15	temporary boring	--	X	X	--	X	X	--	--	X	--	X	--	--	--	X	--	X	X	--	--	--	X
10/4/2018	18-63		25-29	temporary boring	--	X	X	--	X	X	--	--	--	--	X	--	--	--	X	--	X	X	--	--	--	--
10/5/2018	18-63		34-38	temporary boring	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
10/5/2018	18-63	SB-31	10-15	temporary boring	--	X	X	--	X	X	--	--	X	--	X	--	--	--	X	--	X	X	--	--	--	X
10/5/2018	18-63		20-24	temporary boring	--	X	X	--	X	X	--	--	--	--	X	--	--	--	X	--	X	X	--	--	--	--
10/5/2018	18-63		29-33	temporary boring	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/5/2018	18-63		38-42	temporary boring	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/25/2020	NDP/18-35	SB-32	10-15	temporary boring	--	--	--	--	X	X	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
2/25/2020	NDP/18-35		20-25	temporary boring	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/25/2020	NDP/18-35	SB-33	10-15	temporary boring	--	--	--	--	X	X	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
2/25/2020	NDP/18-35		20-25	temporary boring	--	--	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/26/2020	NDP/18-35	SB-34	10-15	temporary boring	X	X	X	--	X	X	X	--	--	X	X	--	--	--	--	--	--	--	--	--	--	--
2/26/2020	NDP/18-35		20-25	temporary boring	X	X	X	--	X	X	X	--	--	X	--	--	--	--	--	--	--	--	--	--	--	--
6/8/2020	NDP	NDP-1	8-13	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--
6/8/2020	NDP	NDP-2	8-13	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--
6/8/2020	NDP	NDP-3	8-13	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--
6/8/2020	NDP	NDP-4	9-14	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--
12/11/2020	NDP	NDP-1	7-12	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--
12/10/2020	NDP	NDP-2	7-12	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--
12/11/2020	NDP	NDP-2	15-19	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--
12/10/2020	NDP	NDP-3	7-12	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--
12/10/2020	NDP	NDP-4	7-12	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--
12/11/2020	NDP	NDP-4	17-21	temporary boring	--	X	X	--	X	X	X	--	--	X	X	X	X	X	X	X	X	X	X	X	X	--

Notes:
-- = not analyzed
X = analyzed
TPH-G = gasoline-range total petroleum hydrocarbons
TPH-D = diesel-range total petroleum hydrocarbons
TPH-O = oil-range total petroleum hydrocarbons
BTEX=benzene, toluene, ethylbenzene, xylenes
VOC = volatile organic compound
SVOC = semi-volatile organic compound
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
Geochemistry includes Total Organic Carbon, Chloride, Nitrate, Nitrite, Sulfate, Sulfide, Alkalinity, Total Dissolved Solids, Calcium, Ferric Iron, Ferrous Iron, Total Iron, Potassium, and/or Sodium

Table 12
Sampling Information - Soil
Remedial Investigation
Boeing Kent Space Center

Date	Area	Site ID	Sample Depth (feet)	TPH-D & -O	SVOCs/ PAHs	PCBs	Specific Metals										
							Arsenic	Barium	Chromium	Silver	Copper	Lead	Nickel	Zinc	Cadmium	Selenium	Mercury
4/12/2017	north	MW-1	2.5	--	--	--	X	--	--	--	--	--	--	--	--	--	--
4/11/2017	northeast	MW-2	2.5	--	--	--	X	--	--	--	--	--	--	--	--	--	--
4/11/2017	east	MW-3	2.5	--	--	--	X	--	--	--	--	--	--	--	--	--	--
4/11/2017	southeast	MW-4	2.5	--	--	--	X	--	--	--	--	--	--	--	--	--	--
4/11/2017	southwest	MW-5	2.5	--	--	--	X	--	--	--	--	--	--	--	--	--	--
4/13/2017	west	MW-6	2.5	--	--	--	X	--	--	--	--	--	--	--	--	--	--
4/11/2017	northwest	MW-7	2.5	--	--	--	X	--	--	--	--	--	--	--	--	--	--
1/24/2017	SWMU 88/89	SB-1	11.5-12.5	--	--	--	X	--	X	X	X	X	X	X	--	--	--
1/24/2017	SWMU 88/89	SB-2	11.5-12.5	--	--	--	X	--	X	X	X	X	X	X	--	--	--
1/27/2017	AOC-1/3	SB-3	8.5-9.5	X	--	--	X	--	--	--	--	--	--	--	--	--	--
1/27/2017	AOC-1/3	SB-4	8-9	X	--	--	--	--	--	--	--	--	--	--	--	--	--
1/27/2017	AOC-1/3	SB-5	11-12	X	--	--	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB21	1-3	--	--	X	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB22	1-4	--	--	X	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB23	1-5	--	--	X	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB24	1-6	--	--	X	--	--	--	--	--	--	--	--	--	--	--
5/7/2018	18-59/transformer	SB25	1-7	--	--	X	--	--	--	--	--	--	--	--	--	--	--
4/18/2019	18-25	HA1	1.0-1.5	--	--	X	--	--	--	--	--	--	--	--	--	--	--
4/18/2019	18-25	HA2	0.5-1.0	--	--	X	--	--	--	--	--	--	--	--	--	--	--
4/18/2019	18-25	HA3	0.5-1.0	--	--	X	--	--	--	--	--	--	--	--	--	--	--
4/18/2019	18-25	HA4	0.2-0.5	--	--	X	--	--	--	--	--	--	--	--	--	--	--
4/18/2019	18-28	HA5	0.3-0.8	--	--	X	--	--	--	--	--	--	--	--	--	--	--
4/18/2019	18-28	HA6	0.3-1.3	--	--	X	--	--	--	--	--	--	--	--	--	--	--

Table 12
Sampling Information - Soil
Remedial Investigation
Boeing Kent Space Center

Date	Area	Site ID	Sample Depth (feet)	TPH-D & -O	SVOCs/ PAHs	PCBs	Specific Metals										
							Arsenic	Barium	Chromium	Silver	Copper	Lead	Nickel	Zinc	Cadmium	Selenium	Mercury
4/18/2019	18-28	HA7	0.5-1.0	--	--	X	--	--	--	--	--	--	--	--	--	--	--
4/18/2019	18-28	HA8	0.8-1.3	--	--	X	--	--	--	--	--	--	--	--	--	--	--
4/18/2019	18-28	HA9	0.5-1.0	--	--	X	--	--	--	--	--	--	--	--	--	--	--
4/18/2019	18-28	HA10	0.5-1.0	--	--	X	--	--	--	--	--	--	--	--	--	--	--
7/17/2019	18-28	HA11C	0-0.5	--	--	X	--	--	--	--	--	--	--	--	--	--	--
7/17/2019	18-28	HA12C	0-0.5	--	--	X	--	--	--	--	--	--	--	--	--	--	--
9/12/2019	SWMU 88/89	T1B	7.5	--	--	--	X	X	X	X	X	X	X	X	X	--	--
9/12/2019	SWMU 88/89	T1N	4	--	--	--	X	X	X	X	X	X	X	X	X	--	--
9/12/2019	SWMU 88/89	T1S	4	--	--	--	X	X	X	X	X	X	X	X	X	--	--
9/12/2019	SWMU 88/89	T1E	4	--	--	--	X	X	X	X	X	X	X	X	X	--	--
9/12/2019	SWMU 88/89	T1W	4	--	--	--	X	X	X	X	X	X	X	X	X	--	--
2/21/2020	18-51/water line	KSCRI-18-51-N1-4	4	X	X	--	X	X	X	X	--	X	--	--	X	X	X
2/21/2020	18-51/water line	KSCRI-18-51-NW1-5	5	X	X	--	X	X	X	X	--	X	--	--	X	X	X
2/21/2020	18-51/water line	KSCRI-18-51-NE1-5	5	X	X	--	X	X	X	X	--	X	--	--	X	X	X
2/21/2020	18-51/water line	KSCRI-18-51-B1-7	7	X	X	--	X	X	X	X	--	X	--	--	X	X	X
2/21/2020	18-51/water line	KSCRI-18-51-B2-7	7	X	X	--	X	X	X	X	--	X	--	--	X	X	X
3/3/2020	18-51/water line	KSCRI-18-51-B1(R)-10	10	X	X	--	X	X	X	X	--	X	--	--	X	X	X
3/3/2020	18-51/water line	KSCRI-18-51-B2(R)-10	10	X	X	--	X	X	X	X	--	X	--	--	X	X	X
3/3/2020	18-51/water line	KSCRI-18-51-W1-6	6	X	X	--	X	X	X	X	--	X	--	--	X	X	X

Table 12
Sampling Information - Soil
Remedial Investigation
Boeing Kent Space Center

Date	Area	Site ID	Sample Depth (feet)	TPH-D & -O	SVOCs/ PAHs	PCBs	Specific Metals										
							Arsenic	Barium	Chromium	Silver	Copper	Lead	Nickel	Zinc	Cadmium	Selenium	Mercury
3/3/2020	18-51/water line	KSCRI-18-51-E1-6	6	X	X	--	X	X	X	X	--	X	--	--	X	X	X
3/3/2020	18-51/water line	KSCRI-18-51-6	6	X	X	--	X	X	X	X	--	X	--	--	X	X	X

Notes:
-- = not analyzed
X = analyzed
BTEX=benzene, toluene, ethylbenzene, xylenes
TPH-D & O = diesel and oil-range total petroleum hydrocarbons
SVOC = semi-volatile organic compound
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl

Table 13

Sampling Information - Stormwater and Solids

Remedial Investigation
Boeing Kent Space Center

DATE	Area	Location	Site ID	Sample Depth (feet)	Method	TPH-G	TPH-D	TPH-O	VOCs	SVOCs/ PAHs	PCBs	Specific Metals										
												Arsenic	Barium	Chromium	Silver	Copper	Lead	Nickel	Zinc	Cadmium	Selenium	Mercury
Stormwater																						
1/18/2017	SWMU 86	Manhole	MH-20.237-W	NA	grab	X	X	X	X	X	X	X	--	X	X	X	X	X	X	X	X	X
1/18/2017	SWMU 86	Manhole	MH-20.235-W	NA	grab	X	X	X	X	X	X	X	--	X	X	X	X	X	X	X	X	X
1/19/2017	SWMU 86	Manhole	MH-16.12-W	NA	grab	X	X	X	X	X	X	X	--	X	X	X	X	X	X	X	X	X
1/20/2017	SWMU 86	Manhole	MH-15.10-W	NA	grab	X	X	X	X	X	X	X	--	X	X	X	X	X	X	X	X	X
1/18/2017	SWMU 86	Outfall- East Drainage Ditch 16	OF-16-W	NA	grab	X	X	X	X	X	X	X	--	X	X	X	X	X	X	X	X	X
1/20/2017	SWMU 86	Outfall-Mill Creek 20/20B	OF-20-W	NA	grab	X	X	X	X	X	X	X	--	X	X	X	X	X	X	X	X	X
1/18/2017	SWMU 86	Outfall-North Detention Pond	OF-NDP-W	NA	grab	X	X	X	X	X	X	X	--	X	X	X	X	X	X	X	X	X
12/9/2020	SWMU 86	Outfall-North Detention Pond	OF-NDP-W	NA	grab	--	--	--	--	--	X	X	X	--	--	--	--	--	--	--	--	--
Sediment																						
5/4/2017	SWMU 86	Outfall-East Drainage Ditch 17	KSC-OF-16-0.3	<10 cm	grab	--	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X
12/20/2017	SWMU 86	Manhole	MH-15.10	NA	sediment trap	--	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X
5/8/2019	SWMU 86	Manhole	MH-15.10M	NA	sediment trap	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
12/20/2017	SWMU 86	Manhole	MH-16.12	NA	sediment trap	--	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X
5/8/2019	SWMU 86	Manhole	MH-16.12M	NA	sediment trap	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
12/20/2017	SWMU 86	Manhole	MH-20.235	NA	sediment trap	--	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X
5/8/2019	SWMU 86	Manhole	MH-20.236M	NA	sediment trap	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--	--
12/20/2017	SWMU 86	Manhole	MH-20.237	NA	sediment trap	--	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X
6/29/2017	SWMU 86	Outfall-Mill Creek 20/20B	OF-20	<10 cm	grab	--	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X
5/4/2017	SWMU 86	Outfall-North Detention Pond	OF-DP-0.3	<10 cm	grab	--	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X

Notes:
X = analyzed
-- = not analyzed
TPH-G = gasoline-range total petroleum hydrocarbons
TPH-D = diesel-range total petroleum hydrocarbons
TPH-O = oil-range total petroleum hydrocarbons
VOC = volatile organic compound
SVOC= semi-volatile organic compound
PAH = polycyclic aromatic hydrocarbon
PCB= polychlorinated biphenyl

Table 14
King County Groundwater Protection Program Well Summary

Remedial Investigation
Boeing Kent Space Center

<table>
<tr><th>Well ID</th><th>S_472536122143101</th><th>S_472535122143301</th><th>S_472534122143301</th><th>S_472450122143501</th><th colspan="5">S_472509122143401</th><th>S_472556122144101</th><th>S_472435122144501</th></tr>
<tr><td>Location Name</td><td>US EPA</td><td>USEPA</td><td>US EPA</td><td>TANAKA</td><td colspan="5">USEPA</td><td>LOVE WILLIAM</td><td>ONCHI</td></tr>
<tr><td>Well Type</td><td>Well</td><td>Well</td><td>Well</td><td>Well</td><td colspan="5">Well</td><td>Well</td><td>Well</td></tr>
<tr><td>Well Depth (ft)</td><td>20</td><td>22</td><td>19</td><td>20</td><td colspan="5">155</td><td>33</td><td>200</td></tr>
<tr><td>Surface Elevation (ft)</td><td>24.03</td><td>24.46</td><td>23.35</td><td>26</td><td colspan="5">22.14</td><td>31</td><td>27</td></tr>
<tr><td>X Coord (WAN-SPF)</td><td>1291753.5</td><td>1291613</td><td>1291611.125</td><td>1291390.875</td><td colspan="5">1291495.5</td><td>1291102.625</td><td>1290677.25</td></tr>
<tr><td>Y Coord (WAN-SPF)</td><td>158828.0781</td><td>158728.5</td><td>158626.375</td><td>154172.2344</td><td colspan="5">156096.5938</td><td>160864.7969</td><td>152663.9844</td></tr>
<tr><td>Has Water Level Data?</td><td>No</td><td>No</td><td>No</td><td>No</td><td colspan="5">Yes</td><td>No</td><td>No</td></tr>
<tr><td>Has Water Quality Data?</td><td>No</td><td>No</td><td>No</td><td>No</td><td colspan="5">No</td><td>No</td><td>No</td></tr>
<tr><td>Local Number</td><td>22N/04E-01F03</td><td>22N/04E-01F01</td><td>22N/04E-01F02</td><td>22N/04E-12D01</td><td colspan="5">22N/04E-01N01</td><td>23N/04E-36N01</td><td>22N/04E-12E01</td></tr>
<tr><td>Ecology Well Tag</td><td>Unknown</td><td>Unknown</td><td>Unknown</td><td>Unknown</td><td colspan="5">Unknown</td><td>Unknown</td><td>Unknown</td></tr>
<tr><td>GWMA Code</td><td>South King County</td><td>South King County</td><td>South King County</td><td>South King County</td><td colspan="5">South King County</td><td>South King County</td><td>South King County</td></tr>
<tr><td>Basin</td><td>Black River</td><td>Black River</td><td>Black River</td><td>Black River</td><td colspan="5">Black River</td><td>Black River</td><td>Black River</td></tr>
<tr><td>CARA Area</td><td>None</td><td>None</td><td>None</td><td>None</td><td colspan="5">None</td><td>None</td><td>None</td></tr>
<tr><td>City</td><td>Kent</td><td>Kent</td><td>Kent</td><td>Kent</td><td colspan="5">Kent</td><td>Kent</td><td>Kent</td></tr>
<tr><td rowspan="3">Water Level Data</td><td rowspan="3">No water level sampling data exists for the searched well.</td><td rowspan="3">No water level sampling data exists for the searched well.</td><td rowspan="3">No water level sampling data exists for the searched well.</td><td rowspan="3">No water level sampling data exists for the searched well.</td><td>Measurement Date</td><td>Measurement Time</td><td>Water Level Depth (ft)</td><td>Well Depth (ft)</td><td>Measure Method</td><td rowspan="3">No water level sampling data exists for the searched well.</td><td rowspan="3">No water level sampling data exists for the searched well.</td></tr>
<tr><td>4/29/1987</td><td>8:50</td><td>4.12</td><td>155</td><td>Steel tape</td></tr>
<tr><td>9/4/1986</td><td>10:00</td><td>6.41</td><td>155</td><td>Electric tape</td></tr>
<tr><td>Water Quality Data</td><td>No water quality sampling data exists for the searched well.</td><td>No water quality sampling data exists for the searched well.</td><td>No water quality sampling data exists for the searched well.</td><td>No water quality sampling data exists for the searched well.</td><td colspan="5">No water quality sampling data exists for the searched well.</td><td>No water quality sampling data exists for the searched well.</td><td>No water quality sampling data exists for the searched well.</td></tr>
</table>

Table 15
Terrestrial Ecological Evaluation Calculations

Remedial Investigation
Boeing Kent Space Center

Table 749-1 (WAC 173-340-900)

Criteria	Points	Score
1 - Area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site		
0.025 acres or less	4	
0.5 acres	5	
1.0 acres	6	
1.5 acres	7	
2.0 acres	8	
2.5 acres	9	
3.0 acres	10	
3.5 acres	11	
4.0 acres or more	12	12
2 - Is this an industrial or commercial property?		
yes	3	3
no	1	
3 - Habitat quality of the site		
High	1	
Intermediate	2	
Low	3	3
4 - Is the undeveloped land likely to attract wildlife?		
Yes	1	
No	2	2
5 - Are there any of the following soil contaminants present: Chlorinated dioxins/furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene?		
Yes	1	
No	4	4
6 - Add the numbers in the boxes on lines 2 through 5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified terrestrial ecological evaluation may be ended under WAC 173-340-7492 (2)(a)(ii).		**12**

Note: See Section 5.4 for explanation of assessment performed.

Table 16
Soil Screening Levels
Remedial Investigation
Boeing Kent Space Center

Chemical Name	Method A Unrestricted Land Use	Method B Non-cancer	Method B Cancer	CLARC Protective of Groundwater Saturated	Protective of Groundwater /Surfacewater Vadose @ 13°C - Fresh Water (CLARC)	CLARC Protective of Groundwater/ Surfacewater Saturated - Fresh Water (CLARC)	Protective of Terrestrial Ecological Receptors Unrestricted Land Use[b]	Protective of Terrestrial Ecological Receptors Commercial or Industrial Site[b]	Soil Method A Industrial Properties	Soil Method C Non cancer (direct contact)	Soil Method C Cancer (direct contact)	Natural Background Concentrations for Puget Sound Region[a]	Most Stringent Screening Level
Metals (mg/kg)													
Arsenic	2.00E+01	2.40E+01	6.67E-01	1.50E-01	2.90E+00	1.50E-01	2.00E+01	2.00E+01	2.00E+01	1.05E+03	8.75E+01	7.30E+00	**7.30E+00**
Barium	--	1.60E+04	--	8.30E+01	8.20E+02	4.10E+01	1.25E+03	1.35E+03	--	7.00E+05	--	400[c]	**4.00E+02**
Cadmium	2.00E+00	80	--	3.50E-02	9.90E-02	5.00E-03	2.50E+01	3.60E+01	2.00E+00	3.50E+03	--	1.00E+00	**1.00E+00**
Chromium (III)	2.00E+03	1.20E+05	--	2.40E+04	1.50E+03	7.40E+01	42[d]	135[d]	2.00E+03	5.25E+06	--	48[d]	**4.80E+01**
Chromium (VI)	1.90E+01	2.40E+02	--	9.30E-01	3.80E+00	1.90E-01	--	--	1.90E+01	1.05E+04	--	48[d]	**4.80E+01**
Copper	--	3.20E+03	--	1.40E+01	4.90E+00	2.50E-01	1.00E+02	5.50E+02	--	1.40E+05	--	3.60E+01	**3.60E+01**
Lead	2.50E+02	--	--	1.50E+02	5.00E+02	2.50E+01	2.20E+02	2.20E+02	1.00E+03	--	--	2.40E+01	**2.50E+01**
Mercury	2.00E+00	--	--	1.00E-01	1.30E-02	6.30E-04	9.00E+00	9.00E+00	2.00E+00	--	--	7.00E-02	**7.00E-02**
Nickel	--	1.60E+03	--	6.50E+00	6.80E+01	3.40E+00	1.00E+02	1.85E+03	--	7.00E+04	--	4.80E+01	**4.80E+01**
Selenium	--	4.00E+02	--	2.60E-01	5.20E-01	2.60E-02	8.00E-01	8.00E-01	--	1.75E+04	--	--	**2.60E-02**
Silver	--	4.00E+02	--	6.90E-01	5.40E-01	2.70E-02	--	--	--	1.75E+04	--	--	**2.70E-02**
Zinc	--	2.40E+04	--	3.00E+02	1.20E+02	6.20E+00	2.70E+02	5.70E+02	--	1.05E+06	--	8.50E+01	**8.50E+01**
TPH (mg/kg)													
Diesel	2.00E+03	--	--	--	--	--	4.60E+02	1.50E+04	2.00E+03	--	--	--	**4.60E+02**
Heavy Oil	2.00E+03	--	--	--	--	--	--	--	2.00E+03	--	--	--	**2.00E+03**
Mineral oil	4.00E+03	--	--	--	--	--	--	--	4.00E+03	--	--	--	**4.00E+03**
Gasoline	30[f]	--	--	--	--	--	2.00E+02	1.20E+04	1.00E+02	--	--	--	**1.00E+02**
PCBs (mg/kg)													
aroclor 1254	--	1.60E+00	5.00E-01	3.50E-02	1.70E-03	8.40E-05	--	--	--	7.00E+01	6.60E+01	--	**8.40E-05**
aroclor 1260	--	--	5.00E-01	3.60E-02			--	--	--	--	6.60E+01	--	**3.60E-02**
Total PCBs	1	--	5.00E-01	1.40E-01		2.20E-06	2.00E+00	2.00E+00	1.00E+01	--	6.60E+01	--	**2.20E-06**
VOCs (mg/kg)													
1,2,4-Trichlorobenzene	--	8.00E+02	3.45E+01	2.90E-02	1.30E-03	7.00E-05	--	--	--	3.50E+04	4.53E+03	--	**7.00E-05**
1,2,4-Trimethylbenzene	--	--	--	7.20E-02	--	--	--	--	--	--	--	--	**--**
1,3,5-Trimethylbenzene	--	8.00E+02	--	7.10E-02	--	--	--	--	--	3.50E+04	--	--	**7.10E-02**
1,3-Butadiene	--	--	2.94E-01	2.40E-05	--	--	--	--	--	--	3.86E+01	--	**2.40E-05**
1,3-Dichlorobenzene	--	--	--	--	2.30E-02	1.30E-03	--	--	--	--	--	--	**--**
2,2,4-Trimethylpentane	--	--	--	--	--	--	--	--	--	--	--	--	**--**
2,4-Dimethylphenol	--	1.60E+03	--	--	--	--	--	--	--	7.00E+04	--	--	**7.00E+04**
2-Butanone/ MEK	--	4.80E+04	--	1.40E+00	--	--	--	--	--	2.10E+06	--	--	**1.40E+00**
2-Hexanone	--	--	--	1.20E-02	--	--	--	--	--	--	--	--	**--**
2-Methylphenol (o-cresol)	--	4.00E+03	--	1.50E-01	--	--	--	--	--	1.75E+05	--	--	**1.50E-01**
4-Ethyltoluene	--	--	--	--	--	--	--	--	--		--	--	**--**
4-Isopropyltoluene	--	--	--	--	--	--	--	--	--		--	--	**--**
4-Methylphenol (p-cresol)	--	8.00E+03	--	4.70E-01	--	--	--	--	--	3.50E+05	--	--	**4.70E-01**
Acetone	--	7.20E+04	--	2.10E+00	--	--	--	--	--	3.15E+06	--	--	**2.10E+00**

Table 16
Soil Screening Levels
Remedial Investigation
Boeing Kent Space Center

Chemical Name	Method A Unrestricted Land Use	Method B Non-cancer	Method B Cancer	CLARC Protective of Groundwater Saturated	Protective of Groundwater /Surfacewater Vadose @ 13°C - Fresh Water (CLARC)	CLARC Protective of Groundwater/ Surfacewater Saturated - Fresh Water (CLARC)	Protective of Terrestrial Ecological Receptors Unrestricted Land Use[b]	Protective of Terrestrial Ecological Receptors Commercial or Industrial Site[b]	Soil Method A Industrial Properties	Soil Method C Non cancer (direct contact)	Soil Method C Cancer (direct contact)	Natural Background Concentrations for Puget Sound Region[a]	Most Stringent Screening Level
Benzene	3.00E-02	3.20E+02	1.82E+01	1.70E-03	2.40E-03	1.50E-04	--	--	3.00E-02	1.40E+04	2.39E+03	--	**1.50E-04**
Carbon Disulfide	--	8.00E+03	--	2.70E-01			--	--	--	3.50E+05	--	--	**2.70E-01**
Carbon Tetrachloride	--	3.20E+02	1.43E+01	2.20E-03	1.70E-03	8.80E-05	--	--	--	1.40E+04	1.88E+03	--	**8.80E-05**
Chloroform	--	8.00E+02	3.23E+01	4.80E-03	3.10E-01	2.00E-02	--	--	--	3.50E+04	4.23E+03	--	**4.80E-03**
Chloromethane	--	--	--	--	--	--	--	--	--	--	--	--	**--**
cis-1,2-DCE	--	1.60E+02	--	5.20E-03	--	--	--	--	--	7.00E+03	--	--	**5.20E-03**
Cyclohexane	--	--	--	--	--	--	--	--	--	--	--	--	**--**
Dichlorodifluoromethane	--	1.60E+04	--	5.30E-01	--	--	--	--	--	7.00E+05	--	--	**5.30E-01**
Ethanol	--	--	--	--	--	--	--	--	--		--	--	**--**
Ethylbenzene	6.00E+00	8.00E+03	--	3.40E-01	2.40E-01	1.40E-02	--	--	6.00E+00	3.50E+05	--	--	**1.40E-02**
Isopropanol	--	--	--	4.60E+00	--	--	--	--	--		--	--	**--**
Isopropylbenzene (cumene)	--	8.00E+03	--	7.90E-01	--	--	--	--	--	3.50E+05	--	--	**7.90E-01**
m,p-Xylene	--	1.60E+04	--	8.30E-01	--	--	--	--	--	7.00E+05	--	--	**8.30E-01**
Methyl Iodide	--	--	--	--	--	--	--	--	--		--	--	**--**
Methylene Chloride	2.00E-02	4.80E+02	5.00E+02	1.50E-03	4.30E-02	3.00E-03	--	--	2.00E-02	2.10E+04	6.56E+04	--	**1.50E-03**
Naphthalene	5.00E+00	1.60E+03	--	2.40E-01	1.40E+02	7.30E+00	--	--	5.00E+00	7.00E+04	--	--	**2.40E-01**
n-Heptane	--	--	--	1.30E-03	--	--	--	--	--	--	--	--	**--**
n-Hexane	--	4.80E+03	--	1.80E+00	--	--	--	--	--	2.10E+05	--	--	**1.80E+00**
n-Propylbenzene	--	8.00E+03	--	8.80E-01	--	--	--	--	--	3.50E+05	--	--	**8.80E-01**
o-Xylene[g]	--	1.60E+04	--	8.40E-01	--	--	--	--	--	7.00E+05	--	--	**8.40E-01**
Styrene	--	1.60E+04	--	1.20E-01	--	--	--	--	--	7.00E+05	--	--	**1.20E-01**
Tetrachloroethene	5.00E-02	4.80E+02	4.76E+02	2.80E-03	2.40E-02	1.30E-03	--	--	5.00E-02	2.10E+04	6.25E+04	--	**1.30E-03**
Tetrahydrofuran	--	--	--	2.10E+00	--	--	--	--	--		--	--	**--**
Toluene	7.00E+00	6.40E+03	--	2.70E-01	4.00E-01	2.40E-02	--	--	7.00E+00	2.80E+05	--	--	**2.40E-02**
Total Xylenes	9.00E+00	1.60E+04	--	8.30E-01	--	--	--	--	9.00E+00	7.00E+05	--	--	**8.30E-01**
trans-1,2-DCE	--	1.60E+03	--	3.20E-02	5.20E-01	3.20E-02	--	--	--	7.00E+04	--	--	**3.20E-02**
Trichloroethene	3.00E-02	4.00E+01	1.20E+01	1.50E-03	1.90E-03	1.10E-04	--	--	3.00E-02	1.75E+03	2.85E+03	--	**1.10E-04**
Trichlorofluoromethane (CFC 11)	--	2.40E+04	--	7.90E-01	--	--	--	--	--	1.05E+06	--	--	**7.90E-01**
Vinyl Chloride	--	2.40E+02	6.70E-01	8.90E-05	1.20E-04	6.10E-06	--	--	--	1.05E+04	8.75E+01	--	**6.10E-06**
SVOCs (mg/kg)													
1-Methylnaphthalene	--	5.60E+03	3.45E+01	4.20E-03	--	--	--	--	--	2.45E+05	4.53E+03	--	**4.20E-03**
2-Methylnaphthalene	--	3.20E+02	--	8.80E-02	--	--	--	--	--	1.40E+04	--	--	**8.80E-02**
Acenaphthene	--	4.80E+03	--	5.00E+00	3.10E+00	1.60E-01	--	--	--	2.10E+05	--	--	**1.60E-01**
Acenaphthylene	--	--	--	--	--	--	--	--	--	--	--	--	**--**
Anthracene	--	2.40E+04	--	1.10E+02	4.70E+01	2.40E+00	--	--	--	1.05E+06	--	--	**2.40E+00**
Benzo(a)anthracene	--	--	1.37E+00	--	1.10E-03	5.70E-05	--	--	--	--	1.80E+02	--	**5.70E-05**
Benzo(a)pyrene	1.00E-01	--	0.137	1.90E-01	3.10E-04	1.60E-05	3.00E+01	3.00E+02	2.00E+00	--	18	--	**1.60E-05**

Table 16
Soil Screening Levels
Remedial Investigation
Boeing Kent Space Center

Chemical Name	**Method A Unrestricted Land Use**	**Method B Non-cancer**	**Method B Cancer**	**CLARC Protective of Groundwater Saturated**	**Protective of Groundwater /Surfacewater Vadose @ 13°C - Fresh Water (CLARC)**	**CLARC Protective of Groundwater/ Surfacewater Saturated - Fresh Water (CLARC)**	**Protective of Terrestrial Ecological Receptors Unrestricted Land Use[b]**	**Protective of Terrestrial Ecological Receptors Commercial or Industrial Site[b]**	**Soil Method A Industrial Properties**	**Soil Method C Non cancer (direct contact)**	**Soil Method C Cancer (direct contact)**	**Natural Background Concentrations for Puget Sound Region[a]**	**Most Stringent Screening Level**
Benzo(b)fluoranthene	--	--	1.37E+00	--	3.90E-03	2.00E-04	--	--	--	--	1.80E+02	--	**2.00E-04**
Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--	--	--	--	--	**--**
Benzo(j)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	**--**
Benzo(k)fluoranthene	--	--	1.37E+01	--	3.90E-02	2.00E-03	--	--	--	--	1.80E+03	--	**2.00E-03**
bis(2-Ethylhexyl) Phthalate	--	1.60E+03	7.14E+01	6.70E-01	1.00E-01	5.00E-03	--	--	--	7.00E+04	9.38E+03	--	**5.00E-03**
Carbazole	--	--	--	--	--	--	--	--	--	--	--	--	**--**
Chrysene	--	--	1.37E+02	--	1.30E-01	6.40E-03	--	--	--	--	1.80E+04	--	**6.40E-03**
Dibenzo(a,h)anthracene	--	--	1.37E-01	--	5.70E-04	2.90E-05	--	--	--	--	1.80E+01	--	**2.90E-05**
Dibenzofuran	--	8.00E+01	--	1.50E-01	--	--	--	--	--	3.50E+03	--	--	**1.50E-01**
Fluoranthene	--	3.20E+03	--	3.20E+01	5.90E+00	3.00E-01	--	--	--	1.40E+05	--	--	**3.00E-01**
Fluorene	--	3.20E+03	--	5.10E+00	1.60E+00	8.00E-02	--	--	--	1.40E+05	--	--	**8.00E-02**
Indeno(1,2,3-cd)pyrene	--	--	1.37E+00	--	1.10E-02	5.60E-04	--	--	--	--	1.80E+02	--	**5.60E-04**
Isophorone	--	1.60E+04	1.05E+03	1.50E-02	1.30E-01	9.00E-03	--	--	--	7.00E+05	1.38E+05	--	**9.00E-03**
Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	--	**--**
Pyrene	--	2.40E+03	--	3.30E+01	1.10E+01	5.50E-01	--	--	--	1.05E+05	--	--	**5.50E-01**

Notes:

[a] Ecology 1994.
[b] WAC 173-340-900, Table 749-2.
[c] USGS, 1995. https://pubs.usgs.gov/wri/1995/4018/report.pdf
[d] Value is for total chromium.
[e] Value is Method A cleanup level for unrestricted land uses.
[f] Cleanup level is 100 mg/kg if benzene is not present.
[g] - values for total xylenes may be lower
All units in mg/kg
mg/kg = Milligrams per kilogram.
TPH = Total petroleum hydrocarbons.
NC = not calculated at this time (and not a detected compound)
Soil screening levels protective of groundwater are assumed protective of indoor air.
Residential based values provided for reference only

Table 17
Groundwater Screening Levels
Remedial Investigation
Boeing Kent Space Center

Chemical Name	Groundwater									Most Stringent Surface Water Based Criteria (see Table 18)
	Method B Non-cancer	Method B Cancer	Maximum Contaminant Level	WA Maximum Contaminant Level	Method A Cleanup Levels	Vapor Intrusion Method B Noncancer	Vapor Intrusion Method B Cancer	Vapor Intrusion Method C Noncancer	Vapor Intrusion Method C Cancer	
Metals (ug/L)										
Arsenic	4.8	0.583[a]	10	10	5	--	--	--	--	0.018
Barium	3200	--	2000	2000	--	--	--	--	--	1000
Cadmium	8	--	5	5	5	--	--	--	--	0.72
Chromium (III)	--	--	100	100	50	--	--	--	--	74
Chromium(VI)	48	--	--	--	--	--	--	--	--	10
Copper	640	--	1300	1300	--	--	--	--	--	11
Lead	--	--	15	15	15	--	--	--	--	2.5
Mercury	--	--	2	2	2	0.89	--	1.95	--	0.012
Nickel	320	--	--	100	--	--	--	--	--	52
Selenium	80	--	50	50	--	--	--	--	--	5
Silver	80	--	--	--	--	--	--	--	--	3.2
Zinc	4800	--	--	--	--	--	--	--	--	100
PCBs (ug/L)										
Aroclor 1248	--	--	--	--	--	--	--	--	--	0.014
Aroclor 1254	0.32	0.0438	--	--	--	--	--	--	--	0.0001
Aroclor 1260	--	0.0438	--	--	--	--	--	--	--	0.014
Total PCBs	--	0.438[a]	0.5	0.5	0.1	--	--	--	--	0.000007
TPH (ug/L)										
Diesel	--	--	--	--	500	30000[c]				500
Heavy Oil	--	--	--	--	500					500
Mineral oil	--	--	--	--	500					500
Gasoline	--	--	--	--	800[b]					800

Table 17
Groundwater Screening Levels
Remedial Investigation
Boeing Kent Space Center

Chemical Name	Groundwater									Most Stringent Surface Water Based Criteria (see Table 18)
	Method B Non-cancer	Method B Cancer	Maximum Contaminant Level	WA Maximum Contaminant Level	Method A Cleanup Levels	Vapor Intrusion Method B Noncancer	Vapor Intrusion Method B Cancer	Vapor Intrusion Method C Noncancer	Vapor Intrusion Method C Cancer	
VOCs (ug/L)										
1,1-Dichloroethane	1600	7.68	--	--	--	--	11.2	--	112	--
1,1-Dichloroethene	400	--	7	7	--	130	--	284	--	300
1,2-Dichloroethane (EDC)	48	4.81[a]	5	5	5	140	4.2	306	42	8.9
1,2-Dichloroethylene (cis)	16	--	70	70	--	--	--	--	--	--
1,2-Dichloroethylene (trans)	160	--	100	100	--	--	--	--	--	100
1,2,4-Trichlorobenzene	80	15.1[a]	70	70	--	39.2	--	85.7	--	0.036
1,2,4-Trimethylbenzene	80[a]	--	--	--	--	28.4	--	62.2	--	--
1,3,5-Trimethylbenzene	80	--	--	--	--	--	--	--	--	--
2-Butanone/MEK	4800	--	--	--	--	1740000	--	3800000	--	--
2-Hexanone	40[a]	--	--	--	--	--	--	--	--	--
4-Isopropyltoluene	--	--	--	--	--	--	--	--	--	--
Acetone	7200	--	--	--	--	--	--	--	--	--
Benzene	32	5[a]	5	5	5	103	2.4/5000[c]	224.6	24	0.44
Carbon Disulfide	800	--	--	--	--	400	--	875	--	--
Chloromethane	--	--	--	--	--	153	--	334	--	--
Ethylbenzene	800	--	700	70	700	2783	--	6087	--	29
Isopropylbenzene (cumene)	800	--	--	--	--	720	--	1580	--	--
m,p-Xylene	1600	--	--	--	--	310	--	678	--	--
Methylene Chloride	48	21.9	5	5	5	4860	4430	10600	44300	10
Naphthalene	160	--	--	--	160	167	8.93	364	89.3	4710
n-Propylbenzene	800	--	--	--	--	--	--	--	--	--
o-Xylene[d]	1600	--	--	--	--	440	--	963	--	--
Styrene	1600	--	100	100	--	8100	--	17700	--	--
Tetrachloroethene	48	20.8	5	5	5	43.5	22.9	95.2	229	2.4
Toluene	640	--	1000	1000	1000	15584	--	34091	--	57
Trichloroethylene (TCE)	4	5[a]	5	5	5	3.84	1.554	8.4	26.46	0.3
Trichlorofluoromethane (CFC 11)	2400	--	--	--	--	120	--	263	--	--
Vinyl chloride	24	0.292[a]	2	2	0.2	56.7	0.3472	124	3.472	0.02
Xylenes (total)	1600	--	10000	10000	1000	310	--	678	--	57

Table 17
Groundwater Screening Levels
Remedial Investigation
Boeing Kent Space Center

Chemical Name	Groundwater									Most Stringent Surface Water Based Criteria (see Table 18)
	Method B Non-cancer	Method B Cancer	Maximum Contaminant Level	WA Maximum Contaminant Level	Method A Cleanup Levels	Vapor Intrusion Method B Noncancer	Vapor Intrusion Method B Cancer	Vapor Intrusion Method C Noncancer	Vapor Intrusion Method C Cancer	
SVOCs (ug/L)										
1-Methylnaphthalene	560	1.51	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	160	--	--	--	--	--	--	--	--	85
2-Methylnaphthalene	32	--	--	--	--	--	--	--	--	--
2-Methylphenol (o-cresol)	400	--	--	--	--	--	--	--	--	--
4-Methylphenol (p-cresol)	800	--	--	--	--	--	--	--	--	14
Acenaphthene	960	--	--	--	--	--	--	--	--	30
Anthracene	4800	--	--	--	--	--	--	--	--	100
Benzo(a)anthracene	--	0.12	--	--	--	--	--	--	--	0.00016
Benzo(a)pyrene	--	0.012	0.2	0.2	0.1	--	--	--	--	0.000016
Benzo(b)fluoranthene	--	0.12	--	--	--	--	--	--	--	0.00016
Benzo(k)fluoranthene	--	1.2	--	--	--	--	--	--	--	0.0016
bis(2-Ethylhexyl) Phthalate	320	6.25	6	6	--	--	--	--	--	0.045
Carbazole	--	--	--	--	--	--	--	--	--	--
Chrysene	--	12	--	--	--	--	--	--	--	0.016
Dibenzo (a,h) anthracene	--	0.012	--	--	--	--	--	--	--	0.000016
Dibenzofuran	16	--	--	--	--	--	--	--	--	--
Fluorene	640	--	--	--	--	--	--	--	--	10
Fluoranthene	640	--	--	--	--	--	--	--	--	6.00
Indeno(1,2,3-cd)pyrene	--	0.12	--	--	--	--	--	--	--	0.00016
Isophorone	1600	46.1	--	--	--	--	--	--	--	27
Phenanthrene	--	--	--	--	--	--	--	--	--	--
Pyrene	480	--	--	--	--	--	--	--	--	8

Notes:

a - CLARC value replaced with Ecology December 2018 Drinking Water based Preliminary Cleanup Level for Sites near the Lower Duwamish Waterway
https://fortress.wa.gov/ecy/gsp/DocViewer.ashx?did=68273
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=2ahUKEwjW0evY5uHfAhW0HzQIHch-CxsQFjACegQICBAC&url=https%3A%2F%2Ffortress.wa

b - Cleanup level is 1,000 µg/L if benzene is not present.

c - Ecology Implementation Memo 14 - Updated Process for Intially Assessing the Potential for Petroleum Vapor Intrusion (3/31/16)

d - values for total xylenes may be lower

All units in microgram per liter

CLARC = 2021 Cleanup Level and Risk Calculations https://fortress.wa.gov/ecy/clarc/CLARCDataTables.aspx

TPH = Total petroleum hydrocarbons.

VOC = volatile organic compound

Chromium values based on Cr^{+6}

VI values account for Implementation Memo #18
https://fortress.wa.gov/ecy/publications/documents/1709043.pdf

Table 18
Surface Water Based Screening Levels
Remedial Investigation
Boeing Kent Space Center

	Surface Water														
Chemical Name	Method B Non-cancer (CLARC unless noted otherwise)	Method B Cancer (CLARC unless noted otherwise)	Aquatic life fresh/ acute 173-201A WAC [A]	Aquatic life fresh/ acute CWA §304 [B]	Aquatic life fresh/ acute NTR 40 CFR 131 [E]	Aquatic life fresh/ chronic 173-201A WAC [A]	Aquatic life fresh/ chronic CWA §304 [B]	Aquatic life fresh/ chronic NTR 40 CFR 131 [E]	Human health Water & Organisms 173-201A WAC [A]	Human health Organisms only 173-201A WAC [A]	Human health Water & Organisms NTR 40 CFR 131 [D]	Human health Organisms only NTR 40 CFR 131 [D]	Human health for consumption of organism (NRWQC) [C]	Human health for consumption of water + organism (NRWQC) [C]	WA Industrial Stormwater Benchmarks [1]
METALS															
Arsenic	18	0.098	360	340	360	190	150	190	10	10	0.018	0.14	0.14	0.018	150
Barium	--	--	--	--	--	--	--	--	--	--	--	--	--	1000	--
Cadmium	41	--	3.70[1]	1.80	3.9	1.031[2]	0.72	1.0	--	--	--	--	--	--	2.1
Chromium (III)	243,000	--	549[3]	570	550	178[4]	74	180	--	--	--	--	--	--	--
Chromium (VI)	486	--	15	16	15	10	11	10	--	--	--	--	--	--	--
Copper	2,880	--	17[5]	--	17	11.4[6]	--	11	1300	--	1300	--	--	1,300	14
Lead	--	--	64.6[7]	65	65	2.5[8]	2.5	2.5	--	--	--	--	--	--	81.6
Mercury	--	--	2.1	1.4	2.1	0.012	0.77	0.01	--	--	--	--	--	--	1.4
Nickel	1,100	--	1414[9]	470	1,400	157[10]	52	160	150	190	80	100	4600	610	--
Selenium	2,700	--	20	--	20	5	--	5.0	120	480	60	200	4200	170	5
Silver	26,000	--	3.45[11]	3.20	3.4	--	--	--	--	--	--	--	--	--	3.8
Zinc	16,500	--	114[12]	120	110	105[13]	120	100	2300	2900	1000	1000	26000	7,400	117
SVOCs															
2,4-Dimethylphenol	552	--	--	--	--	--	--	--	85	97	85	97	3000	100	--
2-Methylphenol (o-cresol)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol (p-cresol)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14/25
Acenaphthene	648	--	--	--	--	--	--	--	110	110	30	30	90	70	--
Acenaphthylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Anthracene	25,900	--	--	--	--	--	--	--	3100	4600	100	100	400	300	--
Benzo[g,h,i]perylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzo[a]anthracene	--	0.30	--	--	--	--	--	--	0.014	0.021	0.00016	0.00016	0.0013	0.0012	--
Benzo[a]pyrene	--	0.03	--	--	--	--	--	--	0.0014	0.0021	0.000016	0.000016	0.00013	0.00012	--
Benzo[b]fluoranthene	--	0.30	--	--	--	--	--	--	0.014	0.021	0.00016	0.00016	0.0013	0.0012	--
Benzo[k]fluoranthene	--	2.96	--	--	--	--	--	--	0.014	0.21	0.0016	0.0016	0.013	0.012	--
bis(2-Ethylhexyl) Phthalate	399	3.56	--	--	--	--	--	--	0.23	0.25	0.045	0.046	0.32	0.37	--
Carbazole	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	--	29.6	--	--	--	--	--	--	1.4	2.1	0.016	0.016	0.13	0.12	--
Dibenzo[a,h]anthracene	--	0.03	--	--	--	--	--	--	0.0014	0.0021	0.000016	0.000016	0.00013	0.00012	--
Dibenzofuran	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	86		--	--	--	--	--	--	16	16	6	6	20	20	--
Fluorene	3,460	--	--	--	--	--	--	--	420	610	10	10	70	50	--
Indeno[1,2,3-cd]pyrene	--	0.30	--	--	--	--	--	--	0.014	0.021	0.00016	0.00016	0.0013	0.0012	--
Isophorone	118000	1550	--	--	--	--	--	--	27	110	27	110	34	1800	--
Methyl naphthalene;1-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl naphthalene;2-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	4,710	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pyrene	2,590	--	--	--	--	--	--	--	310	460	8	8	30	20	--

Table 18
Surface Water Based Screening Levels
Remedial Investigation
Boeing Kent Space Center

	Surface Water															WA Industrial Stormwater Benchmarks [1]
Chemical Name	Method B Non-cancer (CLARC unless noted otherwise)	Method B Cancer (CLARC unless noted otherwise)	Aquatic life fresh/ acute 173-201A WAC [A]	Aquatic life fresh/ acute CWA §304 [B]	Aquatic life fresh/ acute NTR 40 CFR 131 [E]	Aquatic life fresh/ chronic 173-201A WAC [A]	Aquatic life fresh/ chronic CWA §304 [B]	Aquatic life fresh/ chronic NTR 40 CFR 131 [E]	Human health Water & Organisms 173-201A WAC [A]	Human health Organisms only 173-201A WAC [A]	Human health Water & Organisms NTR 40 CFR 131 [D]	Human health Organisms only NTR 40 CFR 131 [D]	Human health for consumption of organism (NRWQC) [C]	Human health for consumption of water + organism (NRWQC) [C]	
PCB																
Aroclor 1016	0.006	0.003	--	--	--	--	--	0.014	--	--	--	--	--	--	--
Aroclor 1221	--	--	--	--	--	--	--	0.014	--	--	--	--	--	--	--
Aroclor 1232	--	--	--	--	--	--	--	0.014	--	--	--	--	--	--	--
Aroclor 1242	--	--	--	--	--	--	--	0.014	--	--	--	--	--	--	--
Aroclor 1248	--	--	--	--	--	--	--	0.014	--	--	--	--	--	--	--
Aroclor 1254	0.002	0.00010	--	--	--	--	--	0.014	--	--	--	--	--	--	--
Aroclor 1260	--	--	--	--	--	--	--	0.014	--	--	--	--	--	--	--
Total PCBs	--	0.0001	2.00	--	--	0.014	0.014	--	0.00017	0.00017	0.000007	0.000007	0.00006	0.00006	--
TPH																
Diesel range organics	500/150	--	--	--	--	--	--	--	--	--	--	--	--	--	10000
Heavy oils	500	--	--	--	--	--	--	--	--	--	--	--	--	--	10000
Gasoline range organics, benzene present	800	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gasoline range organics, no detectable benzene	1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOCs																
1,2,4-Trichlorobenzene	236	2.03	--	--	--	--	--	--	0.12	0.14	0.036	0.037	--	--	--
1,2,4-Trimethylbenzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Isopropyltoluene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetone	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	1,990	22.7/10	--	--	--	--	--	--	0.44	1.6	0.44	1.6	16-58	0.58-2.1	--
Bromodichloromethane	13,600	27.5	--	--	--	--	--	--	--	--	0.73	2.80	27	0.95	--
Bromoform	13,600	216	--	--	--	--	--	--	5.8	27	4.6	12	120	7.0	--
Bromomethane (methyl bromide)	955	--	--	--	--	--	--	--	520	2400	300	--	10000	100	--
Carbon disulfide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	546	4.87	--	--	--	--	--	--	0.2	0.35	0.20	0.35	5	0.4	--
Chlorobenzene	5,190	--	--	--	--	--	--	--	380	890	100	200	800	100	--
Chloroform	6,820	55	--	--	--	--	--	--	260	1200	100	600	2000	60	--
Chloromethane (methyl chloride)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibromochloromethane	13,600	20.3	--	--	--	--	--	--	--	--	--	--	21	0.8	--
Dichloroethane;1,1-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dichloroethane;1,2-	13,000	59.4	--	--	--	--	--	--	9.3	120	8.9	73	650.00	9.9	--
Dichloroethylene;1,1-	23,100	--	--	--	--	--	--	--	1200	4100	700	4000	20000	300	--
Dichloroethylene;1,2-,cis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dichloroethylene;1,2-,trans	32,400	--	--	--	--	--	--	--	--	--	200	1000	4000	100	--
Dichloropropane;1,2-	56,900	43.9	--	--	--	--	--	--	0.71	3.1	0.71	3.1	31	0.9	--
Dichloropropene;1,3-	40,900	34.1	--	--	--	--	--	--	--	--	0.22	1.2	12	0.27	--
Ethyl chloride (chloroethane)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	6820/12	--	--	--	--	--	--	--	200	270	29	31	130	68	--
Isopropylbenzene (cumene)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl ethyl ketone	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 18
Surface Water Based Screening Levels
Remedial Investigation
Boeing Kent Space Center

	Surface Water														
Chemical Name	**Method B Non-cancer (CLARC unless noted otherwise)**	**Method B Cancer (CLARC unless noted otherwise)**	**Aquatic life fresh/ acute 173-201A WAC** [A]	**Aquatic life fresh/ acute CWA §304** [B]	**Aquatic life fresh/ acute NTR 40 CFR 131** [E]	**Aquatic life fresh/ chronic 173-201A WAC** [A]	**Aquatic life fresh/ chronic CWA §304** [B]	**Aquatic life fresh/ chronic NTR 40 CFR 131** [E]	**Human health Water & Organisms 173-201A WAC** [A]	**Human health Organisms only 173-201A WAC** [A]	**Human health Water & Organisms NTR 40 CFR 131** [D]	**Human health Organisms only NTR 40 CFR 131** [D]	**Human health for consumption of organism (NRWQC)** [C]	**Human health for consumption of water + organism (NRWQC)** [C]	**WA Industrial Stormwater Benchmarks** [1]
Methyl isobutyl ketone	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	17,300	3,600	--	--	--	--	--	--	16	250	10	100	1000	20	--
n-Propylbenzene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethane;1,1,2,2-	10,400	6.48	--	--	--	--	--	--	0.12	0.46	0.1	0.3	3	0.2	--
Tetrachloroethylene (PCE)	500	99.6	--	--	--	--	--	--	4.9	7.1	2.4	2.9	29	10	--
Toluene	18900/53	--	--	--	--	--	--	--	180	410	72	130	520	57	--
Trichloro-1,2,2-trifluoroethane;1,1,2-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethane;1,1,1-	926,000	--	--	--	--	--	--	--	47000	160000	20000	50000	200000	10,000	--
Trichloroethane;1,1,2-	2,300	25.3	--	--	--	--	--	--	0.44	1.8	0.35	0.9	8.90	0.55	--
Trichloroethylene (TCE)	118	12.8	--	--	--	--	--	--	0.38	0.86	0.3	0.7	7.0	0.6	--
Trichlorofluoromethane	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl acetate	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	6,480	3.70	--	--	--	--	--	--	0.02	0.26	0.02	0.18	1.6	0.022	--
Xylene;m-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene;o-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylene;p-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Xylenes	57	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

[1] Final Industrial Stormwater General Permit – January 2, 2015
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbon
VOC = volatile organic compound
All units in microgram per liter (µg/L)
Red text = Ecology email 1/18/19 Draft IM #23 not final yet, for reference only
A. Water Quality Standards for Surface Waters of the State of Washington WAC 173-201A January 23, 2020
Values included in or calculated based on WAC 173-201A Table 240 (Toxics Substances Criteria) Aquatic Life Criteria-Freshwater - Acute and Chronic
https://fortress.wa.gov/ecy/publications/documents/0610091.pdf
1. Table 240 states ≤ (0.944)(e(1.128[ln(hardness)]-3.828)) at hardness = 100
2. Table 240 states ≤ (0.909)(e(0.7852[ln(hardness)]-3.490)) at hardness = 100.
3. Table 240 states ≤ (0.316)(e(0.8190[ln(hardness)] + 3.688))
4. Table 240 states ≤ (0.860)(e(0.8190[ln(hardness)] + 1.561))
5. Table 240 states ≤ (0.960)(e(0.9422[ln(hardness)] - 1.464))
6. Table 240 states ≤ (0.960)(e(0.8545[ln(hardness)] - 1.465))
7. Table 240 states ≤ (0.791)(e(1.273[ln(hardness)] - 1.460))
8. Table 240 states ≤ (0.791)(e(1.273[ln(hardness)] - 4.705))
9. Table 240 states ≤ (0.998)(e(0.8460[ln(hardness)] + 3.3612))
10. Table 240 states ≤ (0.997)(e(0.8460[ln(hardness)] + 1.1645))
11. Table 240 states ≤ (0.85)(e(1.72[ln(hardness)] - 6.52))
12. Table 240 states ≤ (0.978)(e(0.8473[ln(hardness)] + 0.8604))
13. Table 240 states ≤ (0.986)(e(0.8473[ln(hardness)] + 0.7614))

B. National Recommended Water Quality Criteria - Aquatic Life
https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table

Table 18
Surface Water Based Screening Levels
Remedial Investigation
Boeing Kent Space Center

	Surface Water														
Chemical Name	Method B Non-cancer (CLARC unless noted otherwise)	Method B Cancer (CLARC unless noted otherwise)	Aquatic life fresh/ acute 173-201A WAC [A]	Aquatic life fresh/ acute CWA §304 [B]	Aquatic life fresh/ acute NTR 40 CFR 131 [E]	Aquatic life fresh/ chronic 173-201A WAC [A]	Aquatic life fresh/ chronic CWA §304 [B]	Aquatic life fresh/ chronic NTR 40 CFR 131 [E]	Human health Water & Organisms 173-201A WAC [A]	Human health Organisms only 173-201A WAC [A]	Human health Water & Organisms NTR 40 CFR 131 [D]	Human health Organisms only NTR 40 CFR 131 [D]	Human health for consumption of organism (NRWQC) [C]	Human health for consumption of water + organism (NRWQC) [C]	WA Industrial Stormwater Benchmarks [1]

C. National Recommended Water Quality Criteria - Human Health
https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table

D. Per Ecology Interim Policy 730, pending resolution of litigation currently underway, during development of the RI/FS the human health-based surface water quality criteria that EPA withdrew from federal regulation 40 CFR 131.45 are recommended to be taken into account.

E. National Toxics Rule 1999 - Freshwater
https://www.gpo.gov/fdsys/pkg/FR-1999-11-09/pdf/99-25559.pdf

Table 19

Stormwater System Solids Screening Levels

Remedial Investigation

Boeing Kent Space Center

Chemical Name	SMS Freshwater Sediment SCO[a]	CSL[b]
Metals (mg/kg)		
Arsenic	14	120
Barium	--	--
Cadmium	2.1	5.4
Chromium	72	88
Copper	400	1,200
Lead	360	>1,300
Mercury	0.66	0.8
Nickel	26	110
Selenium	11	>20
Silver	0.57	1.7
Zinc	3,200	>4,200
PAHs (µg/kg)		
1-Methylnaphthalene	--	--
2-Methylnaphthalene	--	--
Acenaphthene	--	--
Acenaphthylene	--	--
Anthracene	--	--
Benzo(a)anthracene	--	--
Benzo(a)pyrene	--	--
Benzo(b)fluoranthene	--	--
Benzo(g,h,i)perylene	--	--
Benzo(j)fluoranthene	--	--
Benzo(k)fluoranthene	--	--
Chrysene	--	--
Dibenz(a,h)anthracene	--	--
Dibenzofuran	200	680
Fluoranthene	--	--
Fluorene	--	--
Indeno(1,2,3-cd)pyrene	--	--
Naphthalene	--	--
Phenanthrene	--	--
Pyrene	--	--
Total Benzofluoranthenes	--	--
cPAH TEQ	--	--
Total PAHs	17,000	30,000
PCBs (µg/kg)		
Total PCBs	110	2,500
Petroleum Hydrocarbons (mg/kg)		
TPH-Diesel	340	510
TPH-Residual	3,600	4,400

Notes:

SMS = Washington State Sediment Management Standards

SCO[a] = sediment cleanup objective

CSL[b] = cleanup screening level

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

mg/kg = milligrams per kilogram

µg/kg = micrograms per kilogram

Table 20a
Soil Results - Metals
Remedial Investigation
Boeing Kent Space Center

Sample Date	**Area**	**Site ID**	**Depth (ft. bgs)**	**Metals (mg/kg)**										
				Arsenic	**Barium**	**Cadmium**	**Chromium**	**Copper**	**Lead**	**Mercury**	**Nickel**	**Selenium**	**Silver**	**Zinc**
Lowest Screening Level				**7.3**	**400**	**1**	**48**	**36**	**25**	**0.07**	**48**	**0.026**	**0.027**	**85**
RI Data														
1/24/2017	SWMU 88/89	SB-1	11.5-12.5	**7.57**	--	--	**24.2**	**37.6**	**6.78**	--	**21.7**	--	0.232 U	**80.3**
1/24/2017	SWMU 88/89	SB-2	11.5-12.5	**8.59**	--	--	**25.5**	**42.7**	**7.3**	--	**24.3**	--	0.252 U	**54.4**
9/12/2019	SWMU 88/89	T1B	7.5	**2.72**	**2.72**	--	**17.1**	**24.0**	**3.02**	--	**21.1**	--	**0.07 J**	**39.5**
9/12/2019	SWMU 88/89	T1N	4	**3.07**	**3.07**	--	**21.6**	**26.4**	**2.87**	--	**24.2**	--	**0.07 J**	**35.5**
9/12/2019	SWMU 88/89	T1S	4	**1.55**	**1.55**	--	**31.6**	**12.8**	**3.85**	--	**32.2**	--	**1.95**	**28.4**
9/12/2019	SWMU 88/89	T1E	4	**2.75**	**2.75**	--	**12.8**	**20.3**	**2.76**	--	**13**	--	**0.07 J**	**33**
9/12/2019	SWMU 88/89	T1W	4	**2.65**	**2.65**	--	**28**	**16.2**	**2.69**	--	**34.8**	--	**0.05 J**	**38**
1/27/2017	AOC-1/3	SB-3	8.5-9.5	**6.71 J**	--	--	--	--	--	--	--	--	--	--
1/27/2017	AOC-1/3	SB-4	8-9	--	--	--	--	--	--	--	--	--	--	--
1/27/2017	AOC-1/3	SB-5	11-12	--	--	--	--	--	--	--	--	--	--	--
2/21/2020	18-51/water line	KSCRI-18-51-N1-4	4	**2.45**	**43.6**	**0.06 J**	**16.1**	--	**3.93**	**0.0252**	--	0.5 U	**0.04 J**	--
2/21/2020	18-51/water line	KSCRI-18-51-NW1-5	5	**1.8**	**58.1**	**0.05 J**	**23.7**	--	**3.97**	**0.0298**	--	0.53 U	**0.05 J**	--
2/21/2020	18-51/water line	KSCRI-18-51-NE1-5	5	**1.77**	**44.4**	**0.04 J**	**25.1**	--	**2.53**	**0.0328**	--	0.55 U	**0.05 J**	--
2/21/2020	18-51/water line	KSCRI-18-51-B1-7	7	**2.19**	**47.1**	**0.06 J**	**24**	--	**2.44**	**0.0265**	--	**0.53 J**	**0.05 J**	--
2/21/2020	18-51/water line	KSCRI-18-51-B2-7	7	**1.72**	**42.2**	**0.05 J**	**24.4**	--	**2.16**	**0.0226**	--	0.52 U	**0.05 J**	--
3/3/2020	18-51/water line	KSCRI-18-51-B1(R)-10	10	**5.31**	**70.4**	0.13 U	**14**	--	**4.82**	**0.0444 J**	--	**1.29**	**0.11 J**	--
3/3/2020	18-51/water line	KSCRI-18-51-B2(R)-10	10	**5.97**	**83.5**	**0.05 J**	**14.4**	--	**5.49**	**0.0513 J**	--	**1.69**	**0.12 J**	--
3/3/2020	18-51/water line	KSCRI-18-51-W1-6	6	**1.82**	**50.1**	**0.07 J**	**27.5**	--	**2.68**	**0.0166 J**	--	**0.82**	**0.05 J**	--
3/3/2020	18-51/water line	KSCRI-18-51-E1-6	6	**2.03**	**40.9**	**0.05 J**	**25**	--	**2.66**	**0.016 J**	--	**0.6**	**0.05 J**	--
3/3/2020	18-51/water line	KSCRI-18-51-6	6	**1.83**	**46.2**	**0.04 J**	**26.7**	--	**2.55**	**0.018 J**	--	**0.53 J**	**0.04 J**	--
4/12/2017	north	MW1	2.5	**1.31 J**	--	--	--	--	--	--	--	--	--	--
4/11/2017	northeast	MW2	2.5	**4.78 J**	--	--	--	--	--	--	--	--	--	--
4/11/2017	east	MW3	2.5	**3.26 J**	--	--	--	--	--	--	--	--	--	--
4/11/2017	southeast	MW4	2.5	**5.76 J**	--	--	--	--	--	--	--	--	--	--
4/11/2017	southwest	MW5	2.5	**3.44 J**	--	--	--	--	--	--	--	--	--	--
4/13/2017	west	MW6	2.5	**4.64 J**	--	--	--	--	--	--	--	--	--	--
4/11/2017	northwest	MW7	2.5	**2.93 J**	--	--	--	--	--	--	--	--	--	--

Table 20a
Soil Results - Metals
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	Metals (mg/kg)										
				Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
Lowest Screening Level				7.3	400	1	48	36	25	0.07	48	0.026	0.027	85
Due Diligence Soil Results														
11/14/2017	--	LAI1	1-3	2.65	38.0	0.11 U	17.0	--	4.74	0.0296	--	0.55 U	0.22 U	--
			8-10	6.2	70.7	0.19	16.2	--	11.4	0.0953	--	0.86	0.24 U	--
11/14/2017	--	LAI2	1-3	3.1	59.3	0.11 U	15.3	--	2.79	0.0217 U	--	0.53 U	0.21 U	--
			6.3-8.3	3.73	65.7	0.12 U	14.7	--	4.51	0.0616	--	0.61	0.23 U	--
11/15/2017	--	LAI3	0.7-2.7	3.92	81.2	0.11 U	30.7	--	5.60	0.0382	--	0.92	0.53 U	--
			5.5-7.5	9.41	125	0.15 U	23.7	--	7.01	0.169	--	2.40	0.76 U	--
11/15/2017	--	LAI4	0.7-2.7	2.65	60.1	0.11 U	29.7	--	3.74	0.0410	--	0.65	0.21 U	--
			6.7-8.7	9.52	79.9	0.35	27.8	--	22.0	0.0794	--	1.09	0.25 U	--
11/15/2017	--	LAI7	1-3	4.26	56.1	0.11 U	25.8	--	4.69	0.0371	--	0.69	0.21 U	--
			8-10	3.98	69.2	0.13 U	14.8	--	3.63	0.0688	--	0.95	0.26 U	--
11/13/2017	--	LAI13	1-3	2.77	62.1 J	0.11 U	20.3	--	4.29	0.0404	--	0.54 U	0.22 U	--
			8-10	7.04	111	0.14 U	20.0	--	6.91	0.0797	--	1.05	0.27 U	--
11/13/2017	--	LAI18	1-3	2.33	67.1	0.11 U	25.4	--	4.52	0.0284	--	0.53 U	0.21 U	--
			6-8	3.08	65.0	0.11 U	24.8	--	3.82	0.0346	--	0.55 U	0.22 U	--
7/11/2018	--	LAI19	1.5-3	18.1 J	62.3	0.15	23.7 J	--	17.1 J	0.0456	--	0.56 U	0.23 U	--
			11-13	4.72	64.6	0.13 U	16.4	--	3.64	0.0415	--	0.66 U	0.26 U	--
11/14/2017	--	LAI21	0.3-2.3	3.23	58.1	0.11 U	25.1	--	3.03	0.0257 U	--	0.53 U	0.21 U	--
			6.5-8.5	7.59	104	0.23	22.4	--	15.9	0.0959	--	0.93	0.25 U	--
11/14/2017	--	LAI22	6.3-8.3	7.81	89.1	0.20	22.2	--	14.6	0.113	--	0.92	0.24 U	--
			10-12	4.95	72.9	0.13 U	23.3	--	4.88	0.0452	--	0.87	0.26 U	--
5/21/2018	--	LAI34	1-3	5.47	63.2	0.11	22.0	--	6.62	0.0382	--	1.22	0.22 U	--
			10.5-12.5	14.2	99.1	0.36	19.7	--	27.7	0.118	--	1.60	0.26 U	--
7/18/2018	--	TD1	0.5-1.5	2.85	65.8	0.12 U	23.5	20.7	3.39	0.0280 U	--	0.62 U	0.25 U	39.3
			7-8	6.49	60.2 J	0.27	16.1 J	25.0	11.9	0.0513	--	0.72	0.23 U	46.9
			9-10	1.96	34.4	0.12 U	10.6	11.7	2.09	0.0307 U	--	0.68	0.24 U	23.2
7/18/2018	--	TD2	0-1	3.22	59.7	0.10 U	56.4 J	22.0	4.51	0.0263 U	--	0.51 U	0.20 U	41.6
			7-8	2.92	47.2	0.14 U	13.8	17.8	2.32	0.0313 U	--	0.73	0.27 U	27.7
			9-10	4.12	49.2	0.14 U	14.9	19.1	2.40	0.0355 U	--	0.82	0.29 U	29.5

Table 20a
Soil Results - Metals
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	Metals (mg/kg)										
				Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
Lowest Screening Level				**7.3**	**400**	**1**	**48**	**36**	**25**	**0.07**	**48**	**0.026**	**0.027**	**85**
7/18/2018	--	TD3	0.5-1.5	**4.05**	**81.2**	0.10 U	**27.3**	**20.9**	**3.65**	0.0225 U	--	0.52 U	0.21 U	**43.4**
			9-10	**2.62**	**57.1**	0.13 U	**14.0**	**22.7**	**2.92**	**0.0548**	--	**0.90**	0.26 U	**29.9**
			11-12	**3.31**	**71.5**	0.14 U	**16.1**	**25.9**	**3.46**	**0.0370**	--	**1.01**	0.28 U	**37.7**
7/18/2018	--	TE1	0.5-1.5	**5.90**	**104**	**0.45**	**22.3**	**33.0**	**38.4**	**0.0445**	--	**0.73**	0.23 U	**83.6**
			4-5	**1.53**	**44.9**	0.13 U	**11.8**	**14.1**	**18.9**	**0.0907**	--	0.64 U	0.26 U	**21.8**
7/18/2018	--	TE2	0.5-1.5	**4.23**	**69.5**	0.11	**15.3**	**24.6**	**3.79**	**0.0395**	--	**0.75**	0.22 U	**36.2**
			4-5	**2.21**	**45.4**	0.11 U	**12.7**	**15.8**	**1.99**	**0.0333**	--	**0.64**	0.22 U	**25.9**
7/18/2018	--	TE3	0.5-1.5	**5.00**	**70.1**	0.11 U	**15.2**	**30.1**	**4.03**	**0.0347**	--	**0.85**	0.23 U	**35.7**
			4-5	**1.85**	**65.6**	0.13 U	**15.0**	**24.9**	**2.91**	**0.0396**	--	**0.89**	0.26 U	**29.1**

Notes and Abbreviations

1.Screening level detail presented in Table 16

Bolded values are detections

Grey indicates detection above most stringent criteria

-- not analyzed

SL = screening level

ug/kg = micrograms per kilogram

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

Table 20b
Soil Results - Total Petroleum Hydrocarbons
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	TPH via HCID Methods (mg/kg)			TPH via NWTPH Methods (mg/kg)		
				Gasoline Range Organics	Diesel Range Organics	Oil Range Organics	Gasoline Range Organics	TPH-Diesel	TPH-Oil
Lowest Screening Level				--	--	--	**100**	**460**	**2000**
RI Data									
1/27/2017	AOC-1/3	SB-3	8.5-9.5	--	--	--	--	9.7 U	42 U
1/27/2017	AOC-1/3	SB-4	8-9	--	--	--	--	8.3 U	36 U
1/27/2017	AOC-1/3	SB-5	11-12	--	--	--	--	7.8 U	33 U
2/21/2020	18-51/water line	KSCRI-18-51-N1-4	4	--	--	--	--	**4260**	**119**
2/21/2020	18-51/water line	KSCRI-18-51-NW1-5	5	--	--	--	--	**60.3**	10.9 U
2/21/2020	18-51/water line	KSCRI-18-51-NE1-5	5	--	--	--	--	5.54 U	11.1 U
2/21/2020	18-51/water line	KSCRI-18-51-B1-7	7	--	--	--	--	**183**	11.2 U
2/21/2020	18-51/water line	KSCRI-18-51-B2-7	7	--	--	--	--	**2050**	**57**
3/3/2020	18-51/water line	KSCRI-18-51-B1(R)-10	10	--	--	--	--	**1210**	**32.1**
3/3/2020	18-51/water line	KSCRI-18-51-B2(R)-10	10	--	--	--	--	**1290**	**38.5**
3/3/2020	18-51/water line	KSCRI-18-51-W1-6	6	--	--	--	--	5.57 U	11.1 U
3/3/2020	18-51/water line	KSCRI-18-51-E1-6	6	--	--	--	--	5.49 U	11 U
3/3/2020	18-51/water line	KSCRI-18-51-6	6	--	--	--	--	5.56 U	11.1 U
Due Diligence Soil Results									
11/14/2017	--	LAI1	1-3	11 U	28 U	56 U	--	--	--
			8-10	13 U	31 U	63 U	--	--	--
11/14/2017	--	LAI2	1-3	11 U	28 U	56 U	--	--	--
			6.3-8.3	13 U	31 U	63 U	--	--	--
11/15/2017	--	LAI3	0.7-2.7	11 U	28 U	56 U	--	--	--
			5.5-7.5	14 U	35 U	70 U	--	--	--
11/15/2017	--	LAI4	0.7-2.7	11 U	28 U	57 U	--	--	--
			6.7-8.7	14 U	35 U	69 U	--	--	--
11/15/2017	--	LAI7	1-3	11 U	28 U	56 U	--	--	--
			8-10	13 U	33 U	67 U	--	--	--

Table 20b

Soil Results - Total Petroleum Hydrocarbons

Remedial Investigation

Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	TPH via HCID Methods (mg/kg)			TPH via NWTPH Methods (mg/kg)		
				Gasoline Range Organics	Diesel Range Organics	Oil Range Organics	Gasoline Range Organics	TPH-Diesel	TPH-Oil
Lowest Screening Level				**--**	**--**	**--**	**100**	**460**	**2000**
11/13/2017	--	LAI13	1-3	11 U	27 U	54 U	--	--	--
			8-10	14 U	34 U	69 U	--	--	--
7/10/2018	--	LAI14	7.5-9.3	--	--	--	--	**35.2**	**139**
11/13/2017	--	LAI18	1-3	11 U	28 U	**132**	--	**9.35 ***	**83.0 ***
			6-8	12 U	30 U	**60**	--	**6.52 ***	**45.7 ***
7/11/2018	--	LAI19	1.5-3	--	--	--	**10.3**	**19.5**	**80.2**
			11-13	--	--	--	9.37 U	6.38 U	12.8 U
11/14/2017	--	LAI21	0.3-2.3	11 U	27 U	55 U	--	--	--
			6.5-8.5	13 U	33 U	66 U	--	--	--
11/14/2017	--	LAI22	6.3-8.3	14 U	34 U	68 U	--	--	--
			10-12	14 U	35 U	**145**	--	**10.5 ***	**85.6 ***
7/12/2018	--	LAI32	2-3					5.08 U *	10.2 U *
			8-9					6.68 U *	**24.9 ***
5/21/2018	--	LAI34	1-3	13 U	32 U	65 U			
			10.5-12.5	11 U	28 U	56 U			
7/18/2018	--	LAI44	7-8	--	--	--	--	5.38 U	**21.7**
7/18/2018	--	TD1	0.5-1.5	--	--	--	5.6 UJ	5.50 U*	11.0 U*
			7-8	--	--	--	--	6.39 U	12.8 U
			9-10	--	--	--	--	6.30 U	12.6 U
7/18/2018	--	TD2	0-1	--	--	--	5.87 UJ	6.05 U*	12.1 U*
			7-8	--	--	--	--	6.61 U	13.2 U
			9-10	--	--	--	--	7.85 U	**17.0**
7/18/2018	--	TD3	0.5-1.5	--	--	--	5.36 UJ	5.22 U*	10.4 U*
			9-10	--	--	--	--	6.33 U	12.7 U
			11-12	--	--	--	--	6.73 U	13.5 U

Table 20b
Soil Results - Total Petroleum Hydrocarbons
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	TPH via HCID Methods (mg/kg)			TPH via NWTPH Methods (mg/kg)		
				Gasoline Range Organics	Diesel Range Organics	Oil Range Organics	Gasoline Range Organics	TPH-Diesel	TPH-Oil
Lowest Screening Level				**--**	**--**	**--**	**100**	**460**	**2000**
7/18/2018	--	TE1	0.5-1.5	--	--	--	5.38 UJ	**12.3 ***	**51.5 ***
			4-5	--	--	--	--	5.87 U	11.7 U
7/18/2018	--	TE2	0.5-1.5	--	--	--	5.74 UJ	5.71 U*	11.4 U*
			4-5	--	--	--	--	6.43 U	12.9 U
7/18/2018	--	TE3	0.5-1.5	--	--	--	5.46 UJ	5.83 U*	11.7 U*
			4-5	--	--	--	--	6.42 U	12.8 U

Notes and Abbreviations

1.Screening level detail presented in Table 16

Bolded values are detections

Grey indicates detection above most stringent criteria

-- not analyzed

* without silica gel cleanup

HCID = Hydrocarbon Identification

TPH = Total petroleum hydrocarbons

SL = screening level

mg/kg = milligrams per kilogram

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

Table 20c
Soil Results - Volatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	VOCs (mg/kg)												
				1,2,4-Trichlorobenzene	**1,2,4-Trimethylbenzene**	**1,3,5-Trimethylbenzene**	**2-Butanone/ MEK**	**2-Hexanone**	**4-Isopropyltoluene**	**Acetone**	**Benzene**	**Carbon Disulfide**	**Ethylbenzene**	**Isopropylbenzene**	**m,p-Xylene**	**Methyl Iodide**
Lowest Screening Level				**0.00007**	**--**	**0.071**	**1.4**	**--**	**--**	**2.1**	**0.00015**	**0.27**	**0.014**	**0.79**	**0.83**	**--**
RI Data																
2/21/2020	18-51/water line	KSCRI-18-51-N1-4	4	0.042 U	--	--	--	--	--	--	--	--	--	--	--	--
2/21/2020	18-51/water line	KSCRI-18-51-NW1-5	5	0.015 U	--	--	--	--	--	--	--	--	--	--	--	--
2/21/2020	18-51/water line	KSCRI-18-51-NE1-5	5	0.0154 U	--	--	--	--	--	--	--	--	--	--	--	--
2/21/2020	18-51/water line	KSCRI-18-51-B1-7	7	0.0453 U	--	--	--	--	--	--	--	--	--	--	--	--
2/21/2020	18-51/water line	KSCRI-18-51-B2-7	7	0.0451 U	--	--	--	--	--	--	--	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-B1(R)-10	10	0.055 U	--	--	--	--	--	--	--	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-B2(R)-10	10	0.0553 U	--	--	--	--	--	--	--	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-W1-6	6	0.0199 U	--	--	--	--	--	--	--	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-E1-6	6	0.020 U	--	--	--	--	--	--	--	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-6	6	0.020 U	--	--	--	--	--	--	--	--	--	--	--	--
Due Diligence Results																
11/14/2017	--	LAI1	1-3	0.00446 U	0.00089 U	0.00089 U	0.00446 U	0.00446 U	0.00089 U	**0.0112**	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00178 U	0.00089 U
			8-10	0.00580 U	0.00116 U	0.00116 U	0.00580 U	0.00580 U	0.00116 U	**0.0293**	0.00116 U	0.00116 U	0.00116 U	0.00116 U	0.00232 U	0.00116 U
11/14/2017	--	LAI2	1-3	0.00459 U	0.00092 U	0.00092 U	0.00459 U	0.00459 U	0.00092 U	**0.0110**	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00184 U	0.00092 U
			6.3-8.3	0.00607 U	0.00121 U	0.00121 U	**0.0368**	0.00607 U	0.00121 U	**0.152**	0.00121 U	0.00121 U	0.00121 U	0.00121 U	0.00243 U	0.00121 U
11/15/2017	--	LAI3	0.7-2.7	0.00463 U	0.00093 U	0.00093 U	0.00463 U	0.00463 U	0.00093 U	**0.0116**	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00185 U	0.00093 U
			5.5-7.5	0.00727 U	0.00145 U	0.00145 U	0.00727 U	0.00727 U	0.00145 U	**0.0326**	0.00145 U	0.00145 U	0.00145 U	0.00145 U	0.00291 U	0.00145 U
11/15/2017	--	LAI4	0.7-2.7	0.00488 U	0.00098 U	0.00098 U	0.00488 U	0.00488 U	0.00098 U	**0.0131**	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00195 U	0.00098 U
			6.7-8.7	0.00649 U	0.00130 U	0.00130 U	**0.0114**	0.00649 U	0.00130 U	**0.0596**	0.00130 U	0.00130 U	0.00130 U	0.00130 U	0.00260 U	0.00130 U
11/15/2017	--	LAI7	1-3	0.00555 U	0.00111 U	0.00111 U	**0.00696**	0.00555 U	0.00111 U	**0.0389**	0.00111 U	**0.00129**	0.00111 U	0.00111 U	0.00222 U	0.00111 U
			8-10	0.00614 U	0.00123 U	0.00123 U	0.00614 U	0.00614 U	0.00123 U	**0.0121**	0.00123 U	0.00123 U	0.00123 U	0.00123 U	0.00245 U	0.00123 U
11/13/2017	--	LAI13	1-3	0.00507 U	0.00101 U	0.00101 U	0.00507 U	0.00507 U	0.00101 U	**0.0216**	0.00101 U	0.00125	0.00101 U	0.00101 U	0.00203 U	0.00101 U
			8-10	0.00702 U	0.00140 U	0.00140 U	0.00702 U	0.00702 U	0.00140 U	**0.0336**	0.00140 U	0.00140 U	0.00140 U	0.00140 U	0.00281 U	0.00140 U
7/10/2018	--	LAI14	7.5-9.3	0.00666 U	**0.00152**	0.00133 U	**0.0190**	0.00666 U	0.00133 U	**0.0986**	0.00133 U	0.00133 U	**0.00568**	**0.0144**	**0.0242**	0.00133 U
11/13/2017	--	LAI18	1-3	0.00443 U	0.00089 U	0.00089 U	0.00443 U	0.00443 U	0.00089 U	**0.0182**	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00177 U	0.00089 U
			6-8	0.00466 U	0.00093 U	0.00093 U	0.00466 U	0.00466 U	0.00093 U	**0.0203**	**0.00102**	0.00093 U	0.00093 U	0.00093 U	0.00186 U	0.00093 U
7/11/2018	--	LAI19	1.5-3	0.00526 U	**0.00241**	**0.00115**	**0.00601**	0.00526 U	0.00105 U	**0.129**	0.00105 U	0.00105 U	0.00105 U	0.00105 U	0.00211 U	0.00105 U
			11-13	0.00635 U	0.00127 U	0.00127 U	0.00635 U	0.00635 U	0.00127 U	**0.0153**	0.00127 U	**0.00182**	0.00127 U	0.00127 U	0.00254 U	**0.00395**
11/14/2017	--	LAI21	0.3-2.3	0.00442 U	0.00088 U	0.00088 U	0.00442 U	0.00442 U	0.00088 U	**0.00806**	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00177 U	0.00088 U
			6.5-8.5	0.00651 U	0.00130 U	0.00130 U	0.00651 U	0.00651 U	0.00130 U	**0.0323**	0.00130 U	0.00130 U	0.00130 U	0.00130 U	0.00261 U	0.00130 U
11/14/2017	--	LAI22	6.3-8.3	0.00688 U	0.00138 U	0.00138 U	**0.0112**	0.00688 U	0.00138 U	**0.0521**	0.00138 U	0.00138 U	0.00138 U	0.00138 U	0.00275 U	0.00138 U
			10-12	0.00666 U	0.00133 U	0.00133 U	0.00666 U	0.00666 U	0.00133 U	**0.0209**	0.00133 U	0.00212	0.00133 U	0.00133 U	0.00266 U	0.00133 U
7/12/2018	--	LAI31	10-11	0.00654 U	0.00131 U	0.00131 U	0.00654 U	0.00654 U	0.00131 U	**0.0141**	0.00131 U	0.00131 U	0.00131 U	0.00131 U	0.00262 U	0.00131 U
7/12/2018	--	LAI32	2-3	0.00516 U	0.00103 U	0.00103 U	0.00516 U	0.00516 U	0.00103 U	**0.00952**	0.00103 U	0.00103 U	0.00103 U	0.00103 U	0.00206 U	0.00103 U
			8-9	0.00697 U	0.00139 U	0.00139 U	0.00697 U	0.00697 U	0.00139 U	**0.0335**	**0.00183**	0.00139 U	0.00139 U	0.00139 U	0.00279 U	0.00139 U
5/21/2018	--	LAI34	1-3	0.00495 U	0.00099 U	0.00099 U	0.00495 U	0.00495 U	0.00099 U	**0.0284**	0.00099 U	**0.00181**	0.00099 U	0.00099 U	0.00198 U	0.00099 U
			10.5-12.5	0.00618 U	0.00124 U	0.00124 U	0.00618 U	0.00618 U	0.00124 U	**0.0197**	0.00124 U	0.00124 U	0.00124 U	0.00124 U	0.00247 U	0.00124 U
7/18/2018	--	LAI35	7.5-8.5	0.00704 U	0.00141 U	0.00141 U	0.00704 U	0.00704 U	0.00141 U	**0.0471**	**0.00277**	**0.00345**	0.00141 U	0.00141 U	0.00281 U	0.00141 U
7/11/2018	--	LAI37	2.7-3.7	0.00551 U	0.00110 U	0.00110 U	0.00551 U	0.00551 U	0.00110 U	**0.0351**	0.00110 U	0.00110 U	0.00110 U	0.00110 U	0.00220 U	0.00110 U
7/11/2018	--	LAI38	3-3.6	0.00528 U	0.00106 U	0.00106 U	0.00528 U	**0.00733**	0.00106 U	**0.0593**	0.00106 U	0.00106 U	0.00106 U	0.00106 U	0.00211 U	0.00106 U

Table 20c

Soil Results - Volatile Organic Compounds

Remedial Investigation

Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	VOCs (mg/kg)												
				1,2,4-Trichlorobenzene	**1,2,4-Trimethylbenzene**	**1,3,5-Trimethylbenzene**	**2-Butanone/ MEK**	**2-Hexanone**	**4-Isopropyltoluene**	**Acetone**	**Benzene**	**Carbon Disulfide**	**Ethylbenzene**	**Isopropylbenzene**	**m,p-Xylene**	**Methyl Iodide**
Lowest Screening Level				**0.00007**	**--**	**0.071**	**1.4**	**--**	**--**	**2.1**	**0.00015**	**0.27**	**0.014**	**0.79**	**0.83**	**--**
7/11/2018	--	LAI39	2-3	0.00506 U	0.00101 U	0.00101 U	0.00506 U	0.00506 U	0.00101 U	**0.0456**	0.00101 U	0.00101 U	0.00101 U	0.00101 U	0.00202 U	0.00101 U
7/11/2018	--	LAI40	3-4	**0.0146**	**0.00441**	**0.00192**	**0.0283**	**0.0374**	**0.00352**	**0.324**	0.00119 U	0.00119 U	**0.00284**	0.00119 U	**0.00571**	0.00119 U
7/18/2018	--	TD1	7-8	--	--	--	--	--	--	--	--	--	--	--	--	--
7/18/2018			9-10	--	--	--	--	--	--	--	--	--	--	--	--	--
7/18/2018	--	TD2	7-8	--	--	--	--	--	--	--	--	--	--	--	--	--
7/18/2018			9-10	--	--	--	--	--	--	--	--	--	--	--	--	--
7/18/2018	--	TD3	9-10	--	--	--	--	--	--	--	--	--	--	--	--	--
7/18/2018			11-12	--	--	--	--	--	--	--	--	--	--	--	--	--
7/18/2018	--	TE1	4-5	--	--	--	--	--	--	--	--	--	--	--	--	--
7/18/2018	--	TE2	4-5	--	--	--	--	--	--	--	--	--	--	--	--	--
7/18/2018	--	TE3	4-5	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes and Abbreviations

1. Screening level detail presented in Table 16
2. Only VOCs detected at least once included in table.

Bolded values are detections

Grey indicates detection above most stringent criteria

-- not analyzed

ND = Not detected

VOCs = Volatile Organic Compounds

SL = screening level

mg/kg = milligrams per kilogram

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

Table 20c
Soil Results - Volatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	VOCs (mg/kg)						
				Methylene Chloride	Naphthalene	o-Xylene	Styrene	Toluene	Total Xylenes	Trichlorofluoromethane (CFC 11)
Lowest Screening Level				**0.0015**	**0.24**	**0.84**	**0.12**	**0.024**	**0.83**	**0.79**
RI Data										
2/21/2020	18-51/water line	KSCRI-18-51-N1-4	4	--	0.042 U	--	--	--	--	--
2/21/2020	18-51/water line	KSCRI-18-51-NW1-5	5	--	**0.0327**	--	--	--	--	--
2/21/2020	18-51/water line	KSCRI-18-51-NE1-5	5	--	0.0154 U	--	--	--	--	--
2/21/2020	18-51/water line	KSCRI-18-51-B1-7	7	--	**0.0273 J**	--	--	--	--	--
2/21/2020	18-51/water line	KSCRI-18-51-B2-7	7	--	**0.686**	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-B1(R)-10	10	--	**1.2**	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-B2(R)-10	10	--	**1.09**	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-W1-6	6	--	**0.0125 J**	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-E1-6	6	--	0.020 U	--	--	--	--	--
3/3/2020	18-51/water line	KSCRI-18-51-6	6	--	0.020 U	--	--	--	--	--
Due Diligence Results										
11/14/2017	--	LAI1	1-3	0.00178 U	0.00446 U	0.00089 U	0.00089 U	0.00089 U	0.00178 U	0.00089 U
			8-10	0.00232 U	0.00580 U	0.00116 U	0.00116 U	0.00116 U	0.00232 U	0.00116 U
11/14/2017	--	LAI2	1-3	0.00184 U	0.00459 U	0.00092 U	0.00092 U	0.00092 U	0.00184 U	0.00092 U
			6.3-8.3	0.00243 U	0.00607 U	0.00121 U	0.00121 U	0.00121 U	0.00243 U	0.00121 U
11/15/2017	--	LAI3	0.7-2.7	0.00185 U	0.00463 U	0.00093 U	0.00093 U	0.00093 U	0.00185 U	0.00093 U
			5.5-7.5	0.00291 U	0.00727 U	0.00145 U	0.00145 U	0.00145 U	0.00291 U	0.00145 U
11/15/2017	--	LAI4	0.7-2.7	0.00195 U	0.00488 U	0.00098 U	0.00098 U	0.00098 U	0.00195 U	0.00098 U
			6.7-8.7	0.00260 U	0.00649 U	0.00130 U	0.00130 U	0.00130 U	0.00260 U	0.00130 U
11/15/2017	--	LAI7	1-3	0.00222 U	0.00555 U	0.00111 U	0.00111 U	0.00111 U	0.00222 U	0.00111 U
			8-10	0.00245 U	0.00614 U	0.00123 U	0.00123 U	0.00123 U	0.00245 U	0.00123 U
11/13/2017	--	LAI13	1-3	0.00203 U	0.00507 U	0.00101 U	0.00101 U	0.00101 U	0.00203 U	0.00101 U
			8-10	0.00281 U	0.00702 U	0.00140 U	0.00140 U	0.00140 U	0.00281 U	0.00140 U
7/10/2018	--	LAI14	7.5-9.3	0.00266 U	**0.0105**	**0.00623**	**0.0313**	**0.00737**	**0.0304**	0.00133 U
11/13/2017	--	LAI18	1-3	0.00177 U	0.00443 U	0.00089 U	0.00089 U	0.00089 U	0.00177 U	0.00089 U
			6-8	0.00186 U	0.00466 U	0.00093 U	0.00093 U	**0.00096**	0.00186 U	0.00093 U
7/11/2018	--	LAI19	1.5-3	0.00211 U	**3.17**	0.00105 U	0.00105 U	0.00105 U	0.00211 U	**0.00462 J**
			11-13	0.00267 U	**0.0580**	0.00127 U	0.00127 U	0.00127 U	0.00254 U	**0.0385 J**
11/14/2017	--	LAI21	0.3-2.3	0.00177 U	0.00442 U	0.00088 U	0.00088 U	0.00088 U	0.00177 U	0.00088 U
			6.5-8.5	0.00261 U	0.00651 U	0.00130 U	0.00130 U	0.00130 U	0.00261 U	0.00130 U
11/14/2017	--	LAI22	6.3-8.3	0.00275 U	0.00688 U	0.00138 U	0.00138 U	0.00138 U	0.00275 U	0.00138 U
			10-12	0.00266 U	0.00666 U	0.00133 U	0.00133 U	0.00133 U	0.00266 U	0.00133 U
7/12/2018	--	LAI31	10-11	0.00360 U	0.00654 U	0.00131 U	0.00131 U	0.00131 U	0.00262 U	0.00131 U
7/12/2018	--	LAI32	2-3	0.00206 U	0.00516 U	0.00103 U	0.00103 U	0.00103 U	0.00206 U	0.00103 U
			8-9	0.00279 U	0.00697 U	0.00139 U	0.00139 U	0.00139 U	0.00279 U	0.00139 U
5/21/2018	--	LAI34	1-3	0.00198 U	0.00495 U	0.00099 U	0.00099 U	0.00099 U	0.00198 U	0.00099 U
			10.5-12.5	0.00247 U	0.00618 U	0.00124 U	0.00124 U	0.00124 U	0.00247 U	0.00124 U
7/18/2018	--	LAI35	7.5-8.5	0.00433 U	0.00704 U	0.00141 U	0.00141 U	**0.00178**	0.00281 U	0.00141 U
7/11/2018	--	LAI37	2.7-3.7	**0.00369**	**0.00815**	0.00110 U	0.00110 U	0.00110 U	0.00220 U	0.00110 U
7/11/2018	--	LAI38	3-3.6	**0.00270**	0.00528 U	0.00106 U	0.00106 U	**0.00117**	**0.00236**	0.00106 U

Table 20c
Soil Results - Volatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	VOCs (mg/kg)						
				Methylene Chloride	**Naphthalene**	**o-Xylene**	**Styrene**	**Toluene**	**Total Xylenes**	**Trichlorofluoromethane (CFC 11)**
Lowest Screening Level				**0.0015**	**0.24**	**0.84**	**0.12**	**0.024**	**0.83**	**0.79**
7/11/2018	--	LAI39	2-3	**0.00281**	0.00506 U	0.00101 U	0.00101 U	0.00101 U	0.00202 U	0.00101 U
7/11/2018	--	LAI40	3-4	**0.00323**	**0.0511**	**0.00329**	**0.00385**	**0.00184**	**0.00900**	**0.00628**
7/18/2018	--	TD1	7-8	--	0.00490 U	--	--	--	--	--
7/18/2018			9-10	--	0.00481 U	--	--	--	--	--
7/18/2018	--	TD2	7-8	--	0.00497 U	--	--	--	--	--
7/18/2018			9-10	--	0.00493 U	--	--	--	--	--
7/18/2018	--	TD3	9-10	--	0.00484 U	--	--	--	--	--
7/18/2018			11-12	--	0.00482 U	--	--	--	--	--
7/18/2018	--	TE1	4-5	--	0.00487 U	--	--	--	--	--
7/18/2018	--	TE2	4-5	--	0.00496 U	--	--	--	--	--
7/18/2018	--	TE3	4-5	--	0.00495 U	--	--	--	--	--

Notes and Abbreviations

1. Screening level detail presented in Table 16
2. Only VOCs detected at least once included in table.

Bolded values are detections

Grey indicates detection above most stringent criteria

-- not analyzed

ND = Not detected

VOCs = Volatile Organic Compounds

SL = screening level

mg/kg = milligrams per kilogram

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentratic

Table 20d
Soil Results - Semivolatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Sample Location ID	Depth (ft. bgs)	SVOCs (mg/kg)																
				1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Benzo(a) pyrene	Benzo(g,h,i) perylene	bis(2-Ethylhexyl) Phthalate	Chrysene	Dibenzo (a,h) anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Isophorone	Phenanthrene	Pyrene	cPAH TEQ
Lowest Screening Level				**0.0042**	**0.088**	**0.16**	**0.000016**	**--**	**0.005**	**0.0064**	**0.000029**	**0.15**	**0.3**	**0.08**	**0.00056**	**0.009**	**--**	**0.55**	**130**
RI Data																				
2/21/2020	18-51/water line	KSCRI-18-51-N1-4	4	**2.1**	0.042 U	**0.544**	**0.372**	**0.144**	**0.318**	**0.862**	**0.0541**	**0.417**	**2.5**	**1.47**	**0.133**	0.042 U	**5.19**	**2.45**	**0.39933**
2/21/2020	18-51/water line	KSCRI-18-51-NW1-5	5	**0.0885**	**0.119**	**0.0129 J**	0.015 U	0.015 U	0.0375 U	**0.0055 J**	0.015 U	**0.0245**	**0.0133 J**	**0.0377**	0.015 U	0.015 U	**0.058**	**0.0169**	NC
2/21/2020	18-51/water line	KSCRI-18-51-NE1-5	5	0.0154 U	0.0154 U	0.0154 U	0.0154 U	0.0154 U	0.034 U	0.0154 U	0.0154 U	0.0154 U	0.0154 U	0.0154 U	0.0154 U	0.0154 U	0.0154 U	0.0154 U	NC
2/21/2020	18-51/water line	KSCRI-18-51-B1-7	7	**0.172**	**0.199**	**0.0525**	0.0453 U	0.0453 U	0.113 U	**0.030 J**	0.0463 U	**0.0613**	**0.0972**	**0.115**	0.0453 U	0.0453 U	**0.356**	**0.105**	NC
2/21/2020	18-51/water line	KSCRI-18-51-B2-7	7	**4.45**	**3.32**	**0.601**	**0.0496**	**0.0201 J**	**0.242**	**0.168**	0.0451 U	**0.63**	**0.437**	**1.51**	**0.0194 J**	0.0451 U	**3.44**	**0.500**	NC
3/3/2020	18-51/water line	KSCRI-18-51-B1(R)-10	10	**4.03**	**5.43**	**0.49**	**0.0817**	**0.0374 J**	0.139 U	**0.225**	**0.0187 J**	**0.53**	**0.66**	**0.716**	**0.0335 J**	0.0555 U	**2.74**	**0.661**	NC
3/3/2020	18-51/water line	KSCRI-18-51-B2(R)-10	10	**3.51**	**4.88**	**0.434**	**0.142**	**0.0529 J**	0.138 U	**0.379**	0.0553 U	**0.493**	**1.16**	**0.611**	**0.0514 J**	0.0553 U	**2.82**	**1.15**	NC
3/3/2020	18-51/water line	KSCRI-18-51-W1-6	6	**0.0365**	**0.0179 J**	**0.0089 J**	0.0199 U	0.0199 U	0.0499 U	0.0199 U	0.0199 U	**0.0154 J**	0.0199 U	0.0244	0.0199 U	**0.0175 J**	**0.0304**	0.0199 U	NC
3/3/2020	18-51/water line	KSCRI-18-51-E1-6	6	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	0.0499 U	0.020 U	0.020 U	0.020 U	0.02 U	0.020 U	0.02 U	0.020 U	0.020 U	0.020 U	NC
3/3/2020	18-51/water line	KSCRI-18-51-6	6	0.02 U	0.02 U	0.02 U	0.02 U	0.020 U	0.0499 U	0.020 U	0.020 U	0.020 U	0.02 U	0.020 U	0.02 U	0.020 U	0.020 U	0.020 U	NC
Due Diligence Results																				
11/14/2017	--	LAI1	1-3	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
			8-10	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
11/14/2017	--	LAI2	1-3	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
			6.3-8.3	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
11/15/2017	--	LAI3	0.7-2.7	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
			5.5-7.5	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
11/15/2017	--	LAI4	0.7-2.7	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	ND
			6.7-8.7	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	0.063 U	ND
11/15/2017	--	LAI7	1-3	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
			8-10	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	ND
11/13/2017	--	LAI13	1-3	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	0.068 U	ND
			8-10	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
11/13/2017	--	LAI18	1-3	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
			6-8	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	ND
7/11/2018	--	LAI19	1.5-3	**0.119**	**0.215**	**0.216**	0.062 U	0.062 U	**0.4**	**0.079**	0.062 U	**0.158**	**0.165**	**0.13**	0.062 U	**0.473**	**0.345**	**0.137**	**0.00079**
			11-13	0.064 U	0.064 U	**0.089**	**0.196**	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	0.064 U	**0.196**
11/14/2017	--	LAI21	0.3-2.3	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	ND
			6.5-8.5	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	0.065 U	ND
11/14/2017	--	LAI22	6.3-8.3	0.062 U	0.062 U	0.062 U	0.062 U	0.064 U	0.062 U	0.062 U	0.064 U	0.062 U	0.062 U	0.062 U	0.064 U	0.062 U	0.062 U	0.062 U	ND
			10-12	0.064 U	0.064 U	0.064 U	0.064 U	0.062 U	0.064 U	0.064 U	0.062 U	0.064 U	0.064 U	0.064 U	0.062 U	0.064 U	0.064 U	0.064 U	ND
5/21/2018	--	LAI34	1-3	0.062 U	0.062 U	0.062 U	0.062 U	0.065 U	0.062 U	0.062 U	0.065 U	0.062 U	0.062 U	0.062 U	0.065 U	0.062 U	0.062 U	0.062 U	ND
			10.5-12.5	0.065 U	0.065 U	0.065 U	0.065 U	0.062 U	0.065 U	0.065 U	0.062 U	0.065 U	0.065 U	0.065 U	0.062 U	0.065 U	0.065 U	0.065 U	ND
11/14/2017	--	LAI1	1-4	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	ND
			7-8	0.00490 U	0.00490 U	0.00490 U	0.00490 U	**0.00508**	--	0.00490 U	**0.0116**	0.00490 U	0.00490 U	0.00490 U	**0.0123**	--	0.00490 U	0.00490 U	**0.00239**
			9-10	0.00481 U	0.00481 U	0.00481 U	0.00481 U	0.00481 U	--	0.00481 U	**0.0111**	0.00481 U	0.00481 U	0.00481 U	**0.0107**	--	0.00481 U	0.00481 U	**0.00218**

Table 20d
Soil Results - Semivolatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Sample Location ID	Depth (ft. bgs)	SVOCs (mg/kg)															
				1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Benzo(a) pyrene	Benzo(g,h,i) perylene	bis(2-Ethylhexyl) Phthalate	Chrysene	Dibenzo (a,h) anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno (1,2,3-cd) pyrene	Isophorone	Phenanthrene	Pyrene	cPAH TEQ
Lowest Screening Level				**0.0042**	**0.088**	**0.16**	**0.000016**	**--**	**0.005**	**0.0064**	**0.000029**	**0.15**	**0.3**	**0.08**	**0.00056**	**0.009**	**--**	**0.55**	**130**
7/18/2018	--	TD2	7-8	0.00497 U	0.00497 U	0.00497 U	0.00497 U	0.00497 U	--	0.00497 U	0.00497 U	0.00497 U	0.00497 U	0.00497 U	0.00497 U	--	0.00497 U	0.00497 U	ND
7/18/2018			9-10	0.00493 U	0.00493 U	0.00493 U	0.00493 U	0.00493 U	--	0.00493 U	0.00493 U	0.00493 U	0.00493 U	0.00493 U	0.00493 U	--	**0.00497**	0.00493 U	ND
7/18/2018	--	TD3	9-10	0.00484 U	0.00484 U	0.00484 U	0.00484 U	0.00484 U	--	0.00484 U	0.00484 U	0.00484 U	0.00484 U	0.00484 U	**0.00971**	--	0.00484 U	0.00484 U	**0.000971**
7/18/2018			11-12	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	--	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	0.00482 U	--	0.00482 U	0.00482 U	ND
7/18/2018	--	TE1	4-5	0.00487 U	0.00487 U	0.00487 U	0.00487 U	0.00487 U	--	0.00487 U	0.00487 U	0.00487 U	0.00487 U	0.00487 U	0.00487 U	--	0.00487 U	0.00487 U	ND
7/18/2018	--	TE2	4-5	0.00496 U	0.00496 U	0.00496 U	0.00496 U	0.00496 U	--	0.00496 U	0.00496 U	0.00496 U	0.00496 U	0.00496 U	0.00496 U	--	0.00496 U	0.00496 U	ND
7/18/2018	--	TE3	4-5	0.00495 U	0.00495 U	0.00495 U	0.00495 U	0.00495 U	--	0.00495 U	0.00495 U	0.00495 U	0.00495 U	0.00495 U	0.00495 U	--	0.00495 U	0.00495 U	ND

Notes and Abbreviations

1.Screening level detail presented in Table 16

2. Only SVOCs detected at least once included in table.

Bolded values are detections

Grey indicates detection above most stringent criteria

-- not analyzed

ND = not detected

NC = not calculated; TEQ was calculated for RI sample with highest concentrations only

SVOCs = Semi Volatile Organic Compounds

SL = screening level

mg/kg = milligrams per kilogram

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

Table 20e
Soil Results - Polychlorinated Biphenyls
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	PCBs (µg/kg)									
				Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs
Lowest Screening Level				--	--	--	--	--	**0.084**	**36**	**--**	--	**0.0022**
RI Data													
5/7/2018	18-59/transformer	SB21	1-3	18.1 U	18.1 U	18.1 U	18.1 U	18.1 U	**20.3**	18.1 U	18.1 U	18.1 U	**20.3**
5/7/2018	18-59/transformer	SB22	1-3	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	ND
5/7/2018	18-59/transformer	SB23	1-3	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	17.9 U	ND
5/7/2018	18-59/transformer	SB24	1-3	18.3 U	18.3 U	18.3 U	18.3 U	18.3 U	**8.4 J**	18.3 U	18.3 U	18.3 U	**8.4 J**
5/7/2018	18-59/transformer	SB25	1-3	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	ND
4/18/2019	18-25	HA1	1.0-1.5	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	19.0 U	--	--	ND
4/18/2019	18-25	HA2	0.5-1.0	18.6 U	18.6 U	18.6 U	18.6 U	18.6 U	**13.2 J**	18.6 U	--	--	**13.2 J**
4/18/2019	18-25	HA3	0.5-1.0	19.1 U	19.1 U	19.1 U	19.1 U	19.1 U	19.1 U	19.1 U	--	--	ND
4/18/2019	18-25	HA4	0.2-0.5	19.7 U	19.7 U	19.7 U	19.7 U	19.7 U	19.7 U	19.7 U	--	--	ND
4/18/2019	18-28	HA5	0.3-0.8	18.3 U	18.3 U	18.3 U	18.3 U	18.3 U	**57.5**	**16.2**	--	--	**73.7**
4/18/2019	18-28	HA6	0.3-1.3	18.5 U	18.5 U	18.5 U	18.5 U	18.5 U	**92.1**	**25.7**	--	--	**117.8**
4/18/2019	18-28	HA7	0.5-1.0	19.4 U	19.4 U	19.4 U	19.4 U	19.4 U	**28.7**	**10.3**	--	--	**39**
4/18/2019	18-28	HA8	0.8-1.3	19.1 U	19.1 U	19.1 U	19.1 U	19.1 U	**24.5**	19.1 U	--	--	**24.5**
4/18/2019	18-28	HA9	0.5-1.0	19.1 U	19.1 U	19.1 U	19.1 U	19.1 U	**15.3**	19.1 U	--	--	**15.3**
4/18/2019	18-28	HA10	0.5-1.0	18.5 U	18.5 U	18.5 U	18.5 U	18.5 U	**21.6**	18.5 U	--	--	**21.6**
7/17/2019	18-28	HA11C	0.5-1.0	4 U	4 U	4 U	4 U	4 U	**82.1 J**	**16.8**	4 U	4 U	**98.9**
7/17/2019	18-28	HA11C replicate	0.5-1.0	4 U	4 U	4 U	4 U	4 U	**74.2 J**	**14.3**	4 U	4 U	**88.5**
7/17/2019	18-28	HA12C	0.5-1.0	4 U	4 U	4 U	4 U	4 U	**35.7 J**	**13.8**	4 U	4 U	**49.5**
7/17/2019	18-28	HA12C replicate	0.5-1.0	4 U	4 U	4 U	4 U	4 U	**33.8 J**	**14**	4 U	4 U	**47.8**
Due Diligence Soil Results													
7/18/2018	--	TD1	0.5-1.5	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	ND
			7-8	4.0 UJ	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 UJ	4.0 U	4.0 U	ND
			9-10	3.9 UJ	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 UJ	3.9 U	3.9 U	ND
7/18/2018	--	TD2	0-1	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	ND
			7-8	3.9 UJ	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 UJ	3.9 U	3.9 U	ND
			9-10	3.9 UJ	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 UJ	3.9 U	3.9 U	ND
7/18/2018	--	TD3	0.5-1.5	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	ND
			9-10	4.0 UJ	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 UJ	4.0 U	4.0 U	ND
			11-12	4.0 UJ	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 UJ	4.0 U	4.0 U	ND

Table 20e
Soil Results - Polychlorinated Biphenyls
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Site ID	Depth (ft. bgs)	PCBs (µg/kg)									
				Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs
Lowest Screening Level				--	--	--	--	--	**0.084**	**36**	**--**	--	**0.0022**
7/18/2018	--	TE1	0.5-1.5	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	**5.6**	**6**	3.8 U	3.8 U	**11.6**
			4-5	3.9 UJ	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 UJ	3.9 U	3.9 U	ND
7/18/2018	--	TE2	0.5-1.5	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	3.8 U	ND
			4-5	4.0 UJ	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 UJ	4.0 U	4.0 U	ND
7/18/2018	--	TE3	0.5-1.5	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	ND
			4-5	4.0 UJ	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 UJ	4.0 U	4.0 U	ND

Notes and Abbreviations

1.Screening level detail presented in Table 16

Bolded values are detections

Grey indicates detection above most stringent criteria

-- not analyzed

ND = Not detected

PCBs = Polychlorinated Biphenyls

SL = screening level

ug/kg = micrograms per kilogram

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

Table 21a
Groundwater Results - Metals

Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	Dissolved Metals (µg/L)										
				Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
Surface Water Based SLs[1]				**0.018**	**1000**	**0.72**	**74**	**11**	**2.5**	**0.012**	**52**	**5**	**3.2**	**100**
Vapor Intrusion Based Groundwater SLs[2]				**--**	**--**	**--**	**--**	**--**	**--**	**0.89**	**--**	**--**	**--**	**--**
Method B/MCL Based Groundwater SLs[3]				**0.583**	**2000**	**5**	**100**	**640**	**15**	**2**	**100**	**50**	**80**	**4800**
RI Results														
1/24/2017	SWMU 88/89	11-14	SB-1	**193**	--	--	2 U	**2.7**	1 U	--	**5.4**	--	0.5 U	15 U
1/24/2017	SWMU 88/89	11-14	SB-2	**133**	--	--	2 U	2 U	1 U	--	**18.8**	--	0.5 U	15 U
1/27/2017	AOC-1/3	8-12	SB-3	**51.1**	--	--	--	--	--	--	--	--	--	--
1/24/2017	AOC-2/18-24/18-35	8-12	SB-8	**48.3**	--	--	--	--	--	--	--	--	--	--
10/2/2018	AOC-2/18-24/18-35	10-15	SB-26	**11.1**	--	--	--	40 U	--	--	4 U	--	--	**19.4**
10/2/2018		20-24		**2.5**	--	--	--	40 U	--	--	4 U	--	--	15 U
10/3/2018	AOC-2/18-24/18-35	12-17	SB-27	**4.1**	--	--	--	40 U	--	--	4 U	--	--	15 U
10/3/2018		22-26		2.0 U	--	--	--	40 U	--	--	4 U	--	--	15 U
10/2/2018	AOC-2/18-24/18-35	14-18	SB-28	**10.9**	--	--	--	40 U	--	--	**6.8**	--	--	15 U
10/3/2018		23-27		2.0 U	--	--	--	40 U	--	--	**4.6**	--	--	15 U
10/3/2018		23-27 (dup)		2.0 U	--	--	--	40 U	--	--	**4.7**	--	--	15 U
1/25/2017	18-62 Milling	11-15	SB-12	**266**	--	--	--	--	--	--	--	--	--	--
1/26/2017	18-67 UST	8-12	SB-13	**16.7**	--	--	--	--	--	--	--	--	--	--
1/26/2017	KS-1	11-15	SB-14	**105**	--	--	--	--	--	--	--	--	--	--
1/26/2017	KS-3	9.5-13.5	SB-17	2 U	--	--	--	--	--	--	--	--	--	--
10/4/2018	18-63	10-15	SB-29	**229**	--	--	--	40 U	--	--	4 U	--	--	15 U
10/4/2018		20-25		**48.8**	--	--	--	40 U	--	--	4 U	--	--	15 U
10/4/2018		30-35		**28.9**	--	--	--	--	--	--	--	--	--	--
10/4/2018		37-41		**8.2**	--	--	--	--	--	--	--	--	--	--
10/4/2018	18-63	10-15	SB-30	**79.1**	--	--	--	40 U	--	--	4 U	--	--	15 U
10/4/2018		25-29		**15.1**	--	--	--	40 U	--	--	4 U	--	--	15 U
10/5/2018		34-38		**6.7**	--	--	--	--	--	--	--	--	--	--
10/5/2018	18-63	10-15	SB-31	2.0 U	--	--	--	40 U	--	--	**7.2**	--	--	15 U
10/5/2018		20-24		**23.2**	--	--	--	40 U	--	--	4 U	--	--	15 U
2/25/2020	NDP/18-35	10-15	SB-32	**60.7**	--	--	--	--	--	--	--	--	--	--
2/25/2020	NDP/18-35	10-15	SB-33	**5.0**	--	--	--	--	--	--	--	--	--	--
2/26/2020	NDP/18-35	10-15	SB-34	**151**	--	--	--	--	--	--	--	--	--	--
6/8/2020	NDP	8-13	NDP-1	**8.3**	**8.4**	0.52 U	2.1 U	**1.1**	0.52 U	0.2 U	**1**	1.0 U	40 U	10.3 U
12/11/2020		7-12		**6.96**	**7.56**	0.515 U	2.06 U	1.03 U	0.515 U	0.2 U	1.03 U	1.03 U	0.515 U	10.3 U
6/8/2020	NDP	8-13	NDP-2	**4.5**	**12.5**	0.52 U	**2.1**	**6.6**	**1.9**	0.2 U	**5**	1.0 U	40 U	10.3 U
12/10/2020		7-12		5.15 U	**2.17**	0.515 U	2.06 U	**2.52**	0.515 U	0.2 U	1.03 U	1.03 U	0.515 U	10.3 U
12/11/2020		15-19		**11.8**	**5.38**	0.515 U	2.06 U	1.03 U	0.515 U	0.2 U	**11.5**	1.03 U	0.515 U	**12.3**
6/8/2020	NDP	8-13	NDP-3	**42.5**	**7**	0.52 U	2.1 U	1.0 U	0.52 U	0.2 U	**1.5**	1.0 U	40 U	10.3 U
12/10/2020		7-12		5.15 U	2.06 U	0.515 U	2.06 U	**1.49**	0.515 U	0.2 U	1.03 U	1.03 U	0.515 U	10.3 U
6/8/2020	NDP	9-14	NDP-4	**180**	**27.5**	0.52 U	2.1 U	1.0 U	0.52 U	0.2 U	1.0 U	**1**	40 U	10.3 U
12/10/2020		7-12		**223**	**33.5**	0.515 U	2.06 U	1.03 U	0.515 U	0.2 U	1.03 U	**1.03**	0.515 U	10.3 U
12/11/2020		17-21		**47.7**	**17.4**	0.515 U	2.06 U	1.03 U	0.515 U	0.2 U	**18.4**	1.03 U	0.515 U	10.3 U

Table 21a
Groundwater Results - Metals
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	Dissolved Metals (µg/L)										
				Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
Surface Water Based SLs[1]				**0.018**	**1000**	**0.72**	**74**	**11**	**2.5**	**0.012**	**52**	**5**	**3.2**	**100**
Vapor Intrusion Based Groundwater SLs[2]				**--**	**--**	**--**	**--**	**--**	**--**	**0.89**	**--**	**--**	**--**	**--**
Method B/MCL Based Groundwater SLs[3]				**0.583**	**2000**	**5**	**100**	**640**	**15**	**2**	**100**	**50**	**80**	**4800**
Monitoring Well Groundwater Results														
5/4/2017	north	11-16	MW-1	**85.2**	--	0.5 U	**3.5**	**39.8 J**	**1.4**	2 U	**5.3**	2 U	0.5 U	**35.6 J**
6/19/2019		11-16		**208**	--	--	--	--	--	--	--	--	--	--
9/20/2019		11-16		**196**	**26.4**	0.5 U	**3.3**	1.0 U	0.5 U	0.2 U	1.2 U	1.0 U	0.5 U	10.0 U
9/20/2019		11-16 (dup)		**183**	**25.5**	0.5 U	**3.1**	1.0 U	0.5 U	0.2 U	1.2 U	1.0 U	0.5 U	10.0 U
12/18/2019		11-16		**167**	--	--	--	--	--	--	--	--	--	--
12/18/2019		11-16 (dup)		**168**	--	--	--	--	--	--	--	--	--	--
3/3/2020		11-16		**148**	**24.1**	0.52 U	**3.2**	1.0 U	0.52 U	0.2 U	**1.4**	1.0 U	10.0 U	10.3 U
3/3/2020		11-16 (dup)		**149**	**26.1**	0.52 U	**3.7**	1.0 U	0.52 U	0.2 U	**1.5**	1.0 U	10.0 U	10.3 U
5/3/2017	northeast	6.9-11.9	MW-2	**28.2**	--	0.5 U	2.0 U	2 U	1 U	2 U	**7.9**	2 U	0.5 U	15 U
6/18/2019		6.9-11.9		**72.8**	--	--	--	--	--	--	--	--	--	--
9/20/2019		6.9-11.9		**95.9**	**25.3**	0.5 U	**1.1**	1.0 U	0.5 U	0.2 U	3.1 U	1.0 U	0.5 U	10.0 U
12/18/2019		6.9-11.9		**80.8**	--	--	--	--	--	--	--	--	--	--
3/5/2020		6.9-11.9		**56.7**	**23.7**	0.52 U	**5.4**	1.0 U	0.52 U	0.2 U	**2.6**	1.0 U	10.3 U	10.3 U
5/3/2017	east	7.7-12.7	MW-3	**25.6**	--	0.5 U	2.0 U	**2.1**	1 U	2 U	2 U	2 U	0.5 U	15 U
6/18/2019		7.7-12.7		**44.6**	--	--	--	--	--	--	--	--	--	--
9/20/2019		7.7-12.7		**57.1**	**7.5**	0.5 U	1.0 U	1.0 U	0.5 U	0.2 U	1.0 U	1.0 U	0.5 U	10.0 U
12/17/2019		7.7-12.7		**38.3**	--	--	--	--	--	--	--	--	--	--
3/4/2020		7.7-12.7		**29.7**	**5.8**	0.52 U	2.1 U	1.0 U	0.52 U	0.2 U	1.0 U	**1.5**	10.3 U	10.3 U
5/3/2017	southeast	7.7-12.7	MW-4	**18.9**	--	0.5 U	2 U	**2.1**	1 U	2 U	2 U	2 U	0.5 U	15 U
5/3/2017		7.7-12.7 (dup)		**18.4**	--	0.5 U	2 U	2 U	1 U	2 U	2 U	2 U	0.5 U	15 U
6/18/2019		7.7-12.7		**88.0**	--	--	--	--	--	--	--	--	--	--
6/18/2019		7.7-12.7 (dup)		**94.0**	--	--	--	--	--	--	--	--	--	--
9/23/2019		7.7-12.7		**75.2**	**29.7**	0.5 U	**2.2**	1.0 U	0.5 U	0.2 U	1.0 U	1.0 U	0.5 U	10.0 U
12/17/2019		7.7-12.7		**73.6**	--	--	--	--	--	--	--	--	--	--
3/5/2020		7.7-12.7		**123**	**12.5**	0.52 U	2.1 U	1.0 U	0.52 U	0.2 U	1.0 U	1.0 U	10.3 U	10.3 U
6/2/2020		7.7-12.7		**92.1**	**21.7**	--	--	--	--	--	--	--	--	--
5/3/2017	southwest	10.2-15.2	MW-5	**3.3**	--	0.5 U	2 U	**2.9**	1 U	2 U	2 U	2 U	0.5 U	15 U
6/18/2019		10.2-15.2		2.0 U	--	--	--	--	--	--	--	--	--	--
9/23/2019		10.2-15.2		**7.2**	**3.7**	0.5 U	1.0 U	1.0 U	0.5 U	0.2 U	1.0 U	1.0 U	0.5 U	10.0 U
12/17/2019		10.2-15.2		2.1 U	--	--	--	--	--	--	--	--	--	--
3/4/2020		10.2-15.2		**16.8**	**3.7**	0.52 U	2.1 U	1.0 U	0.52 U	0.2 U	1.0 U	1.0 U	10.3 U	10.3 U
6/2/2020		10.2-15.2		2.1 U	**2.8**	--	--	--	--	--	--	--	--	--
12/8/2020		10.2-15.2		5.5 U	**2.68**	--	--	--	--	--	--	--	--	--
5/4/2017	west	8.7-13.7	MW-6	**27.9**	--	0.5 U	2 U	2 U	1 U	2 U	**3.8**	2 U	0.5 U	15 UJ
6/19/2019		8.7-13.7		**21.7**	--	--	--	--	--	--	--	--	--	--
9/20/2019		8.7-13.7		**36.5**	**22.5**	0.5 U	1.0 U	1.0 U	0.5 U	0.2 U	1.2 U	1.0 U	0.5 U	10.0 U
12/18/2019		8.7-13.7		**18**	--	--	--	--	--	--	--	--	--	--
3/4/2020		8.7-13.7		**32.3**	**32.2**	0.52 U	2.1 U	**4**	0.52 U	0.2 U	**3.9**	1.0 U	10.3 U	10.3 U
6/3/2020		8.7-13.7		**129**	**43.6**	--	--	--	--	--	--	--	--	--
12/9/2020		8.7-13.7		**61.6**	**29.6**	--	--	--	--	--	--	--	--	--

Table 21a
Groundwater Results - Metals

Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	Dissolved Metals (µg/L)										
				Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
Surface Water Based SLs[1]				0.018	1000	0.72	74	11	2.5	0.012	52	5	3.2	100
Vapor Intrusion Based Groundwater SLs[2]				--	--	--	--	--	--	0.89	--	--	--	--
Method B/MCL Based Groundwater SLs[3]				0.583	2000	5	100	640	15	2	100	50	80	4800
5/4/2017	northwest	8.8-13.8	MW-7	**27.1**	--	0.5 U	2 U	**2.4 J**	1 U	2 U	**2.5**	2 U	0.5 U	15 UJ
6/19/2019				**47.4**	--	--	--	--	--	--	--	--	--	--
9/19/2019				**50.3**	**15.4**	1.0 U	**1**	10 U	0.5 U	0.2 U	**2.5**	5.0 U	1.0 U	10.0 U
12/18/2019				**53.2**	--	--	--	--	--	--	--	--	--	--
3/4/2020				**50.5**	**14.7**	0.52 U	2.1 U	1.0 U	0.52 U	0.2 U	**2.2**	1.0U	10.3 U	10.3 U
6/3/2020				**62**	**14.4**	--	--	--	--	--	--	--	--	--
12/8/2020				**80.2**	**14.7**	--	--	--	--	--	--	--	--	--
6/10/2021				**63**	**10.9**	--	--	--	--	--	--	--	--	--
10/28/2021				**61.3**	**8.43**	--	--	--	--	--	--	--	--	--
6/3/2020	north	7.0-12.0	MW-8	**36.6**	**106**	0.52 U	2.1 U	1.0 U	0.52 U	0.2 U	**3.7**	1.0 U	40 U	10.3 U
12/9/2020				**77.1**	**102**	0.515 U	2.06 U	1.03 U	0.515 U	0.2 U	**1.84**	1.03 U	0.515 U	10.3 U
6/10/2021				**72.2**	**133**	--	--	--	--	--	--	--	--	--
10/28/2021				**80.7**	**133**	--	--	--	--	--	--	--	--	--
6/3/2020	north	10.0-15.0	MW-9	**74.5**	**192**	0.52 U	2.1 U	**2.8**	0.52 U	0.2 U	**12.1**	**1.4**	40 U	**12.2**
12/9/2020				**159**	**205**	0.515 U	**2.82**	1.03 U	0.515 U	0.2 U	**7.3**	**1.09**	0.515 U	**12.2**
12/9/2020 (dup)				**165**	**209**	0.515 U	**2.75**	1.03 U	0.515 U	0.2 U	**7.58**	**1.14**	0.515 U	**11.8**
6/10/2021				**158**	**157**	--	--	--	--	--	--	--	--	--
6/10/2021 (dup)				**160**	**155**	--	--	--	--	--	--	--	--	--
10/28/2021				**190**	**127**	--	--	--	--	--	--	--	--	--
6/2/2020	southeast	10.0-15.0	MW-10	--	--	0.52 U	2.1 U	1.0 U	0.52 U	0.2 U	**2**	1.0 U	40 U	10.3 U
6/2/2020 (dup)				**18.7**	**62.3**	0.52 U	2.1 U	1.0 U	0.52 U	0.2 U	**2**	1.0 U	40 U	10.3 U
12/8/2020				**7.25**	**21.8**	0.515 U	2.06 U	1.03 U	0.515 U	0.2 U	1.03 U	1.03 U	0.515 U	10.3 U
6/10/2021	northwest	10.0-15.0	MW-11	**70.8**	**8.63**	--	--	--	--	--	--	--	--	--
10/28/2021				**118**	**13**	--	--	--	--	--	--	--	--	--
10/28/2021 (dup)				**118**	**13.6**	--	--	--	--	--	--	--	--	--
6/10/2021	northwest	12.0-17.0	MW-12	**9.31**	**4.82**	--	--	--	--	--	--	--	--	--
10/28/2021				**6.2**	**1.62**	--	--	--	--	--	--	--	--	--
Due Diligence Groundwater Results														
11/14/2017	--	10-15	LAI1	--	--	--	--	--	--	--	--	--	--	--
11/14/2017	--	10-15	LAI2	**186**	**16.7**	0.1 U	**2.84**	--	0.1 U	0.1 U	--	**1.19**	0.2 U	--
11/15/2017	--	10-15	LAI3	**144**	**16.3**	0.1 U	**1.31**	--	0.1 U	0.1 U	--	**0.781**	0.2 U	--
11/15/2017	--	10-15	LAI4	**67.6**	**15.0**	0.1 U	**0.958**	--	0.1 U	0.1 U	--	0.500 U	0.2 U	--
11/16/2017	--	10-15	LAI5	**55.6**	**30.1**	0.1 U	**0.834**	--	0.1 U	0.1 U	--	0.500 U	0.2 U	--
11/15/2017	--	10-15	LAI9	**78.1**	**44.1**	0.1 U	**1.22**	--	0.1 U	0.1 U	--	0.500 U	0.2 U	--
11/15/2017	--	10-15	LAI11	**59.7**	**45.7**	0.1 U	0.5 U	--	0.1 U	0.1 U	--	0.500 U	0.2 U	--
11/13/2017	--	10-15	LAI13	**91.4**	**14.0**	0.1 U	**0.503**	--	0.1 U	0.1 U	--	0.500 U	0.2 U	--
11/13/2017	--	10-15	LAI16	**62.3**	**38.0**	0.1 U	0.5 U	--	0.1 U	0.1 U	--	0.500 U	0.2 U	--
11/13/2017	--	15-20	LAI18	**8**	**29.7**	0.1 U	**1.88**	--	0.1 U	0.1 U	--	**0.642**	0.2 U	--
7/11/2018	--	15-20	LAI19	**43.9**	**16.9**	0.1 U	1.0 U	--	0.1 U	0.1 U	--	0.500 U	0.2 U	--
11/14/2017	--	10-15	LAI21	**269**	**40.2**	0.1 U	**2.07**	--	0.1 U	0.1 U	--	**1.53**	0.2 U	--
11/14/2017	--	10-15	LAI22	**120**	**12.2**	0.1 U	**0.545**	--	0.1 U	0.1 U	--	0.500 U	0.2 U	--
5/21/2018	--	10-15	LAI32	**44.8**	**5.95**	0.1 U	**0.699**	--	**0.234**	0.1 U	--	**1.45**	0.2 U	--
5/21/2018	--	15-20	LAI34	**3.85**	**9.98**	0.1 U	0.5 U	--	0.1 U	0.1 U	--	0.500 U	0.2 U	--

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Sample Date	Area	Depth (ft. bgs)	Site ID	Dissolved Metals (µg/L)										
				Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
Surface Water Based SLs[1]				**0.018**	**1000**	**0.72**	**74**	**11**	**2.5**	**0.012**	**52**	**5**	**3.2**	**100**
Vapor Intrusion Based Groundwater SLs[2]				**--**	**--**	**--**	**--**	**--**	**--**	**0.89**	**--**	**--**	**--**	**--**
Method B/MCL Based Groundwater SLs[3]				**0.583**	**2000**	**5**	**100**	**640**	**15**	**2**	**100**	**50**	**80**	**4800**
Historical Groundwater Sample Results														
12/17/2001	Clearwater	--	18-21-1	--	--	0.2 U	**3**	**1.4**	1.0 U	--	**1.5**	--	--	**5**
10/8/2003		--	18-21-2	--	--	**0.3**	**30**	**21.3**	**7**	--	**45.6**	--	--	**61**
12/17/2001		--	18-23-1	--	--	0.2 U	**2**	0.5 U	1.0 U	--	**0.8**	--	--	4.0 U
10/8/2003	Clearwater	--	18-23-3	--	--	0.2 U	**13**	**10.4**	**2**	--	**25.3**	--	--	**33**
10/8/2003		--	18-23-4	--	--	**0.2**	**21**	**15.1**	**6**	--	**35**	--	--	**44**
10/8/2003		--	18-23-5	--	--	**0.3**	**42**	**30.3**	**6**	--	**67.5**	--	--	**122**
10/9/2003		--	18-35-3	--	--	0.2 U	**3.1**	**6.4**	1.0 U	--	**4.0**	--	--	**9**
10/9/2003		--	18-35-4	--	--	0.2 U	0.5 U	**0.8**	1.0 U	--	**1.5**	--	--	4.0 U
12/17/2001		--	18-62-7	--	--	0.2 U	**2**	**0.7**	1.0 U	--	**2.6**	--	--	4.0 U
10/9/2003		--	18-62-8	--	--	0.2 U	**0.6**	**1.1**	1.0 U	--	**1.5**	--	--	4.0 U
12/26/2001		--	BSC-18-22-01	--	--	0.2 U	0.5 U	**1.6**	1.0 U	--	**10.1**	--	--	4.0 U
12/26/2001		--	BSC-18-22-02	--	--	0.2 U	2.0 U	**0.8**	1.0 U	--	**3.6**	--	--	**4**
12/26/2001		--	BSC-18-22-03	--	--	0.2 U	2.0 U	**0.9**	1.0 U	--	**3.8**	--	--	4.0 U
12/26/2001		--	BSC-18-23-01	--	--	0.2 U	2.0 U	**0.6**	1.0 U	--	**3.7**	--	--	4.0 U
12/26/2001		--	BSC-18-23-02	--	--	0.2 U	**3**	**0.8**	1.0 U	--	**5.7**	--	--	**8**
12/27/2001		--	BSC-18-62-03	--	--	0.2 U	2.0 U	0.5 U	1.0 U	--	**1**	--	--	4.0 U
12/26/2001		--	BSC-18-62-04	--	--	0.2 U	0.5 U	0.5 U	1.0 U	--	**1**	--	--	4.0 U
12/27/2001		--	BSC-18-62-05	--	--	0.2 U	0.5 U	**3.2**	1.0 U	--	**4.1**	--	--	4.0 U
12/26/2001		--	BSC-18-62-06	--	--	0.2 U	0.5 U	**0.6**	1.0 U	--	**1.6**	--	--	4.0 U
12/27/2001		--	BSC-18-63-01	--	--	0.2 U	2.0 U	0.5 U	1.0 U	--	0.5 U	--	--	4.0 U
12/27/2001		--	BSC-18-63-02	--	--	0.2 U	2.0 U	0.5 U	1.0 U	--	**1**	--	--	4.0 U
12/27/2001		--	BSC-18-67-02	--	--	0.2 U	2.0 U	**0.9**	1.0 U	--	**1.4**	--	--	4.0 U
12/27/2001		--	BSC-18-67-03	--	--	0.2 U	2.0 U	**0.6**	1.0 U	--	**2.4**	--	--	4.0 U
12/27/2001		--	BSC-18-67-04	--	--	0.2 U	2.0 U	**0.8**	1.0 U	--	**1.7**	--	--	4.0 U
1/25/2012	Striker	--	KSC-DP-34	**12.6**	--	--	--	--	--	--	--	--	--	--
1/25/2012		--	KSC-DP-35	**15**	--	--	--	--	--	--	--	--	--	--
1/25/2012		--	KSC-DP-36	**47.1**	--	--	--	--	--	--	--	--	--	--
1/25/2012		--	KSC-DP-37	**5.2**	--	--	--	--	--	--	--	--	--	--
1/25/2012		--	KSC-DP-38	**27.9**	--	--	--	--	--	--	--	--	--	--
1/25/2012		--	KSC-DP-39	**58.4**	--	--	--	--	--	--	--	--	--	--
1/25/2012		--	KSC-DP-40	**3.3**	--	--	--	--	--	--	--	--	--	--
1/25/2012		--	KSC-DP-41	**3.3**	--	--	--	--	--	--	--	--	--	--
2/9/2012		--	KSC-DP-42	**6**	--	--	--	--	--	--	--	--	--	--
2/9/2012		--	Kent-1	**59.6**	--	--	--	--	--	--	--	--	--	--
2/9/2012		--	Kent-2	2.0 U	--	--	--	--	--	--	--	--	--	--
2/8/2012		--	Kent-3	2.0 U	--	--	--	--	--	--	--	--	--	--
2/8/2012		--	Kent-4	2.0 U	--	--	--	--	--	--	--	--	--	--
2/8/2012		--	Kent-6	**3.9**	--	--	--	--	--	--	--	--	--	--
2/9/2012		--	Kent-7	**115**	--	--	--	--	--	--	--	--	--	--
2/9/2012		--	Kent-8	**14.5**	--	--	--	--	--	--	--	--	--	--
2/9/2012		--	15M17S	2.0 U	--	--	--	--	--	--	--	--	--	--
2/9/2012		--	15M30A	**10.8**	--	--	--	--	--	--	--	--	--	--

Table 21a
Groundwater Results - Metals
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	Dissolved Metals (µg/L)										
				Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
Surface Water Based SLs[1]				**0.018**	**1000**	**0.72**	**74**	**11**	**2.5**	**0.012**	**52**	**5**	**3.2**	**100**
Vapor Intrusion Based Groundwater SLs[2]				**--**	**--**	**--**	**--**	**--**	**--**	**0.89**	**--**	**--**	**--**	**--**
Method B/MCL Based Groundwater SLs[3]				**0.583**	**2000**	**5**	**100**	**640**	**15**	**2**	**100**	**50**	**80**	**4800**
7/28/2010		--	KSC-DP-1	**23.8**	--	0.2 U	1.0 U	0.5 U	1.0 U	0.1 U	--	--	--	4.0 U
7/30/2010		--	KSC-DP-2	**8.1**	--	2.0 U	5.0 U	2.0 U	20 U	0.1 U	--	--	--	10 U
7/30/2010	Striker	--	KSC-DP-3	**40.3**	--	2.0 U	5.0 U	2.0 U	20 U	0.1 U	--	--	--	10 U
7/29/2010		--	KSC-DP-4	**9.6**	--	0.2 U	1.0 U	0.5 U	1.0 U	0.1 U	--	--	--	10 U
7/30/2010		--	KSC-DP-5	**120**	--	2.0 U	5.0 U	2.0 U	20 U	0.1 U	--	--	--	10 U
7/29/2010		--	KSC-DP-9	**13.8**	--	0.2 U	**2**	**0.8**	1.0 U	0.1 U	--	--	--	4.0 U
7/30/2010		--	KSC-DP-11	**43.8**	--	2.0 U	5.0 U	2.0 U	20 U	0.1 U	--	--	--	10 U
7/30/2010		--	KSC-DP-15	**9.1**	--	2.0 U	5.0 U	2.0 U	20 U	0.1 U	--	--	--	10 U
7/30/2010		--	KSC-DP-16	**53.3**	--	2.0 U	5.0 U	2.0 U	20 U	0.1 U	--	--	--	10 U
1/27/2011		--	KSC-DP-17	**59.9**	--	--	--	--	--	--	--	--	--	--
1/27/2011		--	KSC-DP-18	**115**	--	--	--	--	--	--	--	--	--	--
1/27/2011		--	KSC-DP-19	**77**	--	--	--	--	--	--	--	--	--	--
1/27/2011		--	KSC-DP-20	**33.7**	--	--	--	--	--	--	--	--	--	--
1/26/2011		--	KSC-DP-22	**66**	--	--	--	--	--	--	--	--	--	--
1/26/2011		--	KSC-DP-23	**66.7**	--	--	--	--	--	--	--	--	--	--
1/26/2011		--	KSC-DP-24	**2.7**	--	--	--	--	--	--	--	--	--	--
1/26/2011		--	KSC-DP-25b	**71.6**	--	--	--	--	--	--	--	--	--	--
1/25/2011		--	KSC-DP-26	**0.8**	--	--	--	--	--	--	--	--	--	--
1/25/2011		--	KSC-DP-27	**111**	--	--	--	--	--	--	--	--	--	--
1/25/2011		--	KSC-DP-28	**18**	--	--	--	--	--	--	--	--	--	--
1/25/2011		--	KSC-DP-29	**1.1**	--	--	--	--	--	--	--	--	--	--
1/25/2011		--	KSC-DP-30	**31.9**	--	--	--	--	--	--	--	--	--	--
1/26/2011		--	KSC-DP-31	**65.4**	--	--	--	--	--	--	--	--	--	--
1/26/2011		--	KSC-DP-32	**2.8**	--	--	--	--	--	--	--	--	--	--
1/26/2011		--	KSC-DP-33	**0.3**	--	--	--	--	--	--	--	--	--	--
11/21/1994		--	92MW-01	**19**	--	--	--	--	--	--	--	--	--	--
11/21/1994		--	92MW-02	**17**	--	--	--	--	--	--	--	--	--	--
11/21/1994		--	92MW-03	**25**	--	--	--	--	--	--	--	--	--	--
11/21/1994		--	93MW-04	**17**	--	--	--	--	--	--	--	--	--	--
11/21/1994		--	93MW-05	**16**	--	--	--	--	--	--	--	--	--	--
4/27/2009		--	MW-1	**27**	--	--	--	--	--	--	--	--	--	--
4/27/2009		--	MW-2	**24**	--	--	--	--	--	--	--	--	--	--
4/27/2009		--	MW-3	**51**	--	--	--	--	--	--	--	--	--	--
10/26/1998		--	P-1	**42**	--	--	--	--	--	--	--	--	--	--
10/26/1998		--	P-2	**13**	--	--	--	--	--	--	--	--	--	--
10/26/1998		--	P-3	**18**	--	--	--	--	--	--	--	--	--	--
10/26/1998		--	P-4	**21**	--	--	--	--	--	--	--	--	--	--
3/6/2000		--	KGC-MW-1	**19**	--	--	--	--	--	--	--	--	--	--
3/6/2000		--	KGC-MW-2	**3**	--	--	--	--	--	--	--	--	--	--
3/6/2000		--	KGC-MW-3	**12**	--	--	--	--	--	--	--	--	--	--

Notes and Abbreviations

1. Most stringent surface water based criteria from Table 18

Table 21a

Groundwater Results - Metals

Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	Dissolved Metals (µg/L)										
				Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
Surface Water Based SLs[1]				**0.018**	**1000**	**0.72**	**74**	**11**	**2.5**	**0.012**	**52**	**5**	**3.2**	**100**
Vapor Intrusion Based Groundwater SLs[2]				--	--	--	--	--	--	**0.89**	--	--	--	--
Method B/MCL Based Groundwater SLs[3]				**0.583**	**2000**	**5**	**100**	**640**	**15**	**2**	**100**	**50**	**80**	**4800**

2. Most stringent vapor intrusion based criteria from Table 17

3. Most stringent of Method B and MCL criteria from Table 17 (Method A used where no Method B).

Bolded values are detections

Grey indicates detection above most stringent criteria

-- not analyzed

NDP = North Detention Pond

SL = Screening Level

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

ug/L = micrograms per liter

Table 21b
Groundwater Results -Total Petroleum Hydrocarbons
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	TPH via HCID Methods (µg/L)			TPH via NWTPH Methods			
				Gasoline Range Organics	Diesel Range Organics	Oil Range Organics	TPH-Gasoline (µg/L)	TPH-Diesel (mg/L)	TPH-Oil (mg/L)	Mineral Oil (mg/L)
Surface Water Based SLs[1]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
Vapor Intrusion Based Groundwater SLs[2]				**30,000**	**30,000**	**30,000**	**30,000**	**30**	**30**	**30**
Method B/MCL Based Groundwater SLs[3]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
RI Results										
1/27/2017	AOC-1/3	8-12	SB-3	--	--	--	--	0.099 U	0.25 U	--
1/27/2017	AOC-1/3	8-12	SB-4	--	--	--	--	0.099 U	0.25 U	--
1/27/2017	AOC-1/3	10-14	SB-5	--	--	--	--	0.097 U	0.24 U	--
1/24/2017	AOC-2	8-12	SB-6	--	--	--	--	0.095 U	--	--
1/24/2017	AOC-2	10-14	SB-7	--	--	--	--	0.095 U	--	--
1/24/2017	AOC-2	8-12	SB-8	--	--	--	--	**0.13**	--	--
10/2/2018	AOC-2/18-24/18-35	10-15	SB-26	--	--	--	--	**0.203**	0.252 U	--
10/2/2018		20-24		--	--	--	--	**0.274**	0.248 U	--
10/3/2018	AOC-2/18-24/18-35	12-17	SB-27	--	--	--	--	**0.131**	0.247 U	--
10/3/2018		22-26		--	--	--	--	**0.989**	**0.588**	--
10/3/2018		31-35		--	--	--	--	0.103 U	0.258 U	--
10/3/2018		40-44		--	--	--	--	**0.453**	**0.308**	--
10/2/2018	AOC-2/18-24/18-35	14-18	SB-28	--	--	--	--	0.0972 U	0.243 U	--
10/3/2018		23-27		--	--	--	--	0.0951 U	0.238 U	--
10/3/2018		23-27 (dup)		--	--	--	--	0.0957 U	0.239 U	--
1/25/2017	18-62 Milling	8-12	SB-9	--	--	--	--	0.095 U	--	0.2 U
1/25/2017	18-62 Milling	11-14	SB-10	--	--	--	--	**0.13**	--	0.2 U
1/25/2017	18-62 Milling	11-15	SB-11	--	--	--	--	**0.29 J**	--	**0.325**
1/25/2017	18-62 Milling	11-15	SB-12	--	--	--	--	**0.18**	--	**0.216**
1/26/2017	18-67 UST	8-12	SB-13	--	--	--	250 U	0.097 U	--	--
1/26/2017	KS-1	11-15	SB-14	--	--	--	--	**0.25**	--	--
1/26/2017	KS-1	11-15	SB-15	--	--	--	--	**0.28**	--	--
1/26/2017	KS-1	11-15	SB-16	--	--	--	--	**0.42**	--	--
1/26/2017	KS-3	9.5-13.5	SB-17	--	--	--	250 U	--	--	--
1/27/2017	KS-3	11-15	SB-18	--	--	--	250 U	--	--	--
1/25/2017	KS-3	10-14	SB-19	--	--	--	250 U	--	--	--
1/27/2017	KS-3	10-14	SB-20	--	--	--	250 U	--	--	--
10/4/2018	18-63	10-15	SB-29	--	--	--	--	0.0994 U	0.249 U	--
10/4/2018		20-25		--	--	--	--	0.107 U	0.267 U	--
10/4/2018	18-63	10-15	SB-30	--	--	--	--	**0.329**	**0.296**	--
10/4/2018		25-29		--	--	--	--	**0.373**	0.254 U	--

Table 21b
Groundwater Results -Total Petroleum Hydrocarbons
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	TPH via HCID Methods (µg/L)			TPH via NWTPH Methods			
				Gasoline Range Organics	Diesel Range Organics	Oil Range Organics	TPH-Gasoline (µg/L)	TPH-Diesel (mg/L)	TPH-Oil (mg/L)	Mineral Oil (mg/L)
Surface Water Based SLs[1]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
Vapor Intrusion Based Groundwater SLs[2]				**30,000**	**30,000**	**30,000**	**30,000**	**30**	**30**	**30**
Method B/MCL Based Groundwater SLs[3]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
10/5/2018	18-63	10-15	SB-31	--	--	--	--	**0.839**	**0.709**	--
10/5/2018		20-24		--	--	--	--	**0.373**	**0.332**	--
10/5/2018		29-33		--	--	--	--	**0.119**	**0.346**	--
10/5/2018		38-42		--	--	--	--	**0.198**	**0.518**	--
2/26/2020	NDP/18-35	10-15	SB-34	--	--	--	250 U	**0.162**	**0.38**	--
2/26/2020		20-25		--	--	--	250 U	0.0972 U	0.243 U	--
6/8/2020	NDP	8-13	NDP-1	--	--	--	--	0.0991 U	0.248 U	--
12/11/2020		7-12		--	--	--	--	0.100 U	0.250 U	--
6/8/2020	NDP	8-13	NDP-2	--	--	--	--	**0.112**	**0.429**	--
12/10/2020		7-12		--	--	--	--	0.101 U	0.251 U	--
12/11/2020		15-19		--	--	--	--	0.100 U	0.250 U	--
6/8/2020	NDP	8-13	NDP-3	--	--	--	--	0.0998 U	0.250 U	--
12/10/2020		7-12		--	--	--	--	0.106 U	0.265 U	--
6/8/2020	NDP	9-14	NDP-4	--	--	--	--	**0.171**	**0.439**	--
12/10/2020		7-12		--	--	--	--	0.104 U	0.261 U	--
12/11/2020		17-21		--	--	--	--	0.100 U	0.250 U	--
Monitoring Well Groundwater Results										
5/4/2017	north	11-16	MW-1	--	--	--	--	0.103 U	0.257 U	--
9/20/2019		11-16		--	--	--	250 U	**0.154**	**0.328 J**	--
9/20/2019		11-16 (dup)		--	--	--	250 U	**0.2**	**0.62 J**	--
3/3/2020		11-16		--	--	--	250 U	0.113 U	0.283 U	--
3/3/2020		11-16 (dup)		--	--	--	250 U	**0.119**	**0.49**	--
5/3/2017	northeast	6.9-11.9	MW-2	--	--	--	--	0.0976 U	0.244 U	--
10/2/2019		6.9-11.9		--	--	--	250 U	0.106 U	0.266 U	--
3/5/2020		6.9-11.9		--	--	--	250 U	0.101 U	0.253 U	--
5/3/2017	east	7.7-12.7	MW-3	--	--	--	--	0.0964 U	0.241 U	--
10/2/219		7.7-12.7		--	--	--	250 U	0.102 U	0.256 U	--
3/4/2020		7.7-12.7		--	--	--	250 U	0.0991 U	0.248 U	--
5/3/2017	southeast	7.7-12.7	MW-4	--	--	--	--	0.1 UJ	0.25 U	--
5/3/2017		7.7-12.7(dup		--	--	--	--	**0.216 J**	**0.4**	--
9/23/2019		7.7-12.7		--	--	--	250 U	0.096 U	0.239 U	
3/5/2020		7.7-12.7		--	--	--	250 U	0.101 U	0.253 U	--

Table 21b
Groundwater Results -Total Petroleum Hydrocarbons
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	TPH via HCID Methods (µg/L)			TPH via NWTPH Methods			
				Gasoline Range Organics	Diesel Range Organics	Oil Range Organics	TPH-Gasoline (µg/L)	TPH-Diesel (mg/L)	TPH-Oil (mg/L)	Mineral Oil (mg/L)
Surface Water Based SLs[1]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
Vapor Intrusion Based Groundwater SLs[2]				**30,000**	**30,000**	**30,000**	**30,000**	**30**	**30**	**30**
Method B/MCL Based Groundwater SLs[3]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
5/3/2017	southwest	10.2-15.2	MW-5	--	--	--	--	0.103 U	0.257 U	--
9/23/2019		10.2-15.2		--	--	--	250 U	0.103 U	0.258 U	--
3/4/2020		10.2-15.2		--	--	--	250 U	0.0996 U	0.249 U	--
5/4/2017	west	8.7-13.7	MW-6	--	--	--	--	0.1 U	0.251 U	--
10/2/2019		8.7-13.7		--	--	--	250 U	0.0982 U	0.246 U	--
3/4/2020		8.7-13.7		--	--	--	250 U	0.101 U	0.253 U	--
5/4/2017	northwest	8.8-13.8	MW-7	--	--	--	--	0.099 U	0.248 U	--
9/19/2019		8.8-13.8		--	--	--	250 U	0.104 U	0.260 U	--
3/4/2020		8.8-13.8		--	--	--	250 U	0.107 U	0.267 U	--
6/3/2020	north	7.0-12.0	MW-8	--	--	--	--	0.0993 U	0.248 U	--
12/9/2020		7.0-12.0		--	--	--	--	0.109 U	0.271 U	--
6/3/2020	north	10.0-15.0	MW-9	--	--	--	--	**0.178**	**0.508**	--
12/9/2020		10.0-15.0		--	--	--	--	0.106 U	0.266 U	--
12/9/2020		0.0-15.0 (dup		--	--	--	--	0.108 U	0.271 U	--
6/2/2020	southeast	10.0-15.0	MW-10	--	--	--	--	0.0978 U	0.244 U	--
6/2/2020		10.0-15.0		--	--	--	--	0.0983 U	0.246 U	--
12/8/2020		10.0-15.0		--	--	--	--	0.100 U	0.250 U	--
Due Diligence Groundwater Results										
11/14/2017	--	10-15	LAI1	250 U	500 U	1000 U	--	--	--	--
11/14/2017	--	10-15	LAI2	250 U	500 U	1000 U	--	--	--	--
11/15/2017	--	10-15	LAI3	250 U	500 U	1000 U	--	--	--	--
11/15/2017	--	10-15	LAI4	250 U	500 U	1000 U	--	--	--	--
11/16/2017	--	10-15	LAI5	250 U	500 U	1000 U	--	--	--	--
11/15/2017	--	10-15	LAI7	--	--	--	100 U	--	--	--
11/15/2017	--	10-15	LAI9	250 U	500 U	1000 U	--	--	--	--
11/15/2017	--	10-15	LAI11	250 U	500 U	1000 U	--	--	--	--
11/13/2017	--	10-15	LAI13	250 U	500 U	1000 U	--	--	--	--
7/10/2018	--	10-20	LAI14	--	--	--	--	**0.105 /1.04***	**0.209 /0.568***	--

Table 21b
Groundwater Results -Total Petroleum Hydrocarbons
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	TPH via HCID Methods (µg/L)			TPH via NWTPH Methods			
				Gasoline Range Organics	Diesel Range Organics	Oil Range Organics	TPH-Gasoline (µg/L)	TPH-Diesel (mg/L)	TPH-Oil (mg/L)	Mineral Oil (mg/L)
Surface Water Based SLs[1]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
Vapor Intrusion Based Groundwater SLs[2]				**30,000**	**30,000**	**30,000**	**30,000**	**30**	**30**	**30**
Method B/MCL Based Groundwater SLs[3]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
11/13/2017	--	10-15	LAI16	250 U	500 U	1000 U	--	--	--	--
11/13/2017	--	15-20	LAI18	250 U	500 U	1000 U	--	--	--	--
7/11/2018	--	15-20	LAI19	--	--	--	**1470**	**0.178/ 2.75***	0.2 U/ 0.2 U*	--
11/14/2017	--	10-15	LAI21	250 U	500 U	1000 U	--	--	--	--
11/14/2017	--	10-15	LAI22	250 U	500 U	1000 U	--	--	--	--
7/12/2018	--	12-17	LAI31	--	--	--	--	0.1 U/ 0.1U*	0.2 U/ 0.2 U*	--
5/21/2018	--	10-15	LAI32	250 U	**500**	1000 U		**0.729**	**0.316**	--
7/12/2018		10-15		--	--	--	--	**0.1 U/ 0.503***	**0.2 U/ 0.315***	--
5/21/2018	--	15-20	LAI34	250 U	500 U	1000 U				--
7/18/2018	--	9.5-14.5	LAI35	--	--	--	--	0.1 U/ 0.1U*	0.2 U/ 0.2 U*	--
7/18/2018	--	11-16	LAI36	--	--	--	--	0.1 U/ 0.1U*	0.2 U/ 0.2 U*	--
7/18/2018	--	9.5-14.5	LAI44	--	--	--	--	**0.1 U/ 1.04***	**0.2 U/ 0.634***	--
Historical Groundwater Sample Results										
12/17/2001	Clearwater	--	18-21-1	--	--	--	--	0.25 U	0.5 U	--
10/8/2003		--	18-21-2	--	--	--	--	**0.26**	0.5 U	--
12/17/2001		--	18-23-1	--	--	--	--	0.25 U	0.5 U	--
12/18/2001		--	18-23-2	--	--	--	--	**1.4**	**0.95**	--
10/8/2003		--	18-23-3	--	--	--	--	0.25 U	0.5 U	--
10/8/2003		--	18-23-4	--	--	--	--	0.25 U	0.5 U	--
10/8/2003		--	18-23-5	--	--	--	--	0.25 U	0.5 U	--
12/17/2001		--	18-35-2	--	--	--	--	**0.29**	0.5 U	--
10/9/2003		--	18-35-3	--	--	--	--	0.25 U	0.5 U	--
10/9/2003		--	18-35-4	--	--	--	--	0.25 U	0.5 U	--
12/17/2001		--	18-62-7	--	--	--	--	0.25 U	0.5 U	--
10/9/2003		--	18-62-8	--	--	--	--	0.25 U	0.5 U	--
12/26/2001		--	BSC-18-22-01	--	--	--	--	0.25 U	0.5 U	--
12/26/2001		--	BSC-18-22-02	--	--	--	--	0.25 U	0.5 U	--
12/26/2001		--	BSC-18-22-03	--	--	--	--	0.25 U	0.5 U	--
12/26/2001		--	BSC-18-23-01	--	--	--	--	0.25 U	0.5 U	--

Table 21b
Groundwater Results -Total Petroleum Hydrocarbons
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	TPH via HCID Methods (µg/L)			TPH via NWTPH Methods			
				Gasoline Range Organics	Diesel Range Organics	Oil Range Organics	TPH-Gasoline (µg/L)	TPH-Diesel (mg/L)	TPH-Oil (mg/L)	Mineral Oil (mg/L)
Surface Water Based SLs[1]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
Vapor Intrusion Based Groundwater SLs[2]				**30,000**	**30,000**	**30,000**	**30,000**	**30**	**30**	**30**
Method B/MCL Based Groundwater SLs[3]				**800**	**500**	**500**	**800**	**0.500**	**0.500**	**0.500**
12/26/2001	Clearwater	--	BSC-18-23-02	--	--	--	--	0.25 U	0.5 U	--
12/27/2001		--	BSC-18-62-03	--	--	--	--	0.25 U	0.5 U	--
12/26/2001		--	BSC-18-62-04	--	--	--	--	0.25 U	0.5 U	--
12/27/2001		--	BSC-18-62-05	--	--	--	--	0.25 U	0.5 U	--
12/26/2001		--	BSC-18-62-06	--	--	--	--	0.25 U	0.5 U	--
12/27/2001		--	BSC-18-63-01	--	--	--	--	0.25 U	0.5 U	--
12/27/2001		--	BSC-18-63-02	--	--	--	--	0.25 U	0.5 U	--
12/27/2001		--	BSC-18-67-02	--	--	--	--	0.25 U	0.5 U	--
12/27/2001		--	BSC-18-67-03	--	--	--	--	0.25 U	0.5 U	--
12/27/2001		--	BSC-18-67-04	--	--	--	--	0.25 U	0.5 U	--
7/28/2010	Striker	--	KSC-DP-1	--	--	--	250 U	0.10 U	0.2 U	--
7/30/2010		--	KSC-DP-2	--	--	--	250 U	0.10 U	**0.27**	--
7/30/2010		--	KSC-DP-3	--	--	--	**360**	**0.11**	0.2 U	--
7/29/2010		--	KSC-DP-4	--	--	--	250 U	0.10 U	0.2 U	--
7/30/2010		--	KSC-DP-5	--	--	--	250 U	0.10 U	0.2 U	--
7/29/2010		--	KSC-DP-9	--	--	--	250 U	0.10 U	0.2 U	--
7/30/2010		--	KSC-DP-11	--	--	--	250 U	0.10 U	0.2 U	--
7/30/2010		--	KSC-DP-15	--	--	--	250 U	0.10 U	0.2 U	--
7/30/2010		--	KSC-DP-16	--	--	--	250 U	0.10 U	0.2 U	--
1/26/2011		--	KSC-DP-22	--	--	--	100 U	0.11 U	0.22 U	--
1/26/2011		--	KSC-DP-23	--	--	--	100 U	0.10 U	0.21 U	--
1/26/2011		--	KSC-DP-24	--	--	--	**350**	0.11 U	0.21 U	--
1/26/2011		--	KSC-DP-25b	--	--	--	**380**	**0.20**	0.21 U	--

Notes and Abbreviations

1. Most stringent surface water based criteria from Table 18
2. Most stringent vapor intrusion based criteria from Table 17
3. Most stringent of Method B and MCL criteria from Table 17 (Method A used where no Method B).

Bolded values are detections
Grey indicates detection above most stringent criteria
#/#* = with/without silica gel cleanup
-- not analyzed
SL = Screening Level
NDP = North Detention Pond
HCID = Hydrocarbon Identification
TPH = Total petroleum hydrocarbons
ft. bgs = feet below ground surface
J = The result value is qualified as estimated
U = The compound was analyzed for, but not detected at the reported concentration
ug/L = micrograms per liter
mg/L = milligrams per liter

Table 21c
Groundwater Results - Volatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	VOCs (µg/L)																							
				1,1-Dichloroethane	1,1-Dichloroethene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Butanone/MEK	Acetone	Benzene	Carbon Disulfide	Chloromethane	*cis*-1,2-DCE	Ethylbenzene	Isopropylbenzene (cumene)	m,p-Xylene	Methylene Chloride	n-Propylbenzene	Naphthalene	o-Xylene	Styrene	Tetrachloroethene	Toluene	trans-1,2-DCE	Trichlorofluoromethane (CFC 11)	Xylenes (total)	Vinyl Chloride
Surface Water Based SLs[1]				**--**	**300**	**--**	**--**	**--**	**--**	**0.44**	**--**	**--**	**--**	**29**	**--**	**--**	**10**	**--**	**4710**	**--**	**--**	**2.4**	**57**	**100**	**--**	**57**	**0.02**
Vapor Intrusion Based Groundwater SLs[2]				**11.2**	**130**	**28.4**	**--**	**1740000**	**--**	**2.4**	**400**	**153**	**--**	**2783**	**720**	**310**	**4430**	**--**	**8.93**	**440**	**8100**	**22.9**	**15584**	**--**	**120**	**310**	**0.3472**
Method B/MCL Based Groundwater SLs[3]				**7.68**	**7**	**80**	**80**	**4800**	**7200**	**5**	**800**	**--**	**16**	**70**	**800**	**1600**	**5**	**800**	**160**	**1600**	**100**	**5**	**640**	**100**	**2400**	**1600**	**0.292**
RI Data																											
1/24/2017	AOC-2	8-12	SB-6	--	--	--	--	--	--	**0.3**	--	--	**0.2**	0.5 U	--	--	--	--	--	--	--	--	0.2 U	--	--	0.5 U	**0.19**
1/24/2017	AOC-2	10-14	SB-7	--	--	--	--	--	--	0.2 U	--	--	0.2 U	0.5 U	--	--	--	--	--	--	--	--	0.2 U	--	--	0.5 U	0.2 U
1/24/2017	AOC-2	8-12	SB-8	--	--	--	--	--	--	0.2 U	--	--	**0.2**	0.5 U	--	--	--	--	--	--	--	--	0.2 U	--	--	0.5 U	**0.19**
10/2/2018	AOC-2/18-24/18-35	10-15	SB-26	0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	**0.2**	0.5 U	--	0.5 U	0.5 U	--	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	**0.6**	0.5 U	--	**12**
10/2/2018		20-24		0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	0.07 U	**0.5**	0.5 U	0.2 U	**0.2**	0.2 U	0.5 U	--	**0.14**
10/2/2018		29-33		--	--	--	--	--	--	--	--	--	0.02 U	--	--	--	--	--	--	--	--	0.02 U	--	--	--	--	0.02 U
10/2/2018		38-42		--	--	--	--	--	--	--	--	--	0.02 U	--	--	--	--	--	--	--	--	0.02 U	--	--	--	--	0.02 U
10/3/2018	AOC-2/18-24/18-35	12-17	SB-27	0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
10/3/2018		22-26		0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
10/2/2018	AOC-2/18-24/18-35	14-18	SB-28	0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
10/3/2018		23-27		0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
10/3/2018		23-27 (dup)		0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
10/4/2018	AOC-2/18-24/18-35	10-15	SB-29	0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
10/4/2018		20-25		0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
10/4/2018	AOC-2/18-24/18-35	10-15	SB-30	0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
10/4/2018		25-29		0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	**0.042**
10/5/2018	AOC-2/18-24/18-35	10-15	SB-31	0.5 U	0.2 U	--	--	**6.1**	**24**	**0.2**	0.5 U	0.5 U	0.2 U	**0.5**	--	**2.2**	**2.2**	--	--	**1.2**	**0.8**	0.2 U	**1.4**	0.2 U	0.5 U	--	0.02 U
10/5/2018		20-24		0.5 U	0.2 U	--	--	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	--	0.5 U	0.5 U	--	--	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
1/26/2017	18-67 UST	8-12	SB-13	--	--	--	--	--	--	0.2 U	--	--	--	0.5 U	--	--	--	--	--	--	--	--	0.2 U	--	--	0.5 U	--
1/26/2017	KS-3	9.5-13.5	SB-17	--	--	--	--	--	--	0.2 U	--	--	--	0.5 U	--	--	--	--	--	--	--	--	0.2 U	--	--	0.5 U	--
1/27/2017	KS-3	11-15	SB-18	--	--	--	--	--	--	0.2 U	--	--	--	0.5 U	--	--	--	--	--	--	--	--	0.2 U	--	--	0.5 U	--
1/25/2017	KS-3	10-14	SB-19	--	--	--	--	--	--	0.2 U	--	--	--	0.5 U	--	--	--	--	--	--	--	--	**0.9**	--	--	0.5 U	--
1/27/2017	KS-3	10-14	SB-20	--	--	--	--	--	--	0.2 U	--	--	--	0.5 U	--	--	--	--	--	--	--	--	0.2 U	--	--	0.5 U	--
2/25/2020	NDP/18-35	10-15	SB-32	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 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	0.2 U	0.2 U	0.2 U	0.5 U	--	**0.024**
2/25/2020		20-25		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 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	0.2 U	0.2 U	0.2 U	0.5 U	--	**0.13**
2/25/2020	NDP/18-35	10-15	SB-33	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	**0.5**	0.5 U	0.5 U	0.2 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	0.2 U	0.2 U	0.2 U	0.5 U	--	**0.54**
2/25/2020		20-25		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 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	0.2 U	0.2 U	0.2 U	0.5 U	--	**0.037**
2/26/2020	NDP/18-35	10-15	SB-34	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.08 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	**0.021**
2/26/2020		20-25		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.09 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	**0.36**
6/8/2020	NDP	8-13	NDP-1	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	**5.8**	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	**0.045**
12/11/2020		7-12		0.5 U	0.2 U	0.5 U	0.5 U	5 U	5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.0732 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	**0.0269**
6/8/2020	NDP	8-13	NDP-2	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	**19**	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
12/10/2020		7-12		0.5 U	0.2 U	0.5 U	0.5 U	5 U	5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.0751 UJ	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
12/11/2020		15-19		0.5 U	0.2 U	0.5 U	0.5 U	5 U	5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.0713 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
6/8/2020	NDP	8-13	NDP-3	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
12/10/2020		7-12		0.5 U	0.2 U	0.5 U	0.5 U	5 U	5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.0728 UJ	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
6/8/2020	NDP	9-14	NDP-4	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	**7.8**	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
12/10/2020		7-12		5 U	2 U	5 U	5 U	50 U	50 U	2 U	5 U	5 U	2 U	5 U	5 U	5 U	5 U	5 U	0.0726 UJ	5 U	5 U	2 U	2 U	2 U	5 U	--	0.02 U
12/11/2020		17-21		0.5 U	0.2 U	0.5 U	0.5 U	5 U	5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.0722 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	--	0.02 U
Monitoring Well Groundwater Results																											
11/14/2017	north	11-16	MW-1	2.00 U	2.00 U	2.00 U	2.00 U	50.0 U	50.0 U	2.00 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	4.00 U	10.0 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	ND	0.020 U
9/20/2019		11-16		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 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	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
9/20/2019		11-16 (dup)		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 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	0.2 U	0.2 U	0.2 U	0.5 U	ND	**0.021**
3/3/2020		11-16		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
3/3/2020		11-16 (dup)		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U

Table 21c
Groundwater Results - Volatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	VOCs (µg/L)																							
				1,1-Dichloroethane	**1,1-Dichloroethene**	**1,2,4-Trimethylbenzene**	**1,3,5-Trimethylbenzene**	**2-Butanone/ MEK**	**Acetone**	**Benzene**	**Carbon Disulfide**	**Chloromethane**	***cis*-1,2-DCE**	**Ethylbenzene**	**Isopropylbenzene (cumene)**	**m,p-Xylene**	**Methylene Chloride**	**n-Propylbenzene**	**Naphthalene**	**o-Xylene**	**Styrene**	**Tetrachloroethene**	**Toluene**	**trans-1,2-DCE**	**Trichlorofluoromethane (CFC 11)**	**Xylenes (total)**	**Vinyl Chloride**
Surface Water Based SLs^1				**--**	**300**	**--**	**--**	**--**	**--**	**0.44**	**--**	**--**	**--**	**29**	**--**	**--**	**10**	**--**	**4710**	**--**	**--**	**2.4**	**57**	**100**	**--**	**57**	**0.02**
Vapor Intrusion Based Groundwater SLs^2				**11.2**	**130**	**28.4**	**--**	**1740000**	**--**	**2.4**	**400**	**153**	**--**	**2783**	**720**	**310**	**4430**	**--**	**8.93**	**440**	**8100**	**22.9**	**15584**	**--**	**120**	**310**	**0.3472**
Method B/MCL Based Groundwater SLs^3				**7.68**	**7**	**80**	**80**	**4800**	**7200**	**5**	**800**	**--**	**16**	**70**	**800**	**1600**	**5**	**800**	**160**	**1600**	**100**	**5**	**640**	**100**	**2400**	**1600**	**0.292**
11/14/2017	northeast	6.9-11.9	MW-2	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	**0.75**	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.020 U
10/2/2019		6.9-11.9		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.2 U
3/5/2020		6.9-11.9		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
11/14/2017	east	7.7-12.7	MW-3	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.020 U
10/2/2019		7.7-12.7		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.2 U
3/4/2020		7.7-12.7		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.08 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
11/14/2017	southeast	7.7-12.7	MW-4	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.020 U
9/23/2019		7.7-12.7		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	**0.3**	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
3/5/2020		7.7-12.7		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	**0.1**	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	**0.028**
6/2/2020		7.7-12.7		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
11/14/2017	southwest	10.2-15.2	MW-5	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.020 U
9/23/2019		10.2-15.2		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 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	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
3/4/2020		10.2-15.2		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
11/14/2017	west	8.7-13.7	MW-6	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	**0.65**	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.020 U
10/2/2019		8.7-13.7		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.50 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.2 U
3/4/2020		8.7-13.7		0.5 U	0.2 U	0.5 U	0.5 U	**40**	**7**	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.08 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
11/14/2017	northwest	8.8-13.8	MW-7	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	ND	0.020 U
9/19/2019		8.8-13.8		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 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	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
3/4/2020		8.8-13.8		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	5.0 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
6/3/2020	north	7.0-12.0	MW-8	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	**5.6**	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	**0.11**
12/9/2020		7.0-12.0		0.5 U	0.2 U	0.5 U	0.5 U	5 U	5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.0752 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	**0.165**
6/3/2020	north	10.0-15.0	MW-9	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	**7.7**	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
12/9/2020		10.0-15.0		5 U	2 U	5 U	5 U	50 U	50 U	2 U	5 U	5 U	2 U	5 U	5 U	5 U	5 U	5 U	0.07 U	5 U	5 U	2 U	2 U	2 U	5 U	ND	0.02 U
12/9/2020		10-15(dup)		5 U	2 U	5 U	5 U	50 U	50 U	2 U	5 U	5 U	2 U	5 U	5 U	5 U	5 U	5 U	0.074 U	5 U	5 U	2 U	2 U	2 U	5 U	ND	0.02 U
6/2/2020	southeast	10.0-15.0	MW-10	0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	**6.7**	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
6/2/2020		10-15 (dup)		0.5 U	0.2 U	0.5 U	0.5 U	5.0 U	**6.5**	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.07 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	**0.033**
12/8/2020		10.0-15.0		0.5 U	0.2 U	0.5 U	0.5 U	5 U	5 U	0.2 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.0733 U	0.5 U	0.5 U	0.2 U	0.2 U	0.2 U	0.5 U	ND	0.02 U
Due Diligence Groundwater Results																											
11/14/2017	--	10-15	LAI1	2.00 U	2.00 U	2.00 U	2.00 U	50.0 U	50.0 U	2.00 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	4.00 U	10.0 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	6.00 U	2.00 U
11/14/2017	--	10-15	LAI2	2.00 U	2.00 U	2.00 U	2.00 U	50.0 U	50.0 U	2.00 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	4.00 U	10.0 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	6.00 U	2.00 U
11/15/2017	--	10-15	LAI3	2.00 U	2.00 U	2.00 U	2.00 U	50.0 U	50.0 U	2.00 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	4.00 U	10.0 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	6.00 U	2.00 U
11/15/2017	--	10-15	LAI4	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.60 U	0.20 U
11/16/2017	--	10-15	LAI5	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.60 U	0.20 U
11/14/2017	--	10-15	LAI7	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	**6.95**	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	**0.20**	0.20 U	0.20 U	0.60 U	0.20 U
11/15/2017	--	10-15		0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.60 U	0.20 U
11/15/2017	--	10-15	LAI9	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.60 U	0.20 U
11/15/2017	--	10-15	LAI11	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.60 U	0.20 U
11/13/2017	--	10-15	LAI13	1.00 U	1.00 U	1.00 U	1.00 U	25.0 U	25.0 U	1.00 U	1.00 U	2.50 U	1.00 U	1.00 U	1.00 U	2.00 U	5.00 U	1.00 U	2.50 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U
7/10/2018	--	10-20	LAI14	0.20 U	**36.2**	**0.48**	**0.50**	**9.31**	**32.5**	**0.48**	**0.36**	**0.68**	0.20 U	**17.2**	**1.53**	**61.1**	1.00 U	0.20 U	**1.76**	**14.3**	**7.56**	**0.80**	**14.8**	0.20 U	0.20 U	**75.4**	**7.92**
11/13/2017	--	10-15	LAI16	1.00 U	1.00 U	1.00 U	1.00 U	25.0 U	25.0 U	1.00 U	1.00 U	2.50 U	1.00 U	1.00 U	1.00 U	2.00 U	5.00 U	1.00 U	2.50 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U
11/13/2017	--	15-20	LAI18	1.00 U	1.00 U	1.00 U	1.00 U	25.0 U	25.0 U	1.00 U	1.00 U	2.50 U	1.00 U	1.00 U	1.00 U	2.00 U	5.00 U	1.00 U	2.50 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U
7/11/2018	--	15-20	LAI19	1.00 U	**8.72**	**5.01**	1.00 U	25.0 U	25.0 U	1.00 U	1.00 U	2.50 U	1.00 U	**4.85**	1.00 U	**18.5**	5.00 U	1.00 U	**75.2**	**11.3**	1.00 U	1.00 U	**16.3**	1.00 U	**6.85**	**29.8**	1.00 U
11/14/2017	--	10-15	LAI21	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.60 U	0.20 U
11/14/2017	--	10-15	LAI22	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.60 U	0.20 U
7/12/2018	--	12-17	LAI31	0.20 U	0.20 U	**4.07**	**1.15**	5.00 U	5.00 U	0.20 U	0.20 U	**1.00**	0.20 U	**1.84**	0.20 U	**12.7**	1.00 U	**0.36**	0.50 U	**6.77**	0.20 U	0.20 U	**7.04**	0.20 U	0.20 U	**19.4**	**0.29**
5/21/2018	--	10-15	LAI32	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	**0.42**	0.50 U	0.20 U	0.20 U	**1.15**	**0.75**	1.00 U	0.20 U	**0.66**	**0.32**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	**1.07**	**11.2**
7/12/2018	--	10-15		**0.26**	0.20 U	**2.70**	**0.82**	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	**1.55**	**3.60**	**10.5**	1.00 U	**0.31**	0.50 U	**4.97**	0.20 U	0.20 U	**5.49**	0.20 U	0.20 U	**15.4**	**12.6**
5/21/2018	--	15-20	LAI34	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.60 U	0.20 U
7/18/2018	--	9.5-14.5	LAI35	0.20 U	0.20 U	0.20 U	0.20 U	5.00 U	5.00 U	0.20 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	0.40 U	1.00 U	0.20 U	0.50 U	0.20 U	0.20 U	0.20 U	**0.20**	0.20 U	0.20 U	0.60 U	0.20 U
7/18/2018	--	11-16	LAI36	0.20 U	0.20 U	**4.47**	**1.25**	5.00 U	5.00 U	0.20 U	0.20 U	**0.57**	0.20 U	**2.64**	0.20 U	**17.4**	1.00 U	**0.44**	0.50 U	**8.29**	0.20 U	0.20 U	**11.3**	0.20 U	0.20 U	**25.7**	0.20 U
7/18/2018	--	9.5-14.5	LAI44	2.00 U	2.00 U	2.00 U	2.00 U	50.0 U	50.0 U	2.00 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	4.00 U	10.0 U	2.00 U	5.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	6.00 U	2.00 U

Table 21c
Groundwater Results - Volatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	VOCs (µg/L)																							
				1,1-Dichloroethane	1,1-Dichloroethene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Butanone/MEK	Acetone	Benzene	Carbon Disulfide	Chloromethane	*cis*-1,2-DCE	Ethylbenzene	Isopropylbenzene (cumene)	m,p-Xylene	Methylene Chloride	n-Propylbenzene	Naphthalene	o-Xylene	Styrene	Tetrachloroethene	Toluene	trans-1,2-DCE	Trichlorofluoromethane (CFC 11)	Xylenes (total)	Vinyl Chloride
Surface Water Based SLs[1]				**--**	**300**	**--**	**--**	**--**	**--**	**0.44**	**--**	**--**	**--**	**29**	**--**	**--**	**10**	**--**	**4710**	**--**	**--**	**2.4**	**57**	**100**	**--**	**57**	**0.02**
Vapor Intrusion Based Groundwater SLs[2]				**11.2**	**130**	**28.4**	**--**	**1740000**	**--**	**2.4**	**400**	**153**	**--**	**2783**	**720**	**310**	**4430**	**--**	**8.93**	**440**	**8100**	**22.9**	**15584**	**--**	**120**	**310**	**0.3472**
Method B/MCL Based Groundwater SLs[3]				**7.68**	**7**	**80**	**80**	**4800**	**7200**	**5**	**800**	**--**	**16**	**70**	**800**	**1600**	**5**	**800**	**160**	**1600**	**100**	**5**	**640**	**100**	**2400**	**1600**	**0.292**
Historical Groundwater Sample Results																											
12/17/2001	Clearwater	--	18-21-1	--	--	--	--	--	--	1.0 U	--	--	**1.6**	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	**1.1**
10/8/2003		--	18-21-2	--	--	--	--	--	--	0.2 U	--	--	**0.5**	--	--	--	--	--	--	--	--	--	**0.4**	--	--	--	**0.2**
12/17/2001		--	18-23-1	--	--	--	--	--	--	1.0 U	--	--	**6.1**	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	**3.3**
12/18/2001		--	18-23-2	--	--	--	--	--	--	10 U	--	--	10 U	--	--	--	--	--	--	--	--	--	10 U	--	--	--	10 U
10/8/2003		--	18-23-3	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
10/8/2003		--	18-23-4	--	--	--	--	--	--	0.2 U	--	--	**0.4**	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
10/8/2003		--	18-23-5	--	--	--	--	--	--	0.2 U	--	--	**0.4**	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
12/17/2001		--	18-35-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/9/2003		--	18-35-3	--	--	--	--	--	--	**1.8**	--	--	**0.8**	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
10/9/2003		--	18-35-4	--	--	--	--	--	--	0.2 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	**2.2**
12/17/2001		--	18-62-7	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
10/9/2003		--	18-62-8	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
12/26/2001		--	BSC-18-22-01	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/26/2001		--	BSC-18-22-02	--	--	--	--	--	--	1.0 U	--	--	**8**	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/26/2001		--	BSC-18-22-03	--	--	--	--	--	--	**1.4**	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/26/2001		--	BSC-18-23-01	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/26/2001		--	BSC-18-23-02	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/27/2001		--	BSC-18-62-03	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/26/2001		--	BSC-18-62-04	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/27/2001		--	BSC-18-62-05	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/26/2001		--	BSC-18-62-06	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/27/2001		--	BSC-18-63-01	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/27/2001		--	BSC-18-63-02	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/27/2001		--	BSC-18-67-02	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/27/2001		--	BSC-18-67-03	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
12/27/2001		--	BSC-18-67-04	--	--	--	--	--	--	1.0 U	--	--	1.0 U	--	--	--	--	--	--	--	--	--	1.0 U	--	--	--	1.0 U
7/28/2010	Striker	--	KSC-DP-1	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
7/30/2010		--	KSC-DP-2	--	--	--	--	--	--	0.2 U	--	--	**23**	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	**0.3**
7/30/2010		--	KSC-DP-3	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	**0.2**
7/29/2010		--	KSC-DP-4	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
7/30/2010		--	KSC-DP-5	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	**0.2**	--	--	--	0.2 U
7/29/2010		--	KSC-DP-9	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
7/30/2010		--	KSC-DP-11	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
7/30/2010		--	KSC-DP-15	--	--	--	--	--	--	0.2 U	--	--	**0.3**	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	0.2 U
7/30/2010		--	KSC-DP-16	--	--	--	--	--	--	0.2 U	--	--	**1**	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	**1.8**
1/27/2011		--	KSC-DP-17	--	--	--	--	--	--	0.2 U	--	--	**0.2**	--	--	--	--	--	--	--	--	--	0.2 U	--	--	--	**0.8**
1/27/2011		--	KSC-DP-18	--	--	--	--	--	--	0.2 U	--	--	**0.4**	--	--	--	--	--	--	--	--	--	**0.2**	--	--	--	**1.4**
1/27/2011		--	KSC-DP-19	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	**0.6**	--	--	--	**0.2**
1/27/2011		--	KSC-DP-20	--	--	--	--	--	--	0.2 U	--	--	0.2 U	--	--	--	--	--	--	--	--	--	**0.2**	--	--	--	0.2 U

Notes and Abbreviations

1. Most stringent surface water based criteria from Table 18
2. Most stringent vapor intrusion based criteria from Table 17
3. Most stringent of Method B and MCL criteria from Table 17 (Method A used where no Method B).

Only detected VOCs shown in Table
Bolded values are detections
Grey indicates detection above most stringent criteria
-- not analyzed
NDP = North Detention Pond
ND = Not detected

SL = Screening Level
VOCs = Volatile Organic Compounds
ft. bgs = feet below ground surface
J = The result value is qualified as estimated
U = The compound was analyzed for, but not detected at the reported concentration
ug/L = micrograms per liter

Table 21d
Groundwater Results - Semivolatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	SVOCs (µg/L)								
				1-Methyl-naphthalene	2,4-Dimethyl-phenol	2-Methyl-naphthalene	2-Methylphenol (o-cresol)	4-Methylphenol (p-cresol)	Acenaphthene	Carbazole	Dibenzo-furan	Fluorene
Surface Water Based SLs^1				--	**85**	--	--	**14**	**30**	--	--	**10**
Method B/MCL Based Groundwater SLs^2				**1.51**	**160**	**32**	**400**	**800**	**960**	--	**16**	**640**
RI Results												
10/2/2018	AOC-2/18-24/18-35	10-15	SB-26	0.05 U	11 U	0.07 U	2 U	2 U	0.5 U	2 U	0.05 U	0.05 U
10/2/2018		20-24		**0.09**	10 U	0.07 U	2 U	2 U	**11**	2 U	0.05 U	0.05 U
10/3/2018	AOC-2/18-24/18-35	12-17	SB-27	0.05 U	11 U	0.07 U	2 U	2 U	0.5 U	2 U	0.05 U	0.05 U
10/3/2018		22-26		0.05 U	10 U	0.07 U	2 U	2 U	0.5 U	2 U	0.05 U	0.05 U
10/2/2018	AOC-2/18-24/18-35	14-18	SB-28	0.05 U	10 U	0.07 U	2 U	2 U	0.5 U	2 U	0.05 U	0.05 U
10/3/2018		23-27		0.05 U	10 U	0.07 U	2 U	2 U	0.5 U	2 U	0.05 U	0.05 U
10/3/2018		23-27 (dup)		0.05 U	10 U	0.07 U	2 U	2 U	0.5 U	2 U	0.05 U	0.05 U
2/26/2020	NDP/18-35	10-15	SB-34	0.5 U	10 U	0.08 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
2/26/2020		20-25		**0.2**	11 U	0.08 U	2 U	2 U	**3.0**	3 U	0.05 U	0.05 U
6/8/2020	NDP	8-13	NDP-1	0.05 U	11 U	0.07 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
12/11/2020		7-12		.	Rejected	0.0732 U	Rejected	Rejected	0.0523 U	2.09 U	0.0523 U	0.0523 U
6/8/2020	NDP	8-13	NDP-2	0.05 U	10 U	0.07 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
12/10/2020		7-12		0.0537 UJ	10.7 U	0.0751 UJ	2.15 U	2.15 U	0.0537 UJ	2.15 U	0.0537 UJ	0.0537 UJ
12/11/2020		15-19		0.0509 U	10.2 U	0.0713 U	2.04 U	2.04 U	0.0509 U	2.04 U	0.0509 U	0.0509 U
6/8/2020	NDP	8-13	NDP-3	0.05 U	10 U	0.07 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
12/10/2020		7-12		0.052 UJ	10.4 U	0.0728 UJ	2.08 U	2.08 U	0.052 UJ	2.08 U	0.052 UJ	0.052 UJ
6/8/2020	NDP	9-14	NDP-4	0.05 U	11 U	0.07 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
12/10/2020		7-12		0.0519 UJ	10.4 U	0.0726 UJ	2.07 U	2.07 U	0.0519 UJ	2.07 U	0.0519 UJ	0.0519 UJ
12/11/2020		17-21		0.0516 U	10.3 U	0.0722 U	2.06 U	2.06 U	0.0516 U	2.06 U	0.0516 U	0.0516 U
Monitoring Well Groundwater Results												
9/20/2019	north	11-16	MW1	0.05 U	11.0 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
9/20/2019		11-16 (dup)		0.05 U	10.0 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
3/3/2020		11-16		0.05 U	10 U	0.5 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
3/3/2020		11-16 (dup)		0.05 U	11 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
9/20/2019	northeast	6.9-11.9	MW2	0.06 U	--	0.08 U	--	--	0.06 U	2.0 U	0.06 U	0.06 U
3/5/2020		6.9-11.9		0.05 U	12 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
9/20/2019	east	7.7-12.7	MW3	0.05 U	10.0 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
3/4/2020		7.7-12.7		0.05 U	13 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
9/23/2019	southeast	7.7-12.7	MW4	0.05 U	11.0 U	0.08 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
3/5/2020		7.7-12.7		0.05 U	14 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
9/23/2019	southwest	10.2-15.2	MW5	0.05 U	11.0 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
3/4/2020		10.2-15.2		0.05 U	15 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U

Table 21d
Groundwater Results - Semivolatile Organic Compounds
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	SVOCs (µg/L)								
				1-Methyl-naphthalene	**2,4-Dimethyl-phenol**	**2-Methyl-naphthalene**	**2-Methylphenol (o-cresol)**	**4-Methylphenol (p-cresol)**	**Acenaphthene**	**Carbazole**	**Dibenzo-furan**	**Fluorene**
Surface Water Based SLs[1]				--	**85**	--	--	**14**	**30**	--	--	**10**
Method B/MCL Based Groundwater SLs[2]				**1.51**	**160**	**32**	**400**	**800**	**960**	--	**16**	**640**
9/20/2019	west	8.7-13.7	MW6	0.05 U	--	0.07 U	--	--	0.05 U	2.0 U	0.05 U	0.05 U
3/4/2020		8.7-13.7		0.05 U	--	0.07 U	2.0 U	--	0.05 U	2.0 U	0.05 U	0.05 U
9/19/2019	northwest	8.8-13.8	MW7	0.05 U	11.0 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 UJ	0.05 U
3/4/2020		8.8-13.8		0.05 U	16 U	0.07 U	2.0 U	2.0 U	0.05 U	2.0 U	0.05 U	0.05 U
6/3/2020	north	7.0-12.0	MW8	0.05 U	11 U	0.07 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
12/9/2020		7.0-12.0		0.0537 U	--	0.0752 U	--	--	0.0537 U	2.15 U	0.0537 U	0.0537 U
6/3/2020	north	10.0-15.0	MW9	0.05 U	10 U	0.07 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
12/9/2020		10.0-15.0		0.05 U	2 U	0.07 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
12/9/2020		10-15 (dup)		0.0529 U	2.11 U	0.074 U	2.11 U	2.11 U	0.0529 U	2.11 U	0.0529 U	0.0529 U
6/2/2020	southeast	10.0-15.0	MW10	0.05 U	10 U	0.07 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
6/2/2020		10-15 (dup)		0.05 U	10 U	0.07 U	2 U	2 U	0.05 U	2 U	0.05 U	0.05 U
12/8/2020		10.0-15.0		0.0524 U	2.07 U	0.0733 U	2.07 U	2.07 U	0.0524 U	2.07 U	0.0524 U	0.0524 U
Due Diligence Groundwater Results												
11/14/2017	northwest - storage	10-15	LAI1	1.1 U	3.4 U	1.1 U	1.1 U	2.2 U	1.1 U	1.1 U	1.1 U	1.1 U
11/14/2017	northwest - storage	10-15	LAI2	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11/15/2017	north - storage	10-15	LAI3	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11/15/2017	north - Building 18-43	10-15	LAI4	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11/16/2017	north - parking lot	10-15	LAI5	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11/15/2017	east - parking lot	10-15	LAI9	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11/15/2017	southeast - parking lot	10-15	LAI11	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11/13/2017	south - former Building 18-63	10-15	LAI13	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11/13/2017	southwest - parking lot	10-15	LAI16	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11/13/2017	southwest - parking lot	15-20	LAI18	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
7/11/2018	west - former Building 18-24	15-20	LAI19	**17.3**	**30.9**	**6.1**	**5.6**	**2.8**	**25.1**	**7.4**	**2.5**	**4.7**
11/14/2017	northwest - 18-59 storage	10-15	LAI21	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
11/14/2017	northwest - 18-59 storage	10-15	LAI22	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
5/21/2018	south - former Building 18-63	10-15	LAI32	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
5/21/2018	north - downgradient	15-20	LAI34	1.0 U	3.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes and Abbreviations

1. Most stringent surface water based criteria from Table 18
2. Most stringent of Method B and MCL criteria from Table 17 (Method A used where no Method B).

Only detected SVOCs shown in Table

Bolded values are detections

Grey indicates detection above most stringent criteria

-- not available

SL = Screening Level

SVOCs = Semi Volatile Organic Compounds

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

ug/L = micrograms per liter

Table 21e
Groundwater Results - Polychlorinated Biphenyls
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	PCBs (µg/L)			
				Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCB's
Surface Water Based SLs[1]				**0.014**	**0.0001**	**0.014**	**0.000007**
Method B/MCL Based Groundwater SLs[2]				**--**	**0.0438**	**0.0438**	**0.438**
RI Data							
5/7/2018	18-59/transformer	10-15	SB-21	0.010 U	0.010 U	0.010 U	ND
5/7/2018	18-59/transformer	10-15	SB-22	0.010 U	**0.008 J**	0.010 U	**0.008 J**
5/7/2018	18-59/transformer	10-15	SB-23	0.010 U	0.010 U	0.010 U	ND
5/7/2018	18-59/transformer	9-14	SB-24	0.010 U	0.010 U	0.010 U	ND
5/7/2018	18-59/transformer	10-15	SB-25	0.014 U	0.015 U	0.016 U	ND
2/26/2020	NDP/18-35	10-15	SB-34	0.010 U	0.010 U	0.010 U	ND
2/26/2020		20-25		0.010 U	0.010 U	0.010 U	ND
6/8/2020	NDP	8-13	NDP-1	0.010 U	0.010 U	0.010 U	ND
12/11/2020		7-12		0.010 U	0.010 U	0.010 U	ND
6/8/2020	NDP	8-13	NDP-2	0.010 U	**0.027**	**0.015**	**0.042**
12/10/2020		7-12		0.010 U	0.010 U	0.010 U	ND
12/11/2020		15-19		**0.011**	**0.011**	**0.007 J**	**0.029**
6/8/2020	NDP	8-13	NDP-3	0.010 U	0.010 U	0.010 U	ND
12/10/2020		7-12		0.010 U	0.010 U	0.010 U	ND
6/8/2020	NDP	9-14	NDP-4	0.010 U	0.010 U	0.010 U	ND
12/10/2020		7-12		0.010 U	**0.018**	0.010 U	**0.018**
12/11/2020		17-21		0.010 U	0.010 U	0.010 U	ND
Monitoring Well Groundwater Results							
9/20/2019	north	11-16	MW-1	0.01 U	0.01 U	0.01 U	ND
9/20/2019		11-16 (dup)		0.01 U	0.01 U	0.01 U	ND
3/3/2020		11-16		0.01 U	0.01 U	0.01 UJ	ND
3/3/2020		11-16 (dup)		0.01 U	0.01 U	0.01 U	ND
9/20/2019	northeast	6.9-11.9	MW-2	0.01 U	0.01 U	0.01 U	ND
3/5/2020		6.9-11.9		0.01 U	0.01 U	0.01 U	ND
9/20/2019	east	7.7-12.7	MW-3	0.01 U	0.01 U	0.01 U	ND
3/4/2020		7.7-12.7		0.01 U	0.01 U	0.01 U	ND
9/23/2019	southeast	7.7-12.7	MW-4	0.01 U	0.01 U	0.01 U	ND
3/5/2020		7.7-12.7		0.01 U	0.01 U	0.01 U	ND
9/23/2019	southwest	10.2-15.2	MW-5	0.01 U	0.01 U	0.01 U	ND
3/4/2020		10.2-15.2		0.01 U	0.01 U	0.01 U	ND
9/20/2019	west	8.7-13.7	MW-6	0.01 U	0.01 U	0.01 U	ND
3/4/2020		8.7-13.7		0.01 U	0.01 U	0.01 U	ND
9/19/2019	northwest	8.8-13.8	MW-7	0.01 U	0.01 U	0.01 U	ND
3/4/2020		8.8-13.8		0.01 U	0.01 U	0.01 U	ND
6/10/2021		8.8-13.8		0.01 U	0.01 U	0.01 U	ND
10/28/2021		8.8-13.8		0.01 U	0.01 U	0.01 U	ND

Table 21e

Groundwater Results - Polychlorinated Biphenyls

Remedial Investigation

Boeing Kent Space Center

Sample Date	Area	Depth (ft. bgs)	Site ID	PCBs (μg/L)			
				Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCB's
Surface Water Based SLs[1]				**0.014**	**0.0001**	**0.014**	**0.000007**
Method B/MCL Based Groundwater SLs[2]				**--**	**0.0438**	**0.0438**	**0.438**
6/3/2020	north	7.0-12.0	MW-8	0.01 U	0.01 U	0.01 U	ND
12/9/2020		7.0-12.0		0.01 U	0.01 U	0.01 U	ND
6/10/2021		7.0-12.0		0.01 U	0.01 U	0.01 U	ND
10/28/2021		7.0-12.0		0.01 U	0.01 U	0.01 U	ND
6/3/2020	north	10.0-15.0	MW-9	0.01 U	0.01 U	0.01 U	ND
12/9/2020		10.0-15.0		0.01 U	0.01 U	0.01 U	ND
12/9/2020		10.0-15.0 (dup)		0.01 U	0.01 U	0.01 U	ND
6/10/2021		10.0-15.0		0.01 U	0.01 U	0.01 U	ND
6/10/2021		10.0-15.0 (dup)		0.01 U	0.01 U	0.01 U	ND
10/28/2021		10.0-15.0		0.01 UJ	0.01 UJ	0.01 UJ	ND
6/2/2020	southeast	10.0-15.0	MW-10	0.01 U	0.01 U	0.01 U	ND
6/2/2020		10.0-15.0 (dup)		0.01 U	0.01 U	0.01 U	ND
12/8/2020		10.0-15.0		0.01 U	0.01 U	0.01 U	ND
6/10/2021	northwest	10.0-15.0	MW-11	0.01 U	0.01 U	0.01 U	ND
10/28/2021		10.0-15.0		0.01 U	0.01 U	0.01 U	ND
10/28/2021		10.0-15.0 (dup)		0.01 U	0.01 U	0.01 U	ND
6/10/2021	northwest	12.0-17.0	MW-12	0.01 U	0.01 U	0.01 U	ND
10/28/2021		12.0-17.0		0.01 U	0.01 U	0.01 U	ND

Notes and Abbreviations

1. Most stringent surface water based criteria from Table 18
2. Most stringent of Method B and MCL criteria from Table 17 (Method A used where no Method B).

Only detected PCBs shown in Table

Bolded values are detections

Grey indicates detection above most stringent criteria

-- not analyzed

ND = Not detected

SL = Screening Level

PCBs = Polychlorinated Biphenyls

ft. bgs = feet below ground surface

J = The result value is qualified as estimated

U = The compound was analyzed for, but not detected at the reported concentration

ug/L = micrograms per liter

Table 22
Stormwater Results
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Location	Sample Location ID	TPH-Gasoline (ug/L)	TPH-Diesel (mg/L)	TPH-Oil (mg/L)	Total Metals (ug/L)										Dissolved Metals (ug/L)										
							Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
WA Industrial Stormwater Benchmarks				**--**	**10**		**150**	**2.1**	**--**	**14**	**81.6**	**1.4**	**--**	**5**	**3.8**	**117**	**150**	**--**	**2.1**	**--**	**14**	**81.6**	**1.4**	**--**	**5**	**3.8**	**117**
Screening Level - surface water based				**800/1000**	**0.5**	**0.5**	**0.018**	**0.72**	**74**	**11**	**2.5**	**0.012**	**52**	**5**	**3.2**	**100**	**0.018**	**1000**	**0.72**	**74**	**11**	**2.5**	**0.012**	**52**	**5**	**3.2**	**100**
RI Stormwater Sample Results																											
1/18/2017	SWMU 86	Manhole	MH-20.237-W	100 U	0.1 U	0.2 U	**0.373**	0.1 U	0.5 U	**2.92**	**0.503**	0.1 U	**0.608**	2.0 U	0.2 U	**25.1**	**0.257**	--	0.1 U	0.5 U	**2**	0.1 U	0.1 U	0.5 U	0.5 U	0.2 U	**19**
1/18/2017	SWMU 86	Manhole	MH-20.235-W	100 U	0.1 U	0.2 U	**0.562**	0.1 U	**0.571**	**3.47**	**0.591**	0.1 U	**0.501**	2.0 U	0.2 U	**47.8**	**0.462**	--	0.1 U	0.5 U	**2.25**	**0.11**	0.1 U	0.5 U	0.5 U	0.2 U	**37.2**
1/18/2017	SWMU 86	Manhole	MH-16.12-W	100 U	0.1 U	0.2 U	0.2 U	0.1 U	0.5 U	**2.46**	**0.229**	0.1 U	0.5 U	2.0 U	0.2 U	**59.8**	0.2 U	--	0.1 U	0.5 U	**1.77**	**0.182**	0.1 U	0.5 U	0.5 U	0.2 U	**50.5**
1/18/2017	SWMU 86	Manhole	MH-15.10-W	100 U	0.1 U	0.2 U	**0.381**	0.1 U	**0.844**	**2.85**	**2.18**	0.1 U	0.5 U	2.0 U	0.2 U	**21.4**	**0.272**	--	0.1 U	**0.601**	**1.6**	**0.155**	0.1 U	0.5 U	0.5 U	0.2 U	**8.46**
1/20/2017	SWMU 86	Outfall-Mill Creek 20/20B	OF-20-W	100 U	0.1 U	0.2 U	**0.481**	0.1 U	0.5 U	**2.29**	**0.329**	0.1 U	**0.59**	2.0 U	0.2 U	**12.4**	**0.33**	--	0.1 U	0.5 U	**1.61**	**0.117**	0.1 U	0.5 U	0.5 U	0.2 U	**9.41**
1/18/2017	SWMU 86	Outfall- East Drainage Ditch 16	OF-16-W	100 U	0.1 U	0.2 U	0.2 U	0.1 U	**0.632**	**3.21**	**1.42**	0.1 U	**0.555**	perf	0.2 U	**57.5**	0.2 U	--	0.1 U	0.5 U	**0.945**	0.1 U	0.1 U	0.5 U	0.5 U	0.2 U	**37.7**
1/18/2017	SWMU 86	Outfall-North Detention Pond	OF-NDP-W	100 U	0.1 U	0.2 U	**0.506**	0.1 U	**0.606**	**5.03**	**0.358**	0.1 U	**0.713**	2.0 U	0.2 U	**15.9**	**0.356**	--	0.1 U	0.5 U	**2.02**	0.1 U	0.1 U	0.5 U	0.5 U	0.2 U	**9.88**
12/9/2020	SWMU 86	Outfall-North Detention Pond	OF-NDP-W	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.356**	**3.73**	--	--	--	--	--	--	--	--	--
Historical Surface Water Sample Results																											
11/7/2002	offsite	Mill Creek Offsite	B317	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**52**
1/21/2003			B317	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**35.3**
1/22/2003			B317	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**34.6**
11/17/2003			B317	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**29.6**
Aug 2005			unknown	--	--	--	--	--	--	**0.94-13.6**	--	--	--	--	--	**5-105**	--	--	--	--	**0.75-10.8**	--	--	--	--	--	**4-100**
Sept 2005			unknown	--	--	--	--	--	--	**0.89-14.1**	--	--	--	--	--	**6-88.7**	--	--	--	--	**0.67-10.4**	--	--	--	--	--	**5.7-79.3**
Dec 2005			unknown	--	--	--	--	--	--	**1.23-6.01**	--	--	--	--	--	**19-75.9**	--	--	--	--	**0.74-3.14**	--	--	--	--	--	**18.3-58.4**

Notes and Abbreviations

Bolded values are detections

Grey Box indicates above minimum screening level

Only detected VOCs and PAHs shown

TPH = Total petroleum hydrocarbons

VOCs = Volatile Organic Compounds

PAHs = Polynuclear Aromatic Hydrocarbons

PCBs = Polychlorinated Biphenyls

ug/L = micrograms per liter

mg/L = milligrams per liter

Final Industrial Stormwater General Permit – January 2, 2015

Table 22
Stormwater Results
Remedial Investigation
Boeing Kent Space Center

Sample Date	Area	Location	Sample Location ID	PCBs (ug/L)										VOCs (ug/L)			PAHs (ug/L)					
				Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Aroclor 1268	Total PCBs	Acetone	Chloro methane	Methylene Chloride	Naphthalene	Phenanthrene	Pyrene	Fluoranthene	Chrysene	Total Benzo-fluoranthenes
WA Industrial Stormwater Benchmarks				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Screening Level - surface water based				**0.003**	**0.014**	**0.014**	**0.014**	**0.014**	**0.0001**	**0.014**	--	--	**0.000007**	--	--	**10**	**1.1**	--	**8**	**6**	**0.016**	--
RI Stormwater Sample Results																						
1/18/2017	SWMU 86	Manhole	MH-20.237-W	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.01 U	**5.22**	0.5 U	1.0 U	**0.012**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1/18/2017	SWMU 86	Manhole	MH-20.235-W	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	**0.012**	0.010 U	0.010 U	0.010 U	**0.012**	**6.27**	0.5 U	1.0 U	**0.011**	**0.013**	0.01 U	0.01 U	0.01 U	0.01 U
1/18/2017	SWMU 86	Manhole	MH-16.12-W	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.01 U	**8.18**	0.5 U	1.0 U	**0.012**	**0.012**	0.01 U	0.01 U	0.01 U	0.01 U
1/18/2017	SWMU 86	Manhole	MH-15.10-W	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.01 U	**5.67**	0.5 U	1.0 U	0.01 U	**0.013**	**0.013**	0.01 U	0.01 U	0.01 U
1/20/2017	SWMU 86	Outfall-Mill Creek 20/20B	OF-20-W	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.01 U	**5.33**	0.5 U	1.0 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
1/18/2017	SWMU 86	Outfall- East Drainage Ditch 16	OF-16-W	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.01 U	**20.2**	0.5 U	1.0 U	**0.017**	**0.034**	**0.020**	**0.018**	**0.010**	**0.011**
1/18/2017	SWMU 86	Outfall-North Detention Pond	OF-NDP-W	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.01 U	**5.72**	0.5 U	1.0 U	**0.014**	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
12/9/2020	SWMU 86	Outfall-North Detention Pond	OF-NDP-W	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	5.0 U	**0.27 J**	**3.46**	--	--	--	--	--	--
Historical Surface Water Sample Results																						
11/7/2002	offsite	Mill Creek Offsite	B317	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/21/2003			B317	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/22/2003			B317	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/17/2003			B317	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug 2005			unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sept 2005			unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 2005			unknown	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes and Abbreviations

Bolded values are detections

Grey Box indicates above minimum screening level

Only detected VOCs and PAHs shown

TPH = Total petroleum hydrocarbons

VOCs = Volatile Organic Compounds

PAHs = Polynuclear Aromatic Hydrocarbons

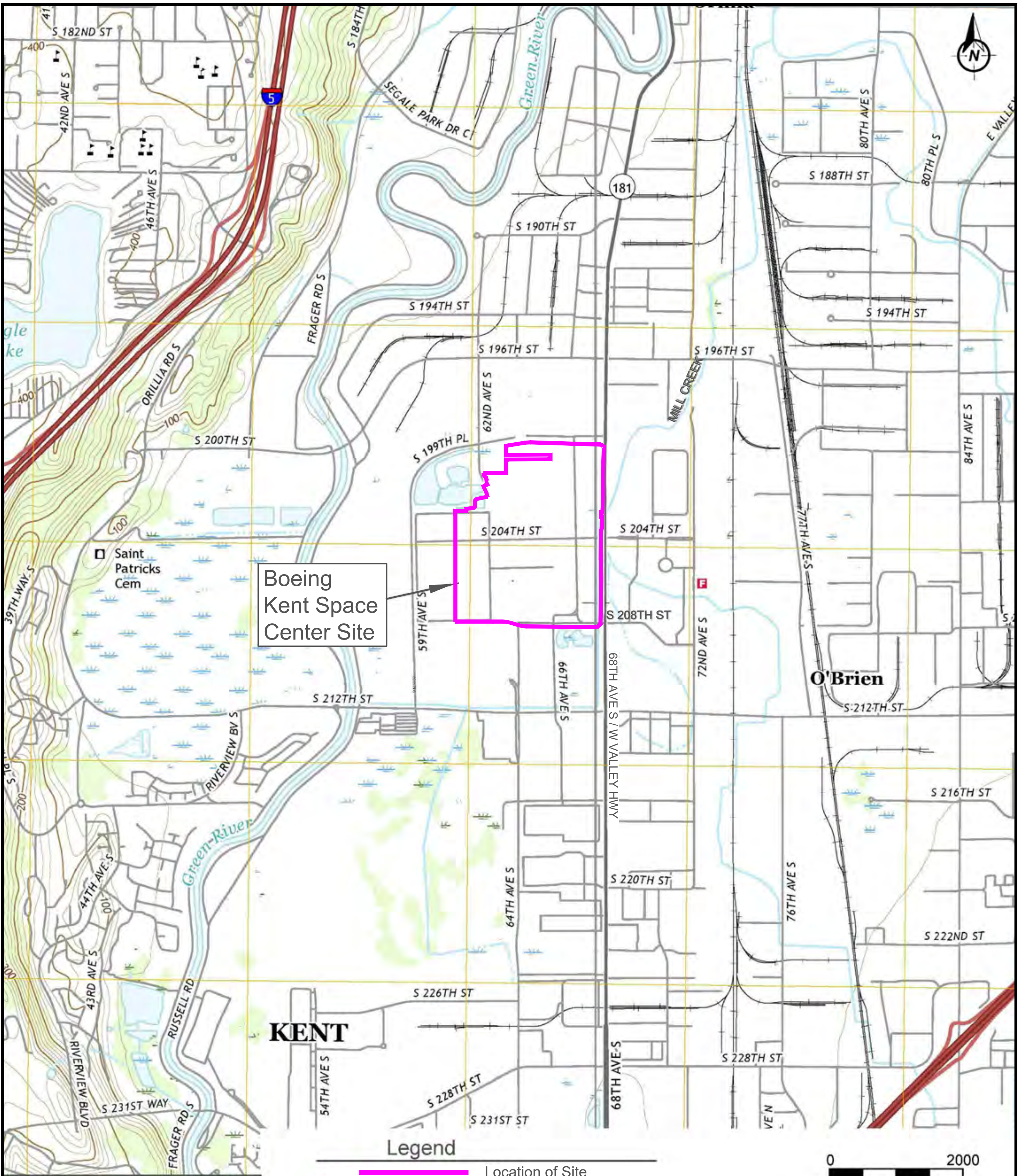
PCBs = Polychlorinated Biphenyls

ug/L = micrograms per liter

mg/L = milligrams per liter

Final Industrial Stormwater General Permit – January 2, 2015

Figures



Boeing Kent Space Center
Kent, Washington
Remedial Investigation

Site Location Map

DALTON OLMSTED FUGLEVAND

FIGURE 1

08/31/2021

PLOT TIME: 8/20/2021 2:50 PM MOD TIME: 8/20/2021 2:40 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 1 Site Location Map.dwg

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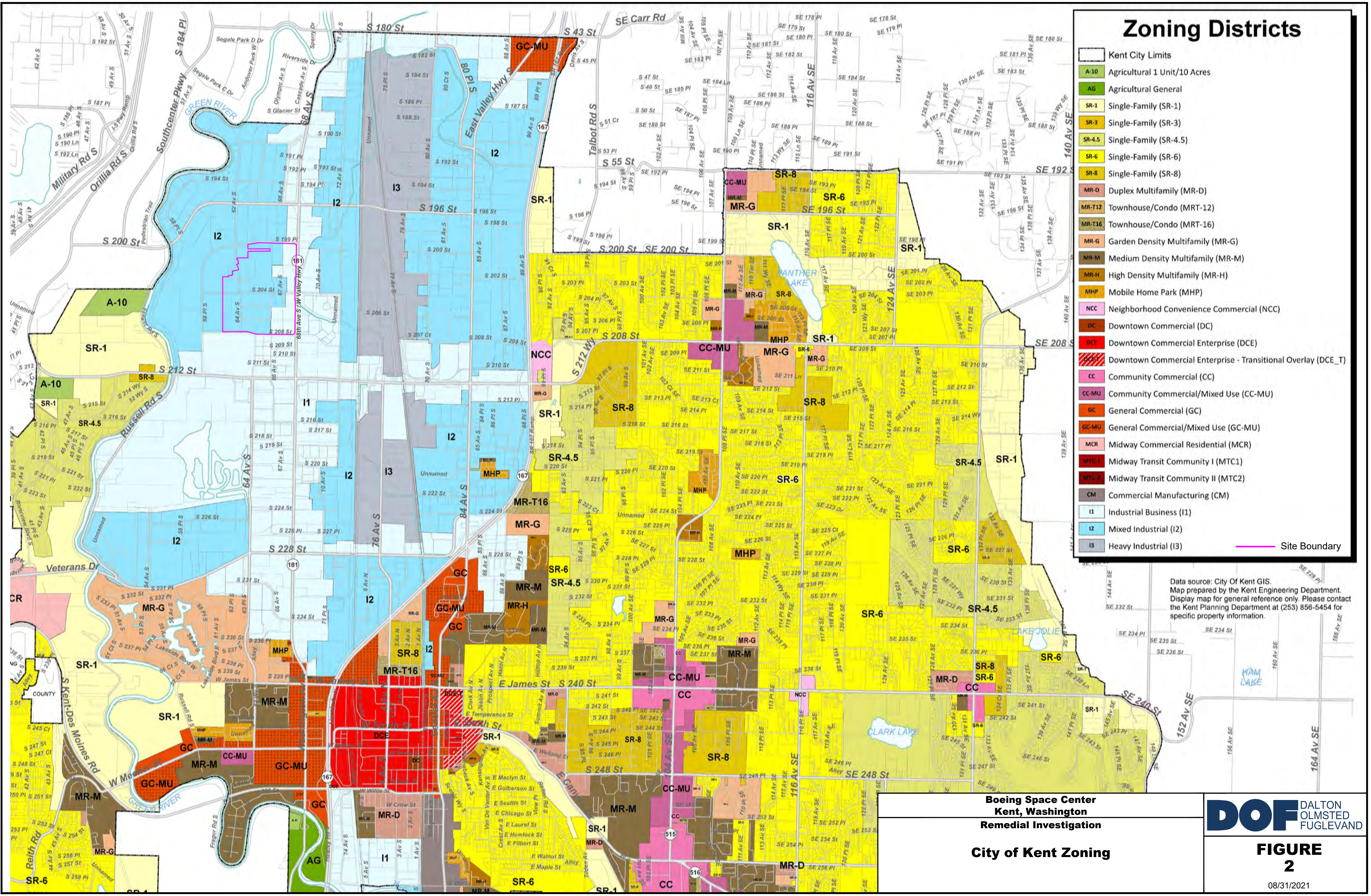


Zoning Districts

☐	Kent City Limits
A-10	Agricultural 1 Unit/10 Acres
AG	Agricultural General
SR-1	Single-Family (SR-1)
SR-3	Single-Family (SR-3)
SR-4.5	Single-Family (SR-4.5)
SR-6	Single-Family (SR-6)
SR-8	Single-Family (SR-8)
MR-D	Duplex Multifamily (MR-D)
MR-T12	Townhouse/Condo (MRT-12)
MR-T16	Townhouse/Condo (MRT-16)
MR-G	Garden Density Multifamily (MR-G)
MR-M	Medium Density Multifamily (MR-M)
MR-H	High Density Multifamily (MR-H)
MHP	Mobile Home Park (MHP)
NCC	Neighborhood Convenience Commercial (NCC)
DC	Downtown Commercial (DC)
DCE	Downtown Commercial Enterprise (DCE)
DCE-T	Downtown Commercial Enterprise - Transitional Overlay (DCE_T)
CC	Community Commercial (CC)
CC-MU	Community Commercial/Mixed Use (CC-MU)
GC	General Commercial (GC)
GC-MU	General Commercial/Mixed Use (GC-MU)
MCR	Midway Commercial Residential (MCR)
MTC-1	Midway Transit Community I (MTC1)
MTC-2	Midway Transit Community II (MTC2)
CM	Commercial Manufacturing (CM)
I1	Industrial Business (I1)
I2	Mixed Industrial (I2)
I3	Heavy Industrial (I3)
—	Site Boundary

Data source: City Of Kent GIS.
Map prepared by the Kent Engineering Department.
Display map for general reference only. Please contact the Kent Planning Department at (253) 856-5454 for specific property information.

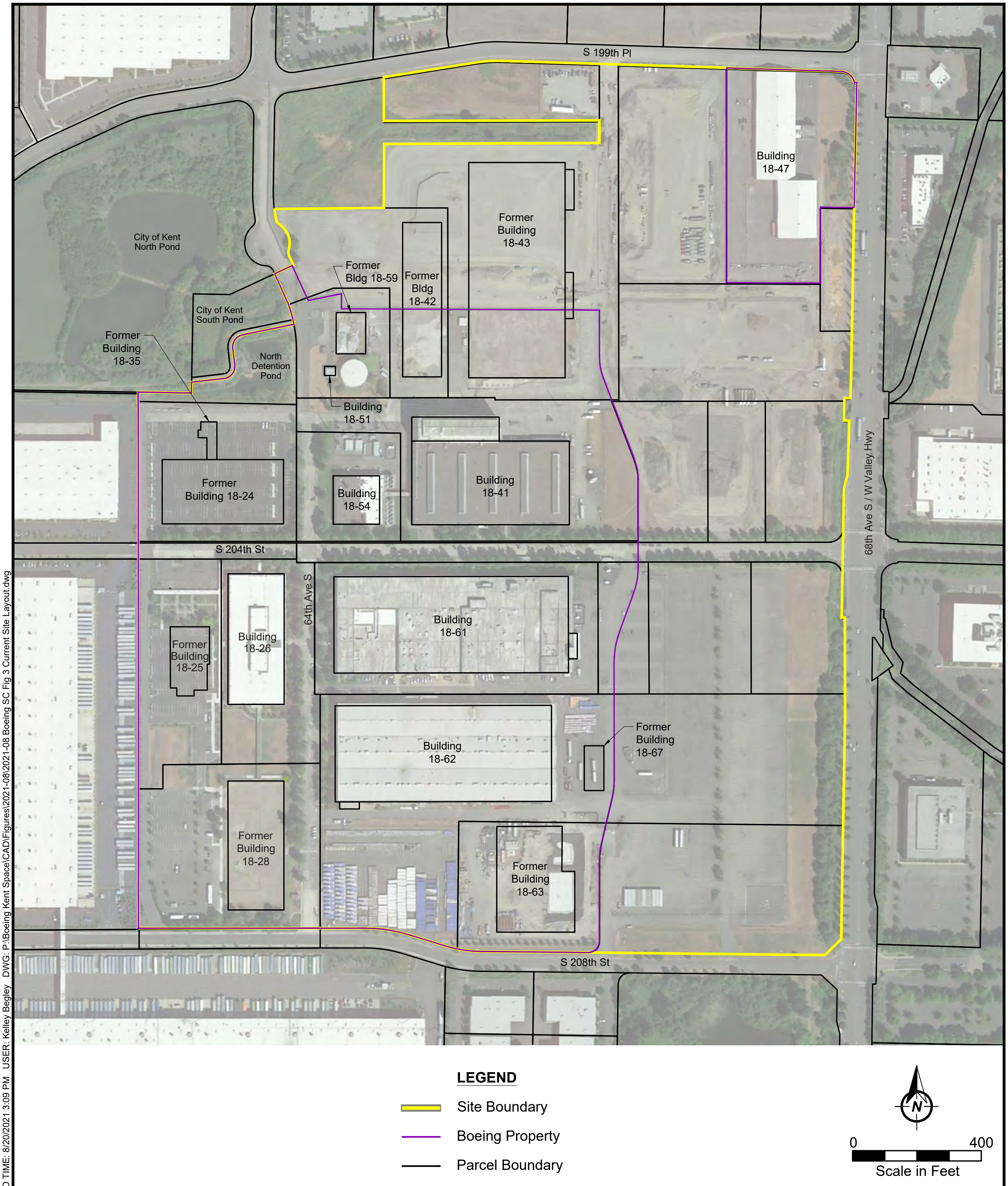
Boeing Space Center
Kent, Washington
Remedial Investigation

City of Kent Zoning

DOF DALTON OLMSTED FUGLEVAND

FIGURE 2

08/31/2021



NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

Parcel Boundary Information: King County, Washington

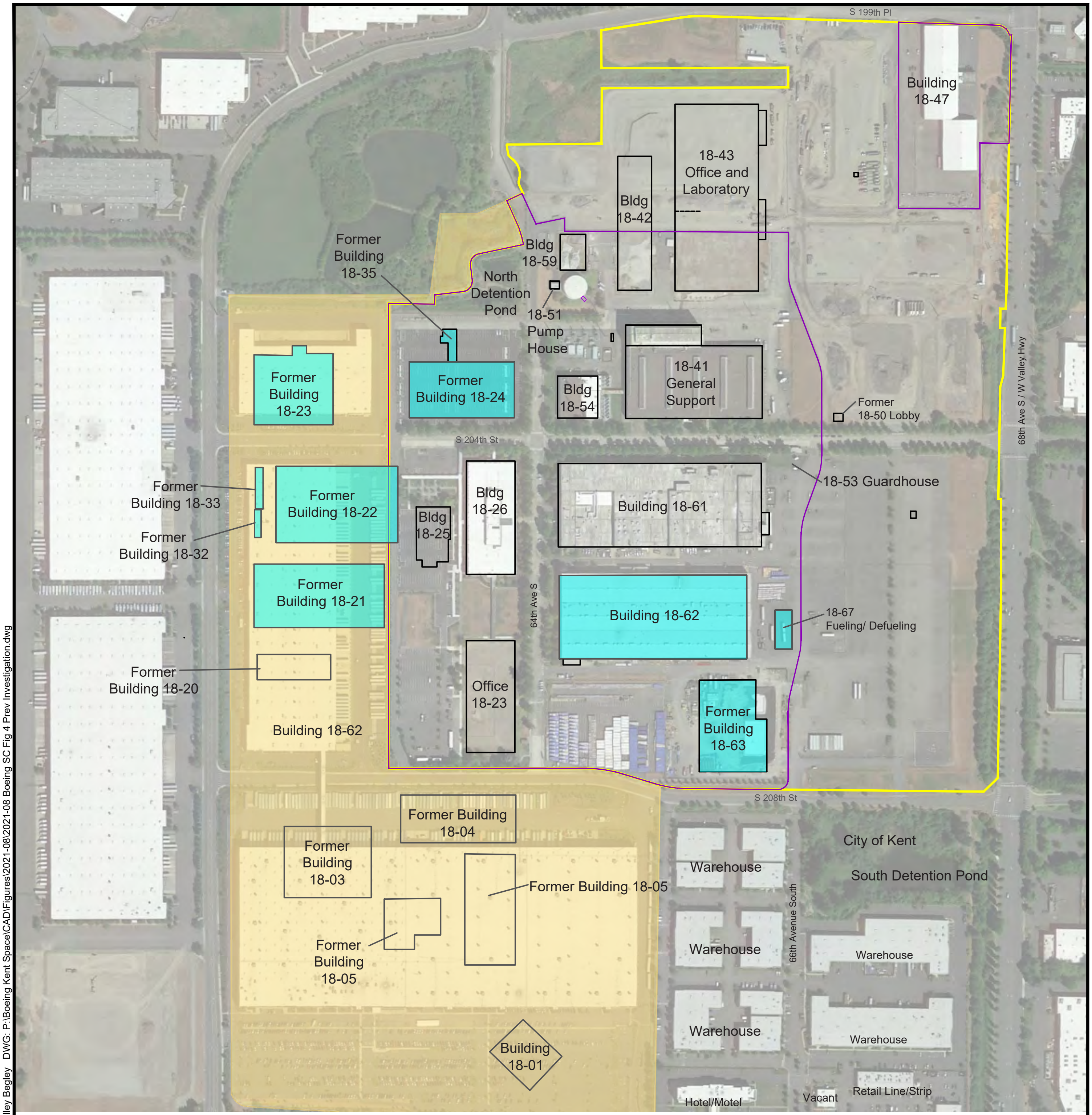
Boeing Space Center
Kent, Washington
Remedial Investigation

Current Site Layout

DALTON OLMSTED FUGLEVAND

FIGURE 3

PLOT TIME: 8/20/2021 5:35 PM MOD TIME: 8/20/2021 3:09 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 3 Current Site Layout.dwg



LEGEND

🟨 Striker Property-Sold and Removed From RCRA Facility

🟦 Investigation During Clearwater Assessment - No Further Action Determination and Approval for Removal From RCRA Facility Received

— Site Boundary

— Boeing Property

N

0 500

Scale in Feet

NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

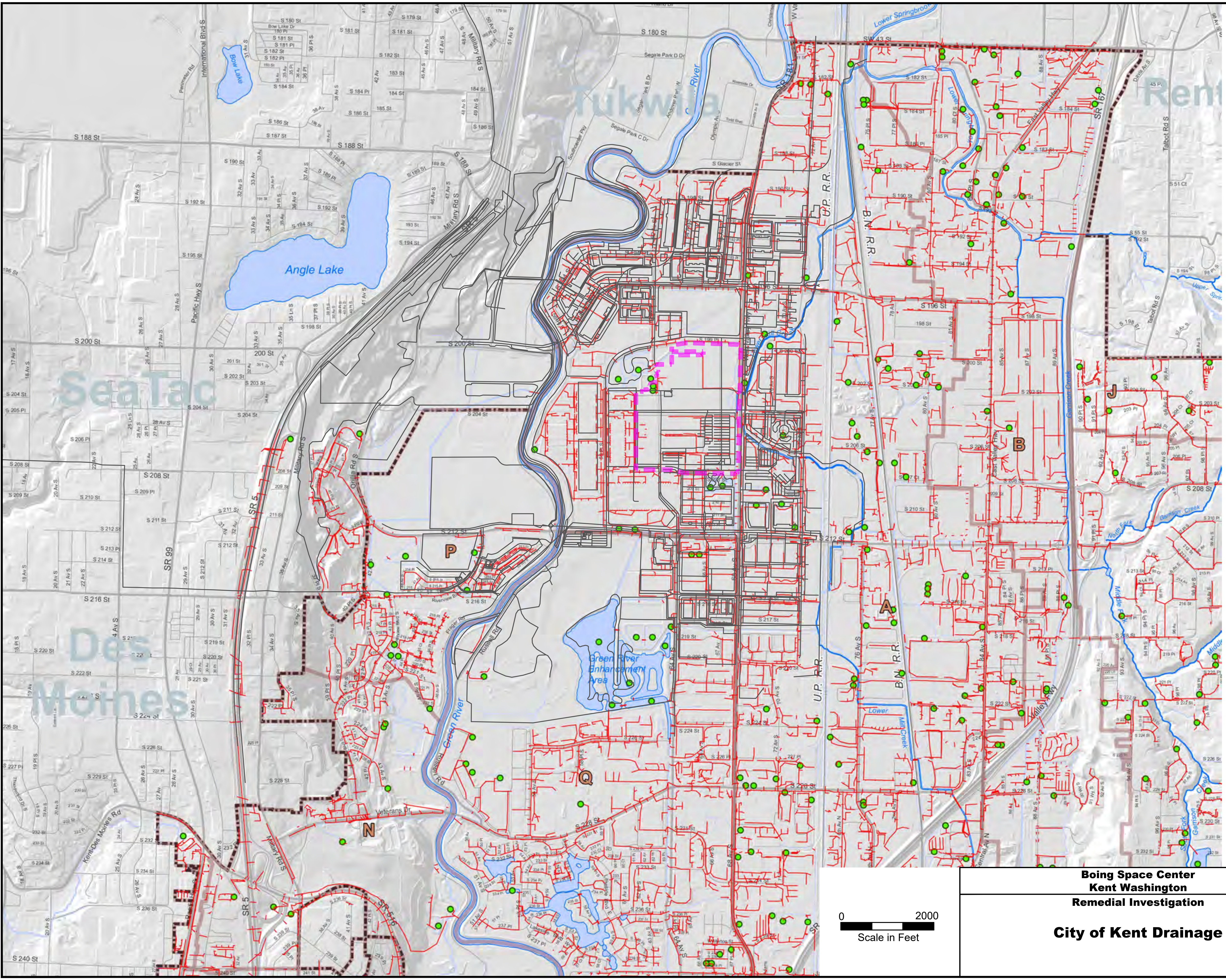
Boeing Space Center
Kent, Washington
Remedial Investigation

Areas of Previous Investigation

DOF DALTON OLMSTED FUGLEVAND

FIGURE 4

PLOT TIME: 8/20/2021 3:11 PM MOD TIME: 8/20/2021 1:34 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 4 Prev Investigation.dwg



Legend

▬ ▬	Site Boundary
―	Storm Sewer
●	Detention Facility
▣	Pump Station
▭	Drainage Utility Basin Boundary
▭	Kent City Limits

BASIN CODE	DESCRIPTION
A	LOWER MILL CREEK
B	LOWER GARRISON CREEK
C	DIRECT INTO GREEN RIVER
D, E, F	MULLEN SLOUGH, MILL CREEK (AUBURN)
G	UPPER MILL CREEK
H	SOOS CREEK
I	UPPER GARRISON CREEK
J	PANTHER CREEK
K, L, M, N, O, P	WESTSIDE
Q	VALLEY DETENTION
R	PANTHER CREEK

Reference:
Base map provided by City of Kent
(Surface Drainage Facilities, Date Printed August 2019)

0 2000
Scale in Feet

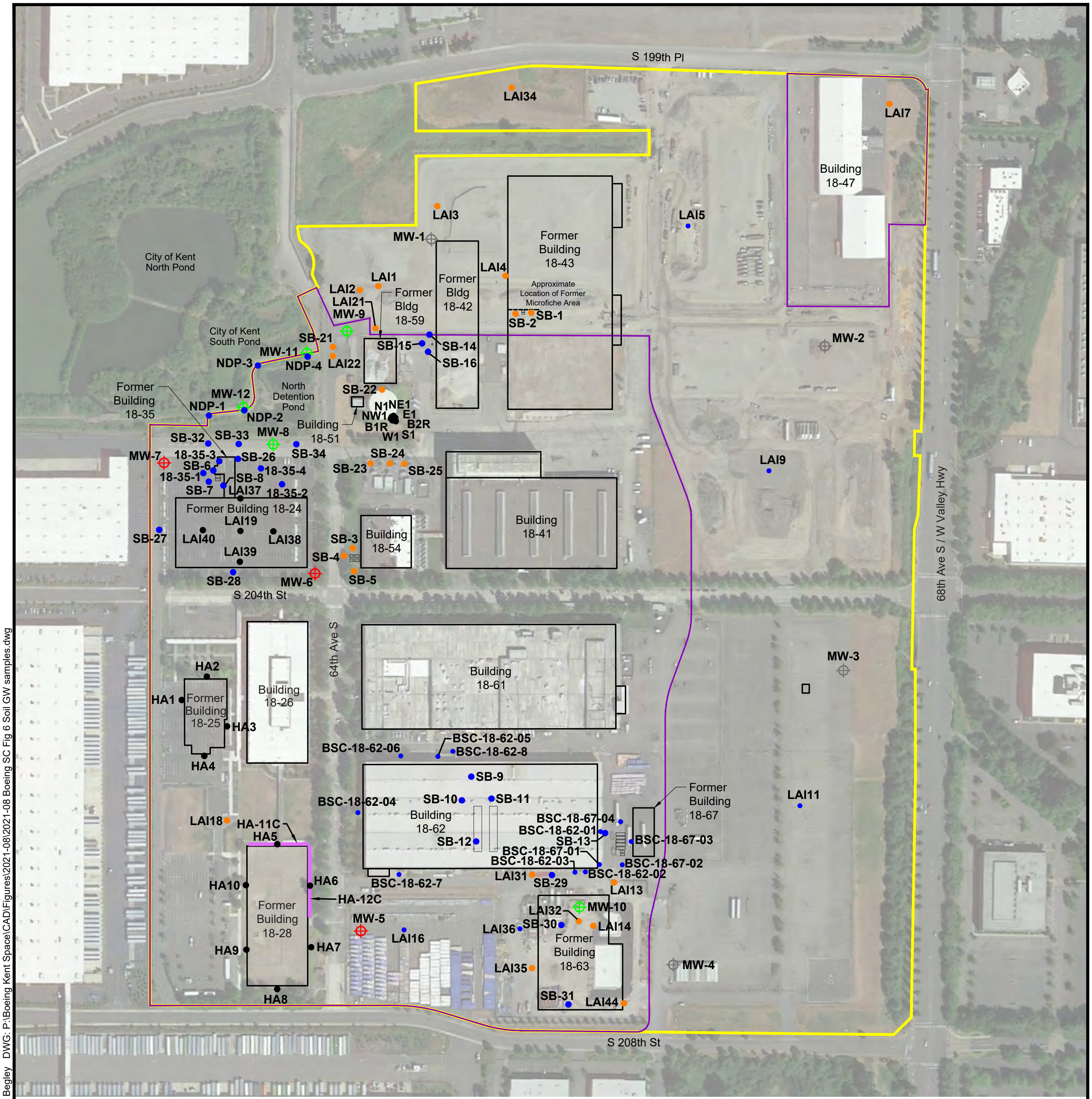
Boing Space Center
Kent Washington
Remedial Investigation

City of Kent Drainage

DALTON
OLMSTED
FUGLEVAND

FIGURE
5

08/31/2021



LEGEND

- ● Soil Sample Only
- ⊕ Monitoring Well Groundwater Sample Only
- ⊕ Monitoring Well Soil and Groundwater Sample
- ⊕ Monitoring Well-Abandoned
- ● Soil and Groundwater Sample
- ● Groundwater Sample Only
- ▭ Site Boundary
- — Boeing Property

NOTES:

Locations with prefix "LAI", "BSC" or "18" predate were conducted prior to the RI or as part of property due diligence.

Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

N

0 400

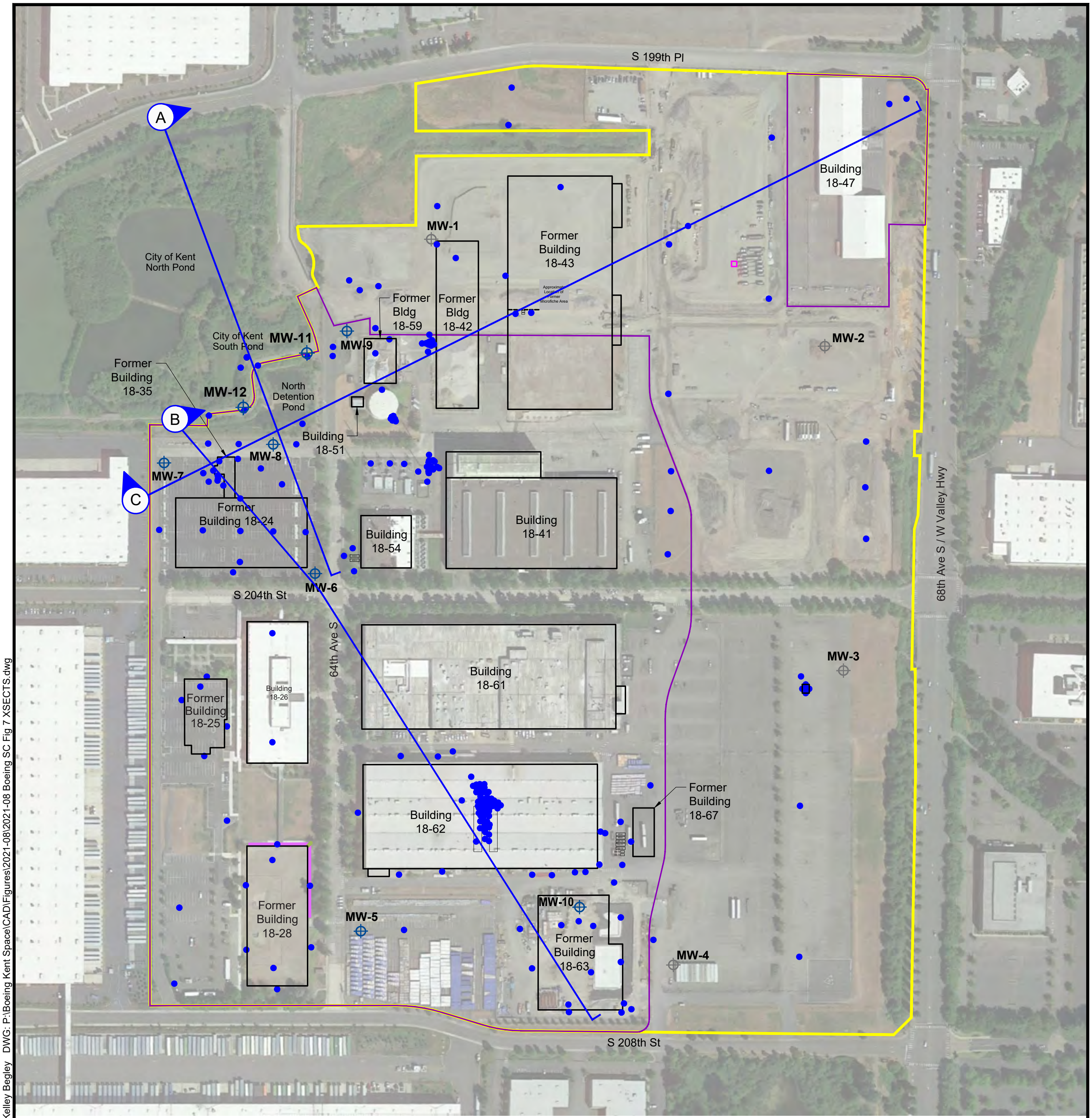
Scale in Feet

Boeing Space Center
Kent, Washington
Remedial Investigation

Soil and Groundwater Sample Locations

DALTON OLMSTED FUGLEVAND

FIGURE 6



LEGEND

● Former Sample or Drilling Location Reviewed for Geologic Information

⌖ Monitoring Well Location

⌖ Monitoring Well Location-Abandoned

🟨 Site Boundary

— Boeing Property

Cross Section Location

N

0 400

Scale in Feet

Boeing Space Center
Kent, Washington
Remedial Investigation

Cross-Section Locations Map

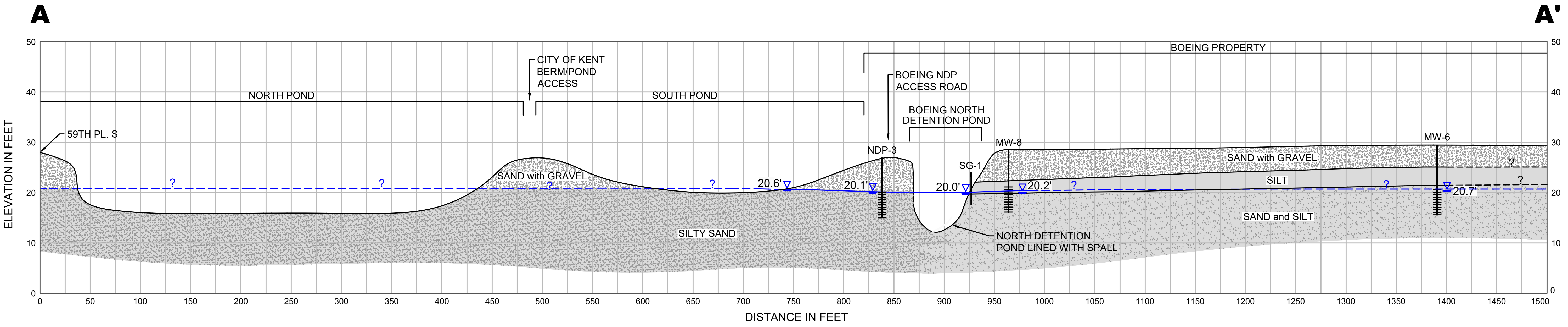
DALTON OLMSTED FUGLEVAND

FIGURE 7

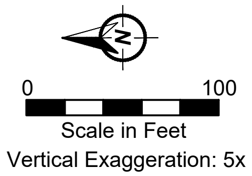
NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

PLOT TIME: 8/30/2021 7:44 AM MOD TIME: 8/27/2021 12:40 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 7 XSECTS.dwg



SECTION A-A'



Legend

╫	Monitoring well/Temporary Boring with Screened Interval	▭	Silt
▽	Groundwater Level	▨	Sand and Silt
– –?– –	Approximate Water Elevation at Borings and Stormwater Ponds	▨	Silty Sand
———	Lithologic Unit Contact	▨	Sand with Gravel
– –?– –	Approximate Lithologic Unit Contact		

NOTES:
1. Elevations north of southern edge of City of Kent storm pond estimated based on Boeing As-Built Plan C313.1 from March 2014.
2. North detention pond lined with quarry spall.
3. Water levels recorded December 11, 2020.

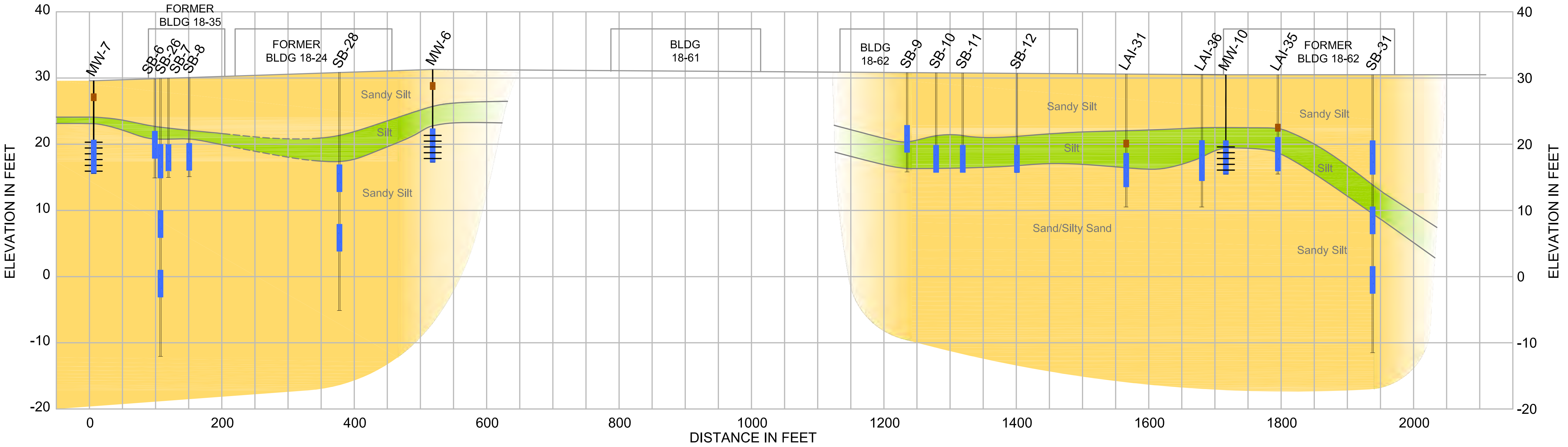
Boeing Space Center
Kent, Washington
Remedial Investigation

Cross Section A-A'

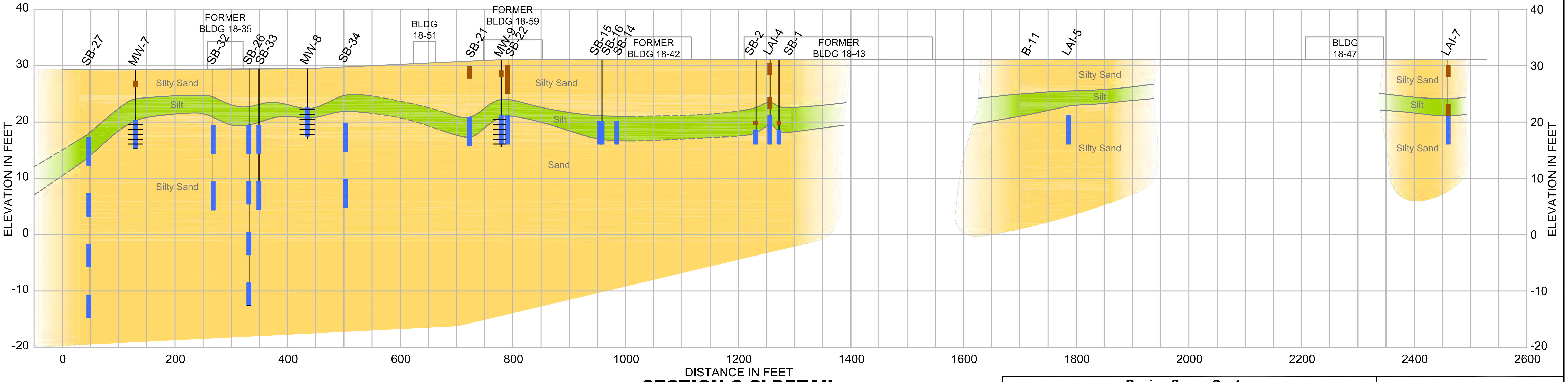
DOF DALTON OLMSTED FUGLEVAND

FIGURE
8

PLOT TIME: 8/27/2021 12:42 PM MOD TIME: 8/27/2021 12:41 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 8 cross section A.dwg



SECTION B-B' DETAIL



SECTION C-C' DETAIL

Legend

╪ Monitoring Well with Screened Interval

▯ Soil Boring

— Lithologic Unit Contact
(Dashed where inferred)

▮ Soil Sample

▮ Water Sample

NOTE:
1. Elevation surface is approximated.

0 175
Scale in Feet
Vertical Exaggeration: 10x

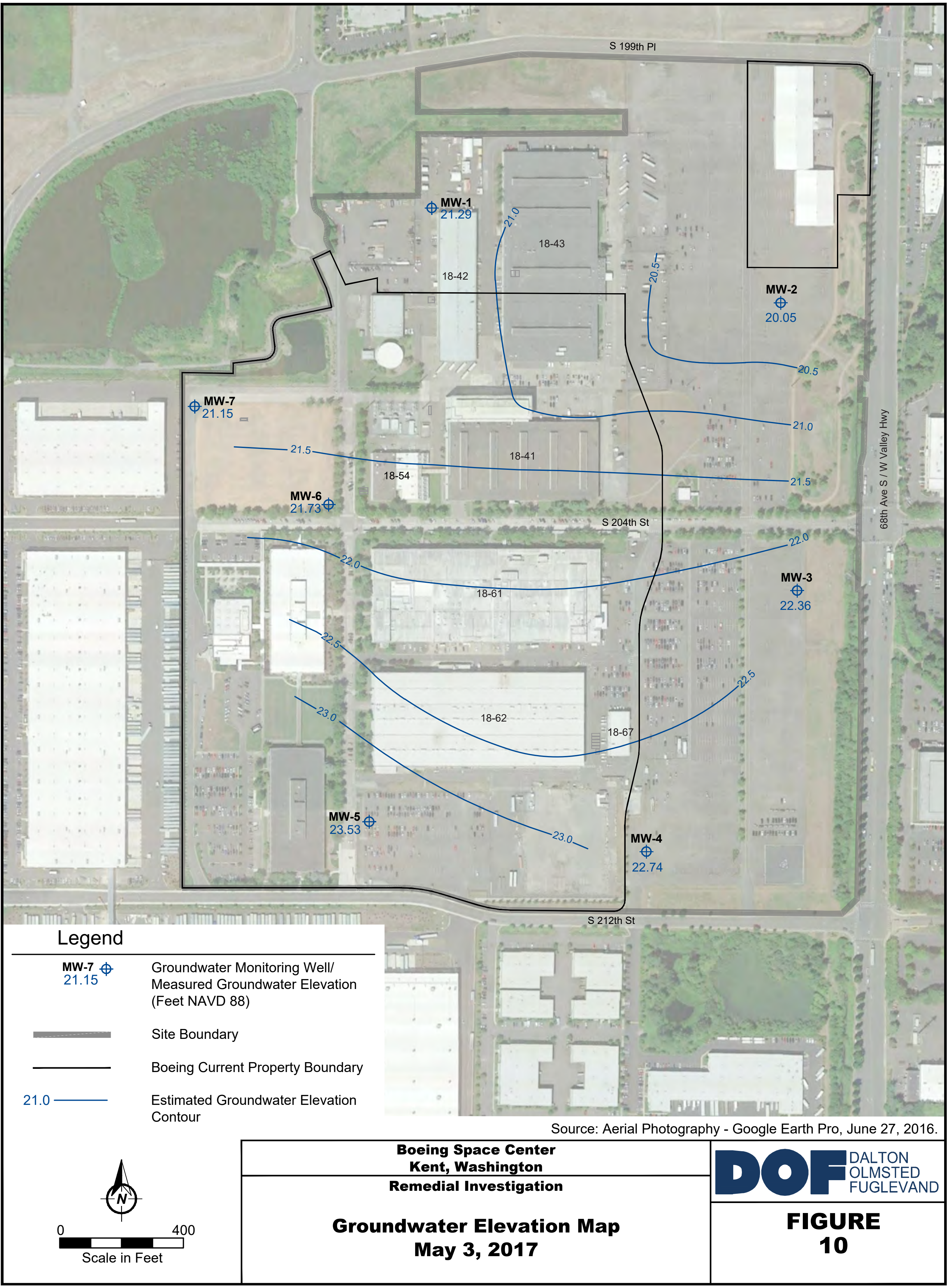
Boeing Space Center
Kent, Washington
Remedial Investigation

Cross Sections B-B' and C-C' Details

DALTON
OLMSTED
FUGLEVAND

FIGURE
9

PLOT TIME: 8/30/2021 7:45 AM MOD TIME: 8/27/2021 12:44 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 9 SWMU-AOC B-C XSECTS.dwg



Source: Aerial Photography - Google Earth Pro, June 27, 2016.

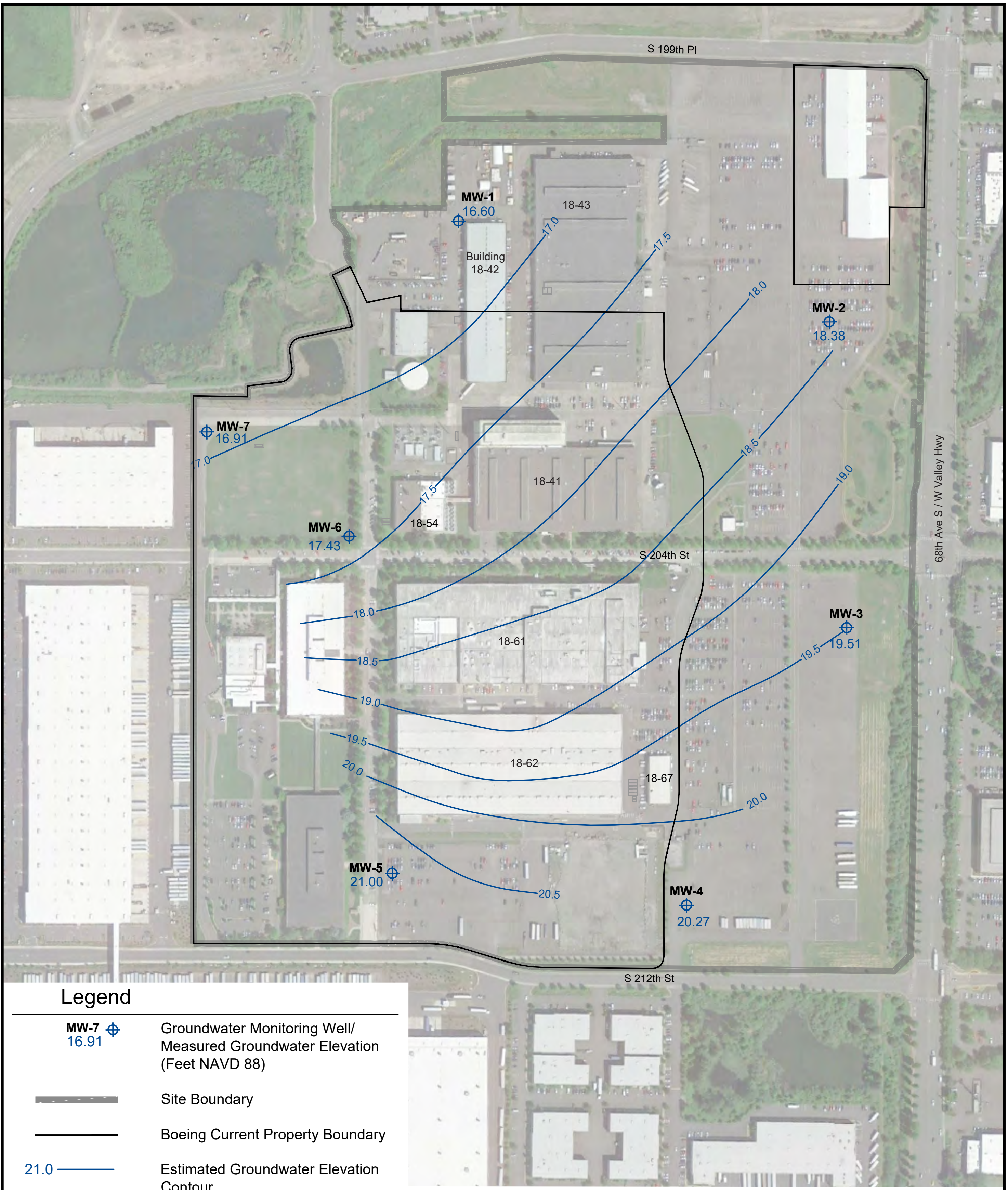
Boeing Space Center
Kent, Washington

Remedial Investigation

Groundwater Elevation Map
May 3, 2017

DOF DALTON OLMSTED FUGLEVAND

FIGURE 10



Source: Aerial Photography - Google Earth Pro, May 22, 2017.

0 400
Scale in Feet

Boeing Space Center
Kent, Washington

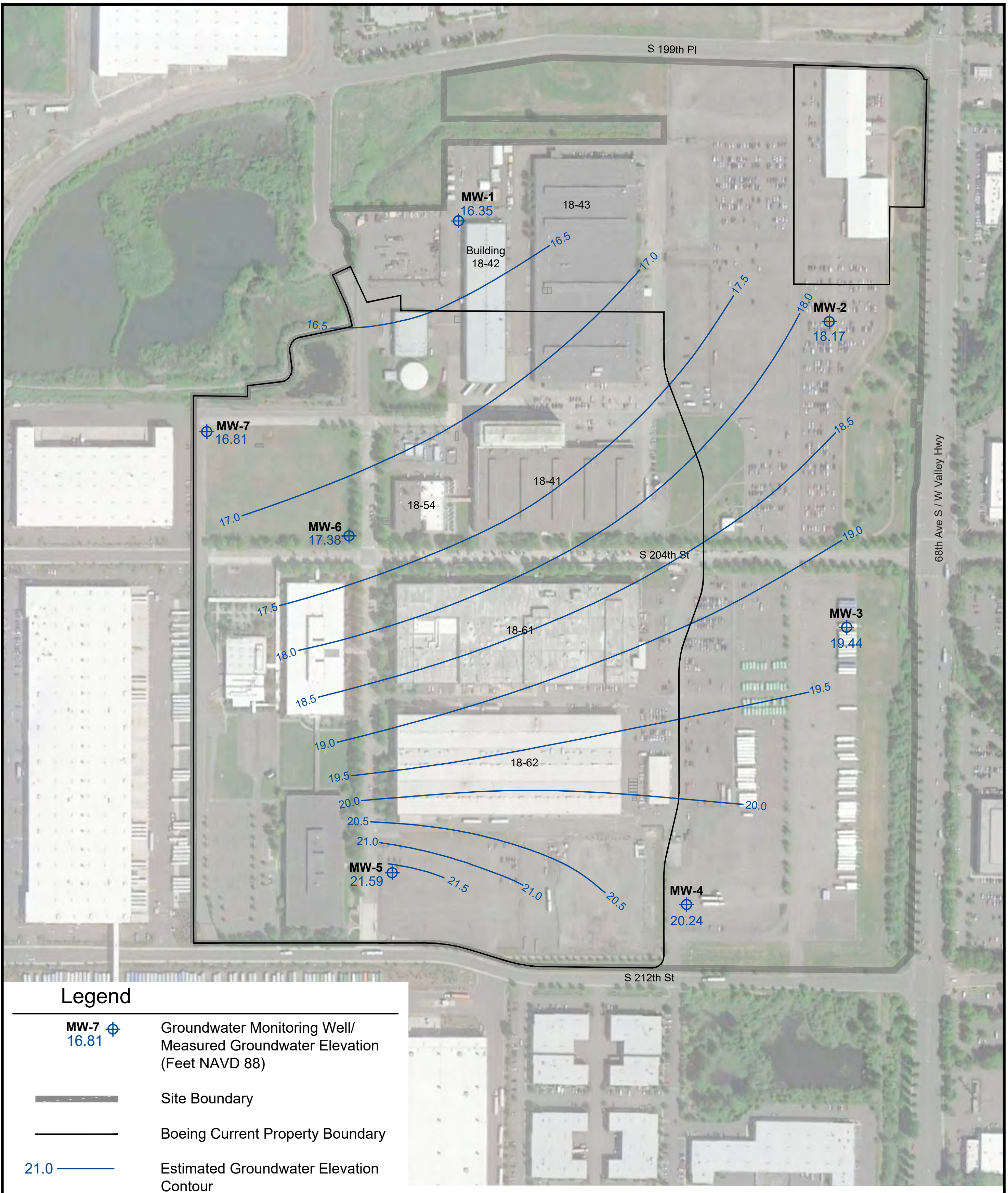
Remedial Investigation

Groundwater Elevation Map
September 28, 2017

DOF DALTON OLMSTED FUGLEVAND

FIGURE
11

PLOT TIME: 8/20/2021 3:36 PM MOD TIME: 8/3/2021 12:16 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 11 gw cont 02 sep2017.dwg



Source: Aerial Photography - Google Earth Pro, May 13, 2018.

Boeing Space Center
Kent, Washington

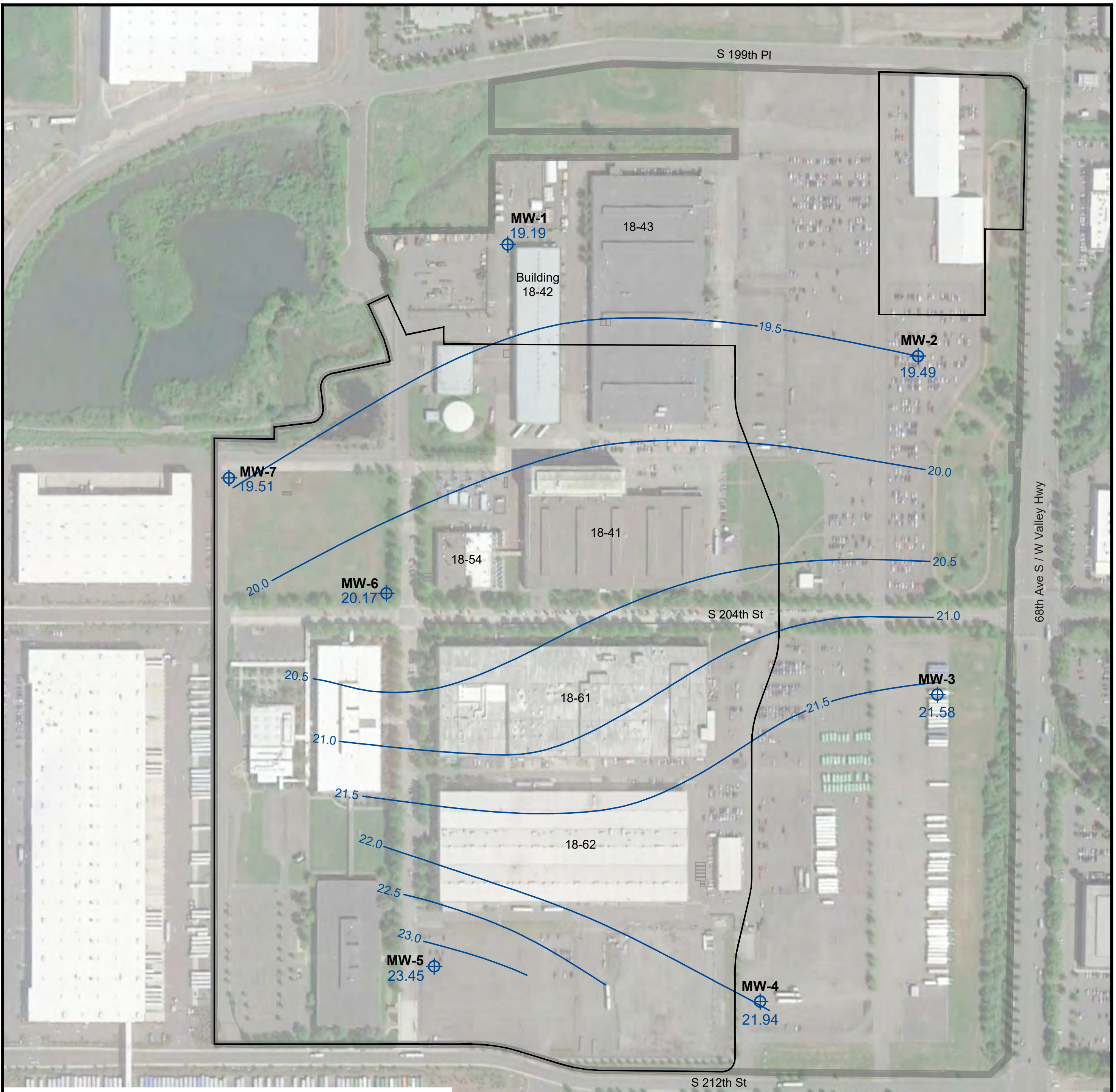
Remedial Investigation

Groundwater Elevation Map
October 24, 2018

DOF DALTON OLMSTED FUGLEVAND

FIGURE 12

PLOT TIME: 8/20/2021 3:37 PM MOD TIME: 8/3/2021 12:21 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 12 gw cont 03 OCT2018.dwg



Legend

MW-7 ⌖ 19.51 — Groundwater Monitoring Well/ Measured Groundwater Elevation (Feet NAVD 88)

▬ Site Boundary

— Boeing Current Property Boundary

21.0 — Estimated Groundwater Elevation Contour

Source: Aerial Photography - Google Earth Pro, May 13, 2018.

N

0 400
Scale in Feet

Boeing Space Center
Kent, Washington

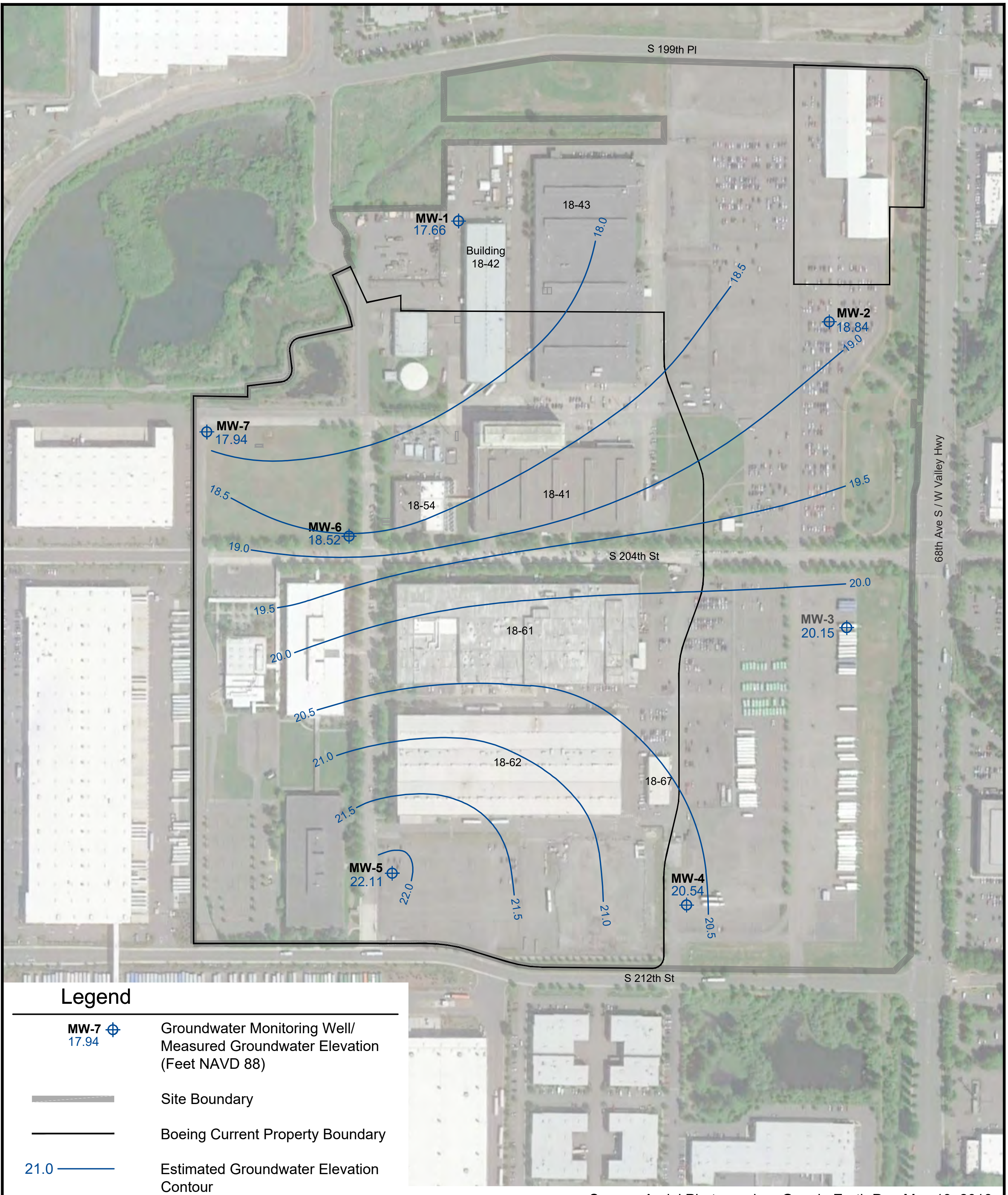
Remedial Investigation

Groundwater Elevation Map
March 14, 2019

DOF DALTON OLMSTED FUGLEVAND

FIGURE
13

PLOT TIME: 8/20/2021 3:39 PM MOD TIME: 8/3/2021 12:26 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 13 gw cont 04 MAR2019.dwg



Source: Aerial Photography - Google Earth Pro, May 13, 2018.

N

0 400

Scale in Feet

Boeing Space Center
Kent, Washington

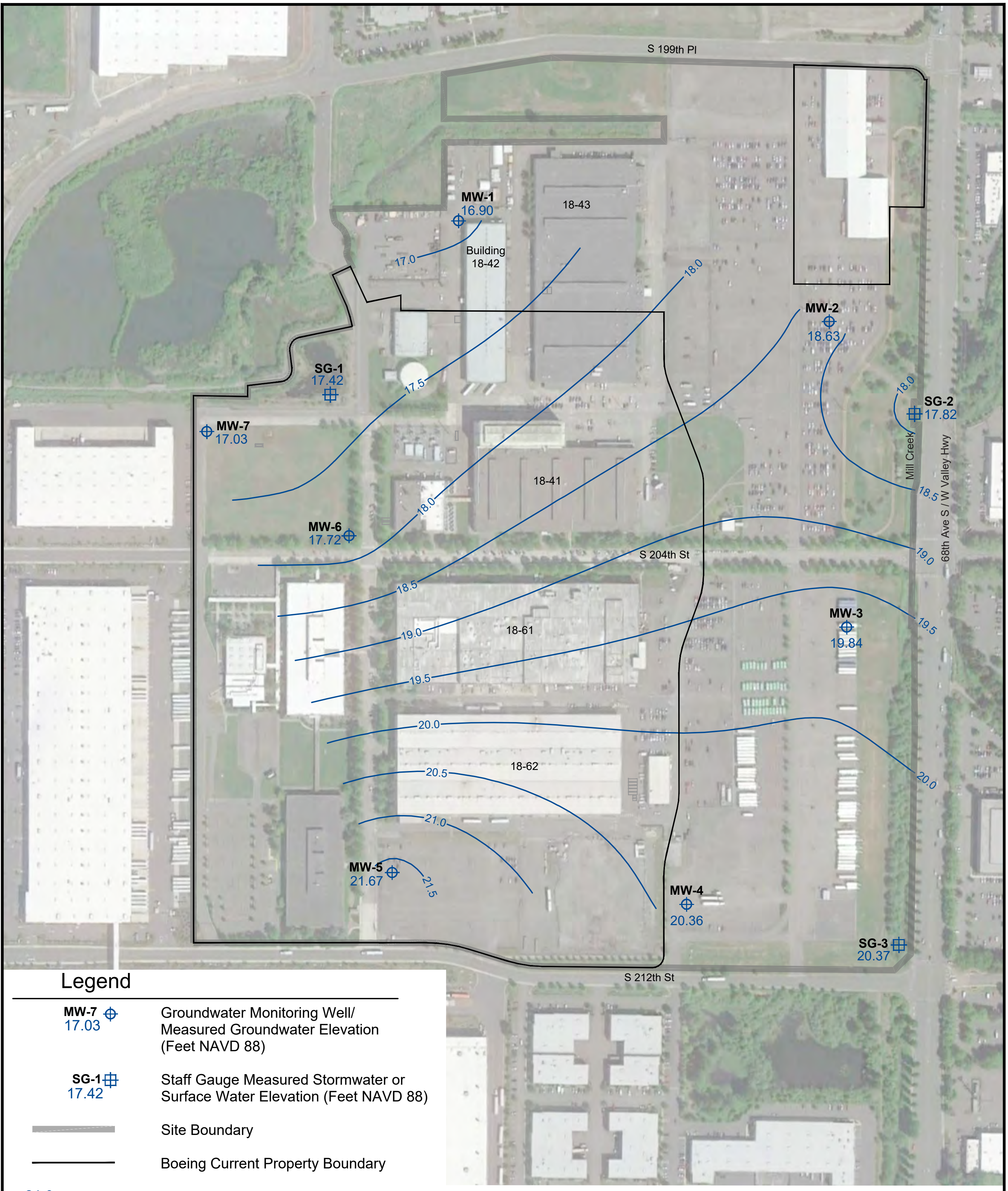
Remedial Investigation

Groundwater Elevation Map
June 18, 2019

DOF DALTON OLMSTED FUGLEVAND

FIGURE 14

PLOT TIME: 8/20/2021 3:43 PM MOD TIME: 8/3/2021 12:29 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 14 gw cont 05 JUN2019.dwg



Legend

MW-7 ⊕ 17.03	Groundwater Monitoring Well/ Measured Groundwater Elevation (Feet NAVD 88)
SG-1 ⊞ 17.42	Staff Gauge Measured Stormwater or Surface Water Elevation (Feet NAVD 88)
▬	Site Boundary
—	Boeing Current Property Boundary
21.0 —	Estimated Groundwater Elevation Contour

Source: Aerial Photography - Google Earth Pro, May 13, 2018.

N

0 400
Scale in Feet

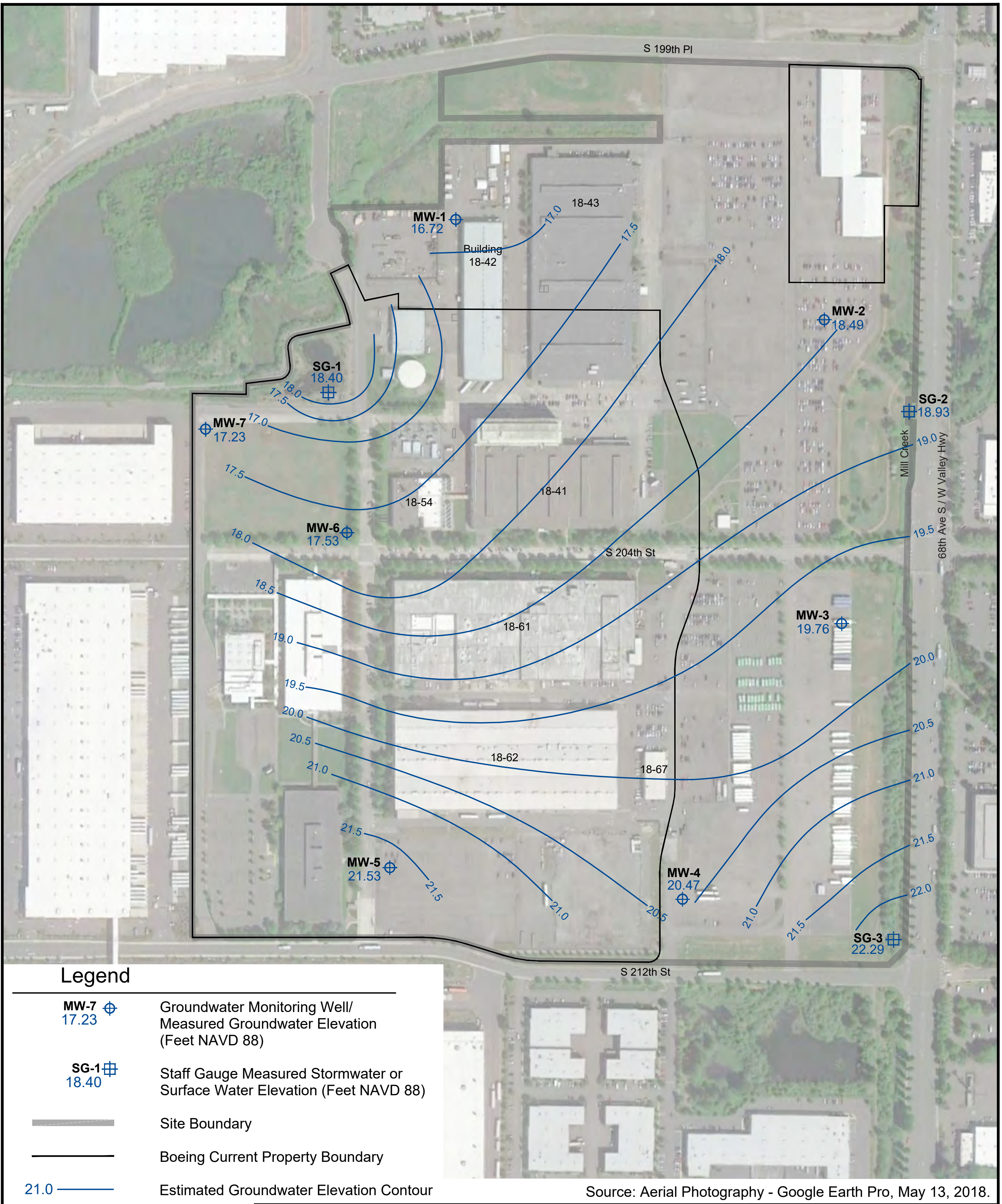
Boeing Space Center
Kent, Washington
Remedial Investigation

Groundwater Elevation Map
August 7, 2019

DOF DALTON OLMSTED FUGLEVAND

FIGURE 15

PLOT TIME: 8/20/2021 3:49 PM MOD TIME: 8/3/2021 2:18 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 15 gw cont 06 AUG2019.dwg



Source: Aerial Photography - Google Earth Pro, May 13, 2018.

PLOT TIME: 8/20/2021 3:54 PM MOD TIME: 8/3/2021 2:27 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 16 gw cont 07 sep2019.dwg

Boeing Space Center
Kent, Washington

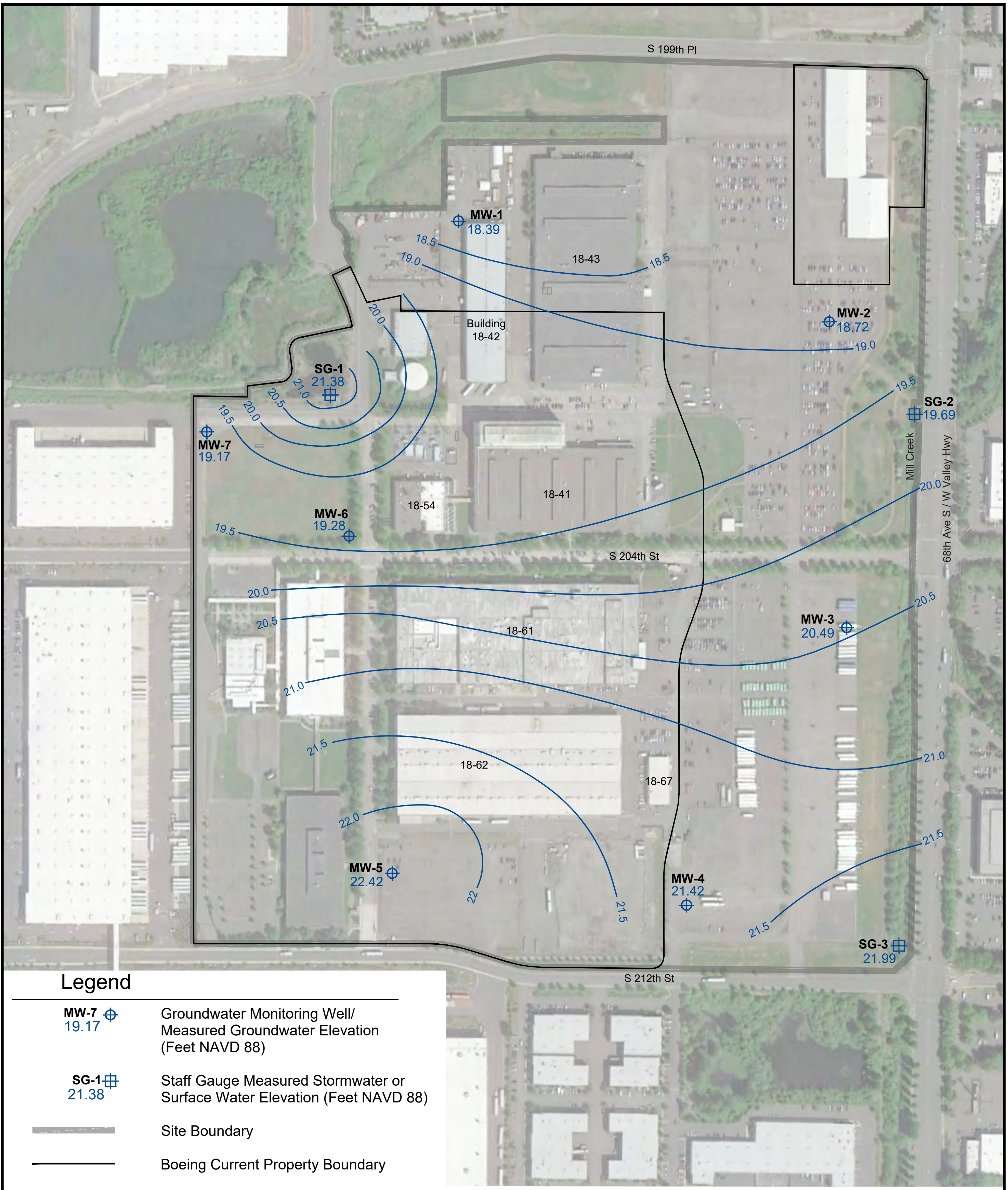
Remedial Investigation

Groundwater Elevation Map
September 10, 2019

DOF DALTON OLMSTED FUGLEVAND

FIGURE
16

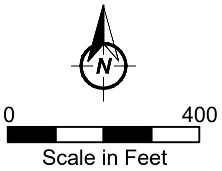
PLOT TIME: 8/20/2021 3:56 PM MOD TIME: 8/3/2021 2:38 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 17 gw cont 08 OCT2019.dwg



Legend

MW-7 ⌖ 19.17	Groundwater Monitoring Well/ Measured Groundwater Elevation (Feet NAVD 88)
SG-1 ⌗ 21.38	Staff Gauge Measured Stormwater or Surface Water Elevation (Feet NAVD 88)
▬	Site Boundary
—	Boeing Current Property Boundary
21.0 —	Estimated Groundwater Elevation Contour

Source: Aerial Photography - Google Earth Pro, May 13, 2018.



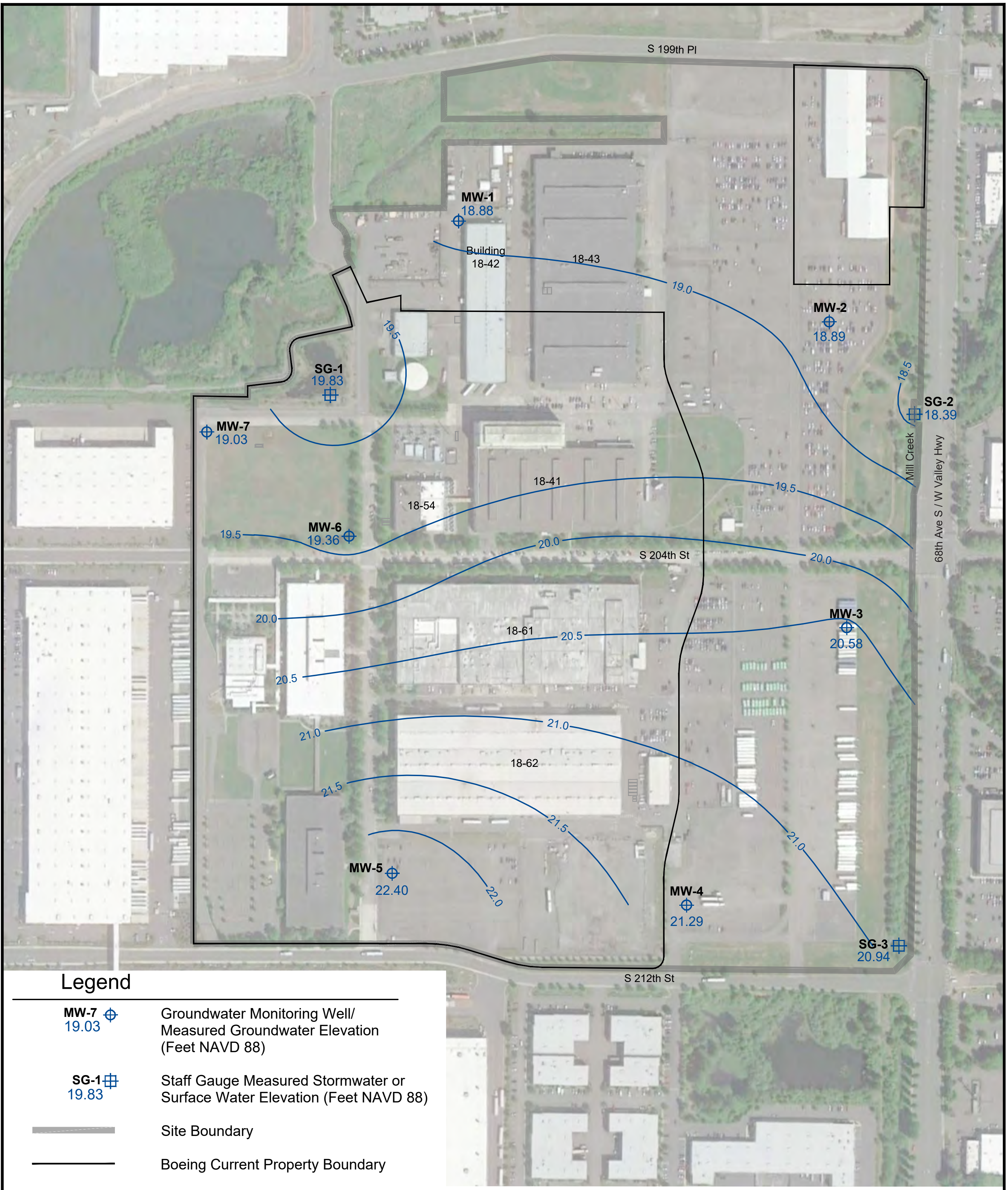
Boeing Space Center
Kent, Washington

Remedial Investigation

Groundwater Elevation Map
October 22, 2019

DOF DALTON OLMSTED FUGLEVAND

FIGURE 17



Source: Aerial Photography - Google Earth Pro, May 13, 2018.

N

0 400
Scale in Feet

Boeing Space Center
Kent, Washington

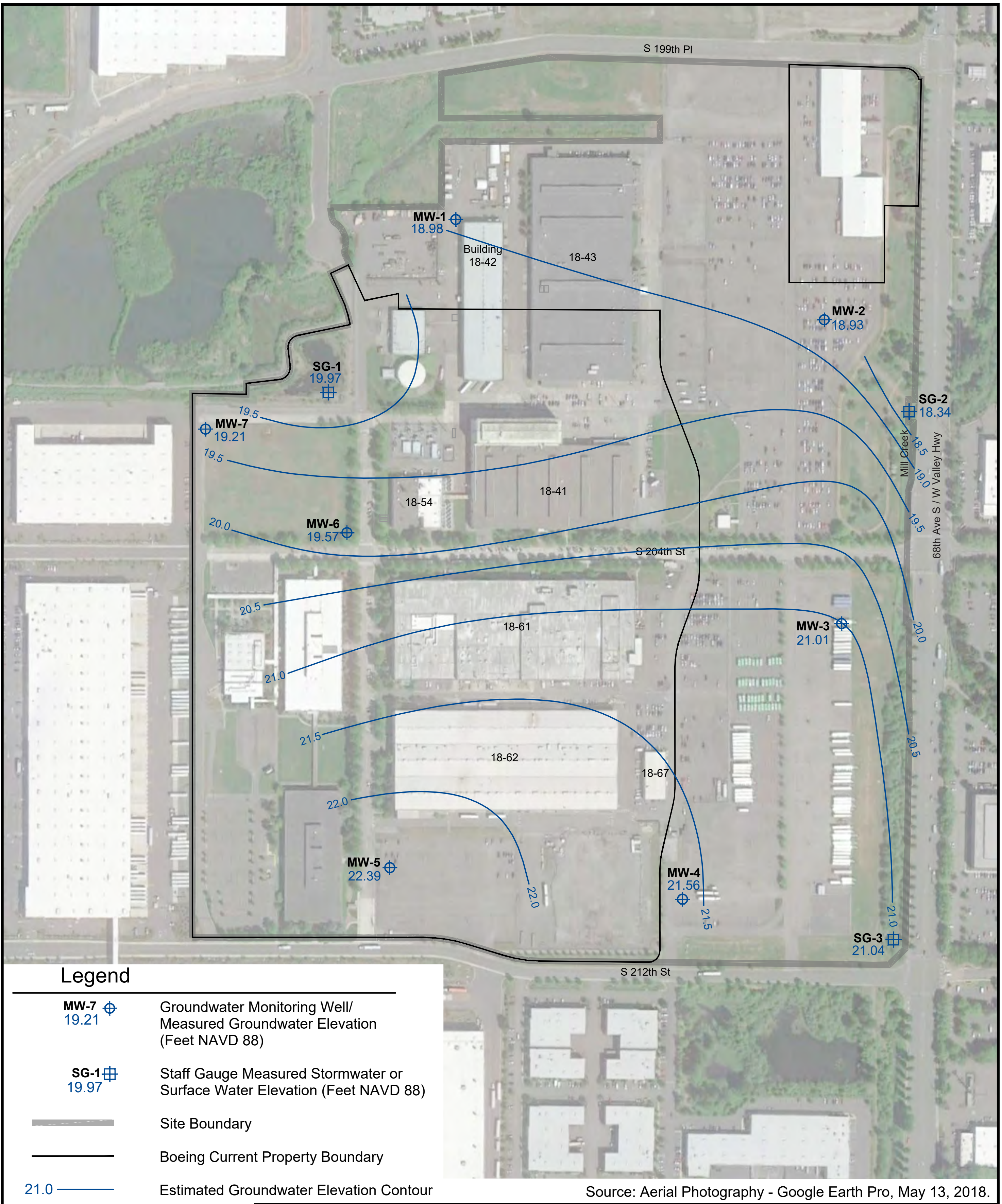
Remedial Investigation

Groundwater Elevation Map
November 18, 2019

DOF DALTON OLMSTED FUGLEVAND

FIGURE 18

PLOT TIME: 8/20/2021 3:58 PM MOD TIME: 8/3/2021 2:36 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 18 gw cont 09 NOV2019.dwg



Legend

MW-7 ⊕ 19.21	Groundwater Monitoring Well/ Measured Groundwater Elevation (Feet NAVD 88)
SG-1 ⊞ 19.97	Staff Gauge Measured Stormwater or Surface Water Elevation (Feet NAVD 88)
▬	Site Boundary
―	Boeing Current Property Boundary
21.0 ―	Estimated Groundwater Elevation Contour

Source: Aerial Photography - Google Earth Pro, May 13, 2018.

N

0 400
Scale in Feet

Boeing Space Center
Kent, Washington

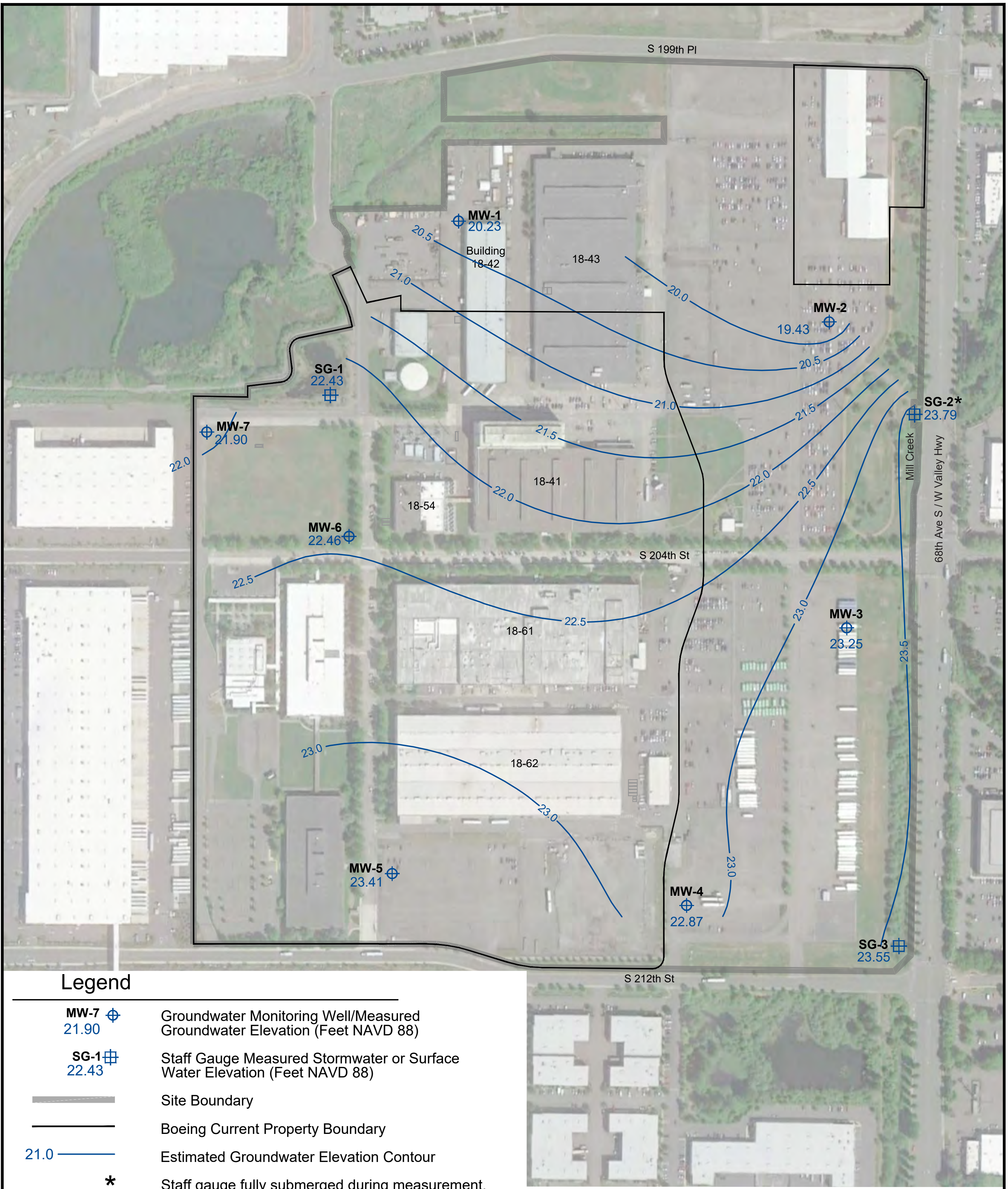
Remedial Investigation

Groundwater Elevation Map
December 17, 2019

DOF DALTON OLMSTED FUGLEVAND

FIGURE
19

PLOT TIME: 8/20/2021 4:01 PM MOD TIME: 8/3/2021 2:45 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 19 gw cont 10 DEC2019.dwg



Legend

MW-7 ⌖ 21.90	Groundwater Monitoring Well/Measured Groundwater Elevation (Feet NAVD 88)
SG-1 ⊞ 22.43	Staff Gauge Measured Stormwater or Surface Water Elevation (Feet NAVD 88)
▬	Site Boundary
—	Boeing Current Property Boundary
21.0 —	Estimated Groundwater Elevation Contour
*	Staff gauge fully submerged during measurement, highest elevation on staff gauge reported.

Source: Aerial Photography - Google Earth Pro, May 13, 2018.

N

0 400
Scale in Feet

Boeing Space Center
Kent, Washington

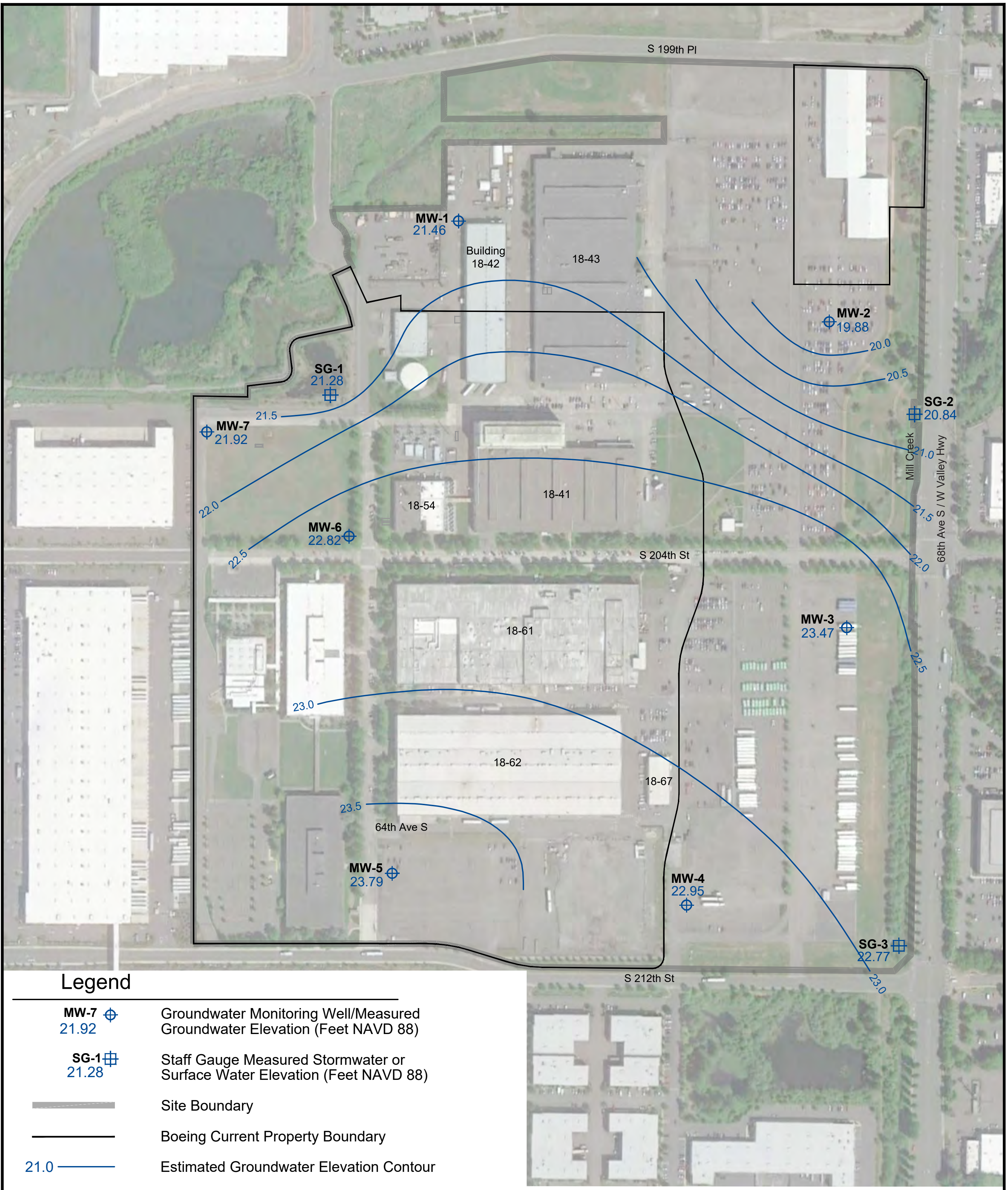
Remedial Investigation

Groundwater Elevation Map
December 23, 2019

DALTON
OLMSTED
FUGLEVAND

FIGURE
20

PLOT TIME: 8/20/2021 4:02 PM MOD TIME: 8/3/2021 2:49 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 20 gw cont 11 DEC-23-2019.dwg



Source: Aerial Photography - Google Earth Pro, May 13, 2018.

0 400
Scale in Feet

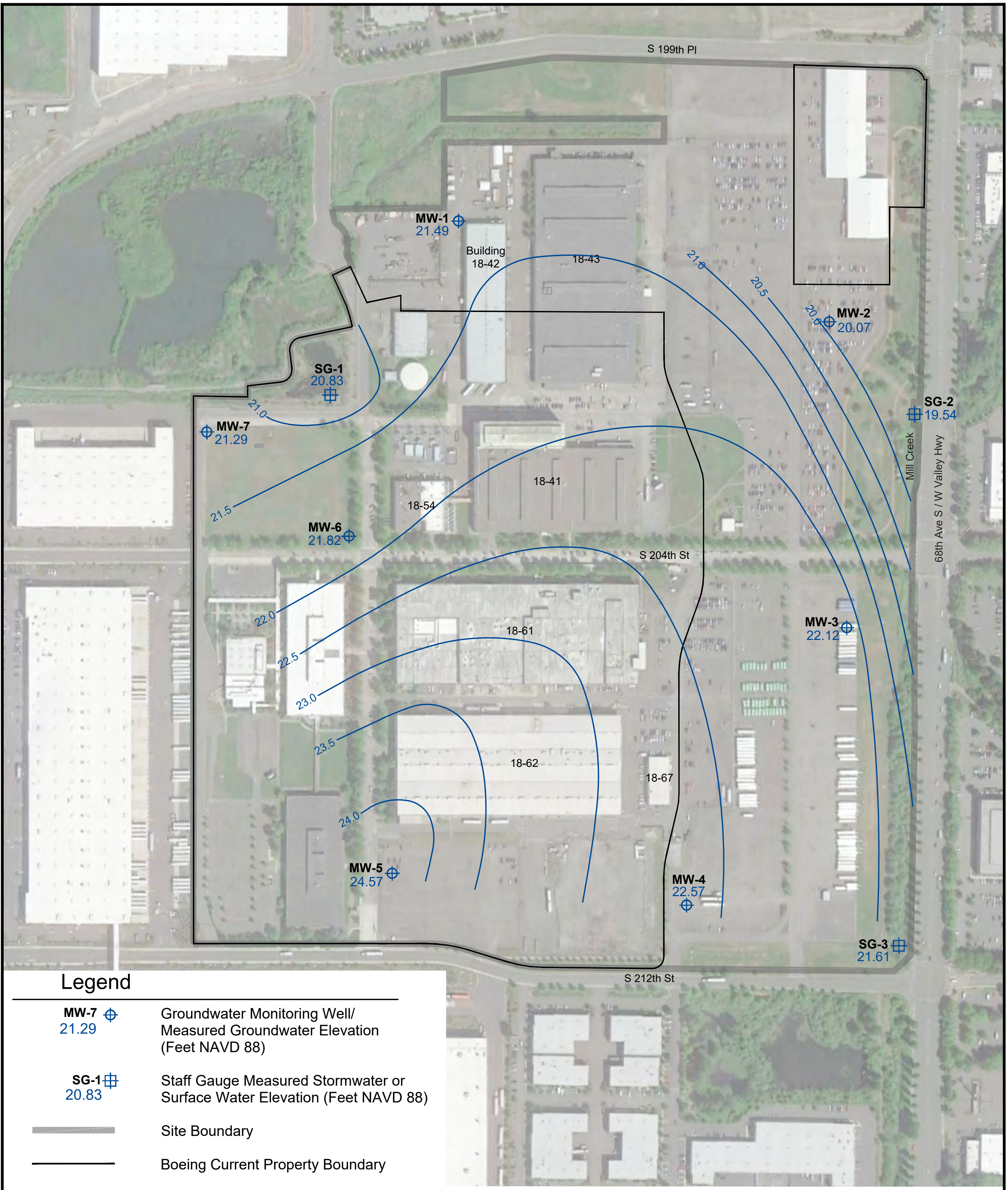
Boeing Space Center
Kent, Washington
Remedial Investigation

Groundwater Elevation Map
January 7, 2020

DALTON
OLMSTED
FUGLEVAND

FIGURE
21

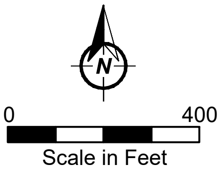
PLOT TIME: 8/20/2021 4:04 PM MOD TIME: 8/3/2021 2:52 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 21 gw cont 12 JAN2020.dwg



Legend

MW-7 ⌖ 21.29	Groundwater Monitoring Well/ Measured Groundwater Elevation (Feet NAVD 88)
SG-1 ⊞ 20.83	Staff Gauge Measured Stormwater or Surface Water Elevation (Feet NAVD 88)
▬	Site Boundary
—	Boeing Current Property Boundary
21.0 —	Estimated Groundwater Elevation Contour

Source: Aerial Photography - Google Earth Pro, May 13, 2018.



Boeing Space Center
Kent, Washington
Remedial Investigation

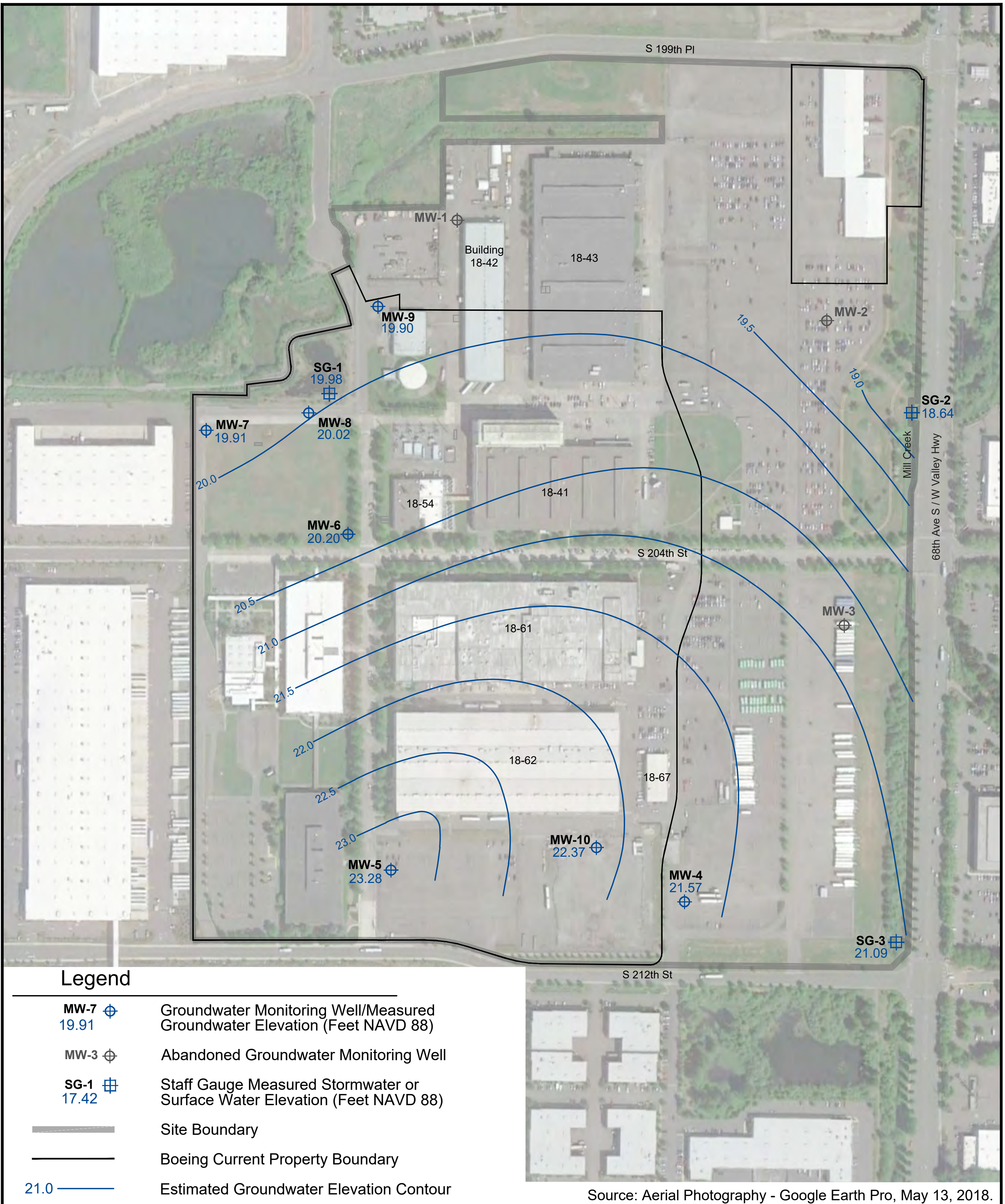
Groundwater Elevation Map
March 6, 2020

DOF DALTON OLMSTED FUGLEVAND

FIGURE 22

PLOT TIME: 8/20/2021 4:05 PM MOD TIME: 8/3/2021 3:04 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 22 gw cont 13 MAR2020.dwg

PLOT TIME: 8/20/2021 4:07 PM MOD TIME: 8/3/2021 3:08 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 23 gw cont 14 JUN2020.dwg



Source: Aerial Photography - Google Earth Pro, May 13, 2018.

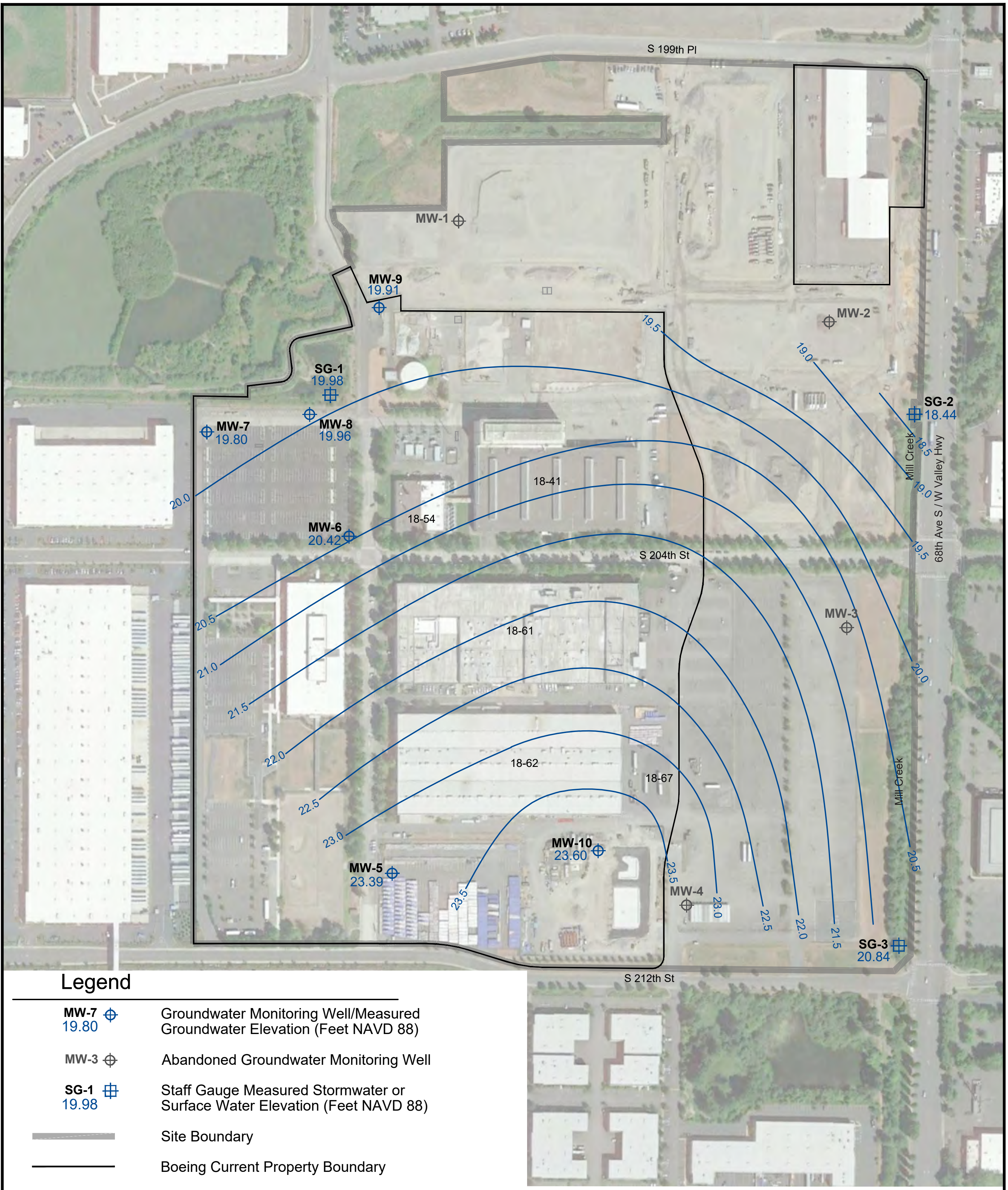
Boeing Space Center
Kent, Washington

Remedial Investigation

Groundwater Elevation Map
June 2, 2020

DOF DALTON OLMSTED FUGLEVAND

FIGURE 23



Legend

MW-7 ⌖ 19.80	Groundwater Monitoring Well/Measured Groundwater Elevation (Feet NAVD 88)
MW-3 ⌖	Abandoned Groundwater Monitoring Well
SG-1 ⊞ 19.98	Staff Gauge Measured Stormwater or Surface Water Elevation (Feet NAVD 88)
▬	Site Boundary
—	Boeing Current Property Boundary
21.0 —	Estimated Groundwater Elevation Contour

Source: Aerial Photography - Google Earth Pro, August 2020.

N

0 400
Scale in Feet

Boeing Space Center
Kent, Washington

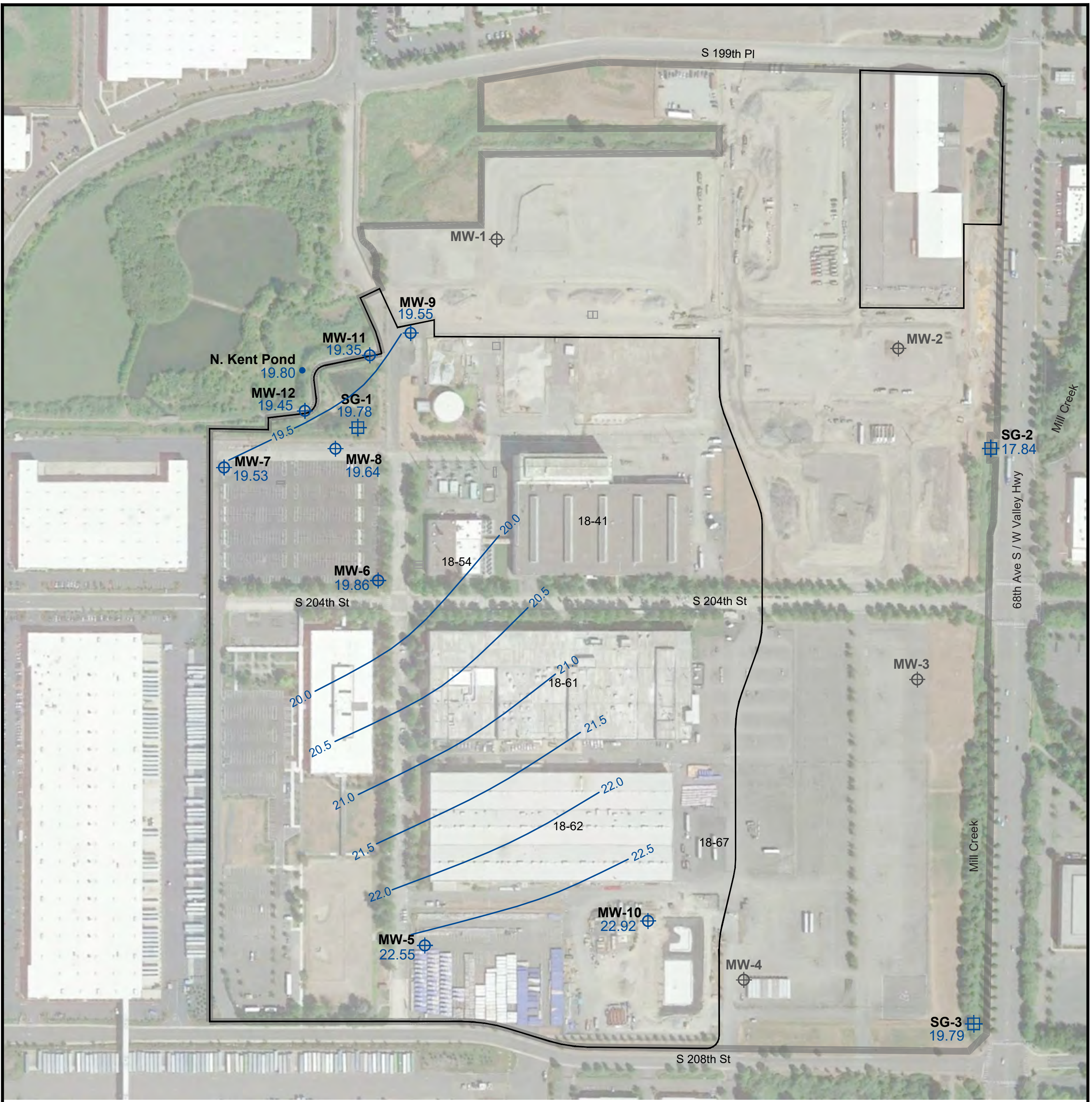
Remedial Investigation

Groundwater Elevation Map
December 7, 2020

DOF DALTON OLMSTED FUGLEVAND

FIGURE 24

PLOT TIME: 8/20/2021 4:08 PM MOD TIME: 8/3/2021 3:10 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 24 gw cont 15 DEC2020.dwg



Legend

MW-7 ⊕ 19.80	Groundwater Monitoring Well/Measured Groundwater Elevation (Feet NAVD 88)
MW-3 ⊕	Abandoned Groundwater Monitoring Well
SG-1 ⊞ 19.98	Staff Gauge Measured Stormwater or Surface Water Elevation (Feet NAVD 88)
•	Measured Stormwater Spot Elevation (Feet NAVD 88)
▬	Site Boundary
—	Boeing Current Property Boundary
21.0 —	Estimated Groundwater Elevation Contour

Note: Stormwater/surface water elevations for informational purposes only.
Source: Aerial Photography - Google Earth Pro, August 2020.

N

0 400
Scale in Feet

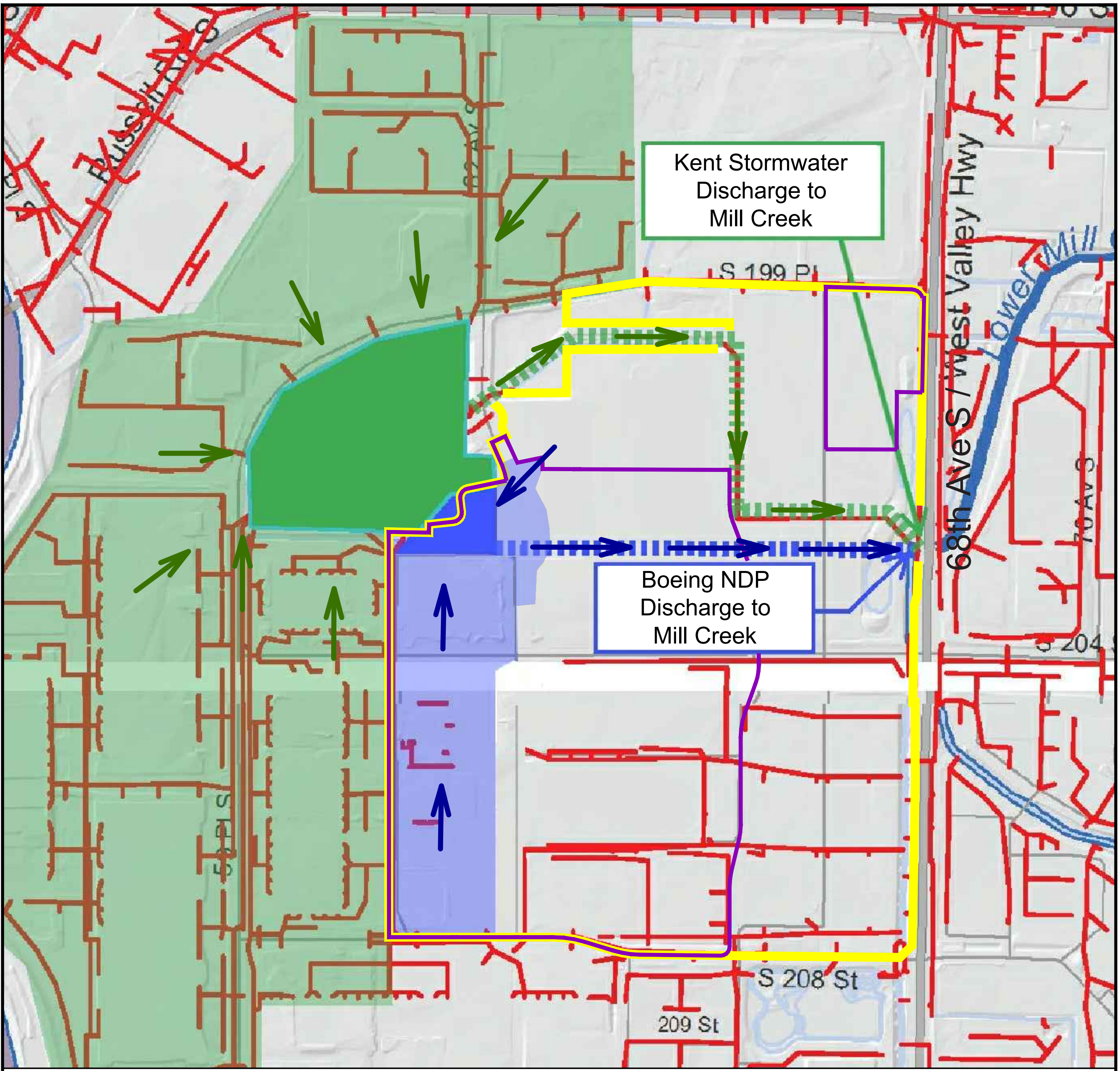
Boeing Space Center
Kent, Washington
Remedial Investigation

Groundwater Elevation Map
June 2021

DOF DALTON OLMSTED FUGLEVAND

FIGURE
25

PLOT TIME: 8/20/2021 4:10 PM MOD TIME: 8/3/2021 3:20 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 25 gw conts 2021-06b.dwg



Legend

🟦 Boeing North Detention Pond (NDP)

🟦 Boeing KSC Drainage Basin (21 acres)

▮▮▮▮▮▮▮▮▮ Boeing NDP Storm Drainage to Mill Creek

▬ Site Boundary

— Boeing Property Boundary

🟩 City of Kent Stormwater Pond

🟩 City of Kent Stormwater Drainage Basin (253 acres)

▮▮▮▮▮▮▮▮▮ City of Kent Stormwater Basin Drainage to Mill Creek

→ Surface Stormwater Flow Direction - Boeing KSC Drainage Basin

→ Surface Stormwater Flow Direction - City of Kent Stormwater Drainage Basin

N

Not to Scale

NOTES:
1. Stormwater network derived from City of Kent GIS.
2. Basin areas based on Barghausen calculation in Sheet C504, March, 2014.

Boeing Space Center
Kent, Washington

Remedial Investigation

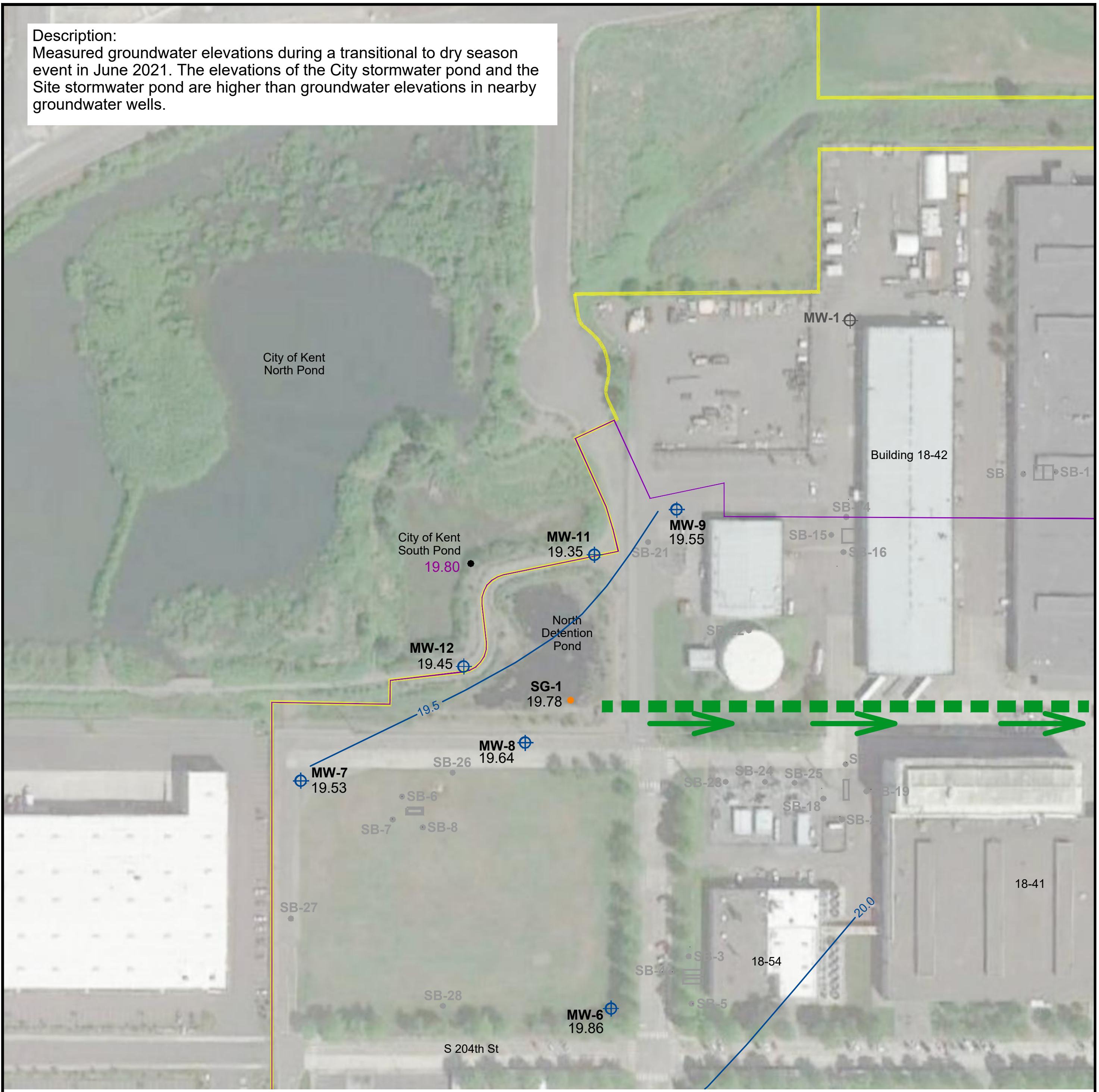
Pictorial Representation of General Stormwater Influences in the Vicinity of Boeing KSC

DALTON
OLMSTED
FUGLEVAND

FIGURE
26

PLOT TIME: 8/20/2021 4:14 PM MOD TIME: 8/3/2021 3:28 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2021-08\2021-08 Boeing SC Fig 26 Pictorial Rep Gen Stormwater Influences.dwg

Description:
Measured groundwater elevations during a transitional to dry season event in June 2021. The elevations of the City stormwater pond and the Site stormwater pond are higher than groundwater elevations in nearby groundwater wells.



Legend

MW-7 ⌖ 19.53 Groundwater Monitoring Well/ Measured Groundwater Elevation

MW-1 ⌖ Abandoned Groundwater Monitoring Well

SG-1 ● Staff Gauge

NDP-1 ● Detention Pond Drilling Location

20.63 ● Approximate City Stormwater Pond Elevation

20.05 Approximate Groundwater Elevation

SB-28 ● Historical Soil Boring Location

▬ Site Boundary

— Boeing Property

Groundwater Flow Direction

▬ ▬ ▬ 54-inch Stormwater Outlet to Mill Creek

Notes:
1. Elevation measured June 8, 2021 and June 9, 2021.
Source: Aerial Photography - Google Earth Pro, August 2020.

N

0 200
Scale in Feet

Boeing Space Center
Kent, Washington

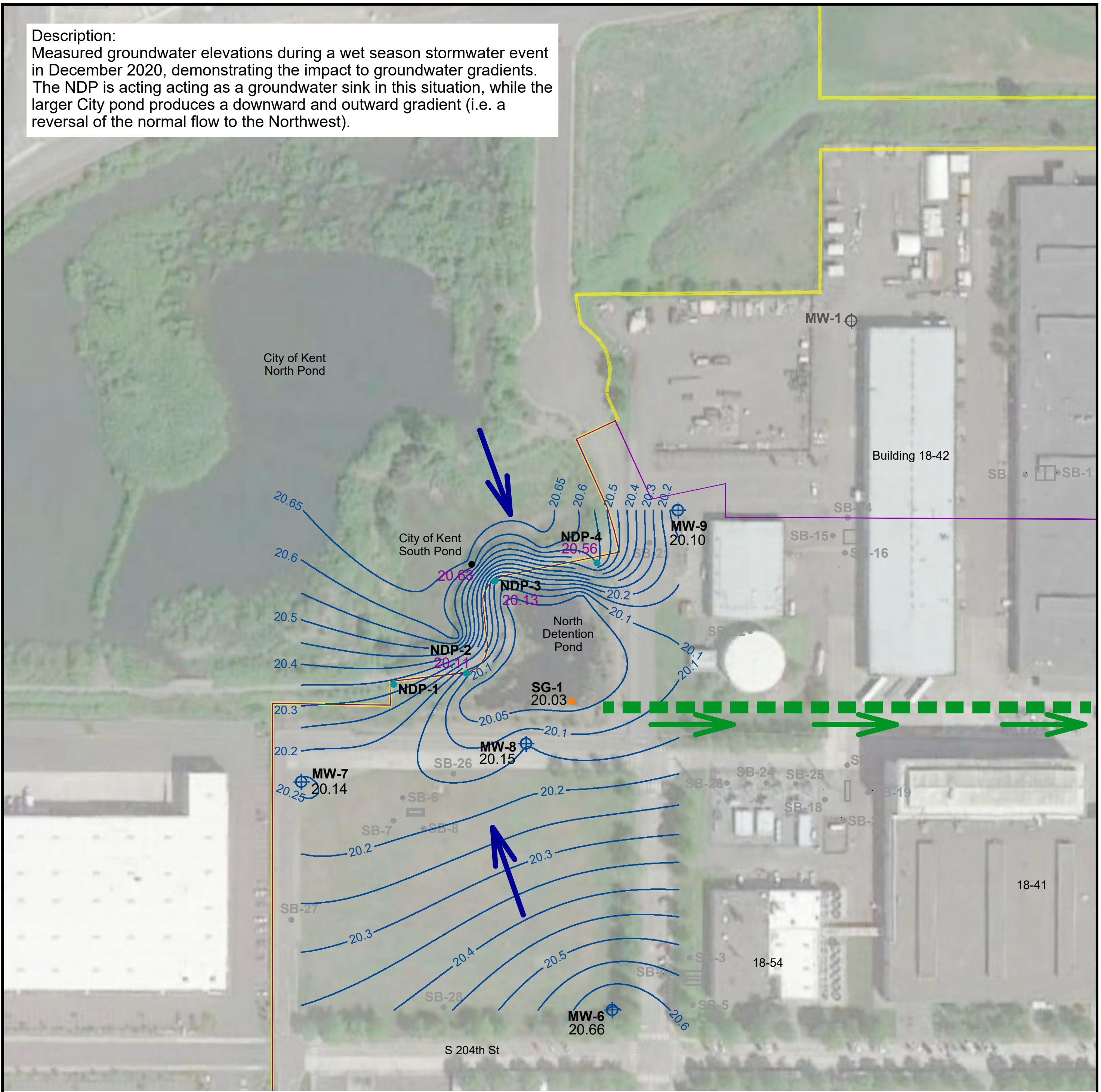
Remedial Investigation

Groundwater Gradient During Dry Season (June 2021)

DALTON OLMSTED FUGLEVAND

FIGURE 27

PLOT TIME: 7/8/2022 3:38 PM MOD TIME: 7/7/2022 4:48 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 27 gw conts 2021-06b.dwg



Description:
Measured groundwater elevations during a wet season stormwater event in December 2020, demonstrating the impact to groundwater gradients. The NDP is acting acting as a groundwater sink in this situation, while the larger City pond produces a downward and outward gradient (i.e. a reversal of the normal flow to the Northwest).

Legend

MW-7 ⊕ 20.14 Groundwater Monitoring Well/ Measured Groundwater Elevation

MW-1 ⊕ Abandoned Groundwater Monitoring Well

SG-1 ● Staff Gauge

NDP-1 ● Detention Pond Drilling Location

20.63 ● Approximate City Stormwater Pond Elevation

20.05 Approximate Groundwater Elevation

SB-28 ● Historical Soil Boring Location

Site Boundary

Boeing Property

Groundwater Flow Direction

🟩 🟩 🟩 54-inch Stormwater Outlet to Mill Creek

Notes:
1. Elevation measured on December 11, 2020.
2. Stormwater elevation recorded at City of Kent South Stormwater Pond and the Site's North Stormwater Detention Pond.

N

0 200
Scale in Feet

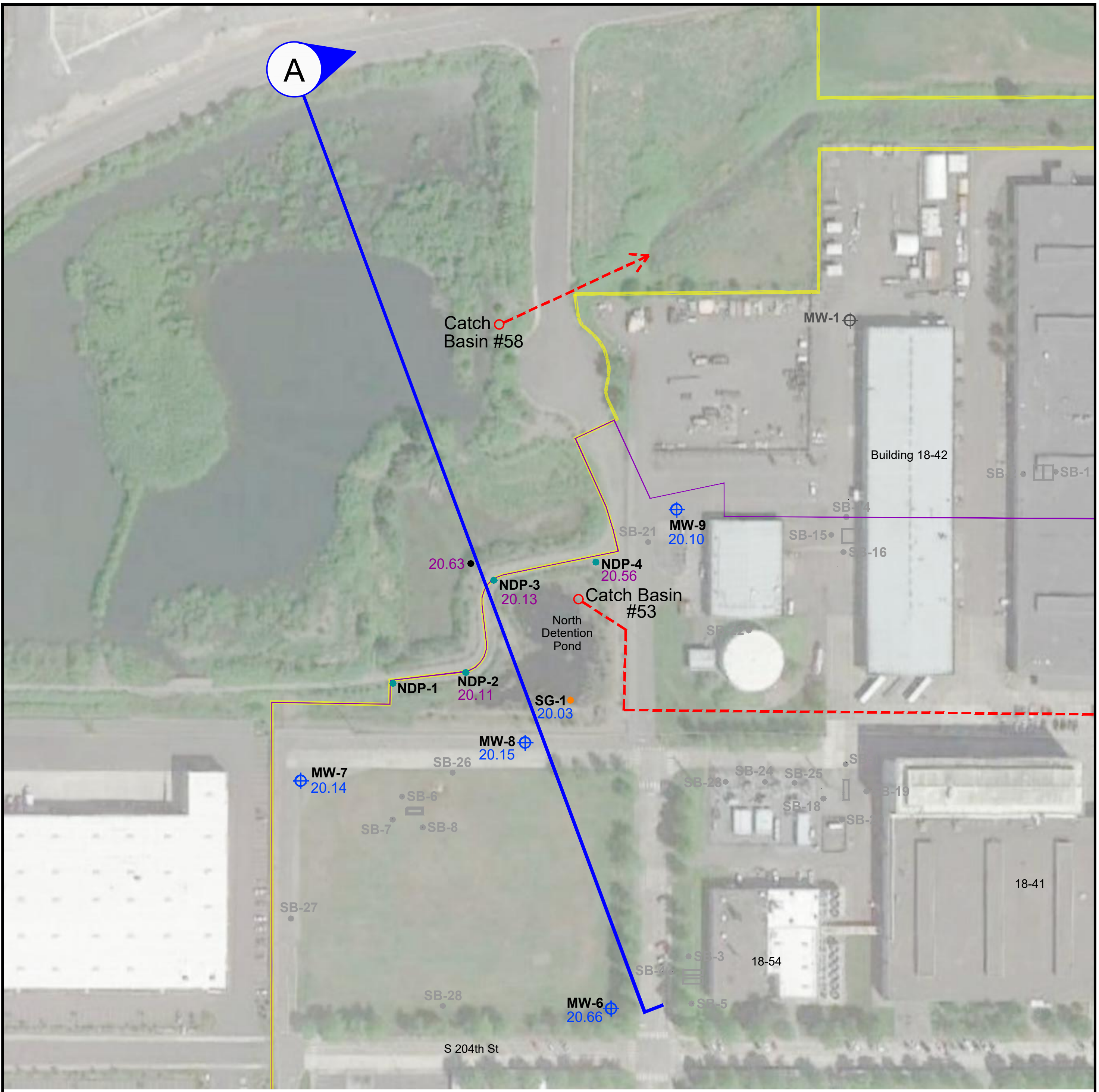
Boeing Space Center
Kent, Washington
Remedial Investigation

Groundwater Gradient During Wet Season Rain Event (December 11, 2020)

DALTON OLMSTED FUGLEVAND

FIGURE 28

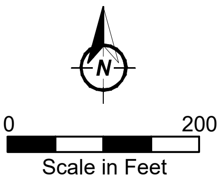
PLOT TIME: 7/8/2022 3:38 PM MOD TIME: 7/7/2022 4:45 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 28 gw conts.dwg



Legend

MW-7 ⌖ 20.14	Groundwater Monitoring Well/ Measured Groundwater Elevation	20.63 ●	Approximate City Stormwater Pond Elevation	- - - -	Stormwater Pipe
MW-1 ⌖	Abandoned Groundwater Monitoring Well	20.05	Approximate Groundwater Elevation	▬	Site Boundary
SG-1 ●	Staff Gauge	SB-28 ●	Historical Soil Boring Location	—	Boeing Property
NDP-1 ●	Detention Pond Drilling Location	○	Stormwater Flow Restrictor Catch Basin Location	Ⓐ——	Cross Section Location

Note: Elevation measured on December 11, 2020.



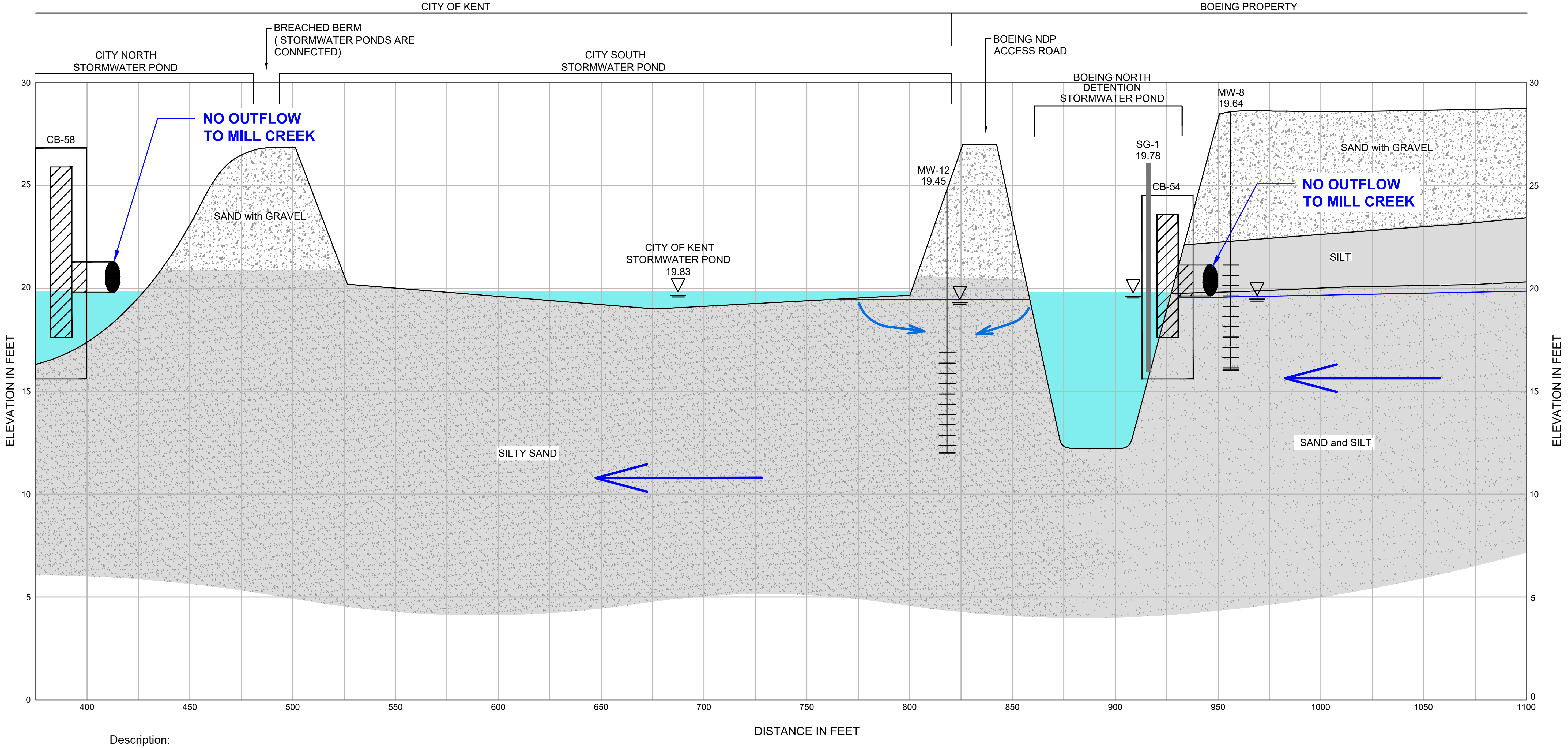
Boeing Space Center
Kent, Washington
Remedial Investigation

Cross Section Location

DALTON
OLMSTED
FUGLEVAND

FIGURE 29

PLOT TIME: 7/8/2022 3:38 PM MOD TIME: 7/8/2022 2:50 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 29 cross section A Plan.dwg



SECTION A-A' DETAIL

Description:
A cross section of a low stormwater (drier season) scenario, where both stormwater ponds are generally static as they would be below their outflow point. Likely having little impact on regional groundwater flow.

NOTES:
1. Elevations north of southern edge of City of Kent Stormwater Pond estimated based on Boeing As-Built Plan C313.1 from March 2014.
2. Flow restrictor catch basins are a pictorial representation only.
3. CB-54 based on Boeing As-Built Plan C9 July, 2012.
4. CB-58 based on Boeing As-Built Plan C504 March, 2014.
5. Water level elevations measured June, 2021.
6. Outlet invert elevations:
   CB54 = 19.63
   CB58 = 19.78

0 50
Scale in Feet
Vertical Exaggeration: 10x

Legend

╪ Monitoring well/Temporary Boring with Screened Interval

▽ Groundwater Elevation

▽ Stormwater Elevation

▭ Silt

▨ Sand and Silt

▨ Silty Sand

▨ Sand with Gravel

▨ Flow Restrictor Catch Basin Detail

● Outfluw to Mill Creek

← Inferred Stormwater to Groundwater Flow Direction

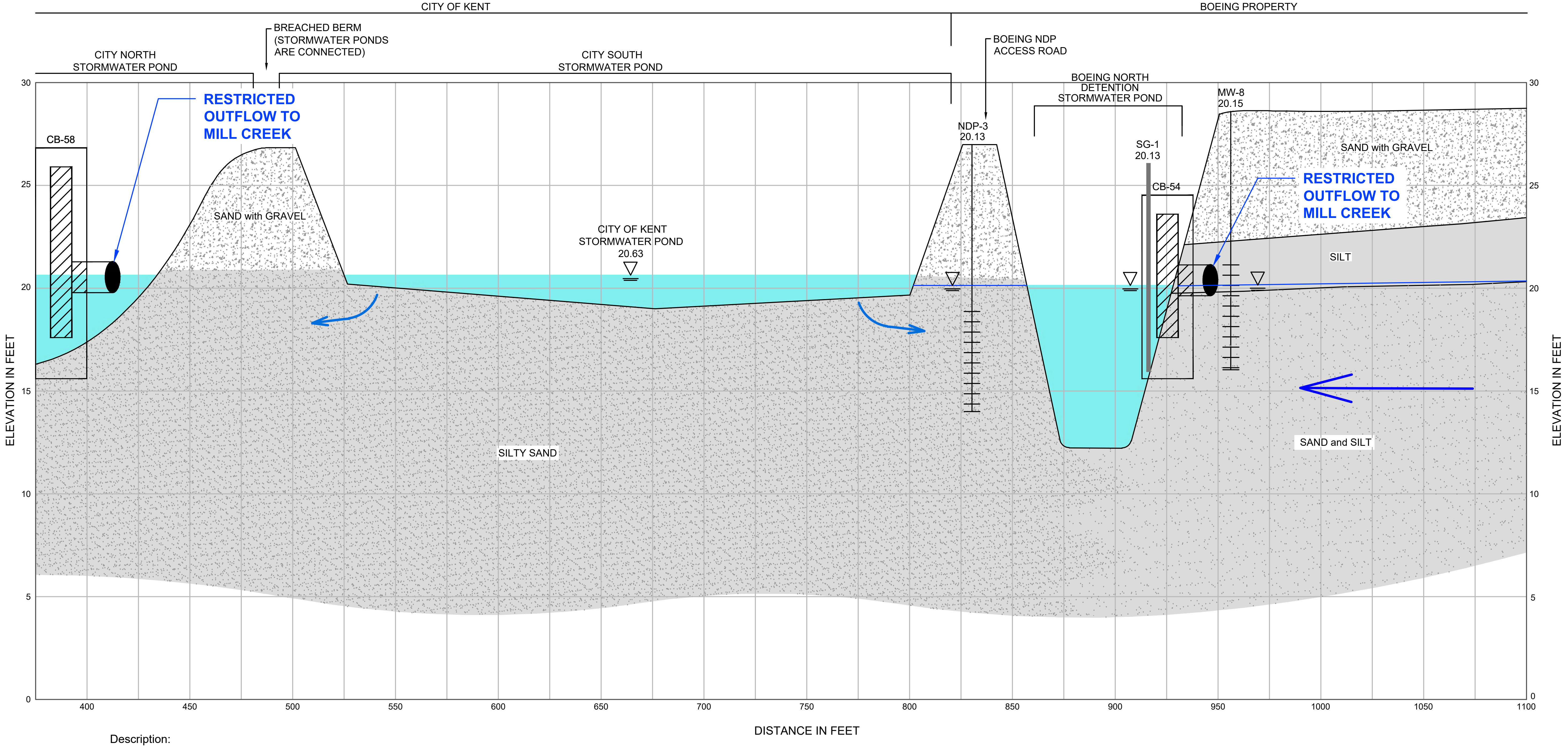
← Regional Flow Direction

Boeing Space Center
Kent, Washington
Remedial Investigation

Cross Section A-A' Detail
Transitional to Dry Season Scenario

DOF DALTON OLMSTED FUGLEVAND

FIGURE
30



SECTION A-A' DETAIL

Description:
A cross section of a high stormwater (wet season) scenario where a higher water elevation in the City of Kent stormwater pond and higher groundwater elevation flow towards the Site's North Detention Stormwater Pond. The outfow detention structures to Mill Creek play a factor, with faster North Detention Stormwater Pond discharge to Mill Creek than the surrounding storm/groundwater system.

Legend

╪ Monitoring well/Temporary Boring with Screened Interval

▽ Groundwater Elevation

▽ Stormwater Elevation

▭ Silt

▨ Sand and Silt

▨ Silty Sand

▨ Sand with Gravel

← Flow Restrictor Catch Basin Detail

← Outflow to Mill Creek

← Inferred Stormwater to Groundwater Flow Direction

⟸ Regional Flow Direction

NOTES:
1. Elevations north of southern edge of City of Kent stormwater pond estimated based on Boeing As-Built Plan C313.1 from March 2014.
2. Flow restrictor catch basins are a pictorial representation only.
3. CB-54 based on Boeing As-Built Plan C9 July, 2012.
4. CB-58 based on Boeing As-Built Plan C504 March, 2014.
5. Water level elevations measured 12/11/2020.
6. Outlet invert elevations:
   CB54 = 19.63
   CB58 = 19.78

0 50
Scale in Feet
Vertical Exaggeration: 10x

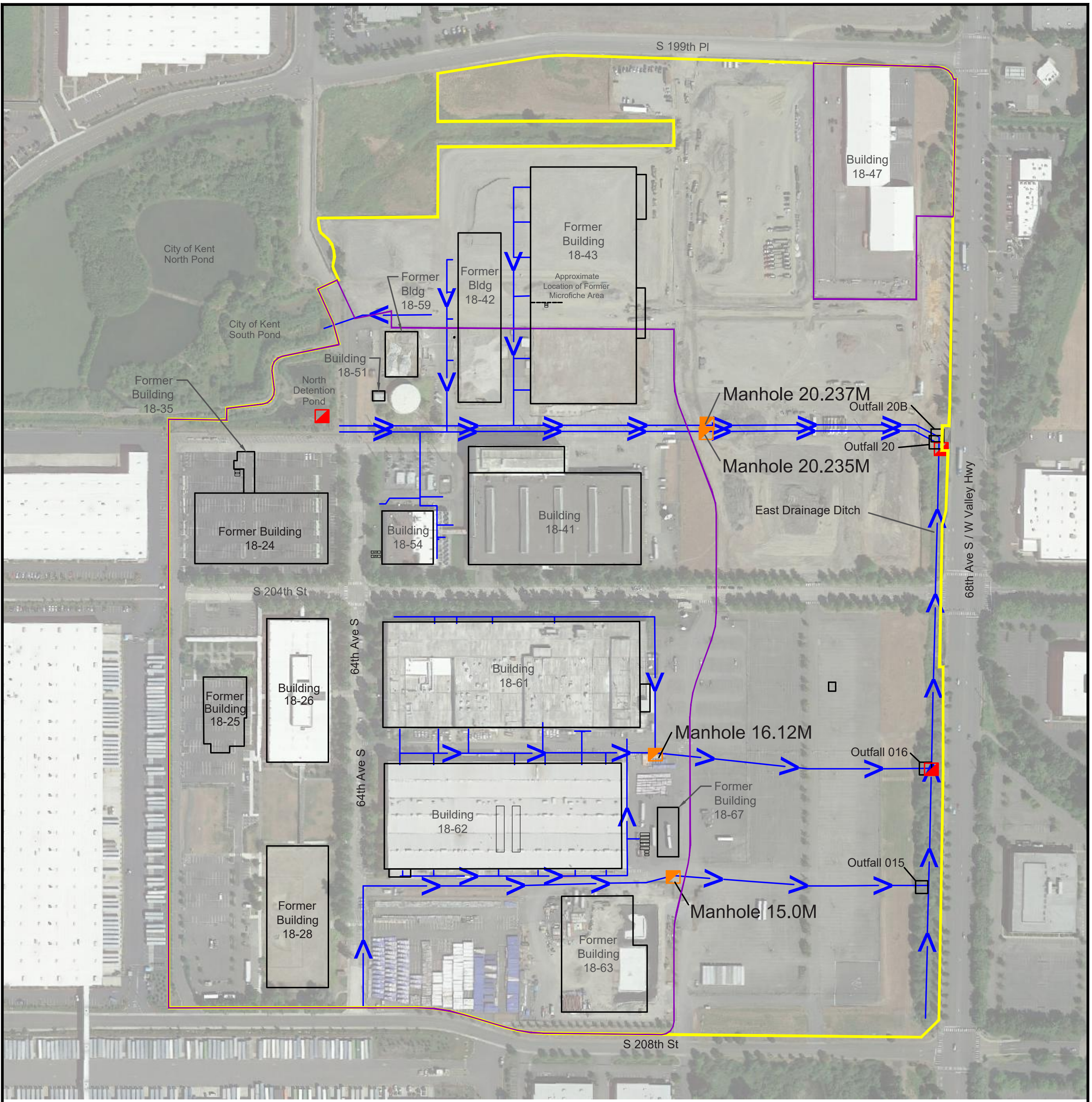
Boeing Space Center
Kent, Washington
Remedial Investigation

Cross Section A-A' Detail
Wet Season Scenario

DALTON
OLMSTED
FUGLEVAND

FIGURE
31

PLOT TIME: 7/8/2022 3:38 PM MOD TIME: 7/8/2022 2:48 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 31 cross section A-A-wet season.dwg



LEGEND

🟧 Former Stormwater Conveyance System Solid and Stormwater Sample Location

🟥 Former Stormwater Conveyance System Sediment and Stormwater Sampling Location

□ Outfall and Number

→ Selected Storm Sewer Lines and Flow Direction Associated with the SWMUs and AOCs

🟨 Site Boundary

— Boeing Property

NOTES:
Historical building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

Boeing Space Center
Kent, Washington
Remedial Investigation

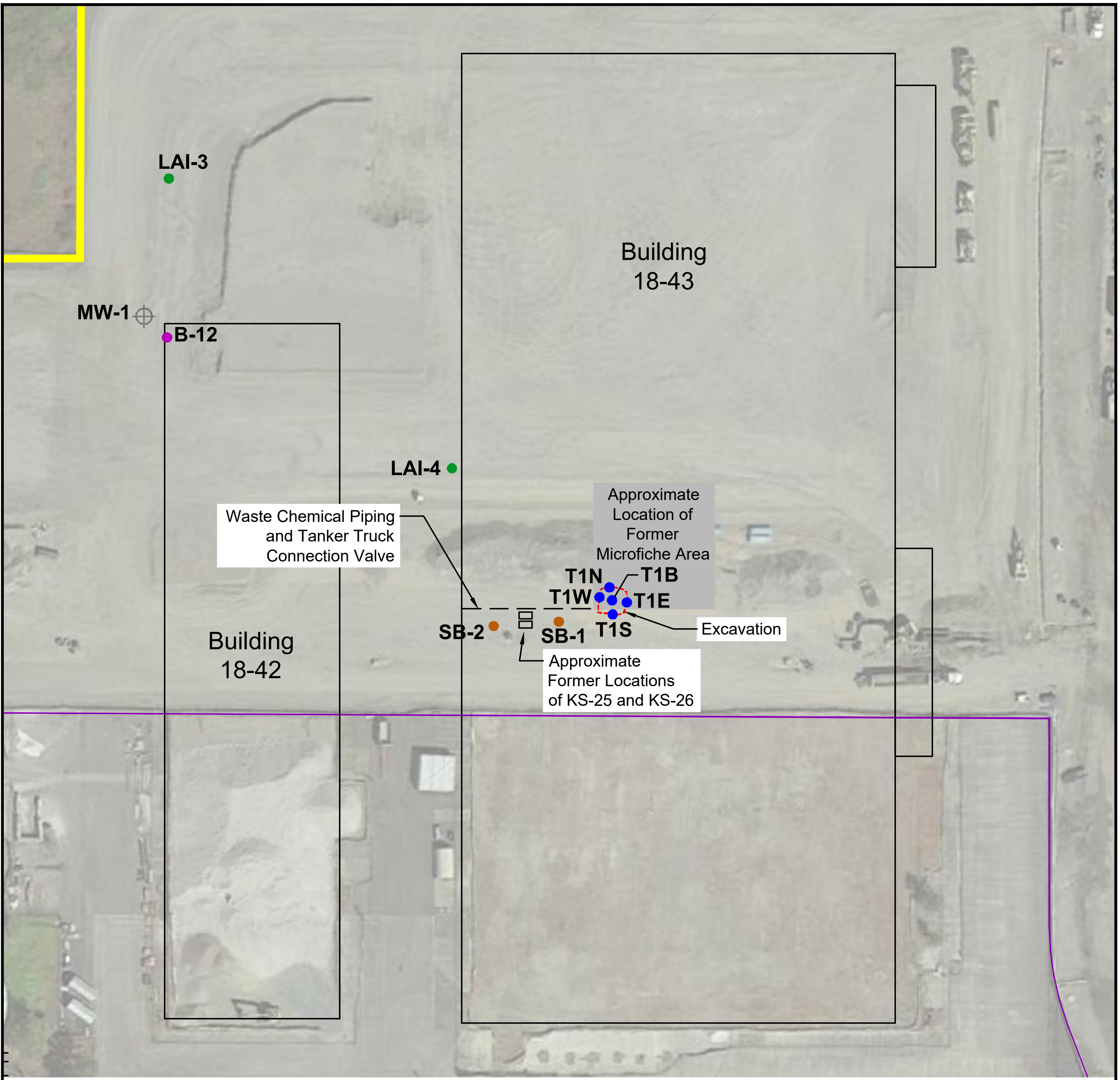
Former SWMU-86 Stormwater Conveyance System Investigation

DALTON OLMSTED FUGLEVAND

FIGURE 32

PLOT TIME: 7/8/2022 3:38 PM MOD TIME: 7/8/2022 2:48 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 32 Stormwater Convey.dwg

PLOT TIME: 7/8/2022 3:38 PM MOD TIME: 7/8/2022 2:49 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 33 SWMU-AOC BLDG 18-43 Det.dwg



Waste Chemical Piping and Tanker Truck Connection Valve

Approximate Location of Former Microfiche Area

Excavation

Approximate Former Locations of KS-25 and KS-26

NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

LEGEND

- ⌖ Monitoring Well - Abandoned
- ● Historical Sample Location
- ● Historical Due Diligence Sample Location
- ● RI Sample Location
- ● Aug 2019 Soil Confirmation Sample Location
- ▬ Site Boundary
- ─ Boeing Property

N

0 100
Scale in Feet

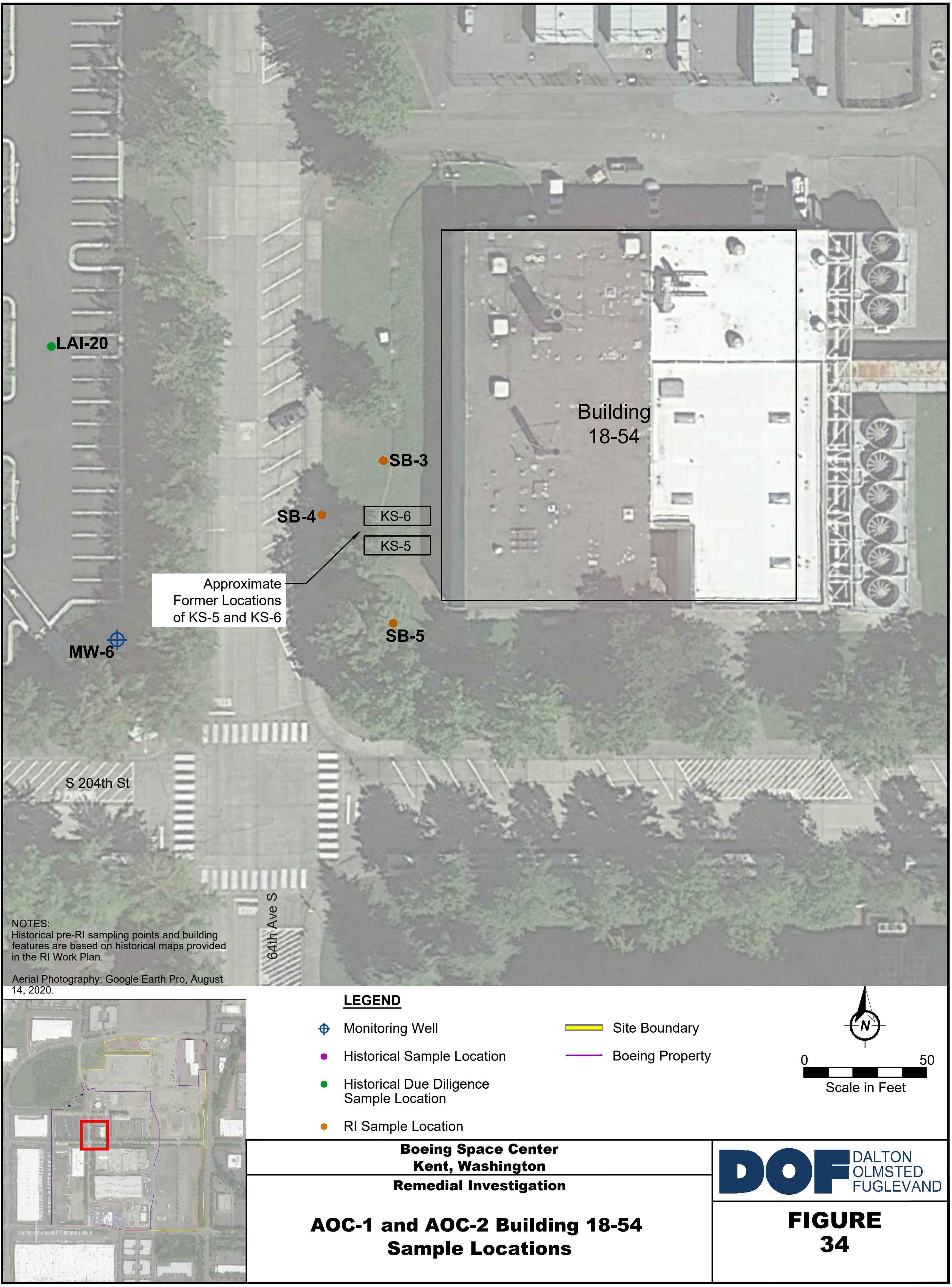
Boeing Space Center
Kent, Washington

Remedial Investigation

SWMU-88 and SWMU-89 Building 18-43 Sample Locations

DOF DALTON OLMSTED FUGLEVAND

FIGURE 33



NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

PLOT TIME: 7/8/2022 3:39 PM MOD TIME: 7/8/2022 2:49 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 34 SWMU-AOC BLDG 18-54 DET.dwg

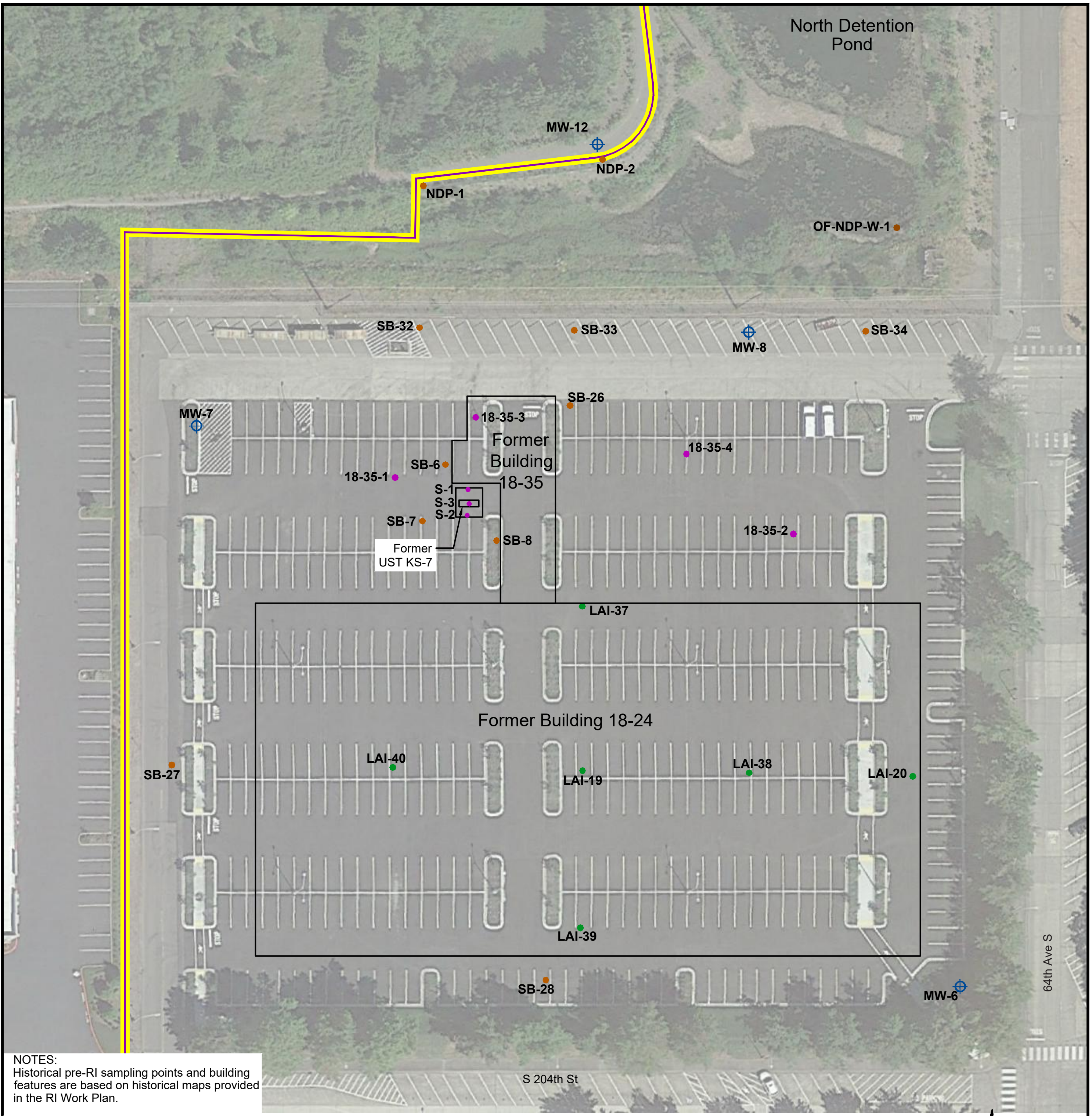
Boeing Space Center
Kent, Washington

Remedial Investigation

AOC-1 and AOC-2 Building 18-54 Sample Locations

DALTON OLMSTED FUGLEVAND

FIGURE 34



NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

LEGEND

⌖	Monitoring Well
●	Historical Sample Location
●	Historical Due Diligence Sample Location
●	RI Sample Location
🟨	Site Boundary
—	Boeing Property

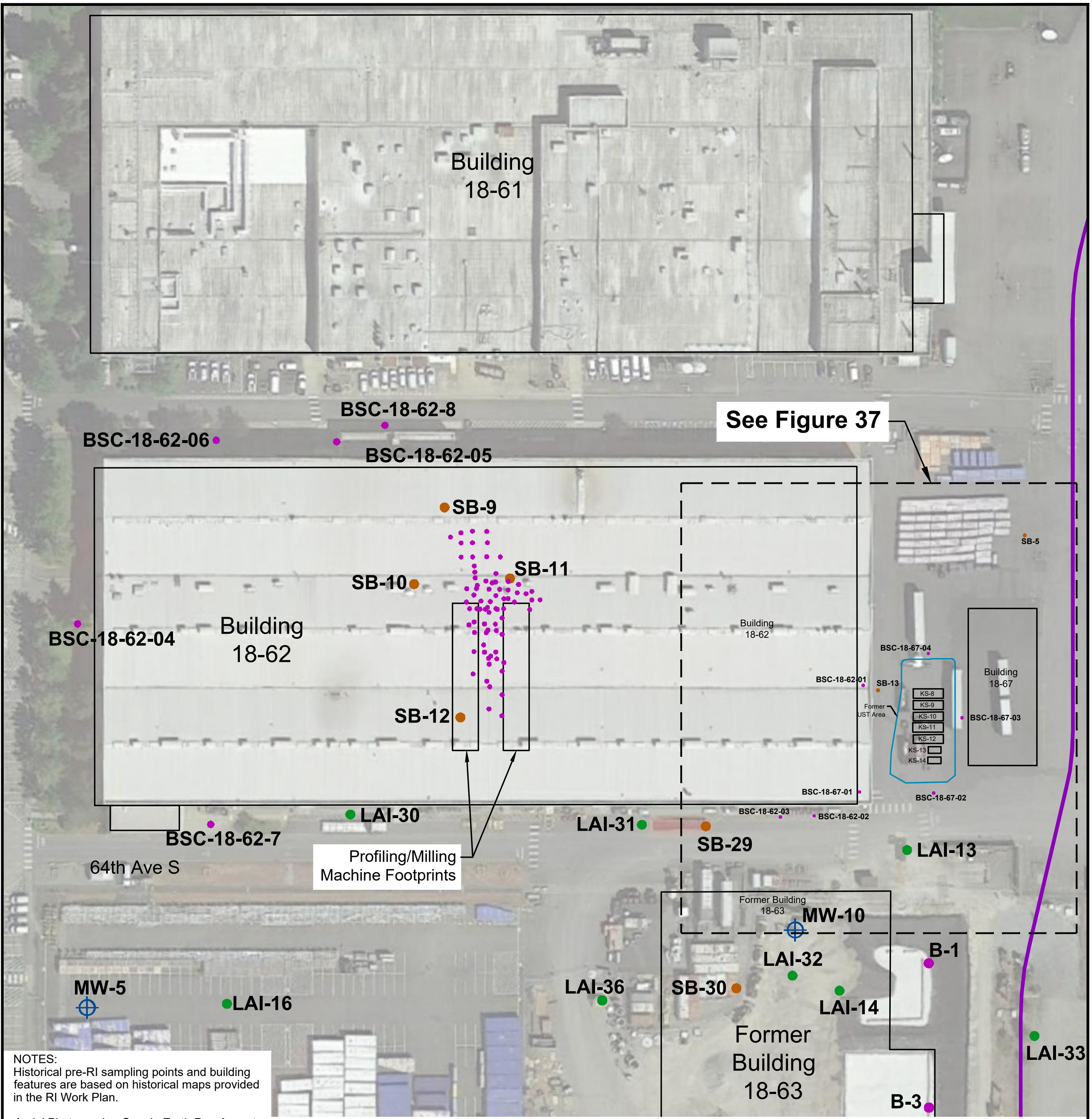
Boeing Space Center
Kent, Washington
Remedial Investigation

AOC-2 Building 18-24 and Building 18-35 Sample Locations

DALTON OLMSTED FUGLEVAND

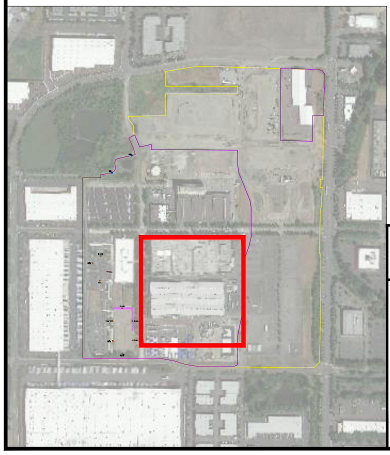
FIGURE 35

PLOT TIME: 7/8/2022 3:39 PM MOD TIME: 7/7/2022 5:06 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 35 SWMU-AOC BLDG 18-35 Det.dwg



NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.



LEGEND

⌖ Monitoring Well

● Historical Sample Location

● Historical Due Diligence Sample Location

● RI Sample Location

▭ Site Boundary

— Boeing Property

0 125
Scale in Feet

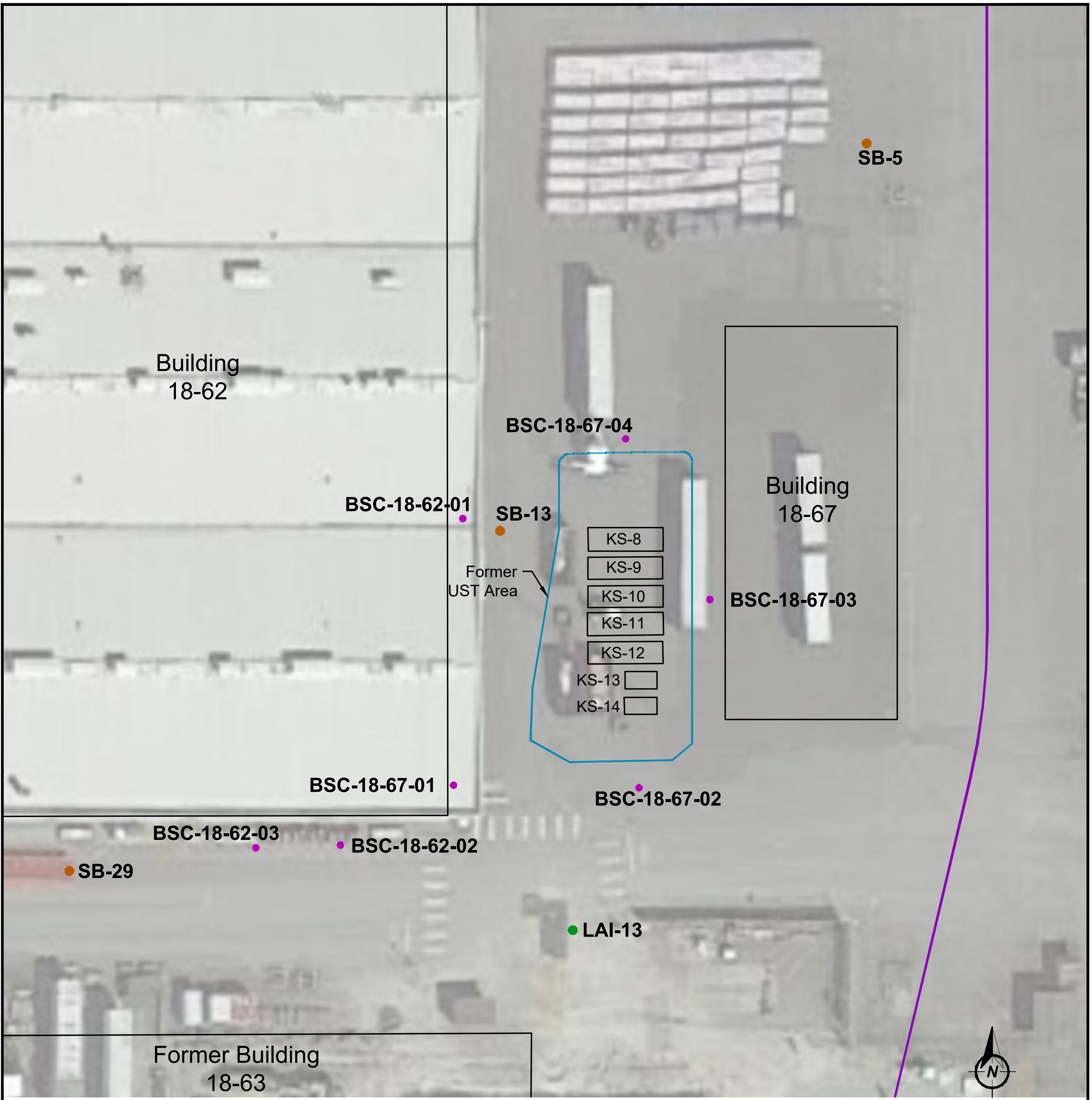
Boeing Space Center
Kent, Washington

Remedial Investigation

Former Milling Area Building 18-62 Sample Locations

DOF
DALTON
OLMSTED
FUGLEVAND

FIGURE
36



0 50
Scale in Feet

LEGEND

⌖ Monitoring Well

● Historical Sample Location

● Historical Due Diligence
Sample Location

● RI Sample Location

▭ Site Boundary

— Boeing Property

NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

Boeing Space Center
Kent, Washington

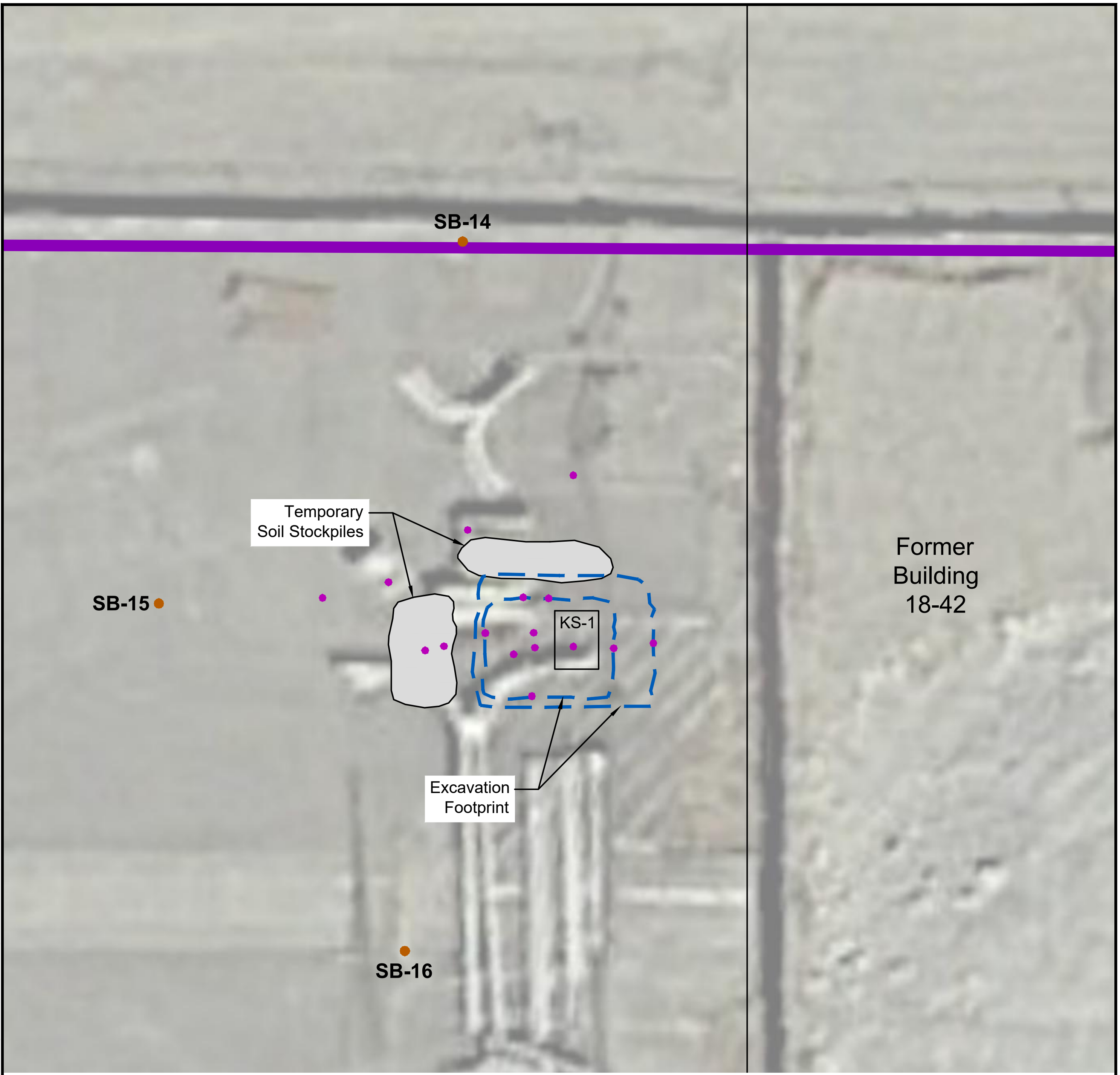
Remedial Investigation

Former Jet Fuel UST Area Building 18-67
Sample Locations

DALTON
OLMSTED
FUGLEVAND

FIGURE
37

PLOT TIME: 7/8/2022 3:54 PM MOD TIME: 7/8/2022 3:05 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 37 SWMU-AOC BLDG 18-67 DET.dwg



NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

Stockpiles were removed after excavation activities.

LEGEND

- ⌖ Monitoring Well
- ● Historical Sample Location
- ● Historical Due Diligence Sample Location
- ● RI Sample Location

- ▬ ▬ Approximate Excavation Footprint
- ▬ Site Boundary
- ▬ Boeing Property

N

0 10
Scale in Feet

Boeing Space Center
Kent, Washington

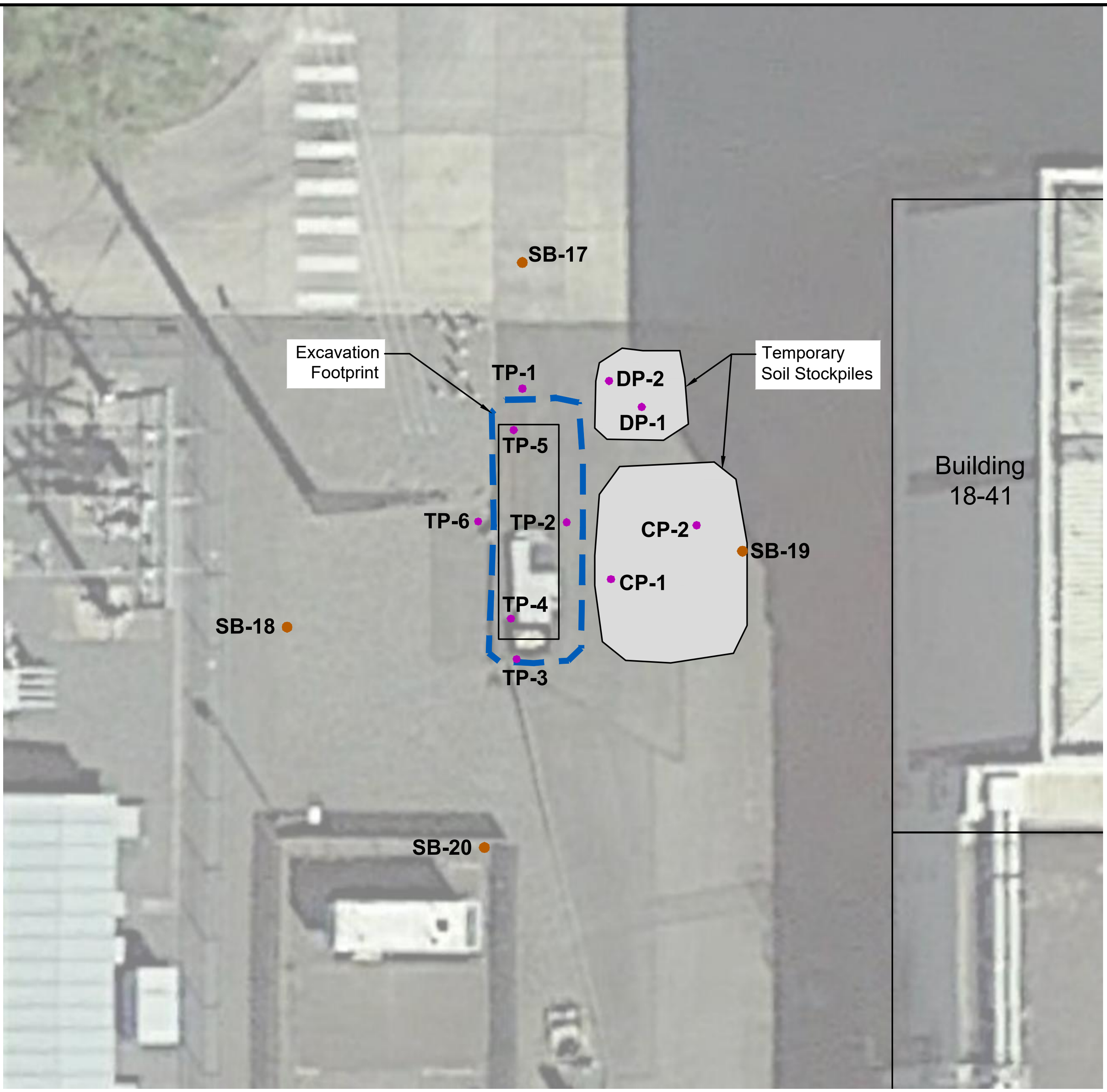
Remedial Investigation

Former KS-1 UST Area Building 18-42
Sample Locations

DALTON
OLMSTED
FUGLEVAND

FIGURE
38

PLOT TIME: 7/8/2022 3:54 PM MOD TIME: 7/8/2022 3:06 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 38 SWMU-AOC BLDG 18-42 DET.dwg



NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

LEGEND

- ⌖ Monitoring Well
- ● Historical Sample Location
- ● Historical Due Diligence Sample Location
- ● RI Sample Location
- – – Approximate Excavation Footprint
- ▬ Site Boundary
- ― Boeing Property

N

0 20
Scale in Feet

Boeing Space Center
Kent, Washington

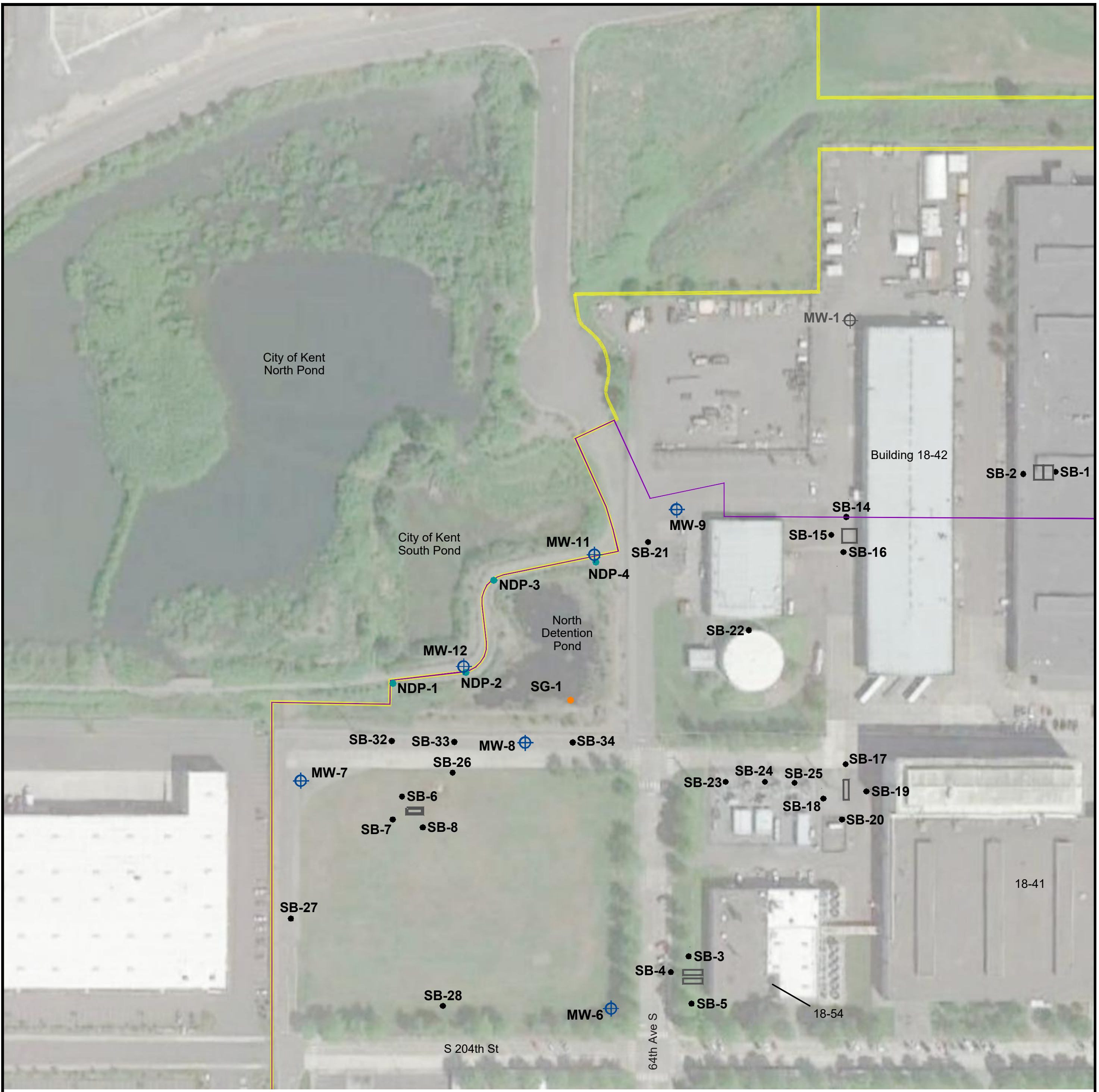
Remedial Investigation

Former KS-3 UST Area Building 18-41 Sample Locations

DOF DALTON OLMSTED FUGLEVAND

FIGURE 39

PLOT TIME: 7/8/2022 3:54 PM MOD TIME: 7/8/2022 3:06 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 39 SWMU-AOC BLDG 18-41 Det.dwg



LEGEND

MW-7 ⊕ Groundwater Monitoring Well

MW-1 ⊕ Abandoned Groundwater Monitoring Well

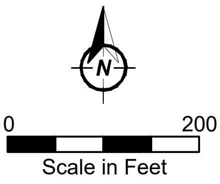
SG-1 ● Staff Gauge

NDP-1 ● Detention Pond Drilling Location

SB-28● Historical Soil Boring Location

▬ Site Boundary

— Boeing Property



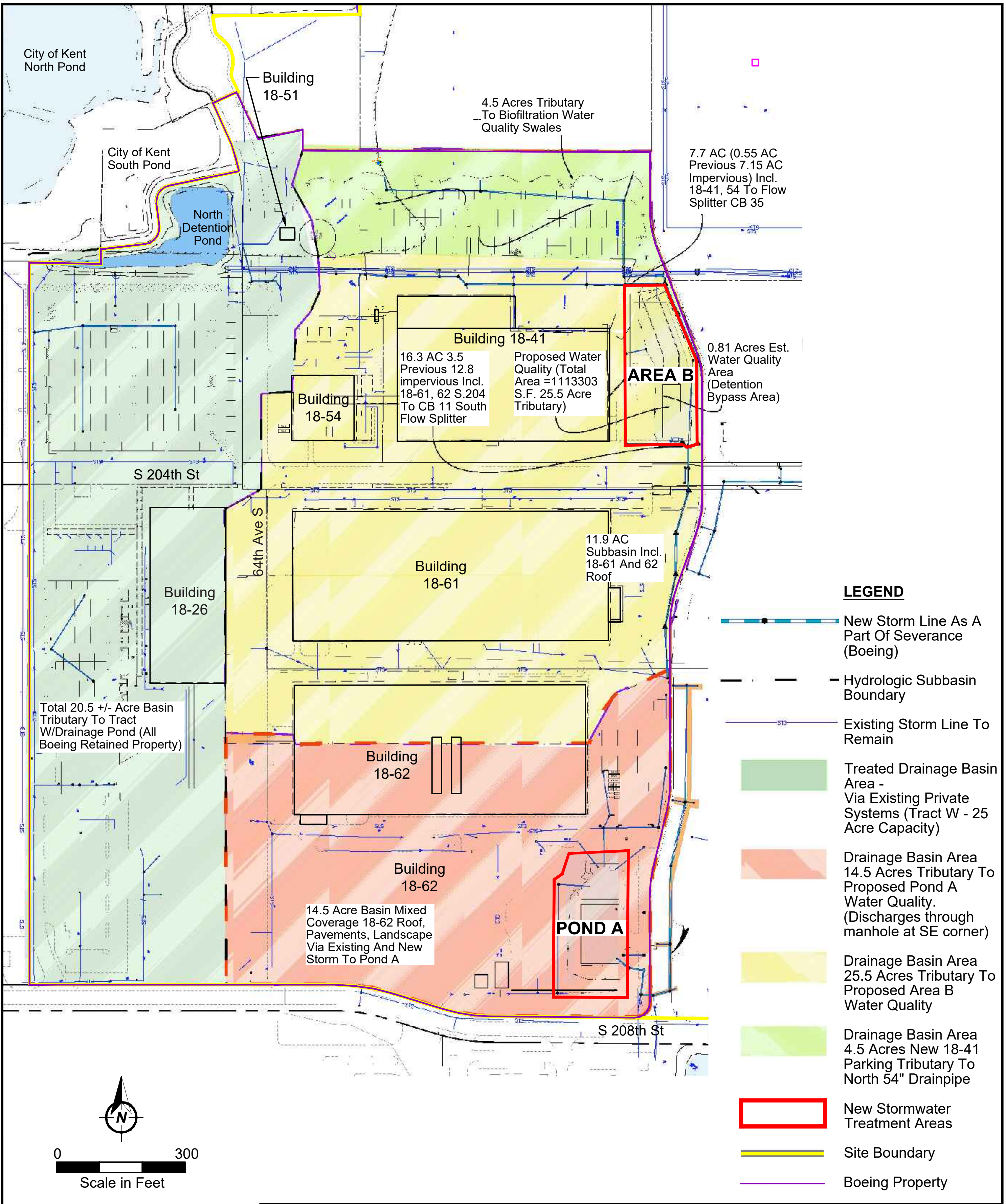
Boeing Space Center
Kent, Washington
Remedial Investigation

North Detention Pond Sample Locations

DALTON
OLMSTED
FUGLEVAND

FIGURE 40

PLOT TIME: 7/8/2022 3:54 PM MOD TIME: 7/8/2022 3:06 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 40 North Deten Pond Samples.dwg



NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

Map Source: Barghausen, Severance Design Post Developed Basin Exhibit, Figure 2.6, 18619-Post Dev Basin.dwg

Boeing Space Center
Kent, Washington

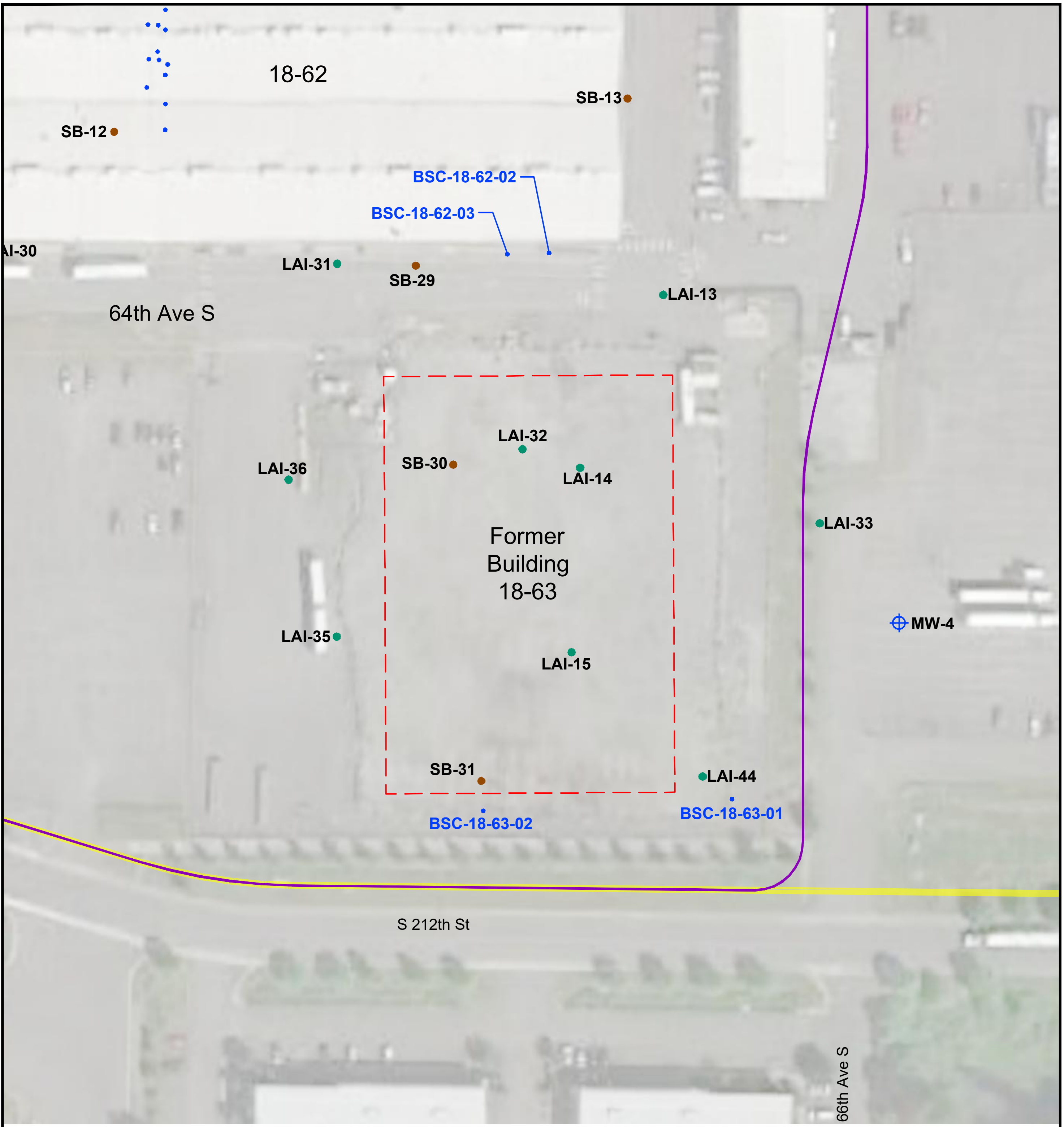
Remedial Investigation

Severance Design Post Developed Basin Exhibit

DOF DALTON OLMSTED FUGLEVAND

FIGURE 41

PLOT TIME: 7/8/2022 3:54 PM MOD TIME: 7/8/2022 3:05 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 41 Post Dev Basin.dwg



LEGEND

MW-5 ⌖ Groundwater Monitoring Well

SB-30 ● Soil/Groundwater Sample Boring

● Historical Sample Location

LAI-35 ● Due Diligence Boring

▭ Former Building Location

▬ Site Boundary

— Boeing Property

N

0 150
Scale in Feet

Boeing Kent Space Center
Kent, Washington
Remedial Investigation

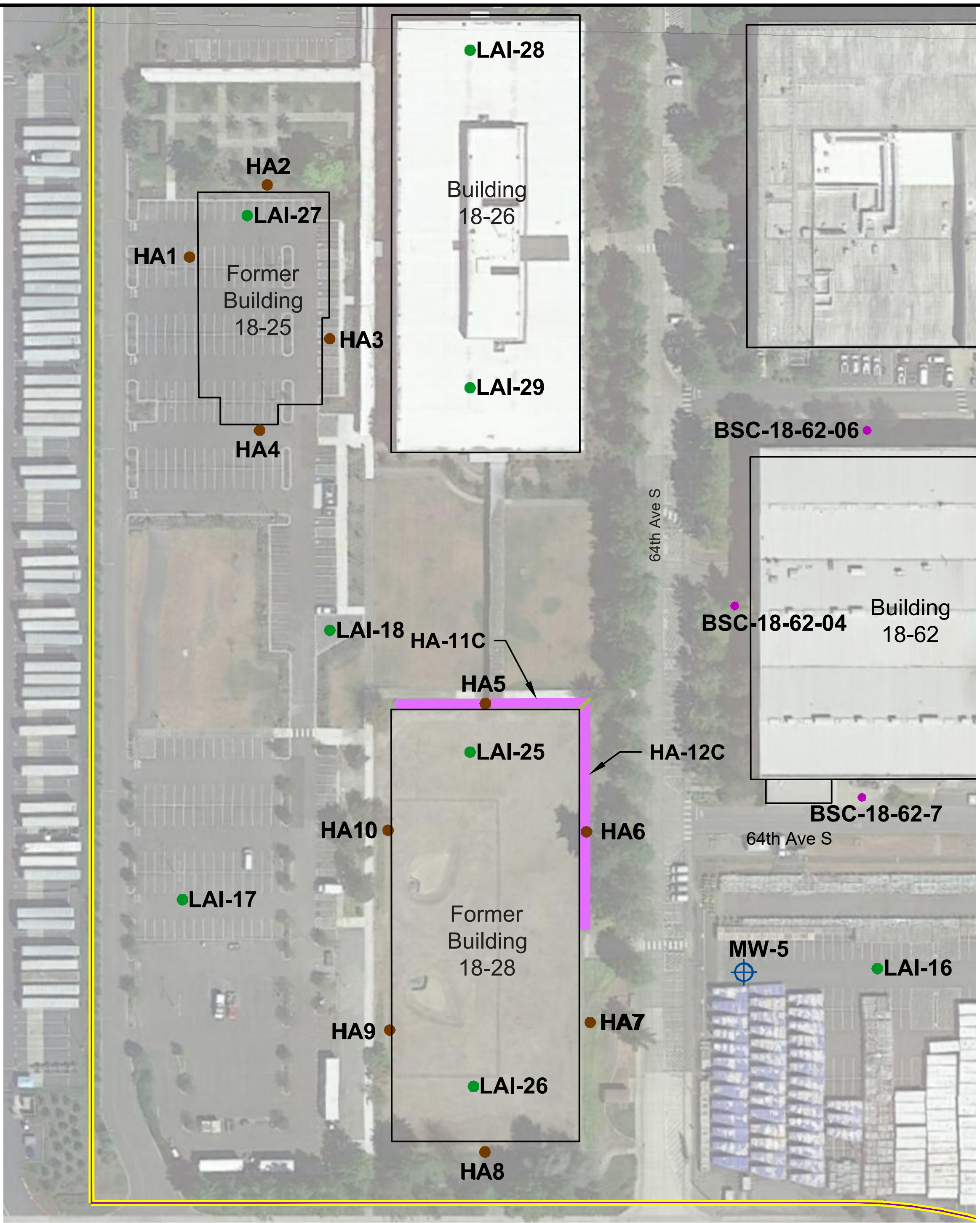
Former Building 18-63 Sample Locations

DOF DALTON OLMSTED FUGLEVAND

FIGURE 42

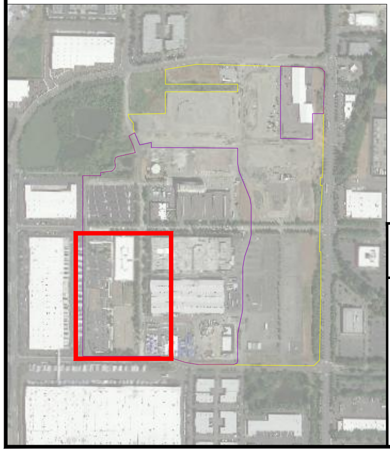
08/31/2021

PLOT TIME: 7/8/2022 3:54 PM MOD TIME: 7/8/2022 3:51 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 42 HIST SAMP LOCS BLDG 18-63 Det.dwg



NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.



LEGEND

⌖ Monitoring Well

● Historical Sample Location

● Historical Due Diligence Sample Location

● RI Sample Location

▬ Site Boundary

— Boeing Property

▬ Composite Shallow Soil Sample Area

N

0 150
Scale in Feet

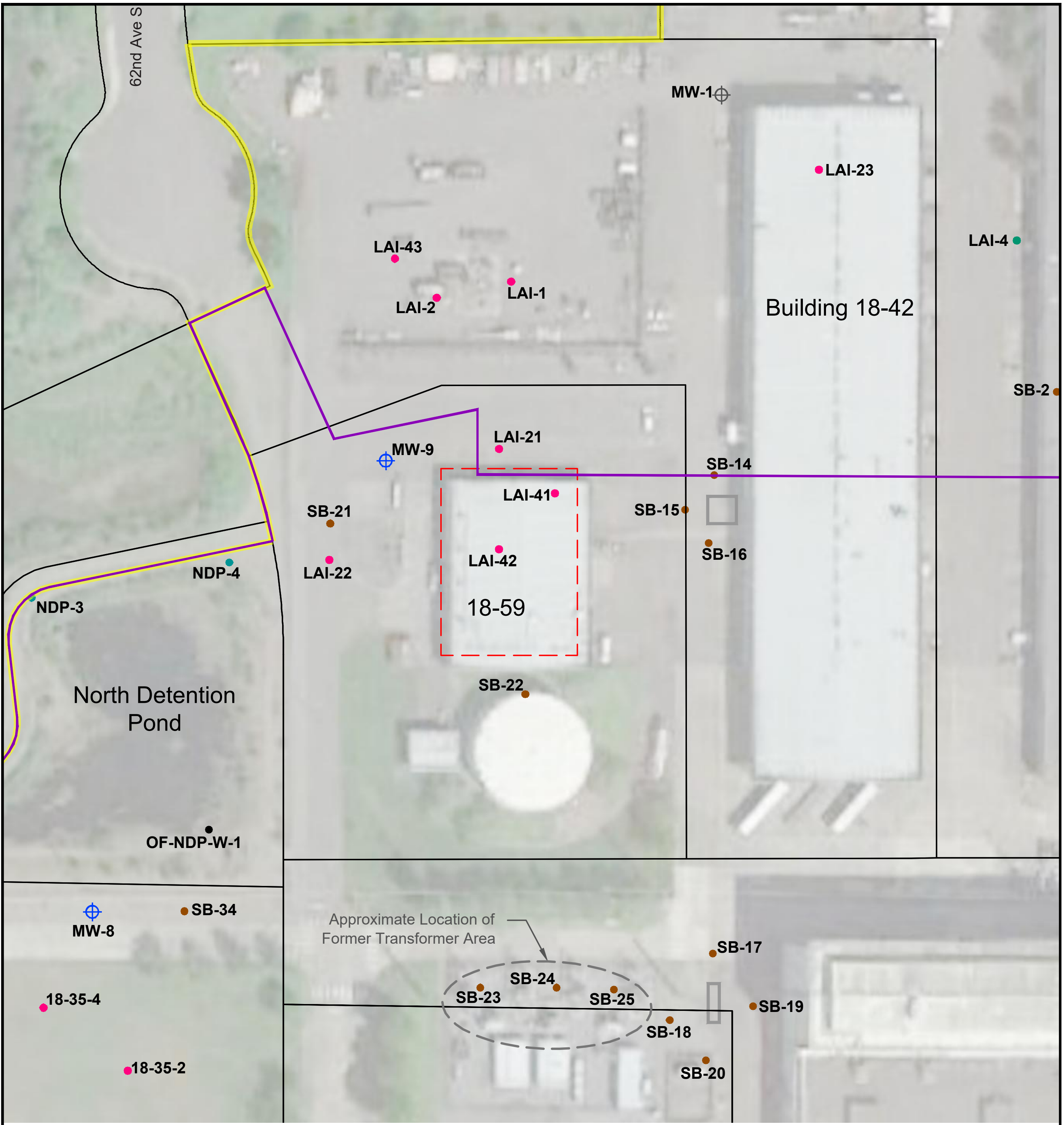
Boeing Space Center
Kent, Washington
Remedial Investigation

Former Building 18-25 and Building 18-28 Sample Locations

DOF
DALTON
OLMSTED
FUGLEVAND

FIGURE 43

PLOT TIME: 7/8/2022 3:54 PM MOD TIME: 7/8/2022 3:31 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 43 SWMU-AOC BLDG 18-25, 18-28 DETS.dwg



Legend

NDP-4 ●	Shallow Groundwater Sampling Point
MW-7 ⌖	Groundwater Monitoring Well
MW-1 ⌖	Former Groundwater Monitoring Well (decommissioned May 2020)
SB-11 ●	RI Soil/Groundwater Sample Boring
OF-NDP-W-1 ●	Stormwater Detention Pond Sample (December 2020)
LAI-19 ●	Historical Soil/Groundwater Sample Boring
🟥	Former Building Location
🟨	Site Boundary
—	Boeing Property

N

0 150
Scale in Feet

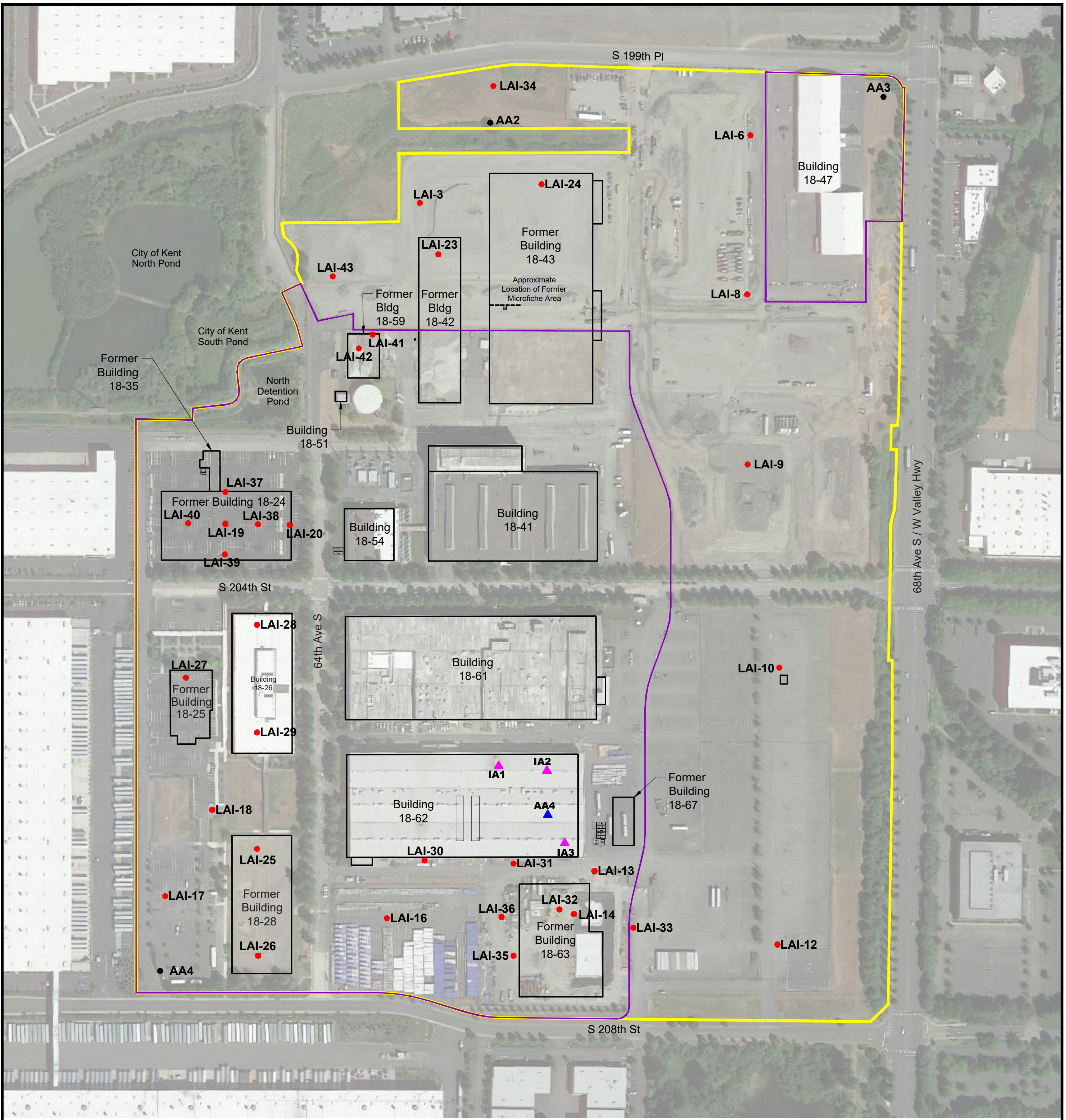
Boeing Kent Space Center
Kent, Washington
Remedial Investigation

Building 18-59 and Transformer Area Sample Locations

DALTON
OLMSTED
FUGLEVAND

FIGURE
44

08/31/2021



LEGEND

● Ambient Air Sample

● LAI Soil Gas Sample

▲ DOF Indoor Ambient Air Sample

▲ DOF Ambient Air Sample

▬ Site Boundary

— Boeing Property

N

0 400
Scale in Feet

Boeing Space Center
Kent, Washington

Remedial Investigation

Due Diligence
Soil Gas Sample Locations and Ambient Air Sample Locations

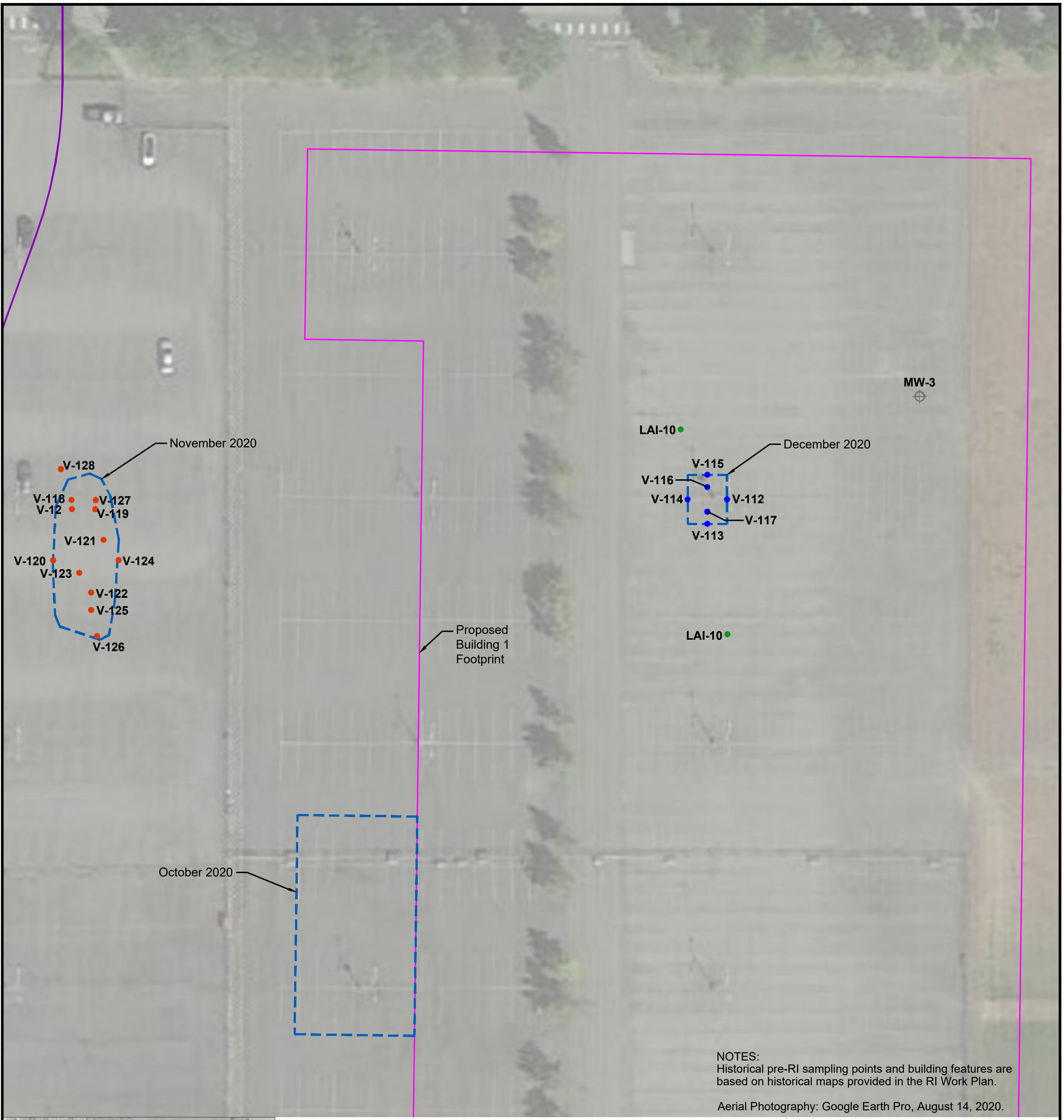
DOF
DALTON
OLMSTED
FUGLEVAND

FIGURE 45

NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

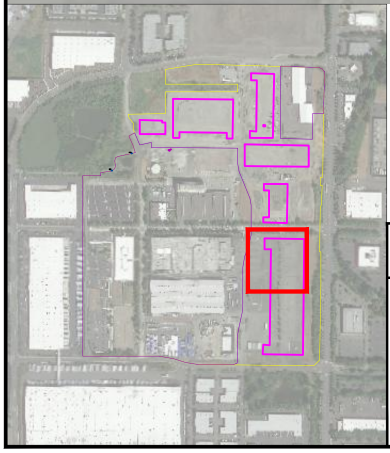
Aerial Photography: Google Earth Pro, August 14, 2020.

PLOT TIME: 7/8/2022 3:54 PM MOD TIME: 7/8/2022 3:02 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 45 Landau Soil Gas Ambient Air.DWG



NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.



LEGEND

- ⌖ Monitoring Well - Abandoned
- ● Motor Oil / Coolant Spill Sample
- ● Soil Sample
- ● Historical Sample Location
- ● Historical Due Diligence Sample Location
- ● RI Sample Location
- ‒ ‒ Approximate Excavation Footprint

N

0 70
Scale in Feet

Boeing Space Center
Kent, Washington

Remedial Investigation

Panattoni Building 1
Sample Locations

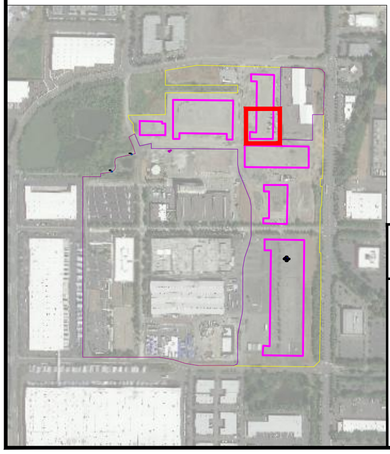
DALTON
OLMSTED
FUGLEVAND

FIGURE
46

PLOT TIME: 7/8/2022 3:54 PM MOD TIME: 7/8/2022 3:05 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 46 SWMU-AOC Panattoni Bldg 1 Samp Locs.dwg

NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.



LEGEND

⌖ Monitoring Well - Abandoned	▬ ▬ Approximate Excavation Footprint
● Historical Sample Location	▬ Site Boundary
● Historical Due Diligence Sample Location	― Boeing Property
● RI Sample Location	

N

0 100

Scale in Feet

Boeing Space Center
Kent, Washington

Remedial Investigation

Panattoni Building 4
Approximate Extent of Excavation

DALTON
OLMSTED
FUGLEVAND

FIGURE
47

PLOT TIME: 7/8/2022 4:24 PM MOD TIME: 7/8/2022 3:24 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 47 SWMU-AOC Panattoni Bldg 4 Det.dwg

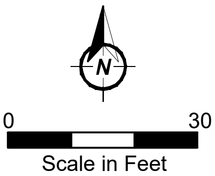
NOTES:
Historical pre-RI sampling points and building features are based on historical maps provided in the RI Work Plan.

Aerial Photography: Google Earth Pro, August 14, 2020.

LEGEND

● RI Sample Location

— — Approximate Excavation Footprint



Boeing Space Center
Kent, Washington

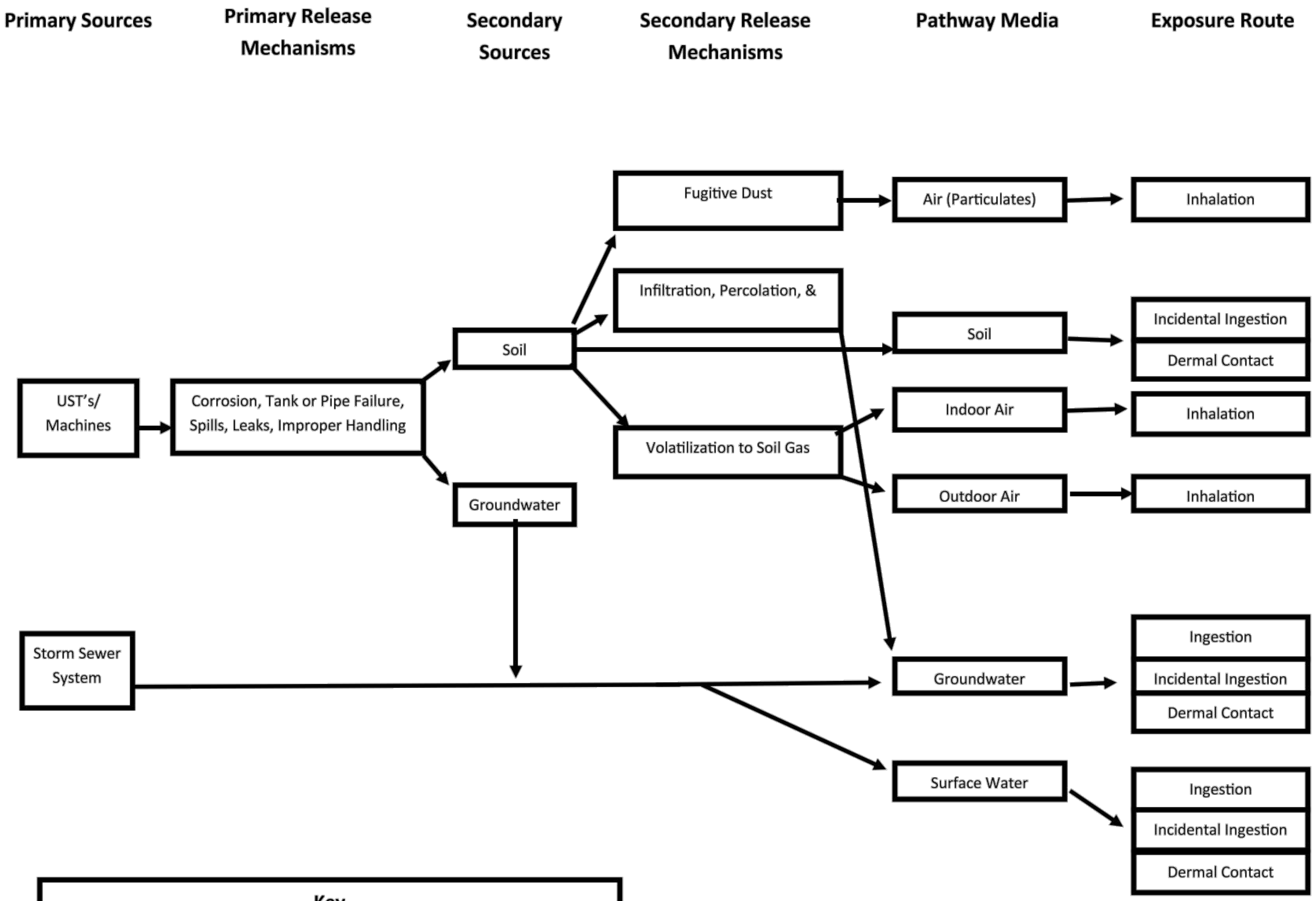
Remedial Investigation

Water Line Cleanup Building 18-51 Sample Locations

DALTON
OLMSTED
FUGLEVAND

FIGURE 48

PLOT TIME: 7/8/2022 4:24 PM MOD TIME: 7/8/2022 3:24 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 48 SWMU-AOC BLDG 18-51 DET.dwg



Potential Receptors

Pathway Media	Exposure Route	Resident		Office Worker		Industrial Worker		Construction/ Utility Worker		Site Visitor		Surface Water User		Ecological Receptor	
		C	F	C	F	C	F	C	F	C	F	C	F	C	F
Air (Particulates)	Inhalation	--	--	X	X	--	X	🟧 X	🟧 X	X	X	--	--	--	--
Soil	Incidental Ingestion	--	--	--	--	--	X	🟧 X	🟧 X	--	--	--	--	--	--
	Dermal Contact	--	--	--	--	--	X	🟧 X	🟧 X	--	--	--	--	--	--
Indoor Air	Inhalation	--	--	🟧 X	🟧 X	X	X	--	--	X	X	--	--	--	--
Outdoor Air	Inhalation	--	--	--	--	X	X	🟧 X	🟧 X	X	X	--	--	--	--
Groundwater	Ingestion	--	X	--	🟧 X	--	--	--	--	--	--	--	--	--	--
	Incidental Ingestion	--	X	--	X	--	--	🟧 X	🟧 X	--	--	--	--	--	--
	Dermal Contact	--	--	--	--	--	--	🟧 X	🟧 X	--	--	--	--	--	--
Surface Water	Ingestion	--	X	--	--	--	--	--	--	--	--	🟧 X	🟧 X	--	🟧 X
	Incidental Ingestion	--	X	--	--	--	--	--	--	--	--	🟧 X	🟧 X	--	🟧 X
	Dermal Contact	--	X	--	--	--	--	--	--	--	--	🟧 X	🟧 X	--	🟧 X

Key

→	Potential Transport or Exposure Pathway
--	Incomplete Exposure Pathway
X	Potentially Complete Exposure Pathway
🟧 X	Most highly Exposed Receptor
C	Current Land Use
F	Future Land Use

Boing Kent Space Center
Kent Washington
Remedial Investigation

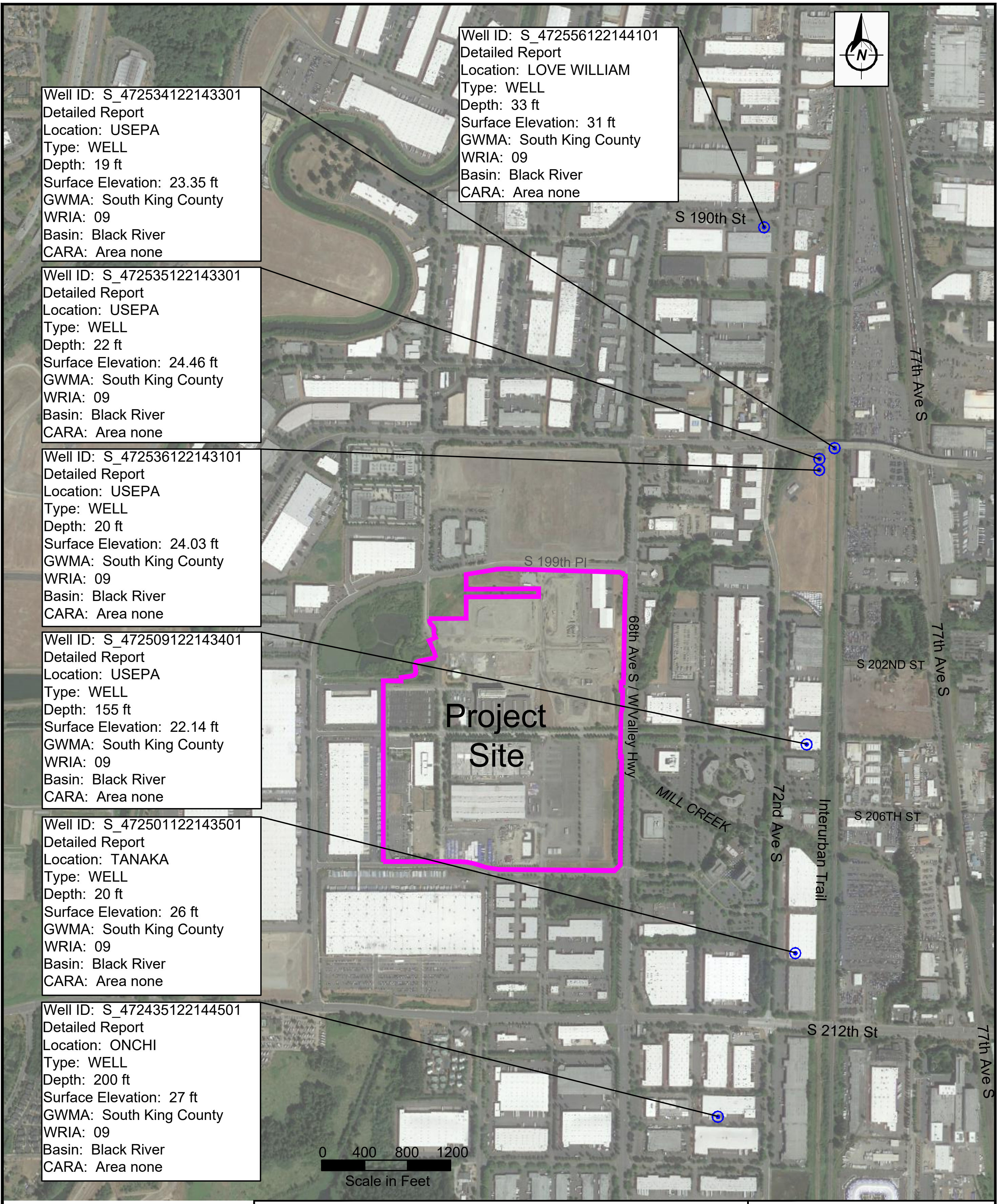
Conceptual Site Model

DOF DALTON OLMSTED FUGLEVAND

FIGURE 49

08/31/2021

PLOT TIME: 7/8/2022 4:24 PM MOD TIME: 7/8/2022 3:25 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 49 Conceptual Site Model.dwg



Well ID: S_472556122144101
Detailed Report
Location: LOVE WILLIAM
Type: WELL
Depth: 33 ft
Surface Elevation: 31 ft
GWMA: South King County
WRIA: 09
Basin: Black River
CARA: Area none

Well ID: S_472534122143301
Detailed Report
Location: USEPA
Type: WELL
Depth: 19 ft
Surface Elevation: 23.35 ft
GWMA: South King County
WRIA: 09
Basin: Black River
CARA: Area none

Well ID: S_472535122143301
Detailed Report
Location: USEPA
Type: WELL
Depth: 22 ft
Surface Elevation: 24.46 ft
GWMA: South King County
WRIA: 09
Basin: Black River
CARA: Area none

Well ID: S_472536122143101
Detailed Report
Location: USEPA
Type: WELL
Depth: 20 ft
Surface Elevation: 24.03 ft
GWMA: South King County
WRIA: 09
Basin: Black River
CARA: Area none

Well ID: S_472509122143401
Detailed Report
Location: USEPA
Type: WELL
Depth: 155 ft
Surface Elevation: 22.14 ft
GWMA: South King County
WRIA: 09
Basin: Black River
CARA: Area none

Well ID: S_472501122143501
Detailed Report
Location: TANAKA
Type: WELL
Depth: 20 ft
Surface Elevation: 26 ft
GWMA: South King County
WRIA: 09
Basin: Black River
CARA: Area none

Well ID: S_472435122144501
Detailed Report
Location: ONCHI
Type: WELL
Depth: 200 ft
Surface Elevation: 27 ft
GWMA: South King County
WRIA: 09
Basin: Black River
CARA: Area none

Legend

⊙ Well Location

Boeing Kent Space Center
Kent, Washington

Remedial Investigation

Nearby Groundwater Wells

DOF DALTON OLMSTED FUGLEVAND

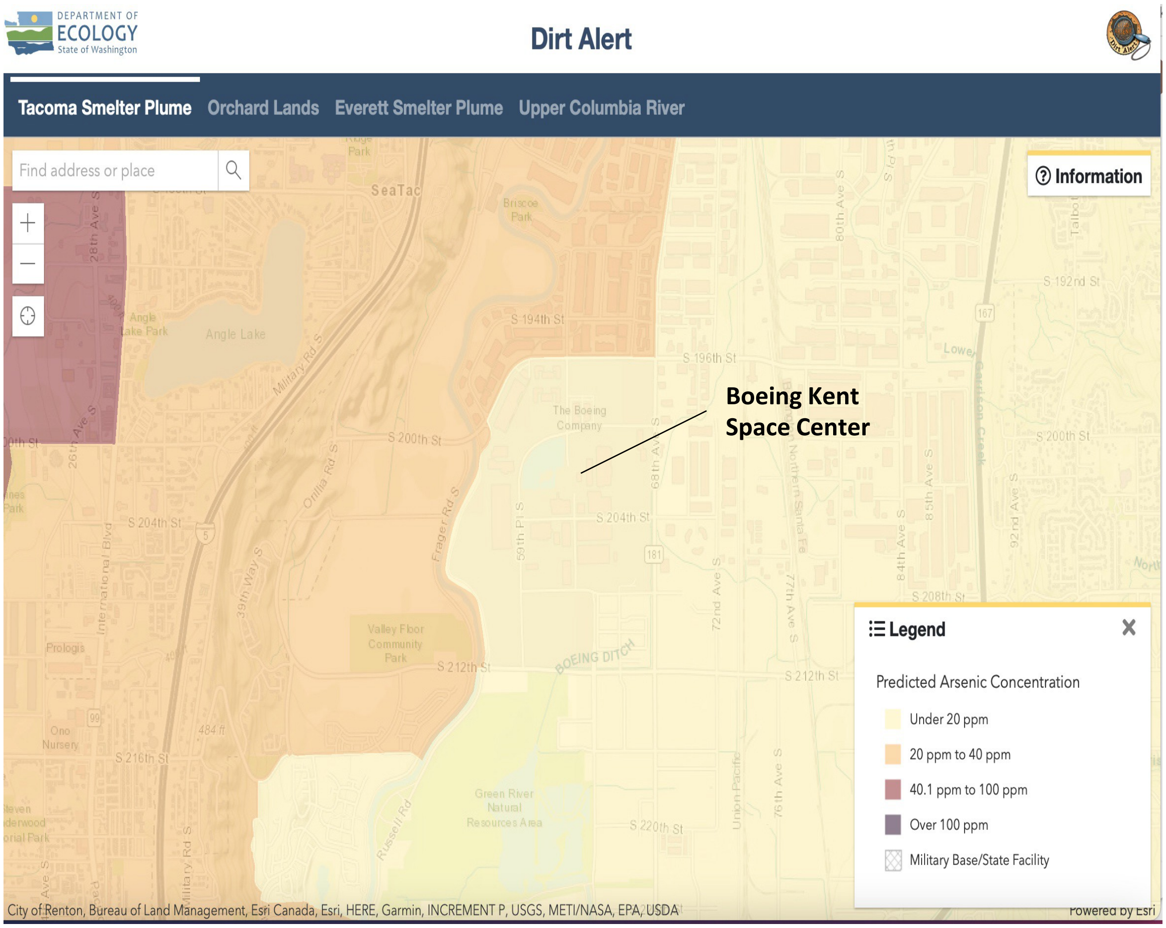
FIGURE 50

PLOT TIME: 7/8/2022 4:24 PM MOD TIME: 7/8/2022 3:25 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 50 Nearby gw wells.dwg

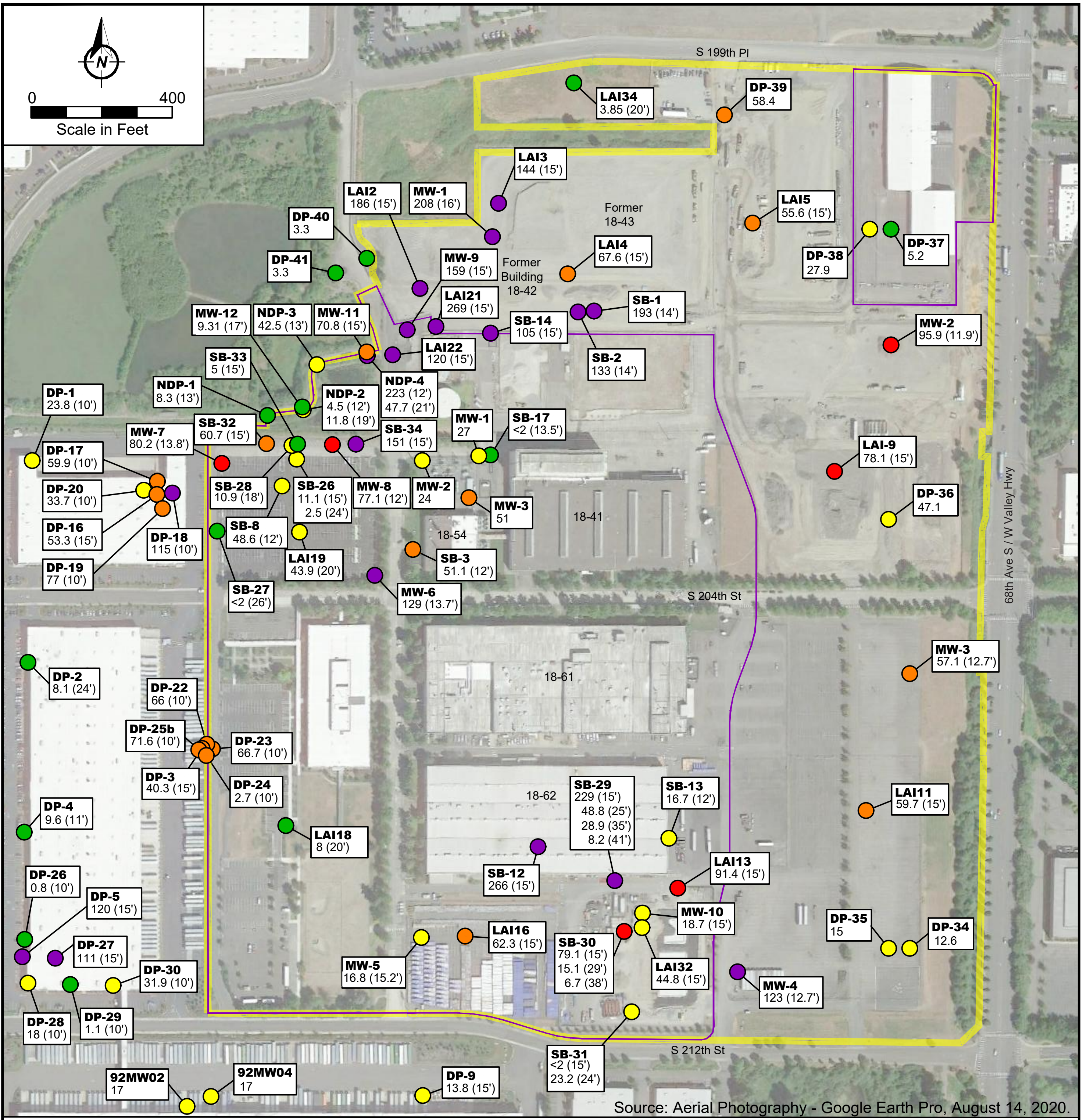
Figure 51

Predicted Arsenic Concentrations in Soils Associated with Asarco Plume

Boeing Kent Space Center
Kent, Washington



Map Source: Ecology "Dirt Alert" map for Tacoma Smelter



Source: Aerial Photography - Google Earth Pro, August 14, 2020.

Legend

- ● **LAI17** Groundwater Sample Location
- 115 Arsenic Concentration (in ug/L)
- (24') Bottom of Screen Depth (Ft)
- ▬ Site Boundary
- — Boeing Property
- MW-7 ⌖ Groundwater Monitoring Well
- MW-3 ⌖ Abandoned Groundwater Monitoring Well

Symbol Color	Arsenic Concentrations (ug/L)
🟣	>100
🔴	>75
🟠	>50
🟡	>10
🟢	<10

Note:
1. Highest concentration of Arsenic in groundwater detected throughout multiple sampling events. See Table 2 for all results.

Boeing Space Center
Kent, Washington
Remedial Investigation

Arsenic Concentrations in Groundwater

DOF DALTON OLMSTED FUGLEVAND

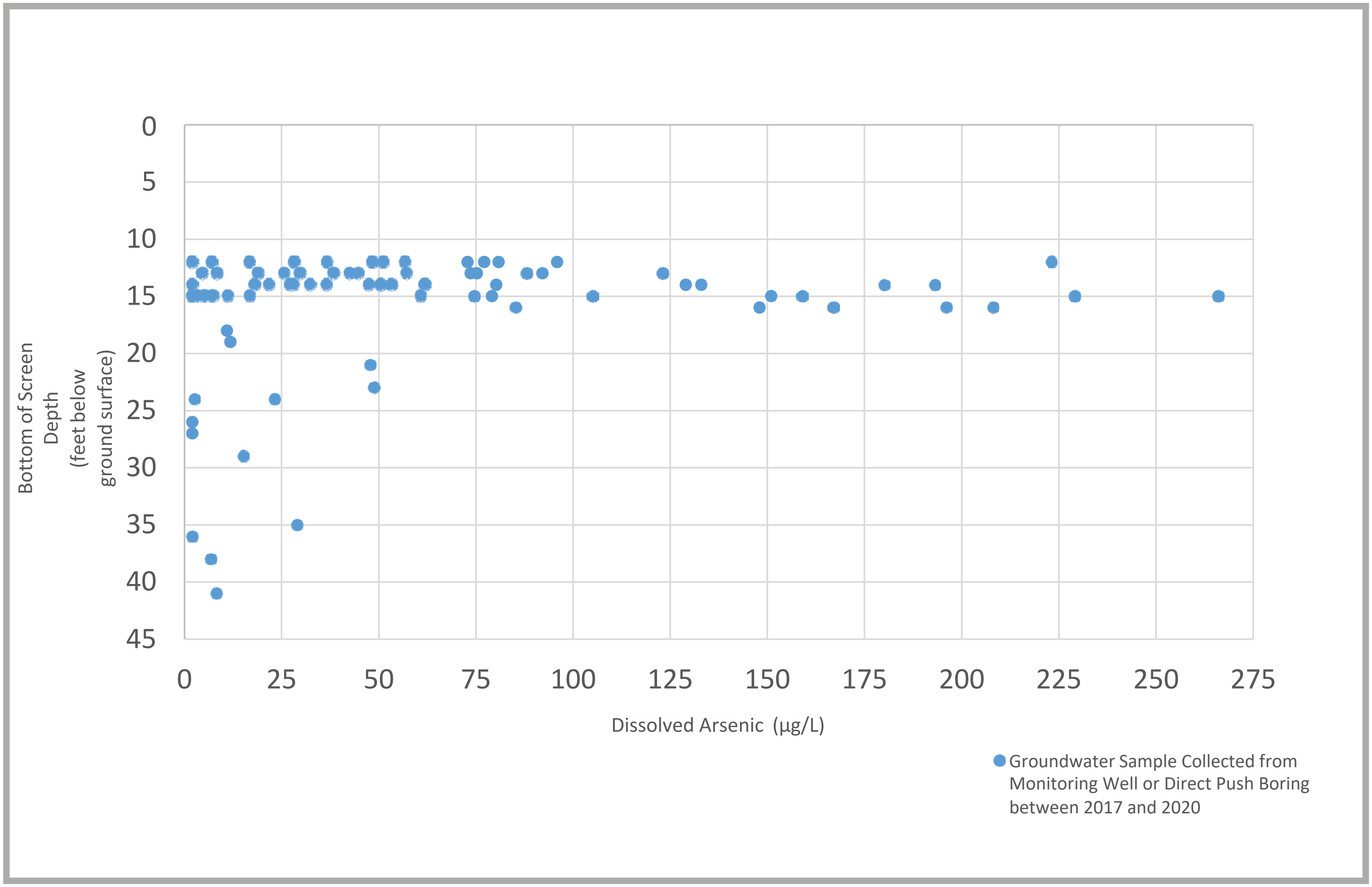
FIGURE 52

PLOT TIME: 7/8/2022 4:24 PM MOD TIME: 7/8/2022 3:25 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 52 Arsenic Samp Locs.dwg

Figure 53

Groundwater Sample Depth vs. Arsenic Concentrations

Boeing Kent Space Center
Kent, Washington

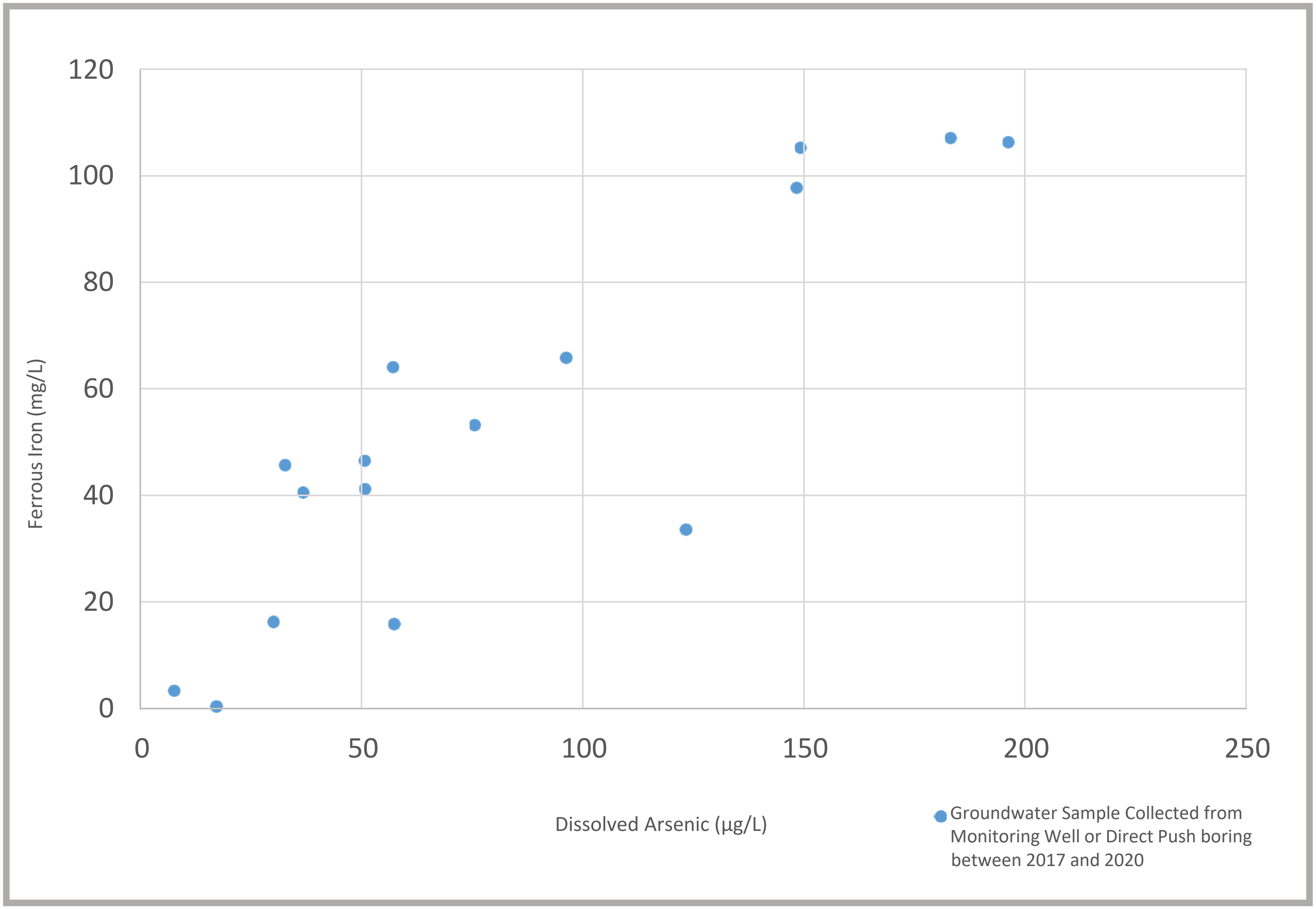


Note: Non-detect values shown at the reporting limit

DOF DALTON OLMSTED FUGLEVAND

Figure 54
Arsenic vs. Ferrous Iron Concentrations

Boeing Kent Space Center
Kent, Washington

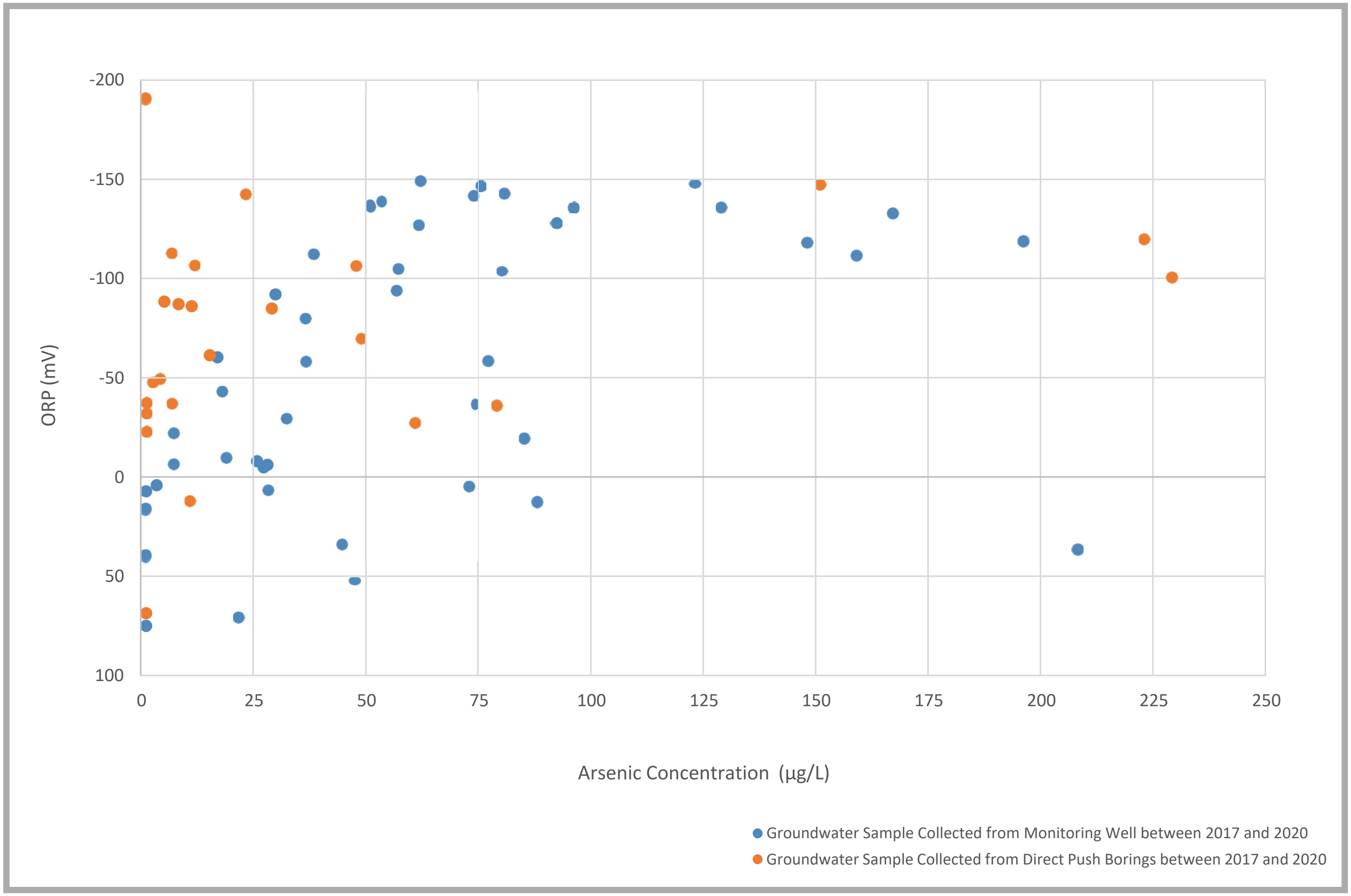


DALTON OLMSTED FUGLEVAND

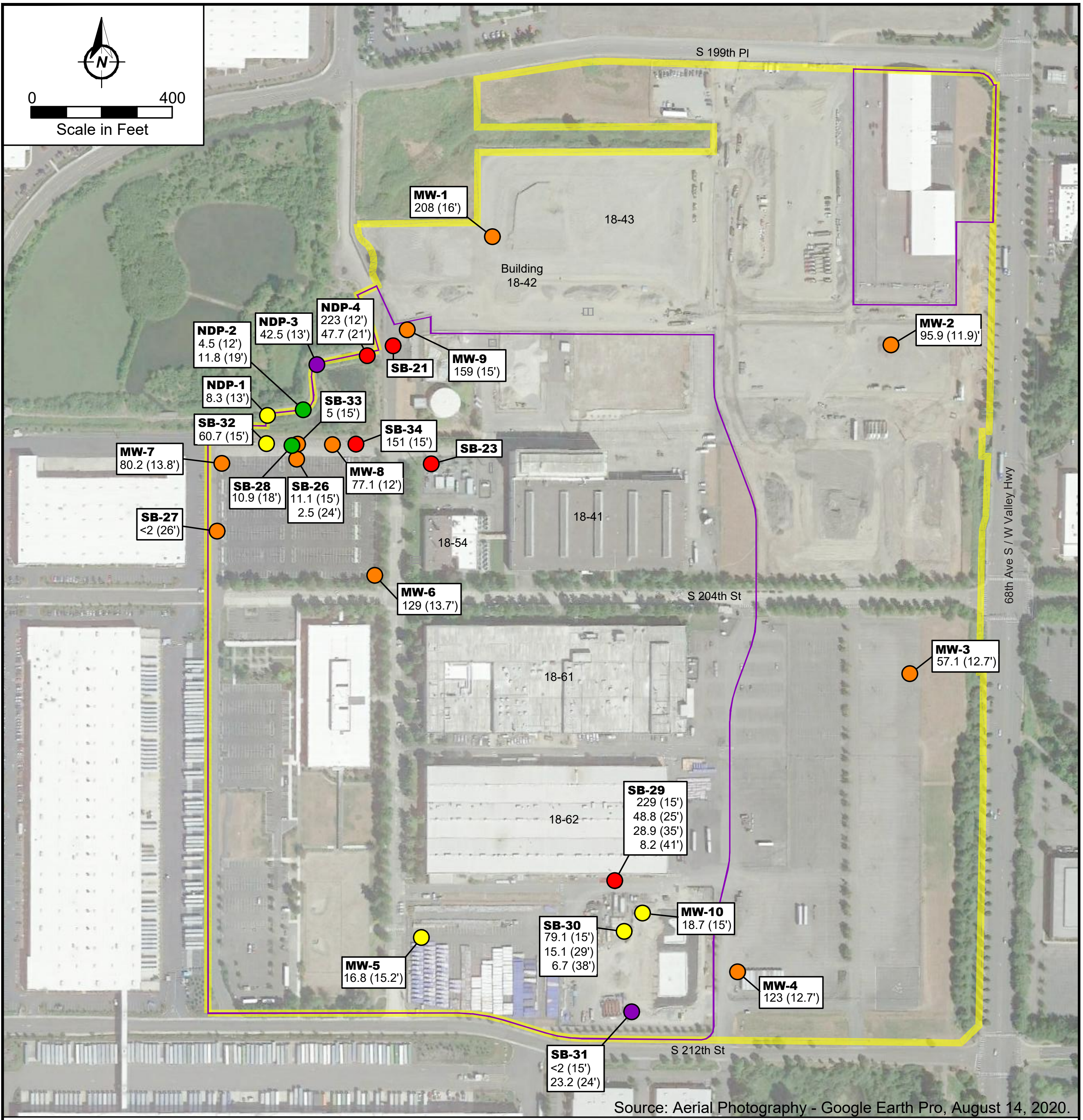
Figure 55

ORP Measurements vs. Arsenic Concentrations

Boeing Kent Space Center
Kent, Washington



DALTON
OLMSTED
FUGLEVAND



Source: Aerial Photography - Google Earth Pro, August 14, 2020.

Legend

● **LAI17**	Groundwater Sample Location
115	Arsenic Concentration (in ug/L)
(24')	Bottom of Screen Depth (Ft)
▬	Site Boundary
—	Boeing Property
MW-7 ⌖	Groundwater Monitoring Well
MW-3 ⌖	Abandoned Groundwater Monitoring Well

Symbol Color	ORP Values (mV)
🟣	-150 to -200
🔴	-100 to -150
🟠	-50 to -100
🟡	0 to -50
🟢	+50 to 0

Note:
1. Highest concentration of Arsenic in groundwater detected throughout multiple sampling events.
2. ORP values shown are average value where multiple events were completed. See Table 4 for actual values.

Boeing Space Center
Kent, Washington

Remedial Investigation

ORP Distribution Related to Arsenic Concentrations in Groundwater

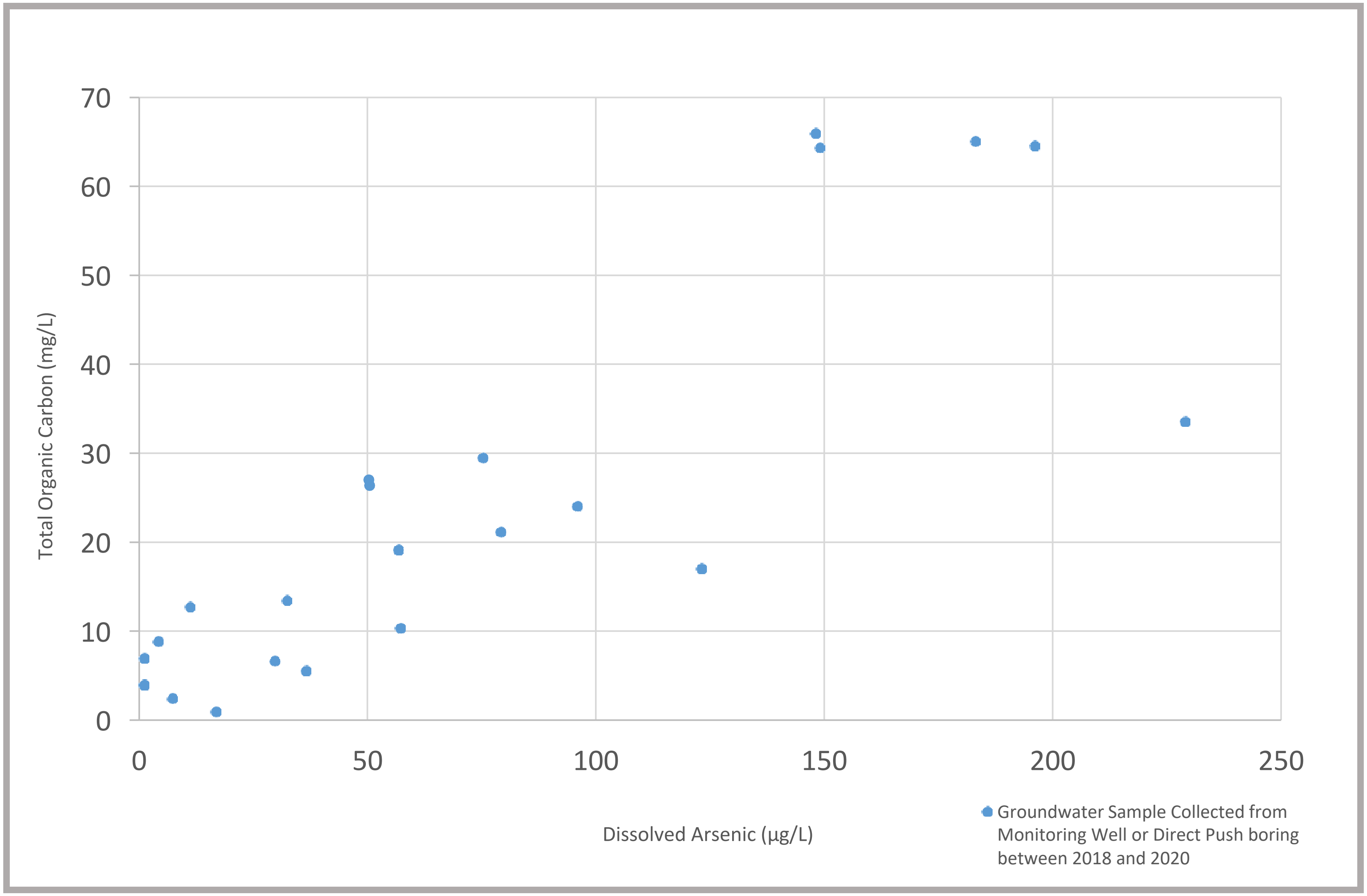
DOF DALTON OLMSTED FUGLEVAND

FIGURE
56

PLOT TIME: 7/8/2022 4:24 PM MOD TIME: 7/8/2022 3:25 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 56 ORP Samp Locs.dwg

Figure 57
Arsenic vs. Total Organic Carbon Concentrations

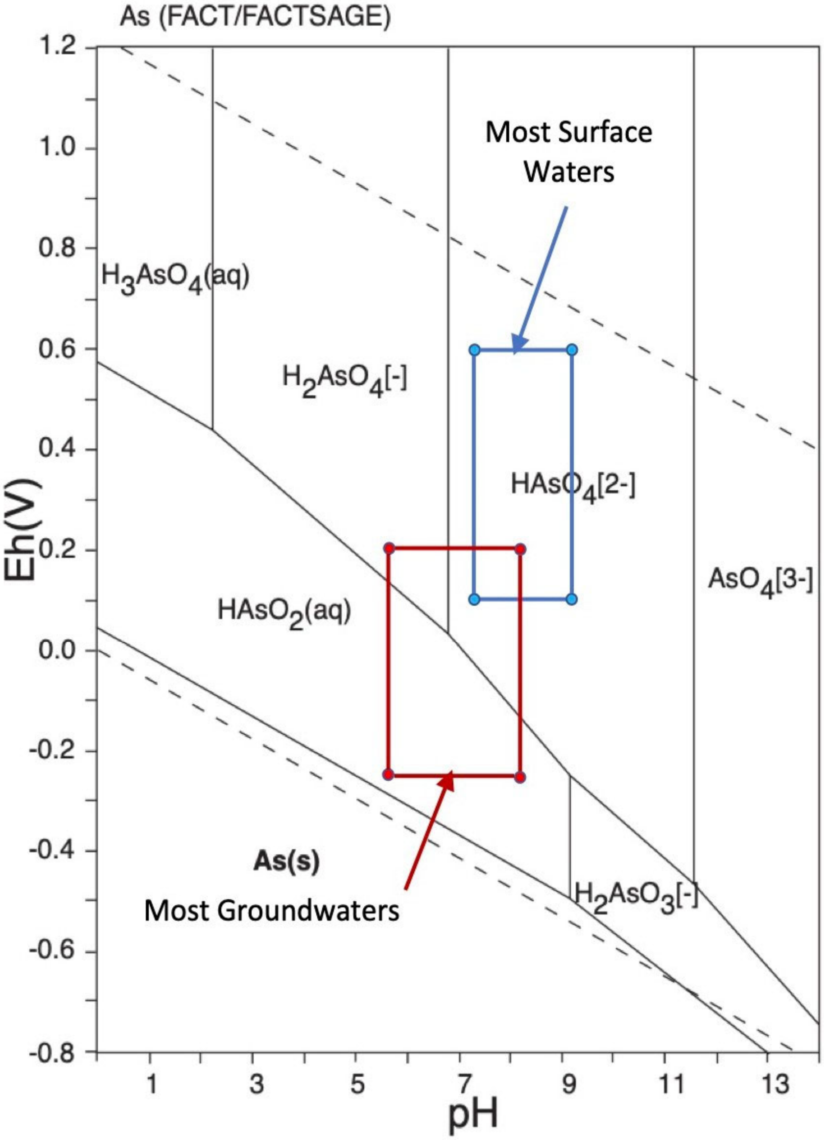
Boeing Kent Space Center
Kent, Washington



DALTON
OLMSTED
FUGLEVAND

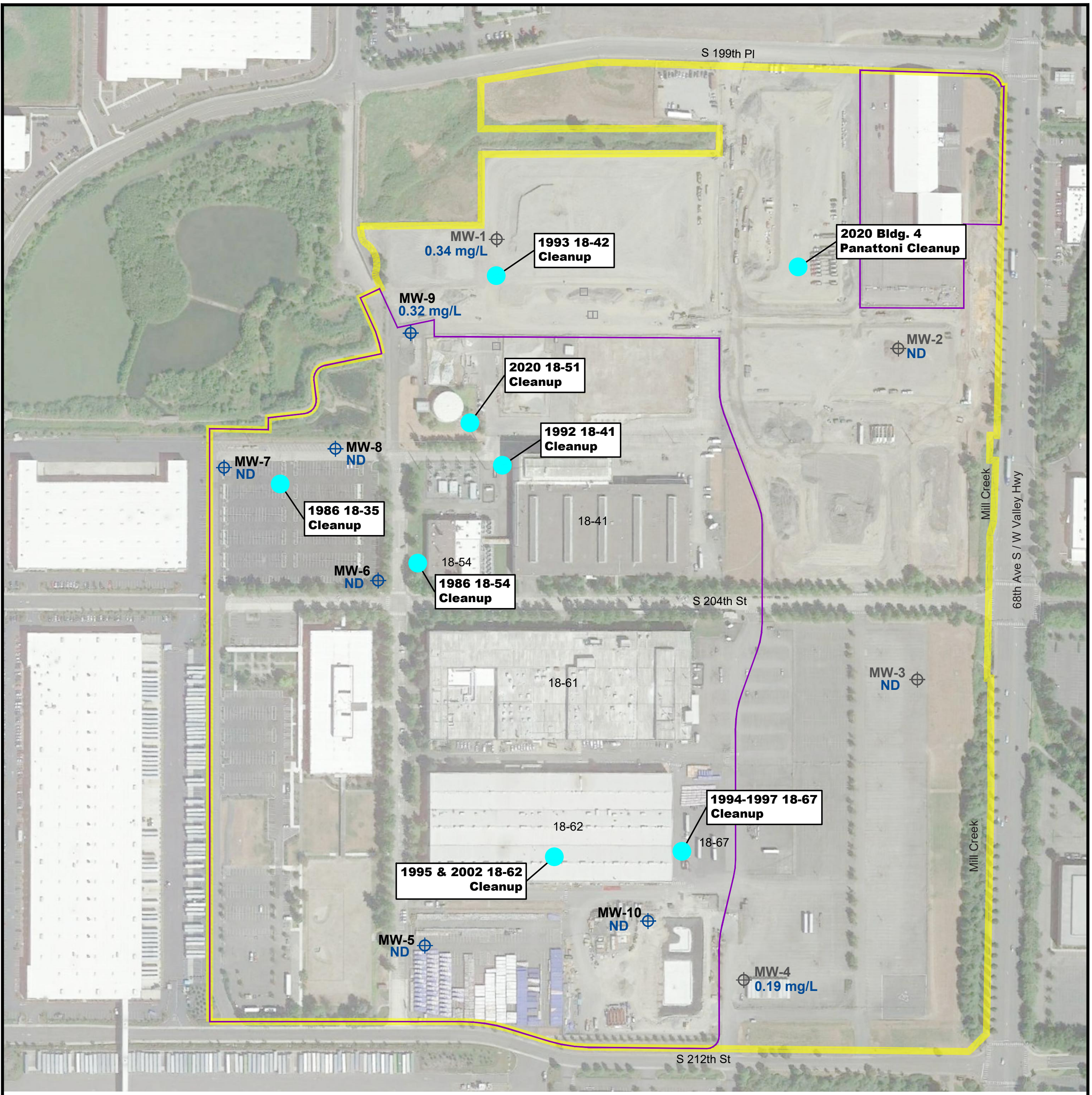
Figure 58
Eh/pH Arsenic Species Stability Phase Diagram

Boeing Kent Space Center
Kent, Washington



Adapted from *Natural Arsenic in Global Groundwaters: Distribution and Geochemical Triggers for Mobilization* from Current Pollution Report (2016) 2:68-69, Springer International Publishing

Abbreviations:
Eh - Oxidation/Reduction Potential (in volts)
aq - aqueous phase



Legend

● Approximate Location of Historical TPH Cleanup Area/UST Removal

MW-7 ⌖ Groundwater Monitoring Well/Measured

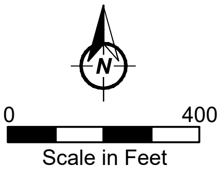
MW-3 ⌖ Abandoned Groundwater Monitoring Well

▬ Site Boundary

— Boeing Property

ND Value shown is the average TPH as diesel or oil concentration detected in all groundwater samples collected from the monitoring well. If all results were non-detect, ND is shown. For calculated averages, one half the reporting limit value was used for non-detects. TPH as gasoline was not detected at any wells.

Source: Aerial Photography - Google Earth Pro, August 2020.



Boeing Space Center
Kent, Washington

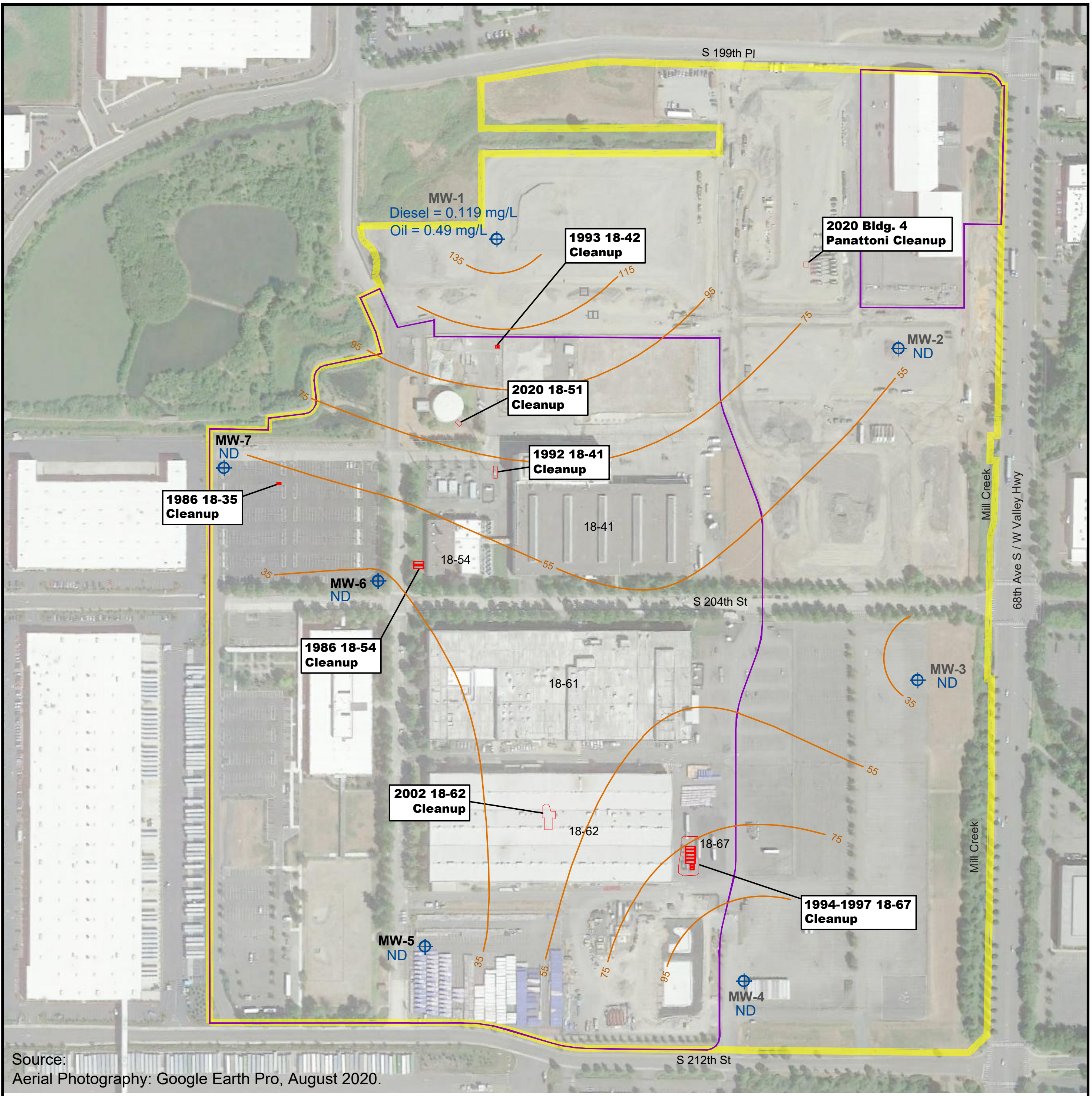
Remedial Investigation

Historical TPH Cleanup Areas

DOF DALTON OLMSTED FUGLEVAND

FIGURE 59

PLOT TIME: 7/14/2022 1:02 PM MOD TIME: 7/14/2022 1:01 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 59 Hist TPH Cleanup Areas.dwg



Source:
Aerial Photography: Google Earth Pro, August 2020.

Legend

🟥 Approximate Location of Historical TPH Cleanup Area/UST Removal

MW-1
Diesel = 0.119 mg/L
Oil = 0.49 mg/L ⊕ Groundwater Monitoring Well with Total Petroleum Hydrocarbons - Diesel Range Hydrocarbons and Oil Range Hydrocarbons

— Arsenic Concentration Contour (ug/L)

▬ Site Boundary

— Boeing Property

Notes:
1. Arsenic and TPH-Dx data collected during March 2020 groundwater monitoring event
2. ND = analyte not detected
3. Concentrations reported in Tables 21a and 21b

N

0 400
Scale in Feet

Boeing Space Center
Kent, Washington

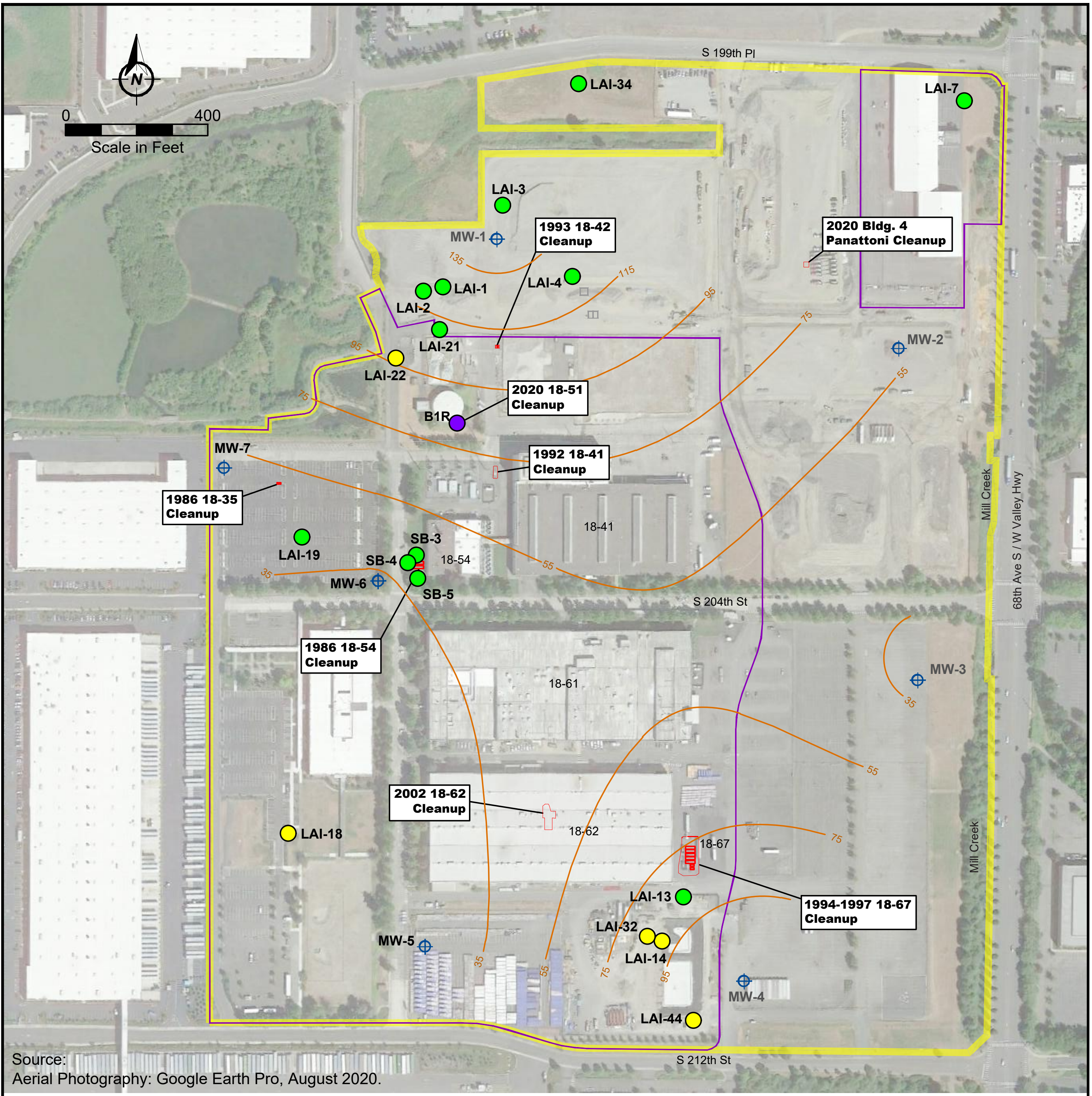
Remedial Investigation

Recent Arsenic and TPH Concentrations in Groundwater

DALTON
OLMSTED
FUGLEVAND

FIGURE 60

PLOT TIME: 7/8/2022 4:24 PM MOD TIME: 7/8/2022 4:08 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 60 Hist TPH Cleanup Areas.dwg



Source:
Aerial Photography: Google Earth Pro, August 2020.

Legend

🟥 Approximate Location of Historical TPH Cleanup Area/UST Removal

MW-1 ⌖ Groundwater Monitoring Well with Total Petroleum Hydrocarbons - Diesel Range Hydrocarbons and Oil Range Hydrocarbons

— Arsenic Concentration Contour (ug/L)

— Site Boundary

— Boeing Property

● Not detected for Diesel and/or Oil Range Hydrocarbons

● Detected below lowest screening criteria for Diesel and/or Oil Range Hydrocarbons

● Detected above lowest screening criteria for Diesel and/or Oil Range Hydrocarbons

Notes:
1. Arsenic data collected during March 2020 groundwater monitoring event. Concentrations shown in Table 21a.
2. Total Petroleum Diesel Range and Oil Range Hydrocarbons (TPH) in soil collected between 2017 and 2020. Concentrations shown in Table 20b.

Boeing Space Center
Kent, Washington

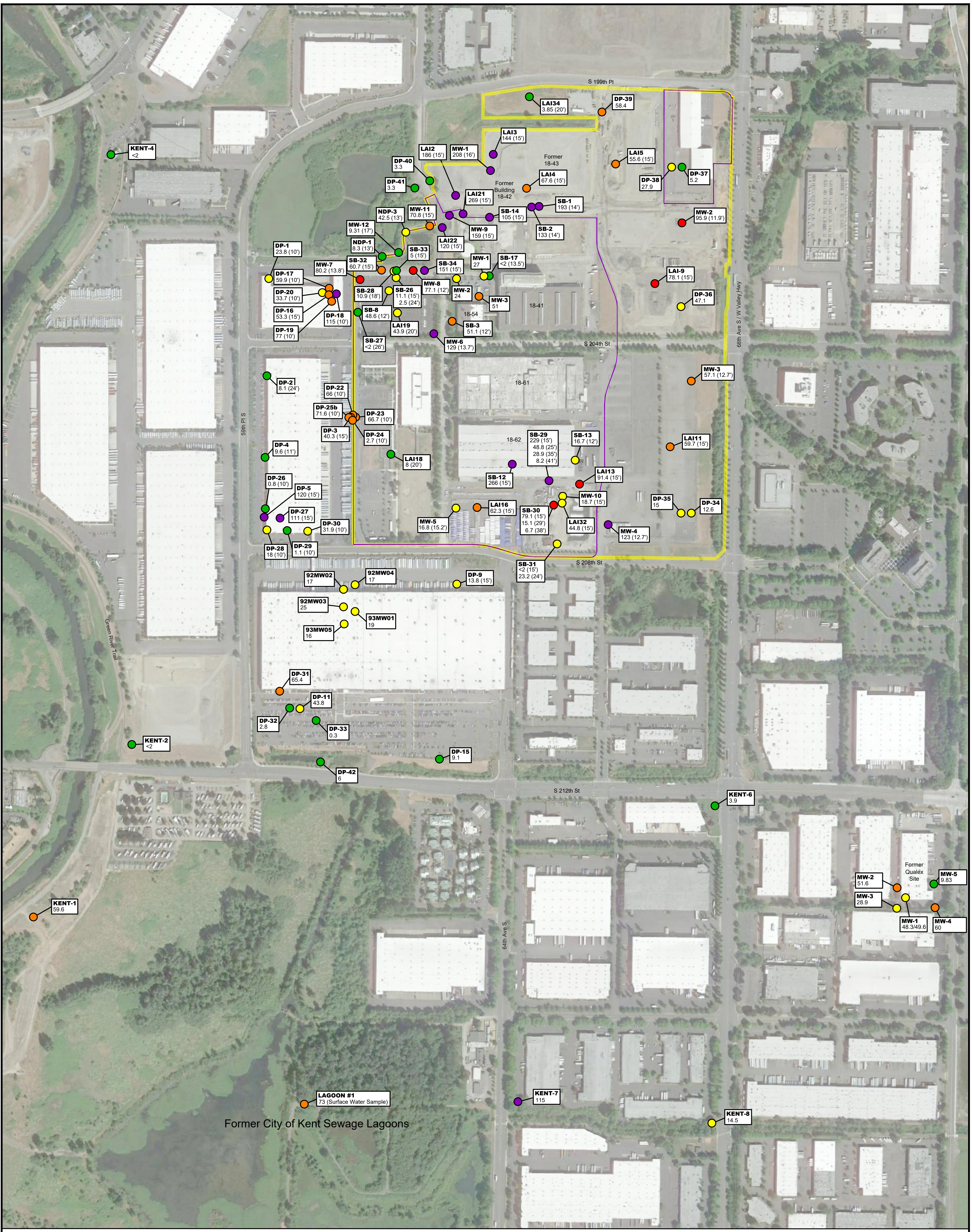
Remedial Investigation

TPH Concentrations in Soil and Recent Arsenic Concentrations in Groundwater

DOF DALTON OLMSTED FUGLEVAND

FIGURE 61

PLOT TIME: 7/8/2022 4:25 PM MOD TIME: 7/8/2022 3:25 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 61 Hist TPH Cleanup Areas.dwg



Source: Aerial Photography - Google Earth Pro, August 14, 2020.

Legend

115	Arsenic Concentration (in ug/L)
(24')	Bottom of Screen Depth (Ft)
▬	Site Boundary
▬	Boeing Property
MW-7 ⊕	Groundwater Monitoring Well
MW-3 ⊕	Abandoned Groundwater Monitoring Well

Symbol Color	Arsenic Concentrations (ug/L)
●	>100
●	>75
●	>50
●	>10
●	<10

N

0 550
Scale in Feet

Note:
1. Highest concentration of Arsenic in groundwater detected throughout multiple sampling events. See Table 2 for all results.

Boeing Space Center
Kent, Washington
Remedial Investigation

Arsenic Concentrations in Groundwater Regional View

DOF DALTON OLMSTED FUGLEVAND

FIGURE
62

PLOT TIME: 7/8/2022 4:25 PM MOD TIME: 7/8/2022 3:24 PM USER: Kelley Begley DWG: P:\Boeing Kent Space\CAD\Figures\2022-06\2022-06 Boeing SC Fig 62 Arsenic Samp-Lagoon Ponds.dwg

Appendix A

Declaration of Covenants, Conditions, Easements, and Restrictions

AFTER RECORDING MAIL TO:

Name	Gerald Bresslour
Address	Law Department The Boeing Company PO BOX 3707, MC 11-XT
City/State	Seattle, WA 98124

Document Title(s):

1. Declaration of Covenants, Conditions, Easements and Restrictions

Reference Number(s) of Documents Assigned or released:

N19-927305
1ST AM ㉜

N/A

Grantor(s):

1. The Boeing Company
2.

[ ] Additional information on page of document

Grantee(s):

1. The Boeing Company
2.

[ ] Additional information on page of document

Abbreviated Legal Description:

Lot 20, Pacific Gateway Business Park File No. SU99-1, V. 197 P. 62
Lots 15-19, 22-27, Tracts D-E, Pacific Gateway Division IV BSP, V. 261, P. 67
Lots 6-9, Pacific Gateway Division II Short Plat, Rec. 20030506900014
Lots 6-9, Kent BLA No. LL-2019-8, Rec. 20191223900004

Tax Parcel Number(s):

660021-0200-04

[ ] Complete legal description is on page of document

I am requesting an emergency nonstandard recording for an additional fee as provided in RCW 36.18.010. I understand that the recording processing requirements may cover up or otherwise obscure some part of the text of the original document.

When Recorded Return To:
Gerald Bresslour
Law Department
The Boeing Company
P.O. Box 3707, MC 11-XT
Seattle, Washington 98124

DOCUMENT TITLE:Declaration of Covenants, Conditions, Easements and Restrictions

REFERENCE NUMBERS OF RELATED DOCUMENTS:

DECLARANT: The Boeing Company

GRANTEE/ASSIGNEE/BENEFICIARY: N/A

LEGAL DESCRIPTION:

A legal description of the Property begins on page 23 of this Declaration

A legal description of the Retained Property begins on page 25 of this Declaration

---

ASSESSOR'S PARCEL NUMBERS:

For the Property: 660021-0020-04; 660007-0150-02; 660007-0160-00; 660007-0170-08; 660007-0180-06;660007-0190-04;660007-0220-08; 660007-0230-06; 660007-0240-04; 660007-0250-01; 660007-0260-09; 660007-0270-07; 660007-0300-01; 660007-0310-09; 660007-0320-07; 022204-9074-00; 022204-9075-09; 022204-9076-08; 022204-9064-02.

For the Retained Property: 660007-0090; 660007-0120; 660007-0130; 660007-0140; 660007-0150 (part); 660007-0300 (part); 660007-0200; 660007-0210; 660007-0220 (part); 660007-0230 (part); 660007-0240 (part); 022204-9064 (part); 022204-9074 (part).

DECLARATION OF COVENANTS, CONDITIONS, EASEMENTS, AND RESTRICTIONS

THIS DECLARATION OF COVENANTS, CONDITIONS, EASEMENTS, AND RESTRICTIONS (hereinafter referred to as the "Declaration") is made, granted, declared, established and reserved this 30th day of December, ~~2020.~~ 2019.

WHEREAS, The Boeing Company, a Delaware corporation (hereinafter referred to as "Declarant") is the owner of certain real property legally described on Exhibit A attached hereto and made a part hereof (the "Property"); and

WHEREAS, the Declarant also owns substantial property in the general area of the Property, legally described in Exhibit B attached hereto and made a part hereof (the "Retained Property"), which is currently used in connection with Declarant's aerospace business; and

WHEREAS, the Declarant wishes to ensure that the use of the Property does not adversely affect the use of the Retained Property and permits the owner of the Retained Property to use and enjoy the Retained Property.

NOW, THEREFORE, in consideration of the benefits to be derived hereunder, the Declarant hereby makes, grants, declares and establishes this Declaration:

1. DEFINITIONS AND PURPOSE.

a. Business Day or business day means any day other than a Saturday, Sunday, or a legal holiday observed in the state of Washington, and expressly excludes December 24 through December 31 in any calendar year and January 2 in any calendar year.

b. Development Agreement shall mean the Development Agreement between Declarant and the City of Kent dated and originally executed September 9, 2004 and recorded in the records of King County, Washington under recording no. 20041130001940, as replaced and superseded by the Development Agreement recorded in the records of King County, Washington under recording no. 20061121002110, as supplemented by Exhibit 21 – Vested Development Regulations recorded in the records of King County, Washington under recording no. 20101105000323, and as further revised by the Development Agreement recorded in the records of King County, Washington under recording no. 20101105000328, as it may be amended after the date of this Declaration, which amendment may only occur if agreed to in writing by Declarant.

c. Environmental Authority shall mean the Washington Department of Ecology ("Ecology"), the United States Environmental Protection Agency ("EPA"), and/or any other governmental authority having jurisdiction over environmental conditions at the Property.

d. Improvements shall mean and refer to all structures, improvements, equipment, fixtures, objects used for decorative or incidental purposes, and construction of any kind on any Lot whether above or below the land surface, whether permanent or temporary, including without limitation, Buildings, utility lines, driveway, paved parking areas, pathways, fences, screening walls, retaining walls, plantings, planted trees and shrubs, irrigation and drainage pipes and fixtures, catch basins or other devices for the collection and/or detention of stormwater runoff, lighting fixtures and signs.

e. Leased Premises shall mean the portion of the Property to be leased by Declarant after the Effective Date.

f. Lot shall mean and refer to any legal lot into which the Property or any part of it has on the date hereof or shall hereafter be divided.

g. Occupant shall mean and refer to, collectively, the Owner and any other Person or Persons entitled, by ownership, leasehold interest or other legal relationship, to the right to occupy all or any portion of the Property.

h. Owner shall mean and refer to the Person or Persons holding record fee title to the Property (including, as applicable, Declarant, but excluding any Person holding such interest merely as security for the performance of an obligation), and their respective heirs, successors and assigns.

i. Person shall mean and refer to any individual, partnership, corporation, trust, estate or other legal entity.

j. Post-Effective Date Hazardous Impacts means any spilling, discharge, deposit, injection, dumping, emitting, releasing, placing, leaking (any of the foregoing, a "Release"), of any Hazardous Material (as defined in Section 3.1(20)) into the air or into or on any land, sediment or waters first occurring after the Effective Date (specifically excluding any movement of contaminants that were Released prior to the Effective Date). The ″Effective Date″ is the date on which this Declaration is recorded.

k. Term shall mean the time period during which Declarant leases the Leased Premises from Declarant.

2. TERM.

The restrictions declared, reserved, granted and established hereby shall commence on the date on which this Declaration is recorded in the records of King County, Washington (the "Effective Date") and shall continue in full force and effect perpetually. This Declaration may be terminated or modified only with the consent of The Boeing Company or the "Other Entities" referred to below in this Section 2 if they (or any of them) are the Owner or Occupant of all or a material part of the Retained Property, which consent may be withheld in the sole discretion of The Boeing Company or such Other Entities, PROVIDED that any modification (but not termination) of this Declaration may be made only with the prior written consent of the Owners of the Property which may be withheld in their respective sole and absolute discretion. The "Other Entities" are (a) any direct or indirect subsidiary of The Boeing Company, or (b) any corporation, business, or other entity that is controlled by or under common control with The Boeing Company or (c) any corporate, business, or other entity that supplies The Boeing Company or any entity identified in clause (b) or (c) with goods or services in support of the aviation industry, including the business of designing, producing, maintaining, repairing, or modifying aircraft or spacecraft.

3. COVENANTS, CONDITIONS, AND RESTRICTIONS.

The Declarant hereby covenants that the Property will be used by Declarant and by all of its successors in title to the Property, and by all occupants of the Property in compliance with and subject to the following:

3.1 Permitted Purposes; Prohibition of Certain Uses. The Property (1) shall be used solely for purposes (other than a Prohibited Use, as defined below) permitted by applicable land use law and regulations and the Development Agreement and (2) shall not be used for any Prohibited Use. On and after the date of this Declaration, no Owner will permit or suffer any tenant, lessee, licensee, subtenant, sublessee, sublicensee, occupant, or user of the Property or any part of it to use the Property or any part of it for any of Prohibited Use or any use prohibited by applicable law.

In addition, uses of the Property are limited to commercial and industrial uses, and may not include any prohibited under regulation by Ecology or any other Environmental Authority having jurisdiction over the Property either in effect on the date of this Declaration or as adopted from time to time.

Unless otherwise specified, each of the following is a Prohibited Use of the Property:

1. Residential uses, including without limitation single family residences, multi-family residences, assisted living facilities, nursing homes, extended stay hotels and motels, trailer courts, and boarding houses.
2. Child care facilities, including day care facilities.
3. Schools, including nursery, primary, secondary, trade, and post-secondary educational institutions.
4. Hospitals; medical or dental clinics (including out-patient clinics) or other on-site medical treatment facilities.
5. Agriculture or farming.
6. The withdrawal, use, consumption, re-injection, or disposal of groundwater under the Property for any purpose other than environmental testing, monitoring or remediation, except as required by applicable law.
7. New infiltration basins, percolation ponds, or any facility that uses or receives stormwater or other discharges, including those as may be contemplated by LEED

building concepts, and except as required for compliance with the City of Kent or Washington State Department of Ecology's regulatory scheme and under no circumstances to materially impact stormwater flow or groundwater at the Retained Property.

8. Outdoor washing, maintenance, or repair of vehicles of any kind; provided that following full severance of the respective Property and Retained Property stormwater systems per Section 3.6.4 of this Declaration, outdoor washing of vehicles shall be permitted so long as such washing is conducted in a self-contained paved area and the wash water is not discharged into the storm system.

9. Discharge of any polluting sources to stormwater in violation of law or regulations. In the event that Owner discovers such a discharge, Owner shall promptly take action to address the discharge.

10. The use of exposed galvanized or copper materials outdoors, including but not limited to fencing, ducting and ventilation (including on roofs), aboveground pipes, etc., except vinyl-coated galvanized fencing is not a Prohibited Use of the Property.

11. Facilities for disposal or treatment, recycling or storage of garbage, refuse, plastics, glass, metals, cardboard, paper, or hazardous or toxic materials or substances, including without limitation junk, wrecking, or salvage yards, or dumping, disposal, incineration or reduction of garbage, sewage, offal, dead animals or refuse. However, collection into separated recycling containers or bins of refuse generated by an Owner or Occupant in the normal course of business conducted on such Owner's or Occupant's Lot shall be permitted.

12. Environmental remediation facilities, except as may be required or approved by an Environmental Authority in connection with clean-up of the Property.

13. Repairing or rewinding of transformers or generators.

14. Welding shops.

15. Uncovered outdoor storage of paving materials and/or building materials except during construction or during post-construction maintenance or renovation of the Property or Improvements. .

16. Manufacturing, refining, storage, or distribution of petroleum or natural gas or any of their respective products, including without limitation butane, propane, gasoline or other fuels (provided storage of propane, gasoline and diesel shall be allowed for ancillary uses to support normal business operations at the Property).

17. Manufacturing involving drop forge industries, smelting or metal plating or compounding, processing or treatment of acids, detergents, disinfectants, dyes or lubricating oils.

18. a. Any possession, use, generation, storage, handling, treatment, transportation, recycling, reclamation, release, or disposal of any Hazardous Materials at, in, on, under, above or from the Property, except as provided in paragraph (b) of this Section 3.1.20. As used in this Declaration, the term "Hazardous Material" includes any material, substance, waste, chemical, compound, constituent, mixture, or byproduct which is or becomes identified, classified, defined, designated, listed,

restricted or otherwise regulated under any Environmental Law as a "hazardous constituent," "hazardous substance," "hazardous material," "extremely hazardous material," "hazardous waste," "dangerous waste," "acutely hazardous waste," "hazardous waste constituent," "infectious waste," "medical waste," "biohazardous waste," "extremely hazardous waste," "pollutant," "toxic pollutant" or "contaminant," including without limitation, any material, substance, waste, chemical, compound, mixture or byproduct which is or contains asbestos, polychlorinated biphenyls ("PCBs"), hexavalent chromium, hydrocarbons, oil or petroleum products, petroleum distillates or petroleum byproducts, explosives, radioactive materials, radon gas or formaldehyde. As used in this Declaration, the terms "Environmental Law" or "Environmental Laws" include any and all federal, State of Washington and local laws, regulations, rules, permit terms, codes and ordinances now or hereinafter in effect, as the same may be amended from time to time, and applicable decisional law, which refers or relates to environmental protection, human health, safety or natural resources, including but not limited to: the Comprehensive Environmental Response Compensation and Liability Act of 1980, 42 U.S.C. Section 9601, et seq. ("CERCLA"); the Resource Conservation and Recovery Act of 1976, 42 U.S.C. Section 6901, et seq. ("RCRA"), the Toxic Substances Control Act of 1976, 15 U.S.C. Section 2501, et seq. ("TSCA"), the Superfund Amendments and Reauthorization Act of 1986, Title III, 42 U.S.C. Section 11001, et seq. ("SARA"), the Clean Air Act, 42 U.S.C. Section 7401, et seq., the Federal Water Pollution Control Act, 33 U.S.C. Section 1251, et seq., the Solid Waste Disposal Act, 42 U.S.C. Section 3251, et seq., the Hazardous Materials Transportation Act, 49 U.S.C. Section 1801, et seq., the Washington Model Toxics Control Act, R.C.W. Section 70.105D.010, et seq., and any and all regulations promulgated thereunder.

b. The foregoing shall not prohibit the presence or use on the Property of a Hazardous Material reasonably incidental to an intended use of the Property, including by way of example cleaning or office supplies, or Hazardous Materials that are contained in products for commercial distribution, provided that the presence, use, storage, handling and disposal of any such Hazardous Material complies with all applicable Environmental Laws (as defined above). Without limiting the generality of the foregoing, any such presence or use on the Property of a Hazardous Material shall not result in a release of a Hazardous Material at, in, on, under, above or from the Property in a manner that violates any applicable Environmental Laws, or that is reasonably likely to give rise to liability for environmental response or cleanup, damage to property, or personal injury to the owner or owners of all or any portion of the Retained Property, or to any other Person or entity. The Owner of the Property shall promptly take all necessary and appropriate actions, pursuant to applicable Environmental Laws, to remedy any non-compliance with the requirements of this paragraph.

19. The sale, distribution, production, or display of pornographic, obscene, or so-called "adult" literature, periodicals, movies, videos, pictures, photographs, or the like. The presentation of so-called "adult" entertainment.

20. Gambling, betting, or casino operations of any kind.

21. The operation of a strip club, gentlemen's club, or an establishment providing entertainment in the form of table or lap dancing

22. The sale, distribution, or display of unlawful drugs, controlled substances, and/or marijuana or any paraphernalia related to unlawful drugs, controlled substances, or marijuana (but the lawful sale, distribution and display of prescription drugs and over-the-counter medications and equipment shall be permitted).

23. Distillation of bones; rendering of fat or animal tissues.

24. Stockyard, slaughter of animals, raising or boarding of animals.

25. Open-sided (i.e., containing no walls) truck terminals, except for commercially accepted distribution style terminals.

26. Any use that involves the generation of electromagnetic or nuclear radiation that would adversely impact all or any part of the Retained Property and/or any use thereof or operations thereon, and any use that is not permitted in the City of Kent's M-1 zone as in effect on the Effective Date (without regard to any changes or amendments relating to such zone that take effect after the Effective Date) that would adversely impact all or any part of the Retained Property and/or any use thereof or operations thereon.

3.2 Vapor Barriers for Certain New Construction.

(a) If all or any part of an Improvement intended for human occupancy is sited within the "Vapor Barrier Area", then Owner will install (at Owner's sole cost and expense) vapor barriers reasonably acceptable to Declarant under the footprint of any new Improvements constructed after the Closing. Declarant shall have the right to approve, prior to commencement of construction of Owner's Improvements, Owner's working drawings for vapor barriers (the "Vapor Barrier Specs"), which approval shall not be unreasonably withheld, conditioned, or delayed. Owner shall provide at least thirty (30) days' written notice to Declarant before commencing the installation of any vapor barrier and shall provide construction quality assurance documentation to Declarant, as required by the Vapor Barrier Specs, within thirty (30) days after completion of such installation. The Vapor Barrier Specs shall, at a minimum, comply with the specifications set forth in Exhibit C. Nothing in this clause (2) is intended to permit any use that is otherwise prohibited by this Declaration. The Vapor Barrier Area is the area depicted as the Vapor Barrier Area on Exhibit C.

(b) Prior to construction of any new structure on the land outside of the Vapor Barrier Area, the Owner shall either install vapor barriers per 3.2(a) above, or the Owner shall conduct a soil vapor investigation and vapor intrusion evaluation in a manner consistent with the guidance of the EPA and Ecology as in effect at the time such construction is to be undertaken. Prior to undertaking any such construction, the Owner shall deliver to the Declarant written evidence that the Owner has conducted such investigation and evaluation. If said investigation or evaluation shows a potential for concentrations of volatile organic compounds in violation of Environmental Law or in violation of any current EPA and/or Ecology guidance regarding indoor air, the Owner shall (1) place a vapor barrier with specifications approved by EPA and Ecology between the soil and the building slab or foundation (when installed using methods approved by EPA and/or Ecology, an "Approved Vapor Barrier") and (2) implement such other vapor mitigation measures as may be required and approved by EPA and Ecology. Owner shall not commence construction of any new structure on said land prior to delivering to the Declarant written evidence of the Owner's compliance with all of the requirements of this Section 3.2.

3.3 Excavation of Soils

3.3.1 Excavation of Soils. Prior to the installation or construction of any foundations for any Improvements on the Property within the Vapor Barrier Area, excavation of soils within the Property will be required in accordance with this Section 3.3.1. Soil under said foundations and soils within fifteen (15) horizontal feet of said foundations shall be excavated to a depth of not less than three (3) feet, with the exception that for any portion of future Improvements within the footprints of former Boeing Buildings 18-42 and 18-43 and within fifteen (15) horizontal feet of such footprints, soils shall be excavated to a depth of not less than five (5) feet (such areas being defined as "Over-Excavation Area" and Owner's obligations to conduct such excavation being referred to here-in as "Over-Excavation Obligations"). Once Owner's Over-Excavation Obligations have been satisfied with respect to construction of a particular New Building, the Over-Excavation Obligations shall not thereafter apply to any redevelopment within the original footprint of such New Building; however, if the redevelopment (including any expansion of a previously constructed New Building) will have a footprint that extends beyond any of the boundaries of the original footprint of such New Building and within the Vapor Barrier Area, the boundaries of the original Over-Excavation Area shall be commensurately extended and the Over-Excavation Obligations shall apply to such extended portion of the Over-Excavation Area. Owner shall notify Declarant at least ten (10) business days in advance of its construction and excavation activities with respect to each Building constructed. Declarant or its designated representation shall have the right (but not the obligation) to visually observe any or all such activities provided that Declarant complies with Owner's reasonable health and safety requirements. During Over-Excavation activities, Owner shall conduct visual and field screening for indications of any contamination using appropriate instrumentation, including for the detection of volatile organic compounds (such as a photoionization detector, PID) in soils excavated by Owner (whether or not within the Over-Excavation Area) with a qualified environmental consultant selected by Owner (the "Owner's Soils Consultant"). If such visual or field screening indicates the presence of contamination, then Owner shall promptly notify Declarant and have Owner's Soils Consultant conduct soil and soil vapor confirmation sampling (using Ecology approved protocols) of the affected soil and cause Owner's Soils

Consultant to provide a certified written report on the results thereof to Declarant. Declarant's designated environmental consultant shall be entitled (but not obligated) to be present and to perform concurrent or additional sampling/screening. Soils excavated by Owner may be returned to the excavation area as needed by Owner unless offsite disposal is required due to contaminant impacts or soil export requirements associated with the Land development, in which case Owner shall dispose of such soils in compliance with applicable Environmental Laws. If Owner encounters contaminated soil during any of its excavations, whether or not such contamination lies within the Over-Excavation Area, Owner shall be responsible for notifying Declarant promptly, as well as notifying the Environmental Authority in accordance with any applicable legal requirements and, to the extent required by the Environmental Authority, for conducting any characterization, handling and disposal of such soil and any other soil. Within thirty (30) days after satisfaction of the applicable Over Excavation Obligations, Owner shall notify Declarant in writing of that fact, which notice shall describe the soil monitoring performed (including, without limitation, dates, procedures, PID readings, observations, and results of any confirmation sampling, if confirmation sampling is required pursuant to this Section 3.3.1).

3.3.2 Pilings and Off-site Soil Disposal. Declarant hereby discloses to each Owner and each Occupant that (i) pilings may be present below the grade of the former building footprints within the Property (former Boeing Buildings 18-42 and 18-43) and (ii) the soils and groundwater on the Property contain levels of certain metals (among other Hazardous Materials) that may exceed Washington State Department of Ecology action levels. Hazardous Materials are not known to be associated with said pilings. However, Declarant makes no representation or warranty as to the environmental condition of said pilings or adjacent soils. Rather, each Owner and each Occupant is required to take, and shall be solely responsible for taking, appropriate precautions to ensure that any pilings, or any soils adjacent to any pilings that are discovered during the course of excavation are properly evaluated and handled in accordance with all Environmental Laws. If any excavation of soils is conducted on the Property (whether or not in connection with said pilings), the Owner shall characterize the soils and their constituents as necessary or appropriate under applicable Environmental Laws before the soils are removed from the Property, whether for disposal or any other use. Any such disposal or other use of excavated soils shall be in accordance with all applicable Environmental Laws. All wastes that are generated on or at the Property, regardless whether such wastes constitute or contain Hazardous Materials, shall be managed and disposed of in accordance with all applicable Environmental Laws. Any and all of the foregoing activities shall be undertaken at no cost, expense or liability to the owner or owners of all or any portion of the Retained Property and also shall be subject to the provisions of Section 3.4 herein.

3.4. Declarant to be Held Harmless from Construction Costs, Mitigation Costs, etc. in Connection with Development of the Property. Except as may otherwise be agreed in writing, the Owner or Owners of all or any portion of the Property shall release the owner or owners of all or any portion of the Retained Property from and shall indemnify and hold harmless the owner or owners of all or any portion of the Retained Property from and against any and all construction costs, mitigation costs (including environmental), fees, or charges associated with the development or redevelopment of all or any portion of the Property, whether such obligation takes the form of construction of public or private improvements, the payment of mitigation or impact fees or the payment of assessments levied by any improvement district formed to finance the construction of any such improvements. The foregoing release and obligation to indemnify and hold harmless the owner or owners of all or any portion of the Retained Property shall not apply in the event that Declarant engages in gross negligence or willful misconduct in carrying out the directives of the Agreed Order (without advocacy by Owner for increased or accelerated work); or 2) to the extent any of the foregoing costs are the result of any Post-Effective Date Hazardous Impacts occurring on, in, under or from the Retained Property.

3.5 Covenant Not to Object to Any Development on or Use of the Retained Property. The Owner of the Property shall not object to any Governmental Authority with respect to any development on all or any portion of the Retained Property, except to the extent that such development, redevelopment, proposal, plan or agreement (1) would require the payment by said Owner of mitigation costs or assessments of any nature in connection therewith or (2) includes low income or subsidized housing or (3) contravenes the Development Agreement as it may be amended from time to time or (4) would require mitigation that would limit, impair, or restrict the development or redevelopment of the Property or the uses permitted thereon pursuant to this Declaration

3.6 Declarant's Cleanup Obligations Under Existing Order and Post-Effective Date Hazardous Impacts.

3.6.1 RCRA Permit; Agreed Order; Existing Conditions; Soils Handling.

(a) Declarant hereby notifies all Owners and Occupants that the Property is as of the date of this Declaration, and the Retained Property continues to be as of the date of this Declaration, designated an Interim Status facility by the Washington Department of Ecology ("Ecology") pursuant to the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 et seq. (the "RCRA Permit"). The Property is also subject to Ecology's Agreed Order DE 12820 (the "Agreed Order"). Pursuant to the Agreed Order and applicable laws, Declarant has been implementing prior to the date of this Declaration and will continue to implement regulatory cleanup requirements on both the Property and the Retained Property. To the extent Declarant is directed by an Environmental Authority to perform environmental assessment or remediation work at or in connection with the Property, whether under the RCRA Permit, the Agreed Order or otherwise, then Declarant will conduct assessments or remediation work on the Property, at its sole cost and expense, and establish such cleanup standards (specifically including commercial/industrial standards), goals and strategies, as may be accepted by Ecology and any other Environmental Authority. Each Owner and each Occupant understands that such strategies and cleanup levels may entail risk-based closures, institutional controls, soil management plans, deed restrictions, restrictive covenants for groundwater or land use, and other strategies to address pre-existing environmental impacts. No Owner and no Occupant shall object to any such strategy unless such strategy requires restrictions to be placed upon the use and/or development of the Property that are more restrictive than those set out in the second grammatical paragraph of Section 3.1 of this Declaration, and if the Environmental Authority requires restrictions more restrictive than those set out in Section 3.1 of this Declaration, Declarant shall use commercially reasonable good faith efforts to request that the Environmental Authority minimize those restrictions, and both Declarant and Owner shall reasonably cooperate with each other and with the Environmental Authority with respect to such restrictions. Promptly after Declarant becomes aware of any such restriction, Declarant shall inform Owner in writing of any such restriction and Declarant shall provide Owner with a reasonable opportunity to contact the Environmental Authority seeking to impose the restriction for the purpose of discussing the restriction and possible alternatives. Each Owner and Occupant shall take all necessary steps to record and comply with any deed restrictions, institutional controls, soil management plans, or restrictive covenants or other conditions imposed by any Environmental Authority.

(b) To the extent Declarant is lawfully and reasonably directed by Ecology or another Environmental Authority (without advocacy by Owner or Occupants for increased or accelerated work) to perform environmental assessment or remediation work at the Property, Declarant will diligently complete such work at its sole cost and expense, except that Declarant shall not be required to perform any cleanup pursuant to this Declaration to the extent of any Post-Effective Date Hazardous Impacts occurring on, in, under or from the Property. , nor any cleanup related to development or redevelopment of all or any portion of the Property as discussed above in section 3.4., except to the extent caused by Declarant's (or any Other Entities') gross negligence or willful misconduct or due to a Post-Effective Date Hazardous Impact occurring on, in, under or from the Retained Property. Declarant shall address existing, identified contamination as of the Declaration date to commercial/industrial standards pursuant to and in accordance with diligent performance under the Agreed Order. Owner is responsible for all other remediation obligations and costs, including those that may be triggered by Owner's site redevelopment, except that Declarant shall be solely responsible for any remediation obligations and costs to the extent Ecology or other Environmental Authority imposes new requirements associated with Declarant's obligations pursuant to the Agreed Order that are 1) not directly caused by Owner's redevelopment, and 2) not a result of Owner or Occupants petitioning, advocating, or soliciting Ecology or other Environmental Authority to expand Declarant's obligations under the Agreed Order. To the extent remediation costs are incurred due to Declarant's Post-Effective Date Hazardous Impacts occurring on, in, under or from the Retained Property, Declarant shall also diligently complete such work.

3.6.2 Right of Entry. The Declarant hereby reserves and each Owner hereby grants to Declarant a nonexclusive right, subject to the terms of Sections 3.6.1(a) and (b) and at no expense to Owner to enter the Property and to permit Ecology or other Environmental Authority having jurisdiction over environmental conditions at the Property, to enter the Property from time to time after the Effective Date as deemed by Declarant, Ecology and/or other Environmental Authority reasonably necessary to conduct or oversee any environmental assessment, sampling, or remediation activities at or in connection with the Property. Declarant shall not be required to pay a fee to Owner for the right of entry provided for in this Section 3.6.2, except that Declarant shall promptly reimburse Owner for any extraordinary out of pocket expenses incurred by Owner as a result of such entry. Such entry shall include the right to utilize the Owner and Occupant's utilities in connection with such activities, at the expense of the Declarant. In the event of any surface disturbances, Declarant shall restore the surface of the Property to its grade as it existed immediately prior to such disturbance and shall provide replacement landscaping for areas that were not paved immediately prior to such disturbance and replacement paving, sealing, and striping for areas that were part of a parking lot immediately prior to such disturbance. Such entry may be made forty-eight (48) hours after giving written notice to Owner, PROVIDED that in the case of an emergency, Declarant, Ecology and/or other Environmental Authority may make an entrance without providing notice. For this purpose, emergencies and emergent conditions shall be deemed to include detection of markedly increased contamination levels and any matter that Ecology or other Environmental Authority directs Declarant to address on an emergency basis. Declarant hereby agrees that it shall promptly following the transmittal or receipt thereof, provide the Owner(s) with copies of all material correspondence, final reports, and other written communications between Declarant and any Environmental Authority that relate to the Property.

3.6.3 Wells and Other Remediation Structures. Declarant may install wells or other remediation-related structures on the Property at locations mutually agreeable to Declarant and Owner, subject to the concurrence of Ecology or other Environmental Authority, but, subject to the concurrence of Ecology or other Environmental Authority, Declarant shall use commercially reasonable efforts to avoid installation of any wells inside a building constructed or being constructed on the Property. Four groundwater monitoring wells are currently on the Property, and, subject to the concurrence of Ecology or other Environmental Authority, Declarant shall make commercially reasonable efforts to abandon them before Owner's construction begins. Declarant may reinstall said wells as provided above, and shall have access to the Property pursuant to Section 3.6.2 to install, monitor, maintain and close and decommission such wells. Promptly after Declarant's completion of its remediation obligations at the Property, Declarant, at no expense to the Owner, shall close and decommission any and all wells and other remediation-related structures Declarant has installed on the Property. Such closure and decommission shall be done in accordance with applicable laws and regulations, and upon such wells and other remediation-related structures being so decommissioned, Declarant's access rights to the Property pursuant to Section 3.6.2 shall terminate. Any wells and other remediation-related structures located on the Property shall be maintained in a good state of repair and operation in accordance with applicable legal requirements by the Declarant at no expense to the Owner. Neither the Owner nor any Occupant shall construct any improvements nor allow the construction of any improvements (other than parking area curbs and paving and drainage/landscaping berms) within twenty-five (25) feet of any such wells and other remediation-related structures unless the locations of such improvements are mutually agreed to in writing between Declarant and Owner. If the Owner or Occupant damages the wells or other remediation-related structures, they shall compensate Declarant for Declarant's actual costs of repair. The Declarant shall provide Owner with copies of all work plans approved by Ecology, or other Environmental Authority, all final reports provided to Ecology, EPA and/or any other Environmental Authority with respect to such wells and other remediation activities.

If an Environmental Authority orders, or indicates in writing that it may order, the installation of additional monitoring wells or other remediation-related structures on the Property, the Declarant shall give the owner of the Property written notice thereof as soon thereafter as is reasonably possible. If the Owner reasonably believes that the location of such additional wells or other remediation-related structures will interfere with business operations on the Property, or the planned development or redevelopment of the Property, it shall provide Declarant in writing its objections, and the Declarant shall provide such written objections to the Environmental Authority. Declarant and the Owner shall be entitled to provide representatives who shall be present if and when such objections are discussed with the Environmental Authority.

3.6.4 Stormwater Management Owner and Occupant Requirements. Declarant makes no representations regarding what is required to achieve stormwater compliance at the Property. Except with regard to the Leased Premises during the Term, the Owners and Occupants of the Property are responsible for determining the content and applicability of all stormwater management rules and regulations of Ecology or other Environmental Authority with respect to the Property. The Owners and Occupants of the Property shall comply with all such rules and regulations.

No later than 12 months from the Effective Date, Declarant and Owner shall fully sever the intermingling of stormwater between the Property and the Retained Property, including intermingling within the piping, drainage and other stormwater collection and conveyance features. Declarant and Owner agree to identify a primary representative for each party to support coordination and notification of the status of progress toward full severance between the Property and the Retained

Property. Neither Declarant nor Owner shall complete severance measures between the Property and the Retained Property that could materially and adversely affect the other party (for example, by causing flooding) without written approval from such other party. After severance between the Property and the Retained Property, in no event shall stormwater flows at or from the Property be permitted to encroach upon the Retained Property or to interfere with Declarant's ability to comply with its own stormwater permit requirements with respect to the Retained Property. After severance between the Property and the Retained Property, stormwater flows at or from the Property shall not be permitted to enter Declarant's stormwater pipes traversing the Property as defined in "Private Drainage and Utility Easement "A"". After severance, Declarant shall not permit stormwater flows at or from the Retained Property from encroaching upon the Property, with the exception of water contained within Declarant's stormwater pipes as defined in "Private Drainage and Utility Easement "A"", nor interfere with Owner's ability to comply with its own stormwater permit requirements with respect to the Property. Notwithstanding anything to the contrary in this Section 3.6.4, Owner shall have until 120 days after termination of Declarant's possession of the Leased Premises to sever any and all stormwater flow from the Leased Premises to the Retained Property.

Prior to commencing redevelopment activities, Owner shall obtain an Owner's Construction Stormwater General Permit. If Owner commences redevelopment activities during the time preceding completion of the severance, Owner shall monitor the Property's stormwater insofar as required by Owner's Construction Stormwater General Permit at a point prior to said stormwater entering the Retained Property as well as at any point within the Property where Property stormwater enters Declarant's pipes as shown in "Private Utility and Drainage Easement "A""; and will share all results promptly with Declarant. Declarant shall also monitor the Retained Property stormwater in accordance with Declarant's Construction Stormwater General Permit and Industrial Stormwater General Permit at a point prior to said stormwater entering the Property, and Declarant will share all results promptly with Owner. Following severance, Declarant and Owner shall continue to monitor their respective stormwater flows as required by any applicable permits, but both Owner and Declarant shall no longer be obliged to promptly share sampling results once severance is completed.

Prior to severance of stormwater flows between the Property and the Retained Property, each Owner and Occupant (apart from Declarant on the Leased Property, which shall act in compliance with its existing permit), shall not engage in any of the following: a) vehicle traffic or parking, except that isolated intermittent vehicle traffic or parking for security purposes or in support of redevelopment planning is allowed, provided that under no circumstances shall parking or storage of leaking vehicles beyond the time required for reasonably prompt removal following discovery be allowed; b) ground surface disturbance; c) construction; and d) uncovered outdoor storage of equipment, tools, materials, or any other items that could contribute to material stormwater pollution.

Declarant hereby reserves reasonable access, upon reasonable prior written notice to Owner, to the Property prior to the severance between the Property and the Retained Property to conduct its own monitoring of stormwater flows onto the Retained Property.

For as long as Declarant owns all or any part of the Retained Property, Owner and Occupant shall allow Declarant access to the Property pursuant to Section 3.6.2 to conduct sweeping of all outdoor areas at least twice per month at the sole cost and expense of Declarant, provided, however, that such street sweeping shall not interfere with Owner's or Occupant's use of or operations at the Property and that Declarant may terminate such sweeping at any time in its sole discretion.

3.6.5 Rights Reserved. **Nothing in this Declaration shall be deemed to abrogate or alter the rights and obligations of Declarant and any other party (including any Owner) pursuant to any agreement between them, including without limitation the agreement pursuant to which the Declarant sold the Property to its original Owner.**

4. ENFORCEMENT AND OTHER MATTERS.

As between Declarant and any Owner or Occupant of all or any part of the Property, Owner and Declarant shall have the right to enforce this Declaration by obtaining injunctive relief and/or by other lawful means. If any violation or contravention of any provision of this Declaration has occurred, then each party shall bear its own costs, including attorneys' fees and disbursements, in connection with the investigation of such violation or contravention and the enforcement of this Declaration. Neither Declarant nor an Owner of a Lot may exempt itself from liability for the payment of any amount due under this Declaration by abandoning its Lot. If the breaching party fails to pay any amount due hereunder within fourteen (14) days of written demand therefor, the non-breaching party may sue such breaching party to collect such amounts but each party shall bear its own costs in connection with such collection, including the fees and disbursements of legal counsel (including any such costs incurred on appeal).

4. 1 Constructive Notice and Acceptance. Every Person who now or hereafter owns or acquires any right, title or interest in or to any portion of the Property is and shall be conclusively deemed to have consented and agreed to every covenant, condition, restriction and provision contained in this Declaration, whether or not any reference to this Declaration is contained in the instrument by which such Person acquired an interest in the Property.

4.2 Rights Under Other Documents. Nothing herein contained shall prejudice or diminish in any way Declarant's or any other Owner's rights under any other documents that have been or that may be subsequently entered into and/or recorded against all or any portions of the Property.

4.3 Notices. Except as otherwise expressly provided in this Declaration or required by law, all notices, consents, requests, demands, approvals, authorizations and other communications provided for herein shall be in writing and shall be deemed to have been duly given if and when personally served or (i) seventy-two (72) hours after being sent if sent by United States first class mail, postage prepaid, or (ii) the next business day if sent by a nationally recognized overnight courier (such as Federal Express) to the Owner of the Property at the Property and to the Declarant at:

Boeing Global Real Estate
153 James S. McDonnell Blvd.
MC_S221-1400
Hazelwood, MO 63042
Attention: Marc A. Poulin
Telephone: 314-409-3576
Email: marc.a.poulin@boeing.com

With a copy to:

Boeing Law Department
7755 E. Marginal Way South, MC-11-509
Seattle, WA 98108
Attention: Real Estate Counsel

With respect to (i) any such notice, consent, request, demand, approval, authorization or communication and (ii) any document or instrument given or made available to any Owner hereunder and which might concern an Occupant of such Owners' Lot, it shall be the sole responsibility of such Owner (but in no event the responsibility of the Declarant) to make a copy thereof available in a timely manner to such Occupant.

4.4 No Waiver. The failure to enforce any provision of this Declaration shall not constitute a waiver of the right to thereafter enforce such provision or the right to enforce any other provision hereof.

4.5 Effect of Invalidation. Each covenant, condition and restriction of this Declaration is intended to be, and shall be construed as, independent and severable from each other covenant, condition and restriction. If any covenant, condition or restriction of this Declaration is held to be invalid by any court, the invalidity of such covenant, condition or restriction shall not affect the validity of the remaining covenants, conditions and restrictions hereof.

4.6 No Discriminatory Restrictions. No Owner or Occupant shall execute or cause to be recorded any instrument that imposes a restriction upon the sale, leasing, or occupancy of his Lot on the basis of race, sex, marital status, national ancestry, color or religion.

4.7 Cumulative Remedies. Each remedy provided for in this Declaration shall be cumulative and not exclusive. The failure to exercise any remedy provided for in this Declaration shall not constitute a waiver of such remedy or of any other remedy provided herein or therein.

4.8 Attorneys' Fees and Costs. If any Person commences litigation for the judicial interpretation or enforcement hereof, or for damages for the breach hereof the prevailing party shall be entitled to its reasonable attorneys' fees and court and other costs incurred.

4.9 Estoppel Certificates; Mortgagee Protection.

(a) Estoppel Certificates. At any time and from time to time within ten (10) days after written notice or request by an Owner, Declarant at no cost or expense to the requesting party shall execute and deliver to Owner or any actual or potential (i) mortgagee, (ii) ground lessee or (iii) purchaser of the Property a statement certifying that this Declaration is unmodified and in full force and effect or if there have been modifications that it is in full force and effect as modified in the manner specified in the statement and that among other things reasonably requested there exists no default under this Declaration other than as may be specified therein. If Declarant fails to deliver any such statement within ten (10) days after written notice or request by an Owner, and if Declarant further fails to deliver such statement within five (5) days after a second written request from an Owner (which second written request shall specifically refer to the deemed estoppel under this sentence) then it shall be conclusively deemed that this Declaration is in full force and effect and there exists no default under this Declaration.

(b) Mortgagee Protection. No breach of the covenants or restrictions herein contained, shall defeat or render invalid the lien of any Mortgage (as defined below), but all of the covenants and restrictions shall be binding upon and effective against any party whose title is derived through foreclosure or trustee's sale, or through a deed in lieu of foreclosure. If the holder of a Mortgage of record or other purchaser of the Property so obtains title to the Property, neither such purchaser, nor its successor in interest, shall be liable for any sums due or assessed against the Property prior to such foreclosure but only for such sums assessed after such foreclosure. Notwithstanding anything to the contrary provided for herein, in the event of a default by any party, the rights of Declarant set forth in this Declaration may not be exercised until written notice of such default is given to any Mortgagee (as defined below) that gave written notice to Declarant of Mortgagee's security interest in the Property, and such Mortgagee shall have an additional fifteen (15) days (with respect to monetary defaults only) or an additional thirty (30) days (with respect to non-monetary defaults) beyond the applicable cure period set forth in this Declaration within which to cure or to commence the curing of such default (nothing contained herein shall obligate a Mortgagee to cure a default, it being understood that any election to cure a default shall be at the Mortgagee's sole option). In case of a default which is not susceptible of being cured by the

Mortgagee within such time, such cure period shall be further extended for so long as the Mortgagee institutes proceedings to acquire title to the Property encumbered by the Mortgage, by foreclosure or otherwise, and is diligently prosecuting the cure to completion (provided that it shall not be required to cure personal defaults of its Owner to the extent not susceptible of cure by Mortgagee so long as Mortgagee is diligently prosecuting foreclosure (or similar proceeding to acquire title to the Property) to completion and upon completion of such foreclosure (or similar proceeding) such defaults shall be deemed waived). No Mortgagee shall be liable for or obligated to perform the obligations of the Owner whose Property or interest therein is encumbered by such Mortgagee under this Declaration unless and until such Mortgagee becomes the owner of such Owner's interest under this Declaration by foreclosure, assignment, deed in lieu of foreclosure or otherwise or except to the extent such Mortgagee undertakes to perform such Owner's obligation hereunder. Thereafter; such Mortgagee and its successors and assigns shall each remain liable for the obligations of such Owner only so long as they are the owner of such Owner's interest under this Declaration. Any such Mortgagee, or any successor or assign of such Mortgagee which becomes the owner of such Owner's interest under this Declaration, shall be entitled to all of the rights and privileges of such Owner under this Declaration.

The term "**Mortgage**" means any duly recorded mortgage, deed of trust, or other security instrument, given for value which constitutes a valid lien on all or any part of the Property or any lease, easement or other interest in all or part thereof, and "**Mortgagee**" means the holder from time to time of any Mortgage.

5. GENERAL PROVISIONS.

a. Runs with Land. The burden and benefits of the covenants, conditions, easements and restrictions contained herein with respect to the Property, shall run with the land described in Exhibit A. The burdens and benefits of the covenants, conditions, easements, and restrictions contained herein with respect to the Retained Property, shall run with the land described in Exhibit B, PROVIDED that for so long as The Boeing Company or the Other Entities as defined in Section 2 of this Declaration is the owner of any part of the Retained Property, any amendments or modifications to this Declaration shall require the prior written consent of The Boeing Company (or the Other Entities) and a Majority of the Owners of the Property, which consent shall not be unreasonably withheld, conditioned or delayed, PROVIDED that any amendment or modification to this Declaration that is required by an Environmental Authority (as defined below) shall be made whether or not The Boeing Company (or the Other Entities) or the Owners of the Property provide their consent. In determining whether a “Majority” of the Owners approves an amendment or modification, each Owner shall be given one vote for each square foot of land contained within such Owner’s Lot.

b. Headings; Exhibits. Paragraph, Section and Article headings, where used in this Declaration, are inserted for convenience only and are not intended to be a part hereof or in any way to define, limit or describe the scope and intent of the particular provisions to which they refer. Exhibits A, B, and C are part of this Declaration and are incorporated into this Declaration by this reference.

c. Law. This Declaration shall be interpreted and enforced pursuant to the laws of the State of Washington, without reference to its choice of law rules.

d. Severability. If any term or provision of this Declaration or the application thereof to any Person or circumstances shall to any extent be invalid and unenforceable, the remainder of this Declaration or the application of such term or provision to Persons or circumstances other than those as to which it is invalid or unenforceable, shall not be affected thereby, and each term and provision of this Declaration shall be valid and shall be enforced to the extent permitted by law.

e. Construction. This Declaration shall be liberally construed in order to effectuate its purposes.

f. Singular Includes Plural. Whenever the context of this Declaration requires, the singular shall include the plural, and vice versa, and the masculine shall include the feminine and the neuter, and vice versa.

Signature appears on the next sheet. The remainder of this page is left blank intentionally.

IN WITNESS WHEREOF, Declarant has duly executed this Declaration as of the day and year first hereinabove set forth.

THE BOEING COMPANY

By: Marc A. Poulin
Marc A. Poulin
Title: Authorized Signatory
Date Signed: December 30, 2019

STATE OF WASHINGTON }
} ss.
COUNTY OF KING }

I certify that I know or have satisfactory evidence that the person appearing before me and making this acknowledgment is the person whose true signature appears on this document.

On this day of , 20___ before me personally appeared, to me known to be the Authorized Signatory of the corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument and that the seal affixed, if any, is the corporate seal of said corporation.

WITNESS my hand and official seal hereto affixed the day and year first above written.

____
Notary Public in and for the State of Washington
Residing at ____________________________
My commission expires: ____________________
____
[Type or Print Notary Name]

STATE OF MISSOURI

COUNTY OF ST. LOUIS

On this 30th day of December in the year 2019, before me appeared Marc A. Poulin, to me personally known, who, being by me duly sworn, did say that he is an authorized signatory of The Boeing Company, that said instrument was signed in behalf of and by authority of said company, and said person acknowledged said instrument to be the free act and deed of said company.

In witness whereof, I have hereunto set my hand and affixed my official seal on the County and State aforesaid, the day and year first above written.

HOLLY B. KARSTETER
My Commission Expires
April 5, 2023
St. Louis County
Commission #15168840

Holly B. Karsteter
Notary Public

EXHIBIT A

LEGAL DESCRIPTION
OF PROPERTY

SEE ATTACHED

EXHIBIT A

LEGAL DESCRIPTION: Real property in the County of King, State of Washington, described as follows:

PARCEL A:

LOTS 20 OF PACIFIC GATEWAY BUSINESS PARK FILE NO. SU99-1, AS PER THE PLAT RECORDED IN VOLUME 197 OF PLATS, PAGES 62 THROUGH 71, IN KING COUNTY, WASHINGTON.

PARCEL B:

LOTS 16, 17, 18, 19, 23, 24, 25, 27 AND TRACTS D, E AND G OF PACIFIC GATEWAY DIVISION IV BINDING SITE PLAN 5th MODIFICATION, ACCORDING TO THE PLAT RECORDED UNDER RECORDING NUMBER 20191223001090, IN VOLUME 290 OF PLATS AT PAGES 56 THROUGH 63, IN KING COUNTY, WASHINGTON.

PARCEL C:

LOTS 7 AND 8 OF CITY OF KENT BOUNDARY LINE ADJUSTMENT LL-2019-8, RECORDED UNDER RECORDING NUMBER 20191223900004, IN KING COUNTY, WASHINGTON.

EXHIBIT B

LEGAL DESCRIPTION
OF RETAINED PROPERTY

SEE ATTACHED

EXHIBIT "B"

LEGAL DESCRIPTION
OF RETAINED AREA

A PORTION OF LAND LYING IN THE NORTHWEST QUARTER, SOUTHWEST QUARTER, SOUTHEAST QUARTER AND NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 2, TOWNSHIP 22 NORTH, RANGE 4 EAST, W.M., KING COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

ALL OF LOTS 9, 12, 13, 14, 20, AND 21 OF PACIFIC GATEWAY DIVISION IV BINDING SITE PLAN, AS MODIFIED ACCORDING TO THE PLAT RECORDED IN VOLUME 262 OF PLATS AT PAGES 67 THROUGH 73 AND AS AMENDED IN VOLUME 265 OF PLATS AT PAGES 42 THROUGH 49, IN KING COUNTY, WASHINGTON;

TOGETHER WITH THAT PORTION OF LOT 15 AND TRACT C OF SAID BINDING SITE PLAN LYING WEST OF THE FOLLOWING DESCRIBED LINE:

COMMENCING at the southwest corner of said Lot 15;
THENCE South 89°56'25" West, along the south line of said Lot 15 a distance of 108.79 feet to the POINT OF BEGINNING of said line;
THENCE North 00°02'42" West, a distance of 94.96 feet to a point of curve to the right having a radius of 290.50 feet and a central angle of 20°03'13";
THENCE Northerly along the arc a distance of 101.68 feet;
THENCE North 20°00'31" East, a distance of 126.75 feet to a point of curve to the left having a radius of 229.50 feet and a central angle of 20°00'55";
THENCE Northerly along the arc a distance of 80.17 feet;
THENCE North 00°00'24" West, a distance of 21.75 feet to the south line of said Tract C;
THENCE continuing North 00°00'24" West, a distance of 61.00 feet to the north line of said Tract C and the terminus of said line.

TOGETHER WITH THAT PORTION OF LOTS 22, 23 AND 24 OF SAID BINDING SITE PLAN LYING WEST AND SOUTH OF THE FOLLOWING DESCRIBED LINE:

COMMENCING at the southeast corner of said Lot 24;
THENCE South 89°59'36" West, along the south line of said Lot 24 a distance of 22.62 feet to the POINT OF BEGINNING of said line;
THENCE North 20°51'37" West, a distance of 72.91 feet to a point of curve to the right having a radius of 190.00 feet and a central angle of 20°50'25";
THENCE northerly along the arc a distance of 69.11 feet;
THENCE North 00°01'12" West, a distance of 143.58 feet;
THENCE North 89°41'42" West, a distance of 801.35 feet;
THENCE North 00°00'07" East, a distance of 46.78 feet;
THENCE South 78°28'54" West, a distance of 105.50 feet to the easterly margin of 62nd Avenue South and the terminus of said line.

Project: 18619 Boeing disposition lots
18619L.007.doc
December 11, 2019
OBH

TOGETHER WITH THAT PORTION OF LOTS 6 AND 9 OF PACIFIC GATEWAY DIVISION II SHORT PLAT RECORDED UNDER RECORDING NO. 20030506900014, IN KING COUNTY, WASHINGTON, LYING WEST OF THE FOLLOWING DESCRIBED LINE:

COMMENCING at the southeast corner of said Lot 6;
THENCE North 89°23'10" West, a distance of 66.32 feet to the POINT OF BEGINNING and the beginning of a curve to the left, of which the radius point lies North 00°36'50" East, a radial distance of 35.00 feet;
THENCE Northeasterly along the arc, through a central angle of 90°36'50", a distance of 55.35 feet;
THENCE North 00°00'00" East, a distance of 244.02 feet to a point of curve to the right having a radius of 290.50 feet and a central angle of 13°18'38";
THENCE Northerly along the arc a distance of 67.49 feet;
THENCE North 13°18'38" East, a distance of 140.23 feet to a point of curve to the left having a radius of 229.50 feet and a central angle of 13°21'20";
THENCE Northerly along the arc a distance of 53.50 feet;
THENCE North 00°02'42" West, a distance of 269.37 feet to the north line of said Lot 9 and the terminus of said line.

OWEN B. HILL
STATE OF WASHINGTON
40016
REGISTERED
PROFESSIONAL LAND SURVEYOR
12/11/2019

Project: 18619 Boeing disposition lots
18619L.007.doc
December 11, 2019
OBH

EXHIBIT C

MINIMUM VAPOR BARRIER SPECIFICATIONS and VAPOR BARRIER AREA

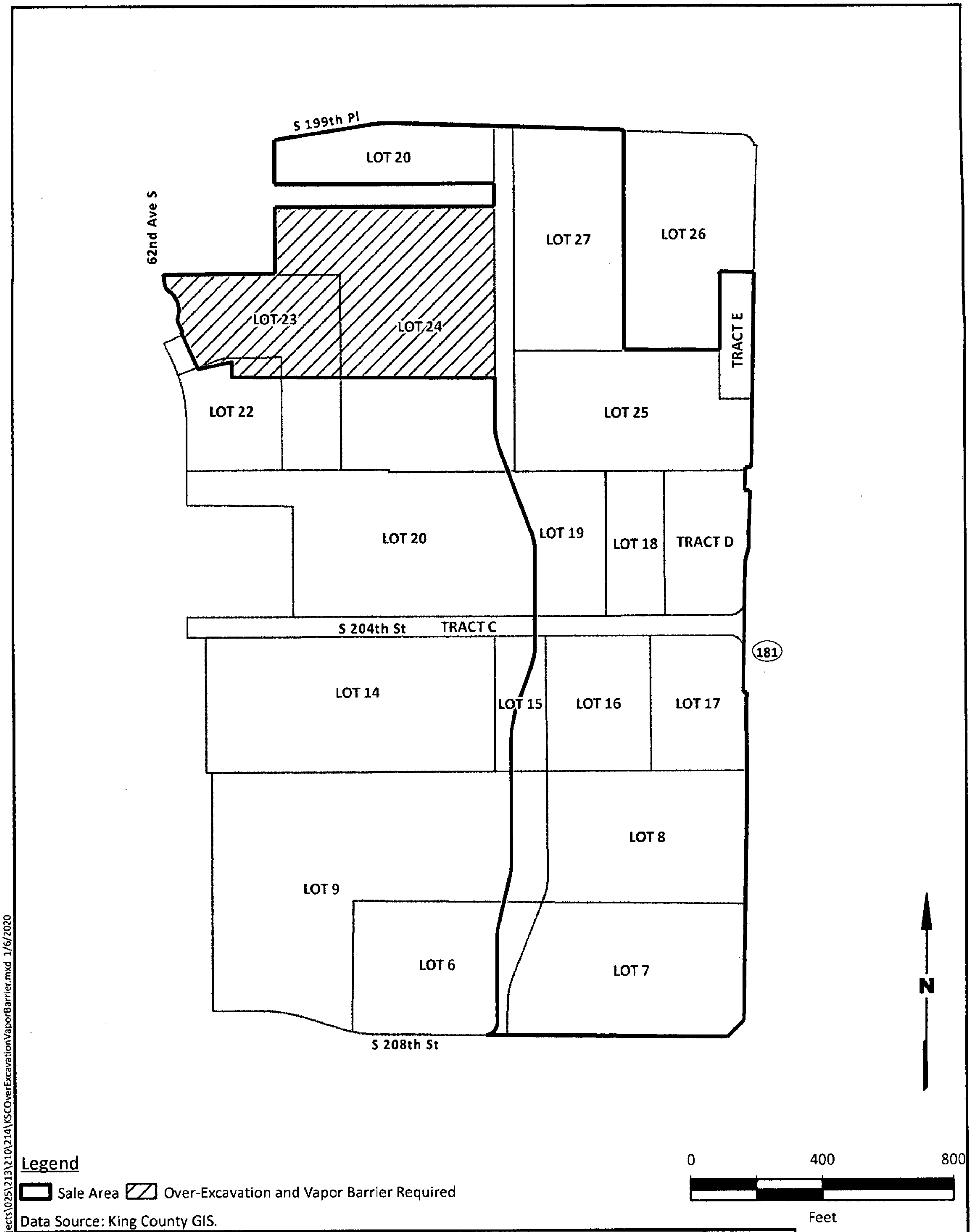
For all Improvements constructed after Closing and located within the Vapor Barrier Area shown in this Exhibit C, where any part of said Improvement is intended for human occupancy, vapor barriers that meet the minimum specifications below are required.

The Owner is solely responsible for the design, installation, and maintenance of the vapor barrier. Minimum specifications for vapor barriers include the following:

- Vapor barriers shall be designed by an engineer registered in the State of Washington with applicable vapor barrier project experience.
- Vapor barrier design shall meet minimum specifications for vapor barriers as required by the US Environmental Protection Agency or the Washington State Department of Ecology (if available).
- Selected barrier material is to be rated for protection against vapor intrusion for volatile organic compounds (VOCs), including both petroleum hydrocarbon-based VOCs as well as chlorinated solvent VOCs.
- Vapor barrier is to be installed by a contractor certified by the vapor barrier manufacturer.
- Vapor barrier is to be installed to the manufacturer's specifications.
- Vapor barrier is to be sealed and tested (e.g. smoke test) by a certified contractor in accordance with manufacturer specifications.

Owner is to develop an Operation and Maintenance Plan for the vapor barrier and provide documentation, including all as-built construction quality assurance documentation, to Declarant that the vapor barrier meets the minimum specifications listed above.

[PLACEHOLDER FOR VAPOR BARRIER AREA FIGURE]



Over-Excavation and Vapor Barrier Requirements
Kent Space Center
Kent, Washington

Scale
1 : 4,800

Appendix B

Boring Logs

DALTON OLMSTED FUGLEVAND

LOG OF MW-1

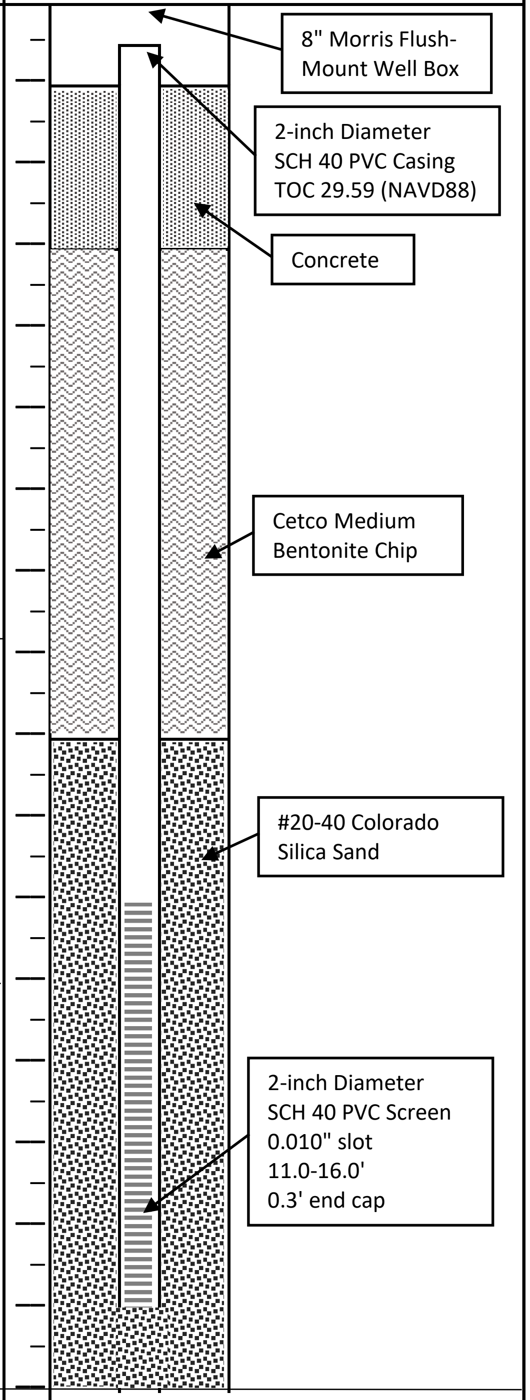
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 157218.0**N** 1288399.3**E** (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION: 29.9 (NAVD88)	
DRILLING CONTRACTOR: Cascade	DATE: 4/13/17	
DRILLING EQUIPMENT: CME 75	TOTAL DEPTH OF BORING: 17.0'	ECOLOGY ID: BKA-087
DRILLING METHOD: 4" ID Hollow-Stem Auger	LOGGED BY: D. Cooper	
SAMPLING METHOD: 3" dia. Split-Spoon w/ 300# Hammer	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
					2-inches Asphalt Concrete Paving
1					
2	MW!-2.5				
3					
4					POORLY GRADED SAND WITH GRAVEL (SP): brown (7.5YR-5/3), moist to wet, 20% gravel, 60% sand, 20% silt
5			3/4/5	0.1	
6					
7			3/4/8		-becoming wet, but not saturated
8			4/3/5	0.0	
9					
10			3/3/4		SILT (ML): gray (7.5YR-6/1), wet, 100% silt
11			5/9/2	0.1	
12					∇
13			5/9/3		
14			3/3/3		POORLY GRADED SAND (SP): gray (7.5YR-5/1), saturated, 90% fine sand, 10% silt with silty interbeds
15					
16			2/2/2		SILT (ML)
17					Bottom of Boring 17.0 feet
18					
19					
20					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

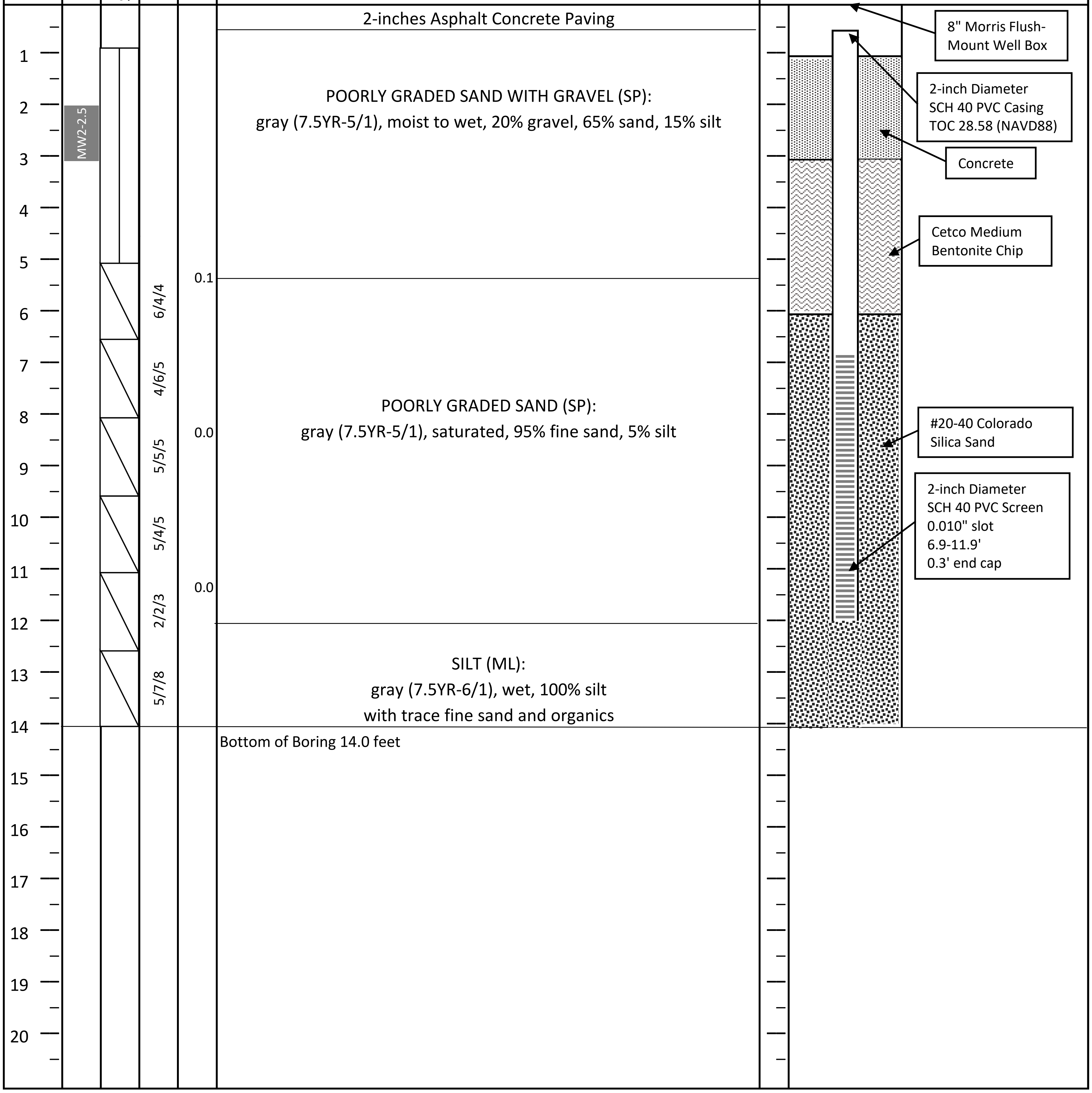
LOG OF MW-2

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156911.0**N** 1289528.0**E** (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION: 29.0 (NAVD88)	
DRILLING CONTRACTOR: Cascade	DATE: 4/14/17	
DRILLING EQUIPMENT: CME 75	TOTAL DEPTH OF BORING: 14.0'	ECOLOGY ID: BKA-089
DRILLING METHOD: 4" ID Hollow-Stem Auger	LOGGED BY: D. Cooper	
SAMPLING METHOD: 3" dia. Split-Spoon w/ 300# Hammer	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blow Counts	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



2-inches Asphalt Concrete Paving

POORLY GRADED SAND WITH GRAVEL (SP):
gray (7.5YR-5/1), moist to wet, 20% gravel, 65% sand, 15% silt

POORLY GRADED SAND (SP):
gray (7.5YR-5/1), saturated, 95% fine sand, 5% silt

SILT (ML):
gray (7.5YR-6/1), wet, 100% silt
with trace fine sand and organics

Bottom of Boring 14.0 feet

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

LOG OF MW-3

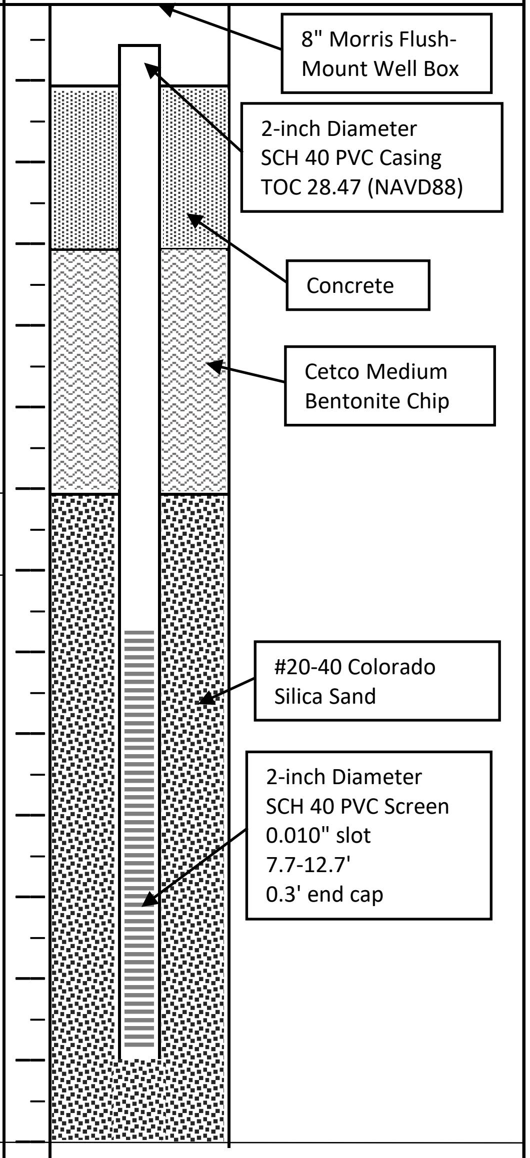
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 155979.9**N** 1289581.4**E** (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION: 28.8 (NAVD88)
DRILLING CONTRACTOR: Cascade	DATE: 4/14/17
DRILLING EQUIPMENT: CME 75	TOTAL DEPTH OF BORING: 14.0' · ECOLOGY ID: BKA-090
DRILLING METHOD: 4" ID Hollow-Stem Auger	LOGGED BY: D. Cooper
SAMPLING METHOD: 3" dia. Split-Spoon w/ 300# Hammer	RESPONSIBLE PROF.: D. Cooper · REG. NO.: 1600

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES				VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
	Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	
					2-inches Asphalt Concrete Paving
1					
2	MW3-2.5				POORLY GRADED SAND WITH GRAVEL (SP): gray (7.5YR-5/1), moist to wet, 20% gravel, 60% sand, 20% silt
3					
4					
5			2/2/2	0.0	
6					SILT (ML): gray (7.5YR-6/1), wet, 100% silt, trace organics
7			2/2/3		
8				0.0	▽
9			1/1/1		
10			3/3/4		
11				0.0	POORLY GRADED SAND (SP): gray (7.5YR-5/1), saturated, 95% fine sand, 5% silt with silt clasts and silt interbeds
12			7/8/8		
13			7/10/2		
14					Bottom of Boring 14.0 feet
15					
16					
17					
18					
19					
20					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF MW-4

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 155134.9**N** 1289093.6**E** (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION: 29.2 (NAVD88)
DRILLING CONTRACTOR: Cascade	DATE: 4/14/17
DRILLING EQUIPMENT: CME 75	TOTAL DEPTH OF BORING: 14.0' ECOLOGY ID: BKA-091
DRILLING METHOD: 4" ID Hollow-Stem Auger	LOGGED BY: D. Cooper
SAMPLING METHOD: 3" dia. Split-Spoon w/ 300# Hammer	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600
NOTES: Boring cleared by Air-Knife from 0-5'	

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blow Counts	SAMPLES: PID (ppm)
2–3	MW4-2.5			
5				0.0
5–6.5			2/2/1	
6.5–8			2/2/3	
8				0.1
8–9.5			2/4/4	
9.5–11			4/4/4	
11				0.1
11–12.5			3/4/4	
12.5–14			6/7/7	

VISUAL SOIL DESCRIPTION

Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors

2-inches Asphalt Concrete Paving

POORLY GRADED SAND WITH GRAVEL (SP):
gray (7.5YR-5/1), moist to wet, 20% gravel, 60% sand, 20% silt

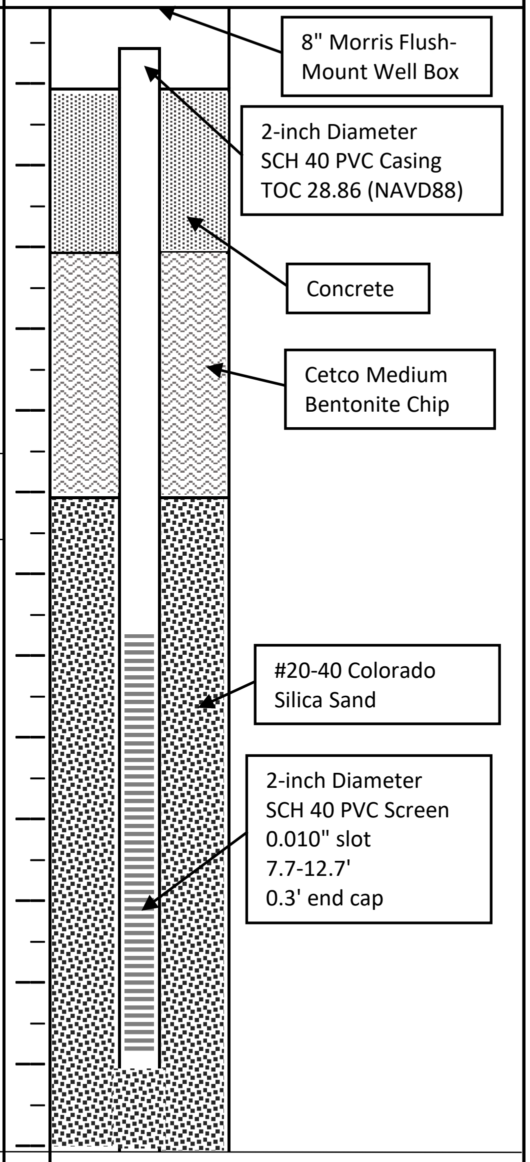
SILT (ML):
gray (7.5YR-6/1), wet, 100% silt, soft

POORLY GRADED SAND WITH SILT (SP-SM):
gray (7.5YR-5/1), moist to saturated, 70% sand, 30% silt

POORLY GRADED SAND (SP):
gray (7.5YR-5/1), saturated, 100% fine sand
with silt interbeds

Bottom of Boring 14.0 feet

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

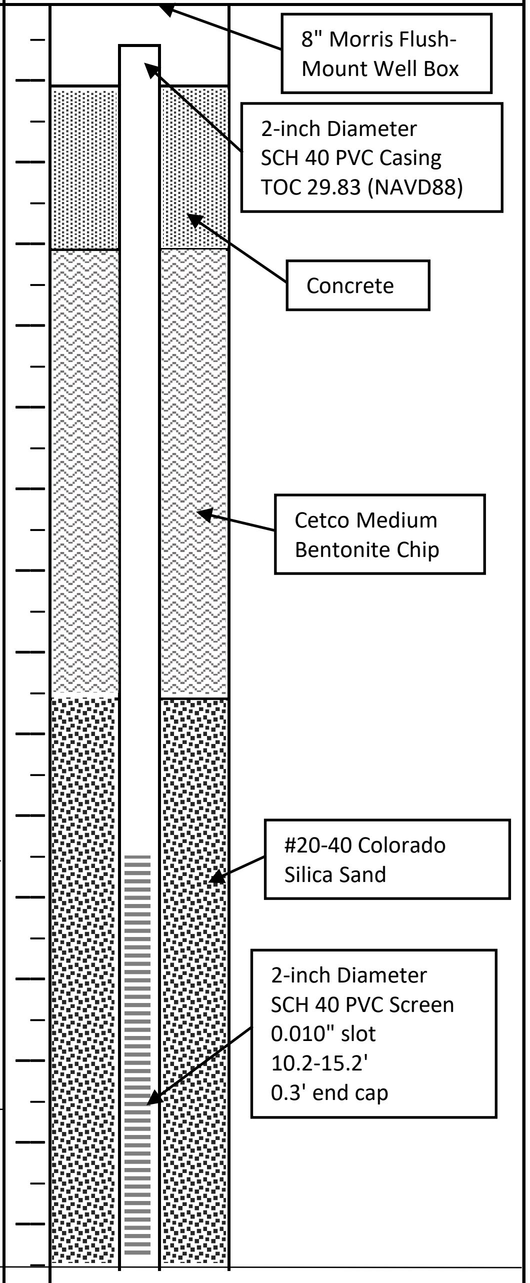
LOG OF MW-5

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 155231.7**N** 1288197.2**E** (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION: 30.3 (NAVD88)	
DRILLING CONTRACTOR: Cascade	DATE: 4/14/17	
DRILLING EQUIPMENT: CME 75	TOTAL DEPTH OF BORING: 15.5'	ECOLOGY ID: BKA-092
DRILLING METHOD: 4" ID Hollow-Stem Auger	LOGGED BY: D. Cooper	
SAMPLING METHOD: 3" dia. Split-Spoon w/ 300# Hammer	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by Air-Knife from 0-5'		

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Blow Counts	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
0				2-inches Asphalt Concrete Paving
2.5	MW5-2.5			POORLY GRADED SAND WITH GRAVEL (SP): brown (7.5YR-5/3), moist to wet, 20% gravel, 60% sand, 20% silt poor recovery to 9.5', grading silty
5		3/3/4	0.1	
6.5		6/6/4		
8		5/5/5	0.0	
9.5		3/4/5		
10.5				SILT (ML): gray (7.5YR-6/1), wet, 100% silt soft, organic silt interbeds, gravel clasts
11		3/4/4	0.2	
12.5		8/15/15		
13.5				POORLY GRADED SAND (SP): gray (7.5YR-5/1), saturated, 100% fine sand with silt clasts
14		7/14/15		
15.5				Bottom of Boring 15.5 feet

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

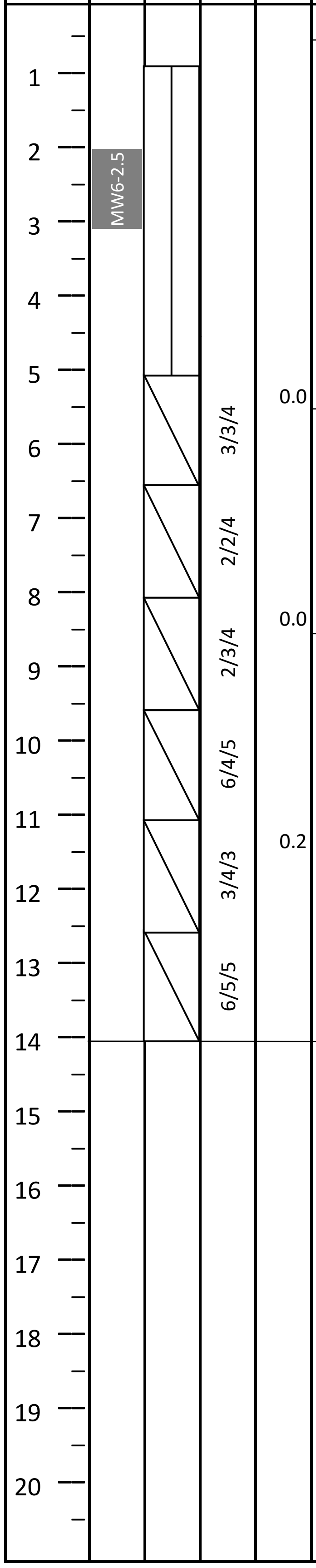
LOG OF MW-6

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156258.2**N** 1288065.8**E** (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION: 29.5 (NAVD88)
DRILLING CONTRACTOR: Cascade	DATE: 4/13/17
DRILLING EQUIPMENT: CME 75	TOTAL DEPTH OF BORING: 14.0' ECOLOGY ID: BKA-088
DRILLING METHOD: 4" ID Hollow-Stem Auger	LOGGED BY: D. Cooper
SAMPLING METHOD: 3" dia. Split-Spoon w/ 300# Hammer	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet) | SAMPLES: Lab Sample, Sample Recovery, Blow Counts, PID (ppm)



VISUAL SOIL DESCRIPTION

Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors

2-inches Asphalt Concrete Paving

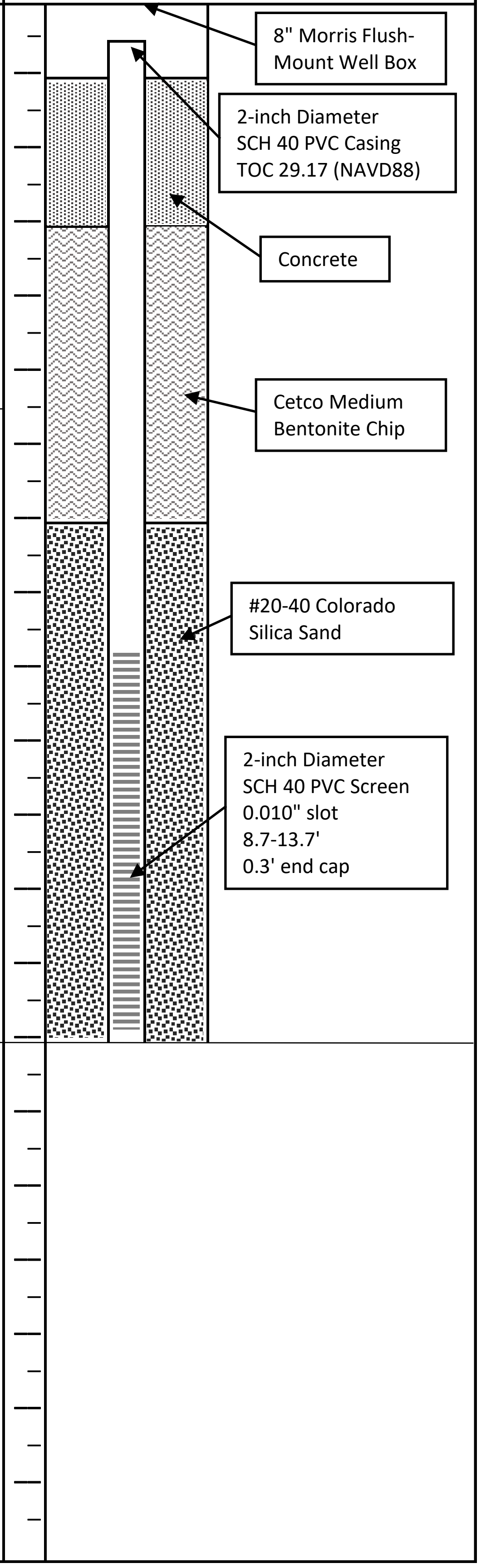
POORLY GRADED SAND WITH GRAVEL (SP):
brown (7.5YR-5/3), moist to wet, 20% gravel, 60% sand, 20% silt

SILT (ML):
gray (7.5YR-6/1), wet, 100% silt
with fine sandy interbeds below 6.5 '

POORLY GRADED SAND and SILT (SP-SM):
gray (7.5YR-5/1), saturated, 95% fine sand, 5% silt
interbedded with 30% fine sand, 70% silt

Bottom of Boring 14.0 feet

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

LOG OF MW-7

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156575.9**N** 1287632.9**E** (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION: 28.3 (NAVD88)
DRILLING CONTRACTOR: Cascade	DATE: 4/13/17
DRILLING EQUIPMENT: CME 75	TOTAL DEPTH OF BORING: 14.0' ECOLOGY ID: BKA-086
DRILLING METHOD: 4" ID Hollow-Stem Auger	LOGGED BY: D. Cooper
SAMPLING METHOD: 3" dia. Split-Spoon w/ 300# Hammer	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	Lab Sample	Blow Counts	PID (ppm)
2 – 3	MW7-2.5		
5 – 6		2/2/2	0.0
7		2/3/4	0.1
8 – 9		3/4/5	0.0
10		4/6/5	0.0
11 – 12		7/8/7	0.0
13		7/7/8	

VISUAL SOIL DESCRIPTION

Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors

2-inches Asphalt Concrete Paving

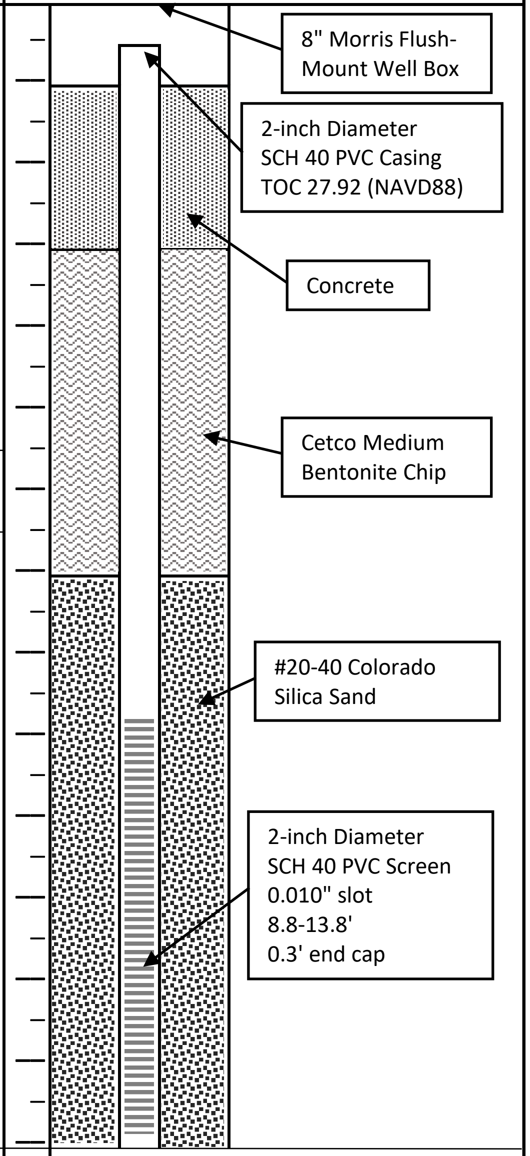
POORLY GRADED SAND WITH SILT and GRAVEL (SP-SM):
brown to gray (7.5YR-5/3-5/1), moist to wet,
20% gravel, 60% sand, 20% silt

SILT (ML):
gray (7.5YR-6/1), wet, 100% silt, plastic

POORLY GRADED SAND (SP):
gray (7.5YR-5/1), saturated, 95% fine sand, 5% silt

Bottom of Boring 14.0 feet

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

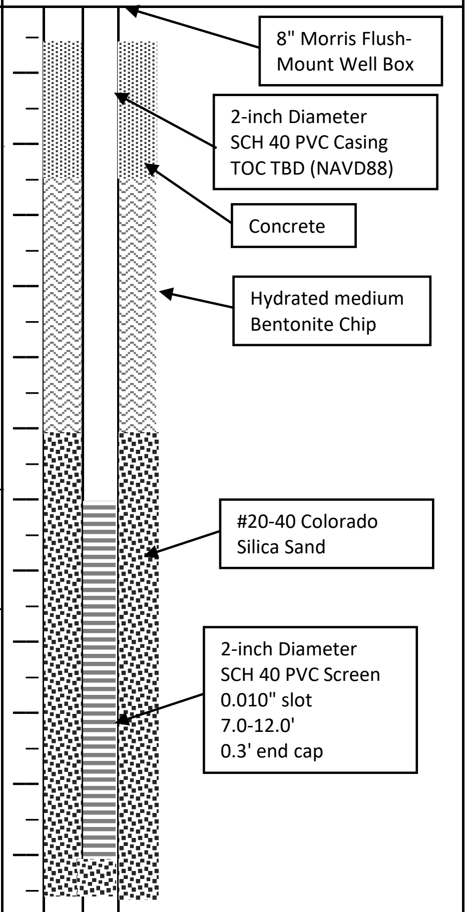
LOG OF MW-8

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: **N 156629.1 E 1287945.9** (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION: TBD	
DRILLING CONTRACTOR: Cascade	DATE: 5/29/2020	
DRILLING EQUIPMENT: CME 75	TOTAL DEPTH OF BORING: 12.5ft	ECOLOGY I BLK-851
DRILLING METHOD: 4" Hollow Stem Auger	LOGGED BY: D.Cooper	
SAMPLING METHOD: 3"x18" SPT 300# auto	RESPONSIBLE PROF.: D.Cooper	REG. NO.: 1600
NOTES: Boring cleared by Air-Knife from 0-5'		

DEPTH (feet)	SAMPLES				VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors
	Lab Sample (GW)	Sample Recovery	Blow Counts	PID (ppm)	
					3 - inches Asphalt concrete paving
1					POORLY GRADED SAND with GRAVEL (SP): brown (7.5YR-5/3), moist to wet 70% sand, 25% gravel, 5% silt
2					
3					
4					POORLY GRADED SAND with GRAVEL and SILT (SP-SM): brown (7.5YR-5/3), moist to saturated 60% sand, 20% gravel, 20% silt
5					
6			1/2/2		
7			1/1/1		SILT (ML): gray (7.5YR 5/1), wet, very soft, 95% silt, with trace 5% sand
8					
9			3/3/3		POORLY GRADED SAND (SP): gray (7.5YR5/1), saturated, loose, 100% fine sand
10			1/1/1		
11					- Silty Sand interbeds
12			2/3/2		
13					Bottom of Boring 12.5' bgs

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

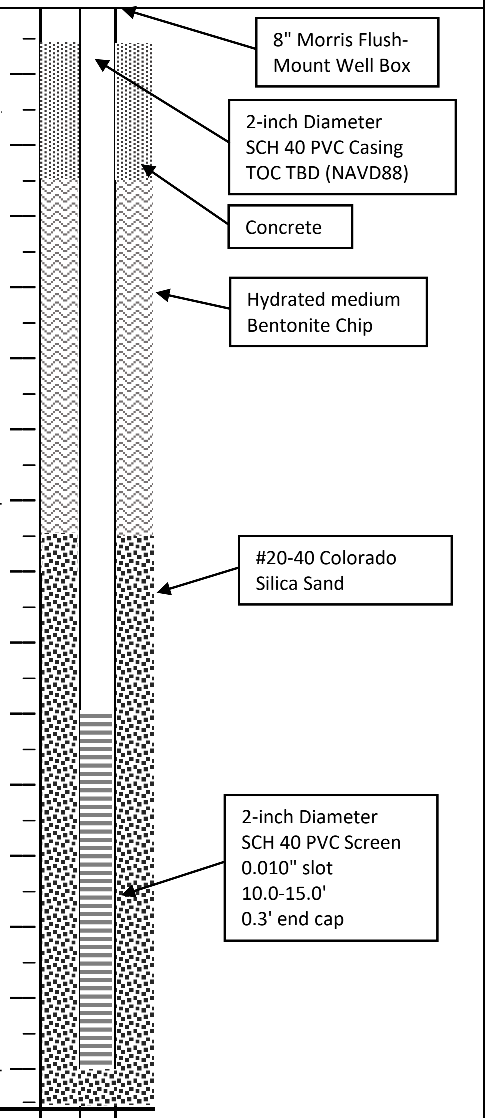
LOG OF MW-9

Sheet 1 of 1

PROJECT: Boeing KSC RI
COORDINATES: **N 156954.5 E 1288157.6** (NAD83)
LOCATION: Kent, WA
SURFACE ELEVATION: TBD
DRILLING CONTRACTOR: Cascade
DATE: 5/29/2020
DRILLING EQUIPMENT: CME 75
TOTAL DEPTH OF BORING: 15.5ft
ECOLOGY I BLK-850
DRILLING METHOD: 4" Hollow Stem Auger
LOGGED BY: D.Cooper
SAMPLING METHOD: 3"x18" SPT 300# auto
RESPONSIBLE PROF.: D.Cooper
REG. NO.: 1600
NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES Lab Sample (GW)	 Sample Recovery	 Blow Counts	 PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors
					3 - inches Asphalt concrete paving
1					POORLY GRADED GRAVELLY SAND (SP): 70% sand, 25% gravel, 5% silt - non-woven fabric at 1.5'
2					
3					
4					POORLY GRADED SAND WITH GRAVEL and SILT (SP-SM): gray (7.5YR 5/1), moist, dense, 60% sand, 20% gravel, 20% silt
5					
6			12/18/19		
7			4/6/6		
8					SILT (ML): gray (7.5YR 6/1), wet, soft 100% silt, plastic
9			2/3/5		
10			3/3/3		
11					-becomes very soft
12			1/1/1		
13			2/3/3		
14					POORLY GRADED SAND (SP): gray (7.5YR 5/1), saturated, loose, 95% fine sand with 5% silt
15			2/2/2		SILT (ML): gray (7.5YR 6/1), wet, soft, 100% plastic silt
					Bottom of Boring 15.5' bgs

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

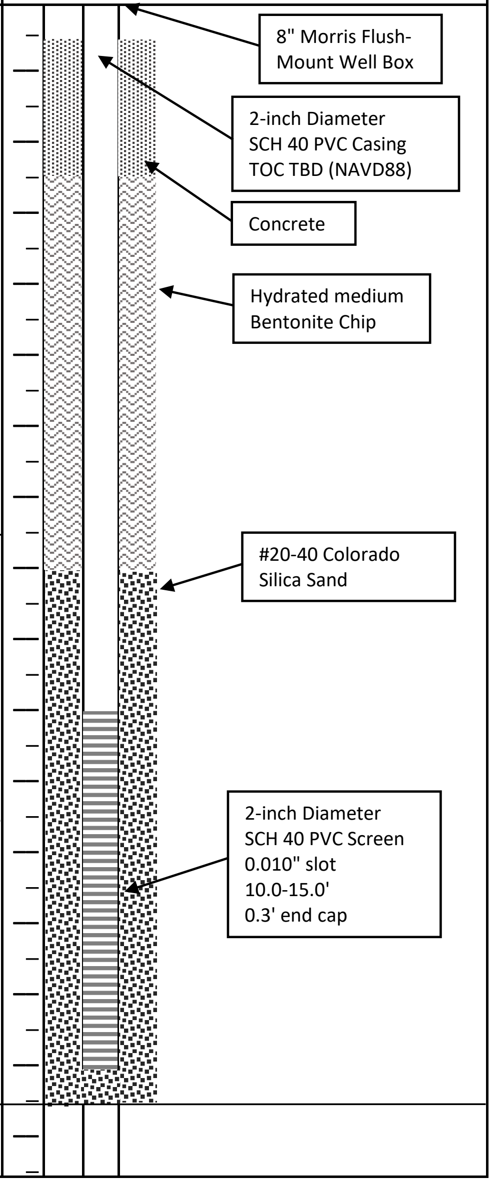
LOG OF MW-10

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: **N 155355.0 E 1288811.2** (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION: TBD	
DRILLING CONTRACTOR: Cascade	DATE: 5/29/2020	
DRILLING EQUIPMENT: CME 75	TOTAL DEPTH OF BORING: 15.5ft	ECOLOGY I BLK-852
DRILLING METHOD: 4" Hollow Stem Auger	LOGGED BY: D.Cooper	
SAMPLING METHOD: 3"x18" SPT 300# auto	RESPONSIBLE PROF.: D.Cooper	REG. NO.: 1600
NOTES: Boring cleared by Air-Knife from 0-5'		

DEPTH (feet)	SAMPLES Lab Sample (GW)	 Sample Recovery	 Blow Counts	 PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors
					3 - inches Asphalt concrete paving 3 - inches crushed rock
1					
2					POORLY GRADED SAND WITH GRAVEL and SILT (SP-SM): brown to gray (7.5YR-5/3-5/1) , moist to wet 60% sand, 20% gravel, 20% silt
3					
4					
5					
6			6/7/7		
7			11/9/5		- grades cleaner, less silt
8					
9			1/1/1		SILT (ML): gray (7.5YR 6/1), wet, medium dense, 100% silt, plastic
10			2/4/4		
11					-rust colored oxidation banding
12			1/1/2		
13			1/2/1		POORLY GRADED SAND (SP): gray (7.5YR 5/1), saturated fine sand with silt interbeds.
14					-decreased interbedding becomes 80% sand with 20% silt
15			3/6/7		
					Bottom of Boring 15.5' bgs

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

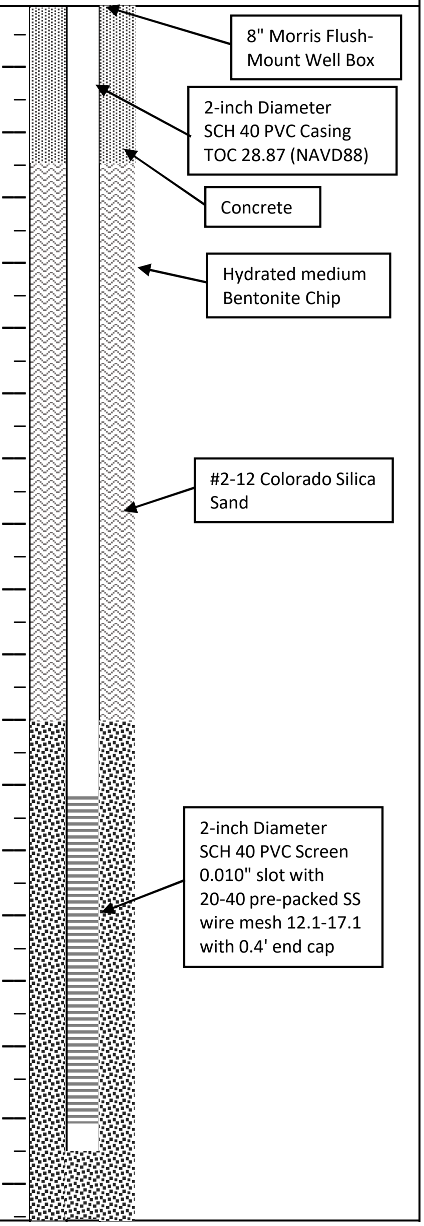
LOG OF MW-11

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: **N 156891.3 E 1288042.6** (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION: 29.32 ft	
DRILLING CONTRACTOR: Cascade	DATE: 6/4/2021	
DRILLING EQUIPMENT: 7822 DT	TOTAL DEPTH OF BORING: 17.1 ft	ECOLOGY I BMM-637
DRILLING METHOD: 4" Hollow Stem Auger	LOGGED BY: A.Cerruti	
SAMPLING METHOD: N/A	RESPONSIBLE PROF.: D.Cooper	REG. NO.: 1600

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES				VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Lab Sample (GW)	Sample Recovery	Blow Counts	PID (ppm)		
1					Boring not logged. Refer to nearby NDP-4 for log	
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18					Bottom of boring 18.0 ft.	



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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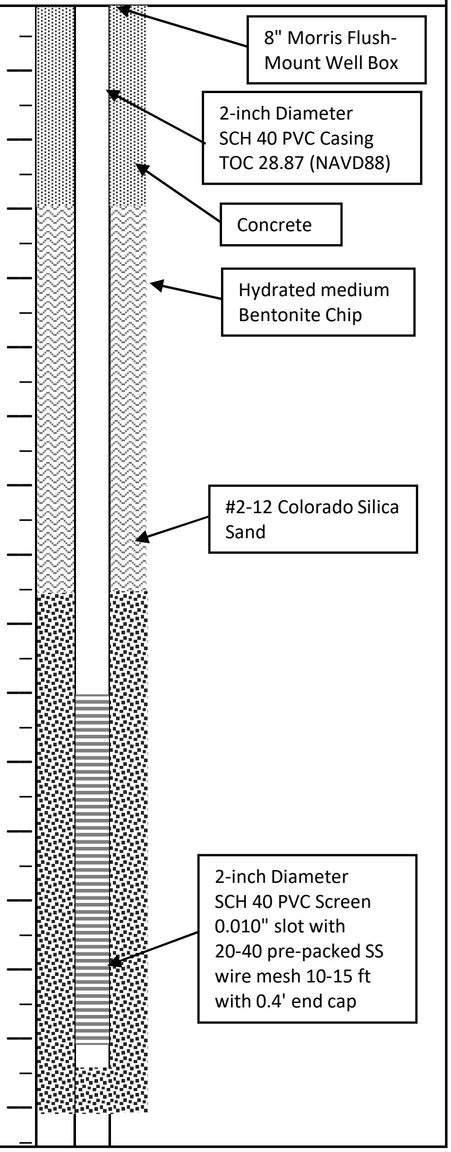
LOG OF MW-12

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: **N 156735.4 E 1287860.2** (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION: 27.20 ft	
DRILLING CONTRACTOR: Cascade	DATE: 6/4/2021	
DRILLING EQUIPMENT: 7822 DT	TOTAL DEPTH OF BORING: 14.85 ft	ECOLOGY I BMM-636
DRILLING METHOD: 4" Hollow Stem Auger	LOGGED BY: A.Cerruti	
SAMPLING METHOD: N/A	RESPONSIBLE PROF.: D.Cooper	REG. NO.: 1600
NOTES: Boring cleared by Air-Knife from 0-5'		

DEPTH (feet)	SAMPLES				VISUAL SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Lab Sample (GW)	Sample Recovery	Blow Counts	PID (ppm)	Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16					Boring not logged. Refer to nearby NDP-2 for log Bottom of boring 16.0 ft.	

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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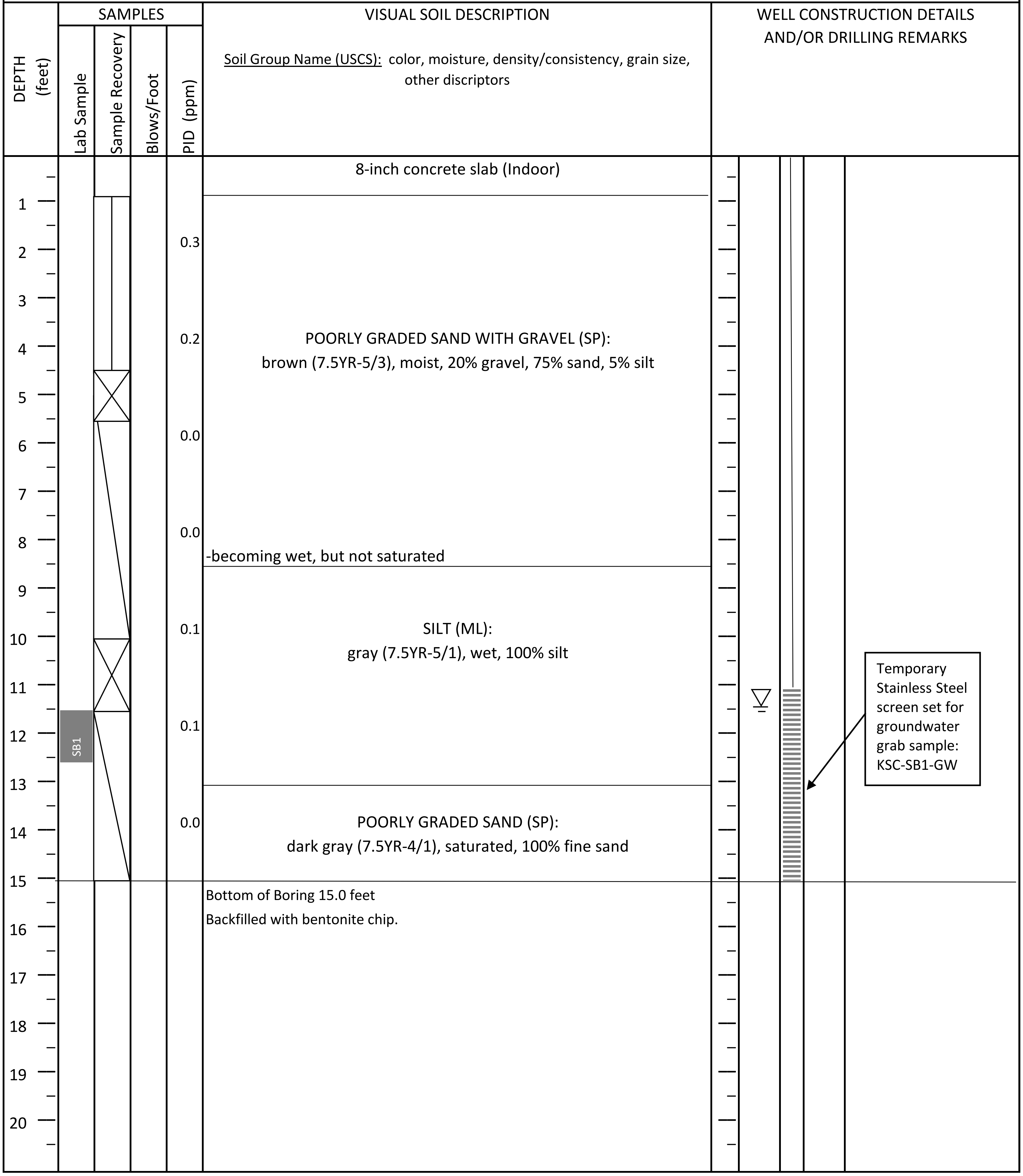
FUGLEVAND

LOG OF SB-1

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 157007**N** 1288686**E** (NAD83)	
LOCATION: Kent, WA - Bldg. 18-43 (indoor)	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/24/17	
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by hand auger from 0-4.5'		



VISUAL SOIL DESCRIPTION

Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

8-inch concrete slab (Indoor)

POORLY GRADED SAND WITH GRAVEL (SP):
brown (7.5YR-5/3), moist, 20% gravel, 75% sand, 5% silt

-becoming wet, but not saturated

SILT (ML):
gray (7.5YR-5/1), wet, 100% silt

POORLY GRADED SAND (SP):
dark gray (7.5YR-4/1), saturated, 100% fine sand

Bottom of Boring 15.0 feet
Backfilled with bentonite chip.

Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB1-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

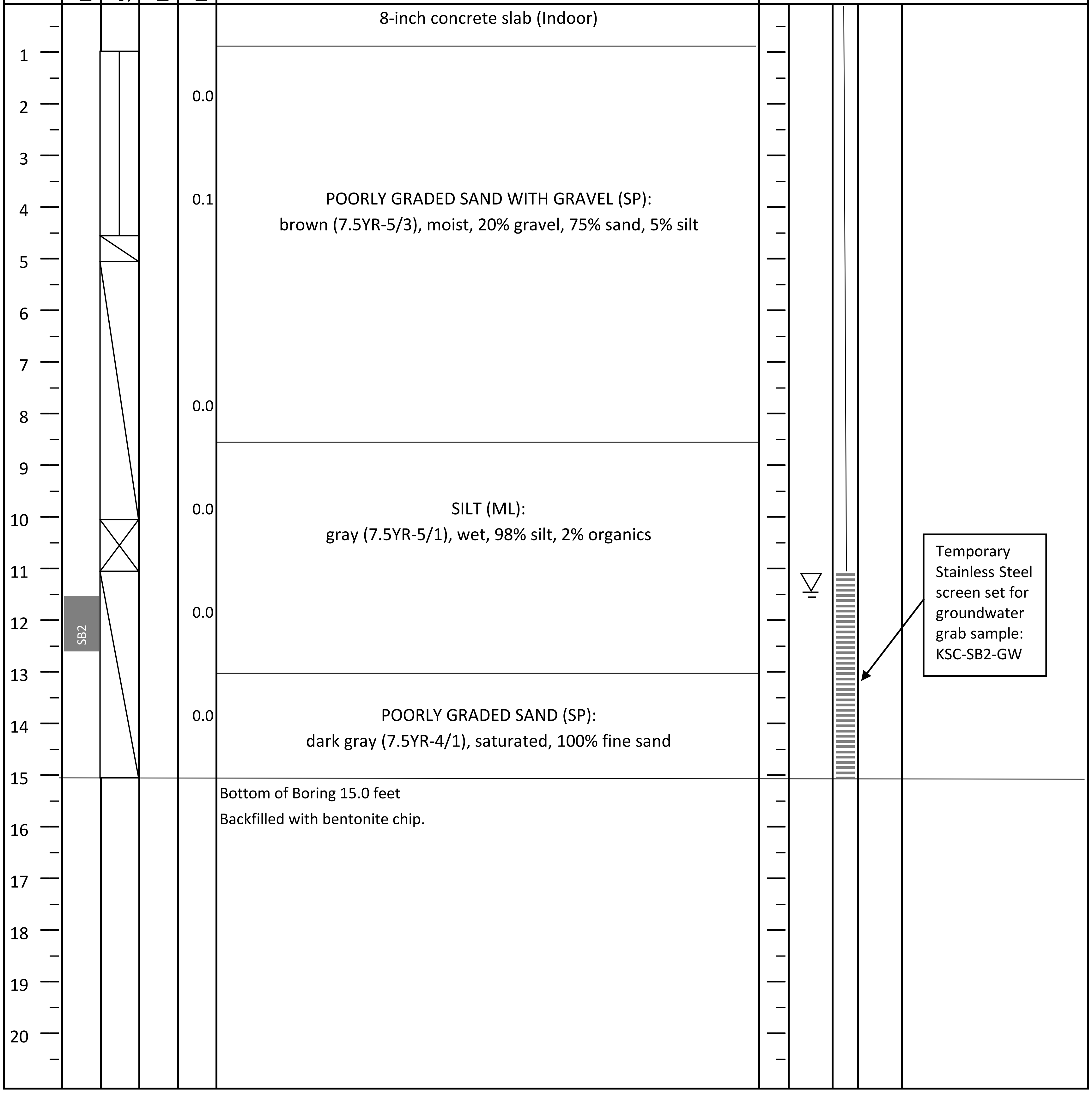
LOG OF SB-2

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 157004**N** 1288641**E** (NAD83)	
LOCATION: Kent, WA - Bldg. 18-43 (indoor)	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/24/17	
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by hand auger from 0-4.5'		

DEPTH (feet) | SAMPLES: Lab Sample, Sample Recovery, Blows/Foot, PID (ppm) | VISUAL SOIL DESCRIPTION | WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors



8-inch concrete slab (Indoor)

POORLY GRADED SAND WITH GRAVEL (SP):
brown (7.5YR-5/3), moist, 20% gravel, 75% sand, 5% silt

SILT (ML):
gray (7.5YR-5/1), wet, 98% silt, 2% organics

POORLY GRADED SAND (SP):
dark gray (7.5YR-4/1), saturated, 100% fine sand

Bottom of Boring 15.0 feet
Backfilled with bentonite chip.

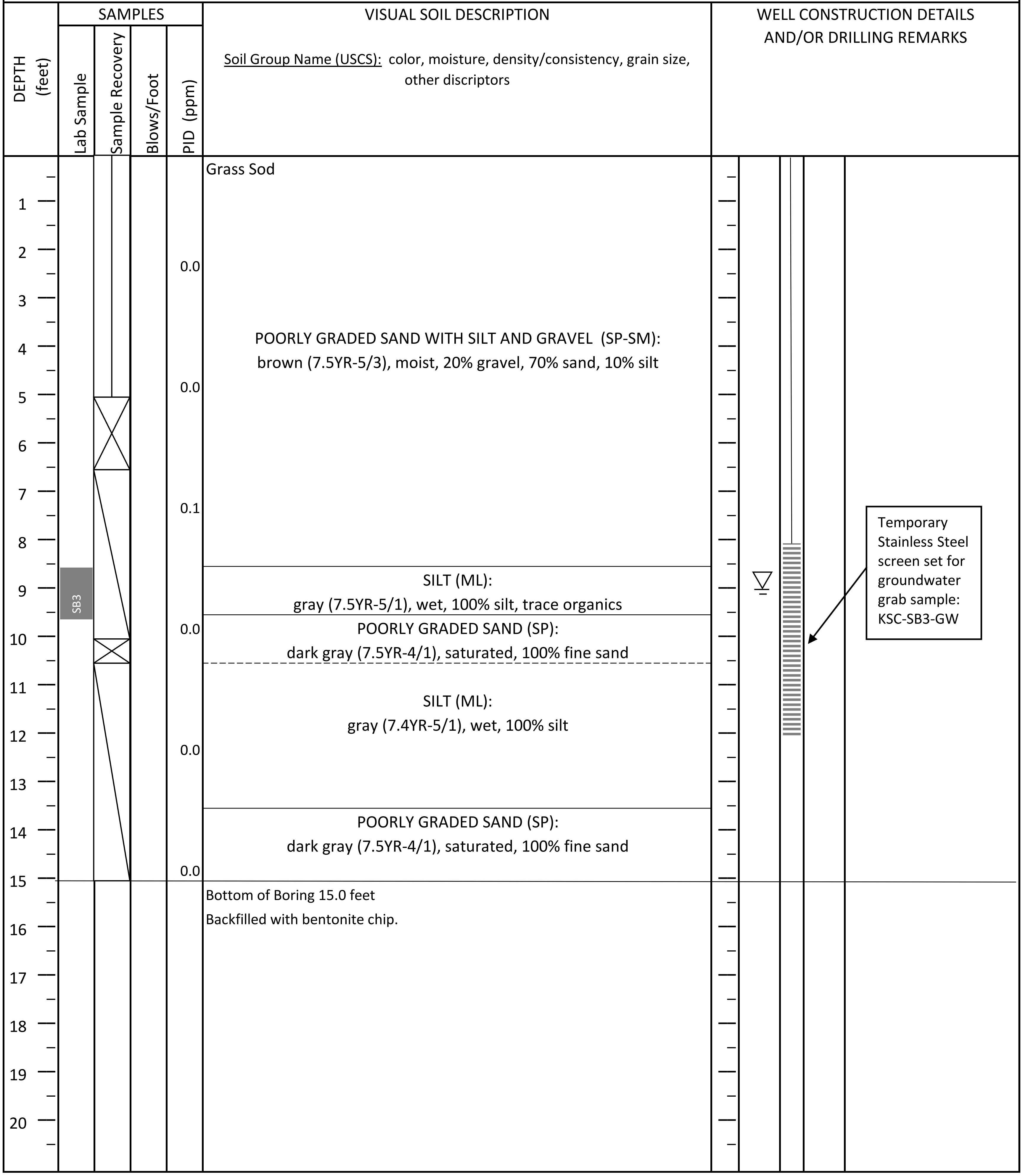
Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB2-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-3

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156331**N** 1288174**E** (NAD83)	
LOCATION: Kent, WA - West of Bldg. 18-54	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/27/17	
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by vac-truck from 0-5'		



VISUAL SOIL DESCRIPTION

Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors

Grass Sod

POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown (7.5YR-5/3), moist, 20% gravel, 70% sand, 10% silt

SILT (ML): gray (7.5YR-5/1), wet, 100% silt, trace organics

POORLY GRADED SAND (SP): dark gray (7.5YR-4/1), saturated, 100% fine sand

SILT (ML): gray (7.4YR-5/1), wet, 100% silt

POORLY GRADED SAND (SP): dark gray (7.5YR-4/1), saturated, 100% fine sand

Bottom of Boring 15.0 feet

Backfilled with bentonite chip.

Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB3-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-4

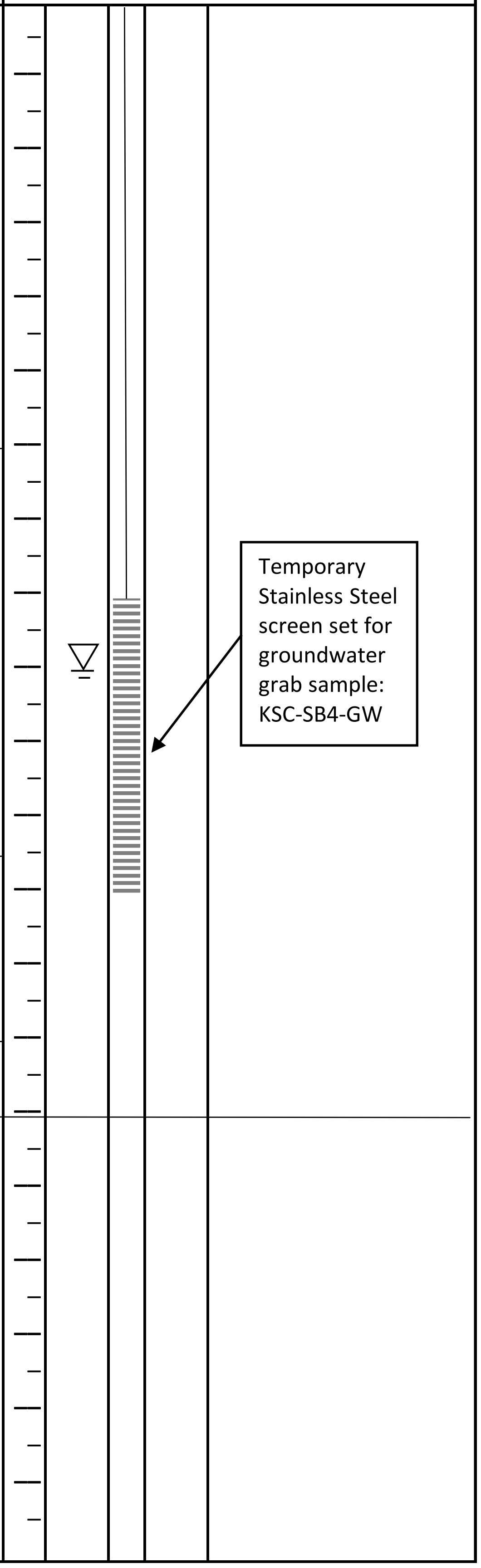
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156309**N** 1288149**E** (NAD83)
LOCATION: Kent, WA - West of Bldg. 18-54	SURFACE ELEVATION:
DRILLING CONTRACTOR: Cascade	DATE: 1/27/17
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper — REG. NO.: 1600

NOTES: Boring cleared by vac-truck from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blows/Foot	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
					Grass Sod
1					
2				0.0	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown (7.5YR-5/3), moist, 20% gravel, 70% sand, 10% silt
3					
4					
5				0.0	
6					
7				0.1	
8	SB4				SILTY SAND (SM):
9					gray (7.5YR-5/1), saturated, 80% sand, 17% silt, 3% gravel
10				0.0	
11					
12				0.2	SILT (ML):
13					gray (7.4YR-5/1), wet, 100% silt
14					>Organics POORLY GRADED SAND (SP):
15				0.0	dark gray (7.5YR-4/1), saturated, 100% fine sand Bottom of Boring 15.0 feet Backfilled with bentonite chip.
16					
17					
18					
19					
20					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS


Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB4-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-5

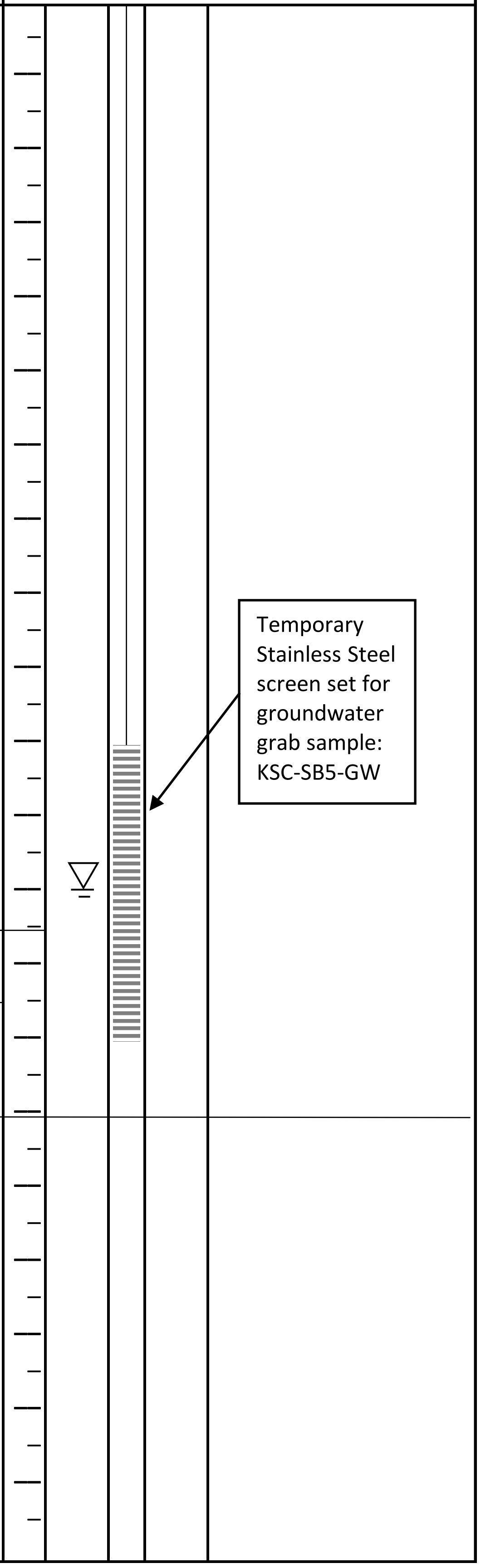
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156265**N** 1288178**E** (NAD83)
LOCATION: Kent, WA - West of Bldg. 18-54	SURFACE ELEVATION:
DRILLING CONTRACTOR: Cascade	DATE: 1/27/17
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper — REG. NO.: 1600

NOTES: Boring cleared by vac-truck from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blows/Foot	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
0					Ivy Planter
2				0.0	
5				0.1	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown-gray (7.5YR-5/3-5/1), moist, 20% gravel, 70% sand, 10% silt
7				0.2	
10				0.0	
11	SB5				
12				0.1	
12.5					POORLY GRADED SAND WITH GRAVEL (SP): dark gray (7.5YR-4/1), saturated, 10% gravel, 90% sand
13.5					SILT (ML): gray (7.4YR-5/1), wet, 100% silt
15				0.0	Bottom of Boring 15.0 feet Backfilled with bentonite chip.

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS


Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB5-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-6

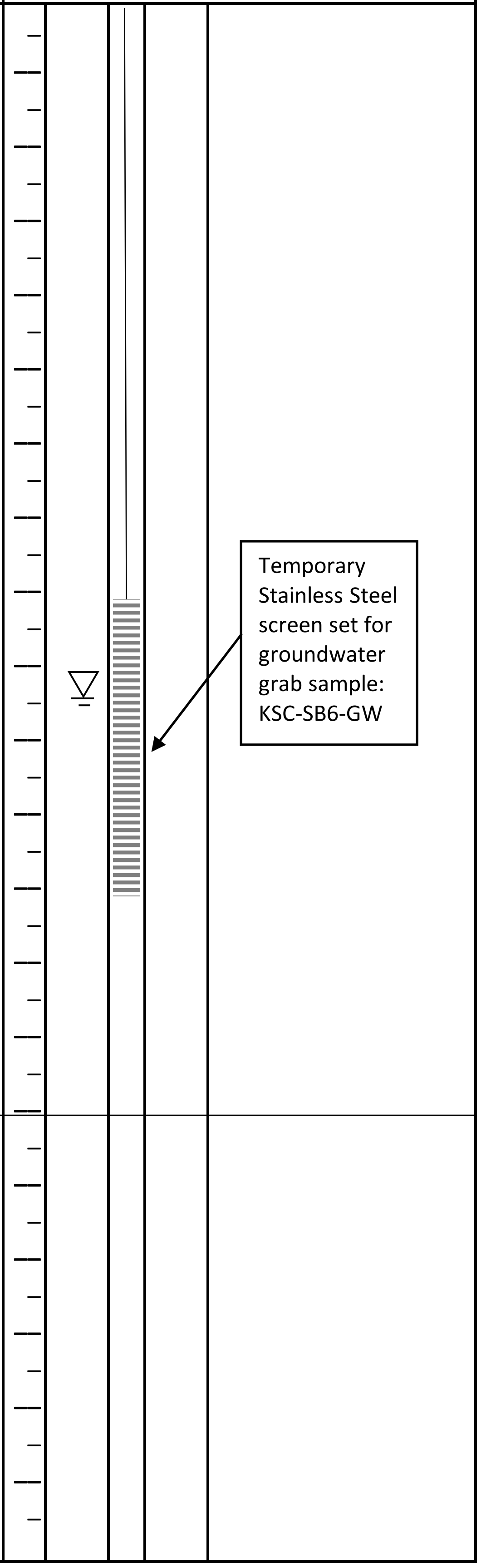
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156554**N** 1287774**E** (NAD83)
LOCATION: Kent, WA - Former Bldg. 18-35	SURFACE ELEVATION:
DRILLING CONTRACTOR: Cascade	DATE: 1/24/17
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600

NOTES: Boring cleared by vac-truck from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	Sample Recovery	Blows/Foot	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
				0.0	
				0.1	POORLY GRADED SAND WITH GRAVEL (SP): brown (7.5YR-5/3), wet, 20% gravel, 75% sand, 3-5% silt
				0.0	
				0.1	-gray, saturated, fine sand in sampling shoe
					No Recovery after three attempts Driving large gravel ahead of sampler
15				0.0	
					Bottom of Boring 15.0 feet Backfilled with bentonite chip.

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



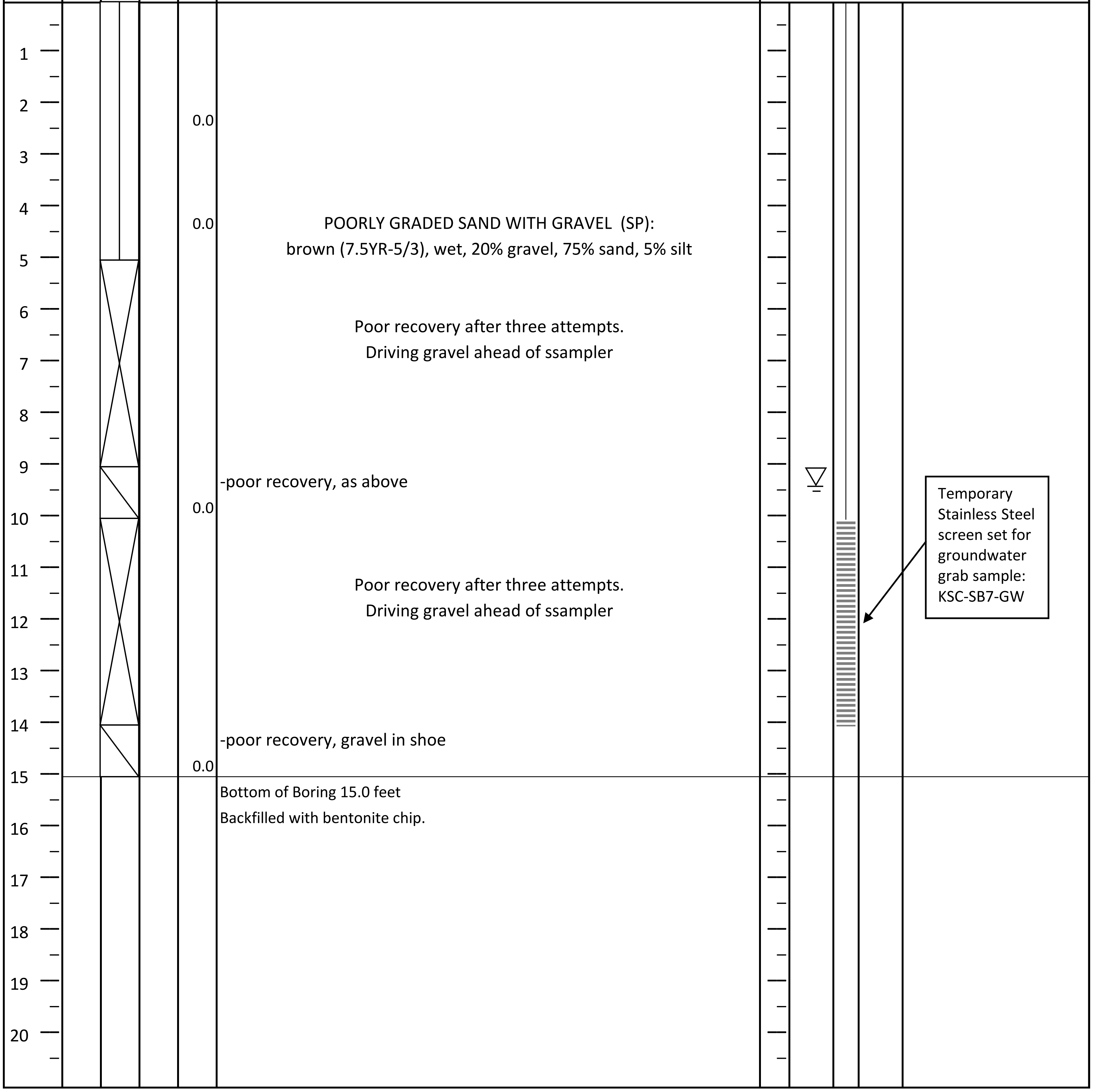
Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-7

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156522**N** 1287761**E** (NAD83)	
LOCATION: Kent, WA - Former Bldg. 18-35	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/24/17	
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by vac-truck from 0-5'		

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blows/Foot	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



POORLY GRADED SAND WITH GRAVEL (SP):
brown (7.5YR-5/3), wet, 20% gravel, 75% sand, 5% silt

Poor recovery after three attempts.
Driving gravel ahead of ssampler

-poor recovery, as above

Poor recovery after three attempts.
Driving gravel ahead of ssampler

-poor recovery, gravel in shoe

Bottom of Boring 15.0 feet
Backfilled with bentonite chip.

Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB7-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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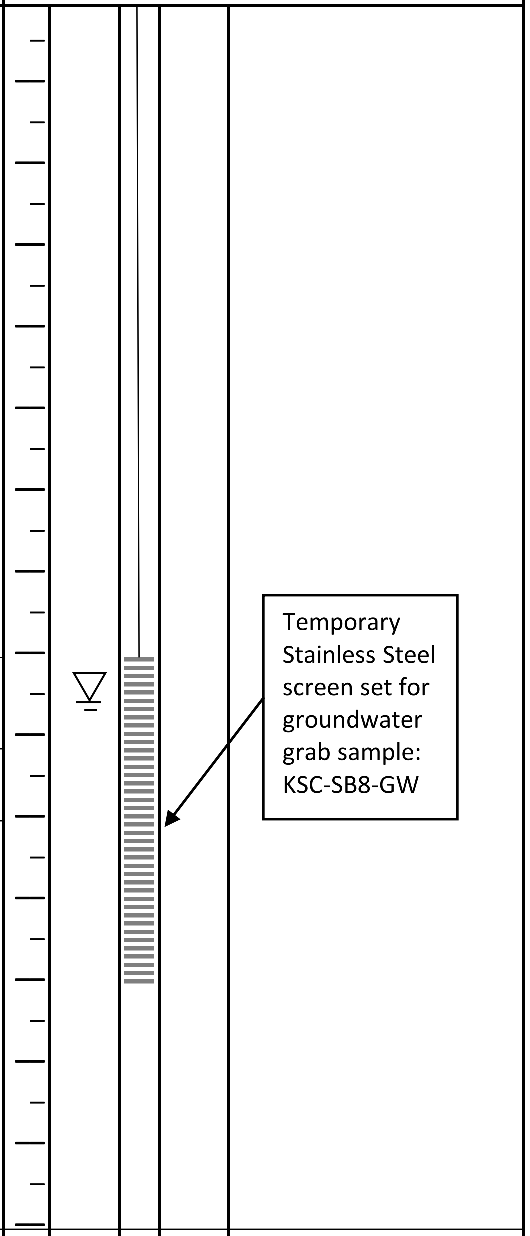
LOG OF SB-8

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156511**N** 1287803**E** (NAD83)	
LOCATION: Kent, WA - Former Bldg. 18-35	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/24/17	
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by vac-truck from 0-5'		

DEPTH (feet)	SAMPLES Lab Sample	 Sample Recovery	 Blows/Foot	 PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
1					
2				0.3	
3					POORLY GRADED SAND WITH GRAVEL (SP): brown (7.5YR-5/3), wet, 20-30% gravel, 65-75% sand, 5% silt
4				0.4	
5					
6				0.2	
7					
8				0.1	SILT (ML): gray (7.5YR-5/1), wet, 100% silt
9					POORLY GRADED SAND (SP): gray (7.5YR-5/1), wet, 95% sand, 5% silt
10				0.0	
11					
12				0.0	SILTY SAND (SM): gray (7.5YR-5/1), saturated, 70% sand, 30% silt
13					
14				0.0	
15					Bottom of Boring 15.0 feet Backfilled with bentonite chip.
16					
17					
18					
19					
20					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB8-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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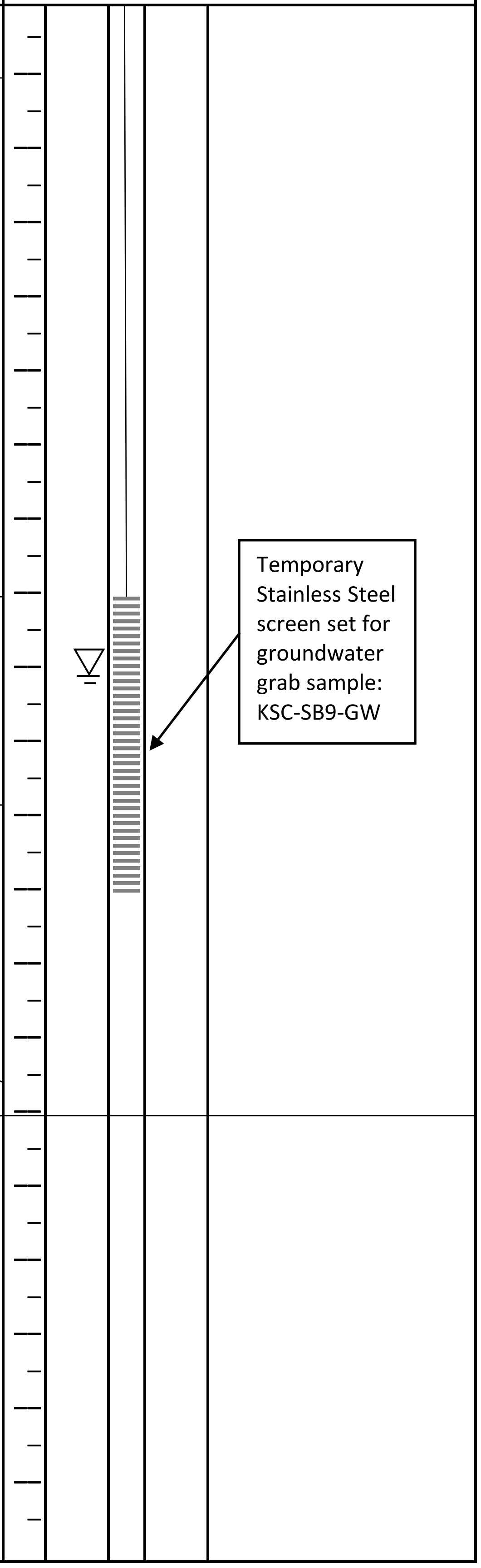
LOG OF SB-9

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 155675**N** 1288514**E** (NAD83)
LOCATION: Kent, WA - Bldg. 18-62 (indoor)	SURFACE ELEVATION:
DRILLING CONTRACTOR: Cascade	DATE: 1/25/17
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600
NOTES: Boring cleared by hand-auger from 0-3'	

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blows/Foot	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
1					8-inch concrete slab 6 inches of pea gravel/washed rock bedding
2–8				0.0 0.0 0.1	POORLY GRADED SAND WITH GRAVEL (SP): brown (7.5YR-5/3), wet, 20% gravel, 75% sand, 5% silt
8–11				0.0	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): gray (7.5YR-5/1), wet, 20% gravel, 70% sand, 10% silt
11–14				0.2	SILT (ML): brown to gray (7.5YR-5/3-5/1), wet, 100% silt
14–15				0.0	POORLY GRADED SAND (SP): dark gray (7.5YR-4/1), saturated, 100% fine sand
15					Bottom of Boring 15.0 feet Backfilled with bentonite chip.

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-10

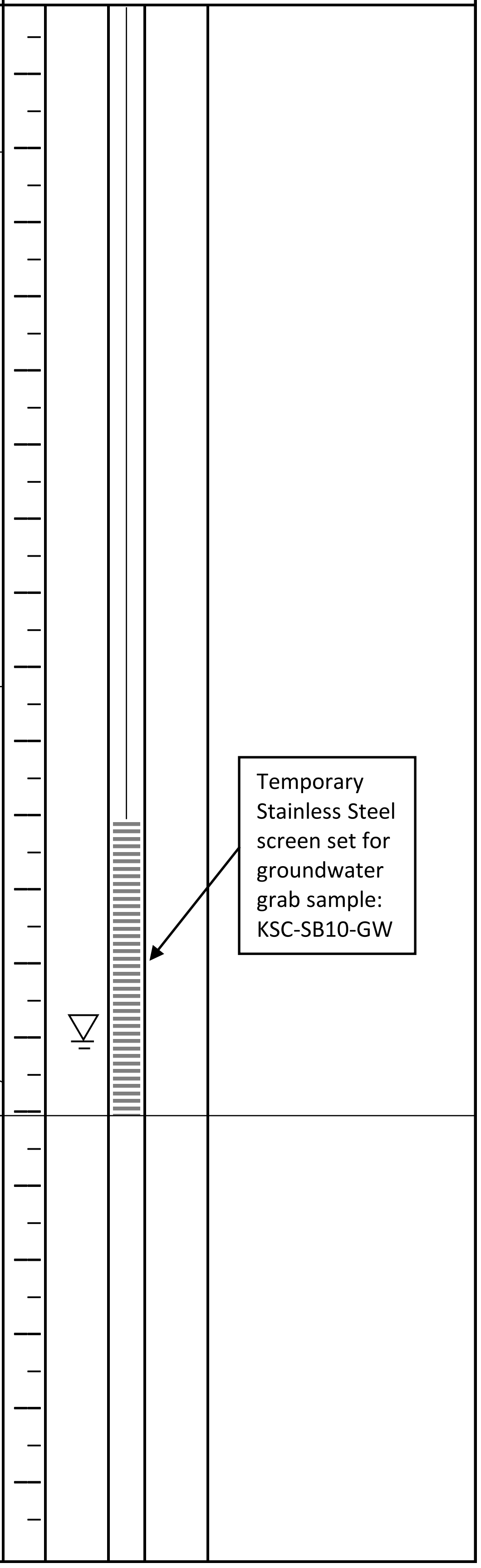
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 155607**N** 1288487**E** (NAD83)
LOCATION: Kent, WA - Bldg. 18-62 (indoor)	SURFACE ELEVATION:
DRILLING CONTRACTOR: Cascade	DATE: 1/25/17
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600

NOTES: Boring cleared by hand-auger from 0-3'

DEPTH (feet)	SAMPLES: Lab Sample	Sample Recovery	Blows/Foot	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
1					24-inch concrete slab
2				0.0	
4					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): gray (7.5YR-5/1), wet, 20% gravel, 70-75% sand, 5-10% silt
5				0.0	
7				0.0	
9					-no perched water
10				0.0	
11					SILT (ML): gray (7.5YR-5/1), wet, 100% silt, plastic
12				0.0	
14					-reddish oxidation
15				0.0	SILTY SAND (SM): dark gray (7.5YR-4/1), saturated, 70% fine sand, 30% silt
16					Bottom of Boring 15.0 feet Backfilled with bentonite chip.
17					
18					
19					
20					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



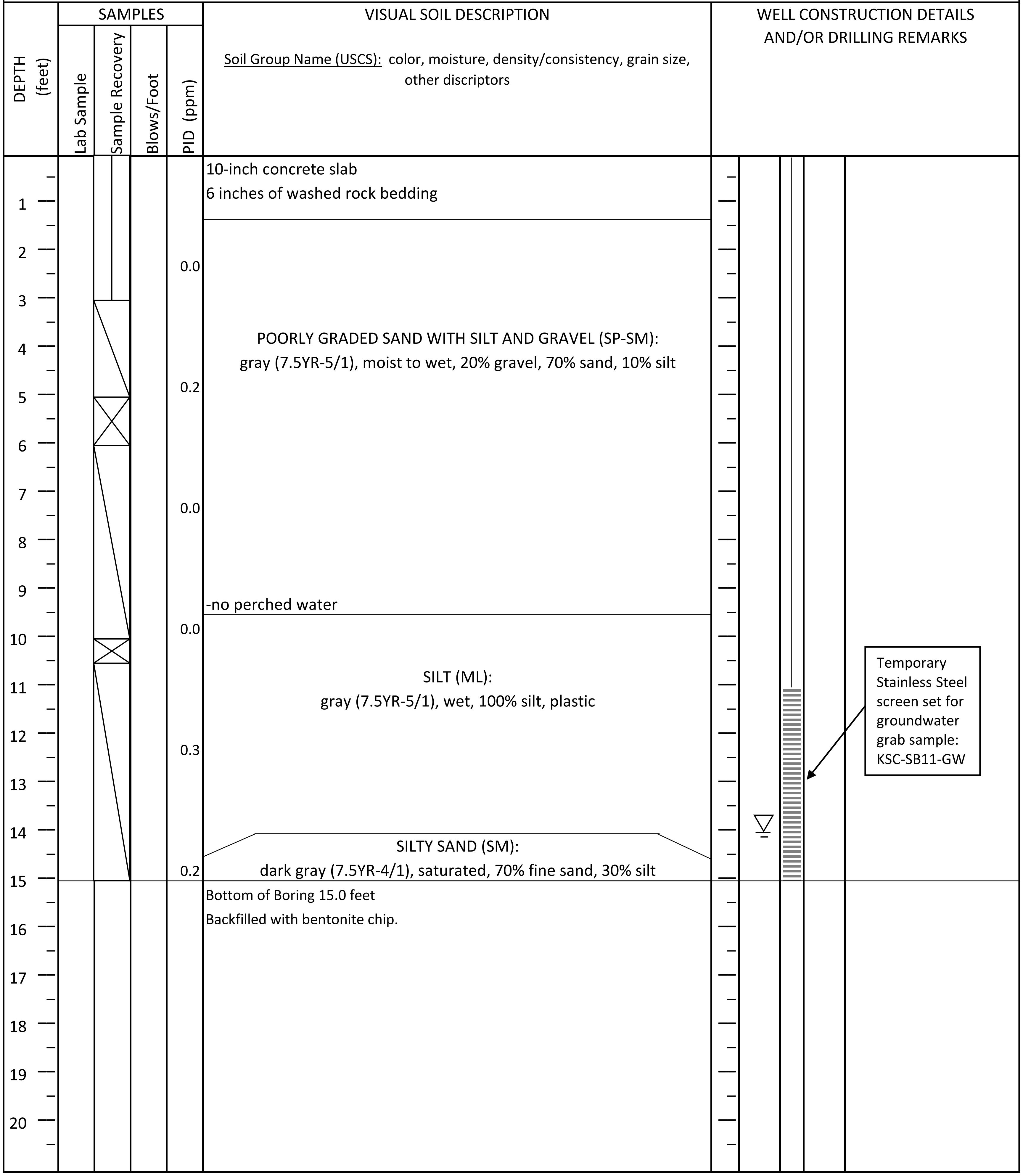
Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB10-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-11

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 155612**N** 1288572**E** (NAD83)	
LOCATION: Kent, WA - Bldg. 18-62 (indoor)	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/25/17	
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by hand-auger from 0-3'		



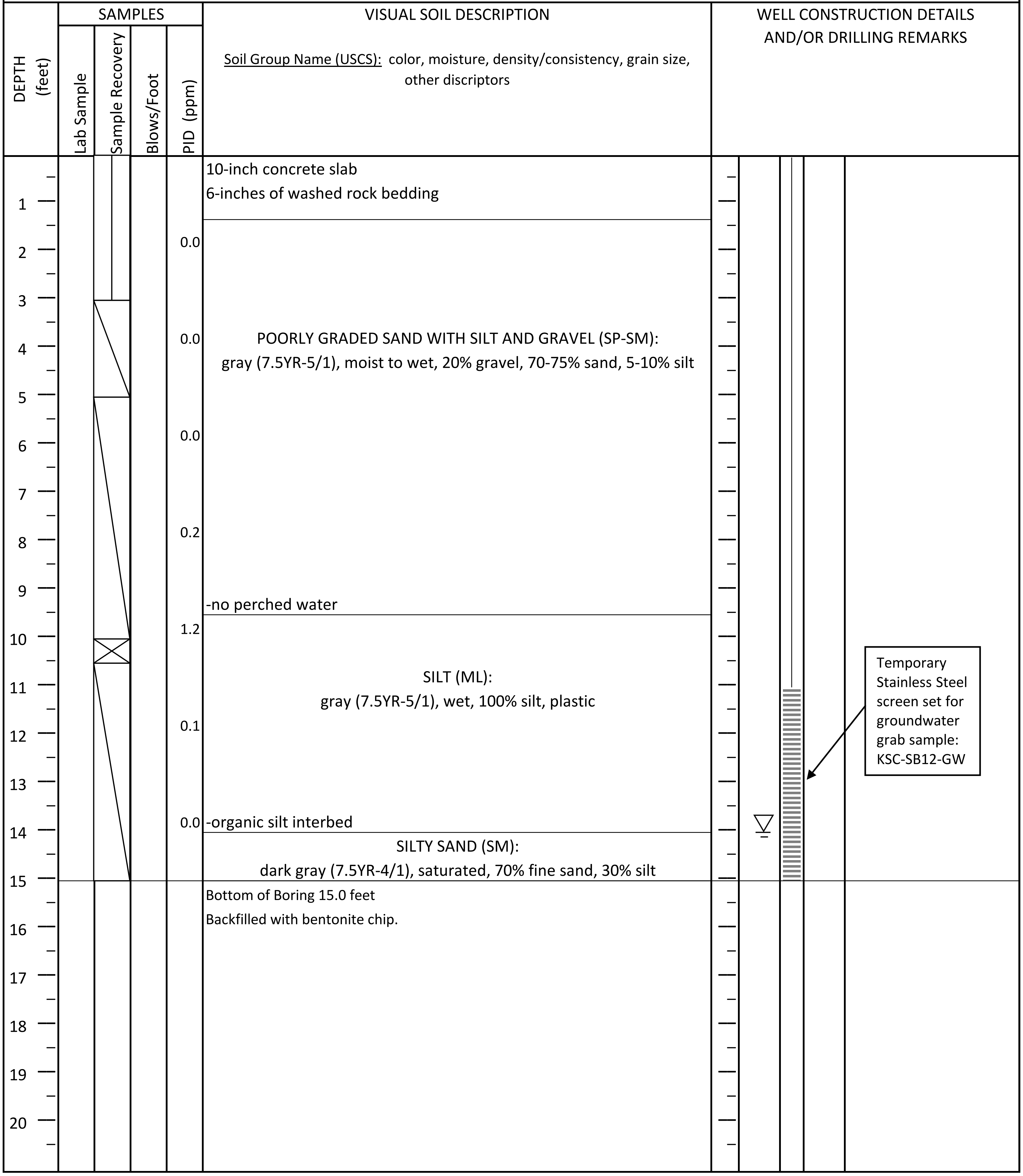
DEPTH (feet)	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0–1.3		10-inch concrete slab 6 inches of washed rock bedding	
1.3–9.5	0.0 0.2 0.0	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): gray (7.5YR-5/1), moist to wet, 20% gravel, 70% sand, 10% silt -no perched water	
9.5–14	0.0 0.3	SILT (ML): gray (7.5YR-5/1), wet, 100% silt, plastic	Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB11-GW
14–15	0.2	SILTY SAND (SM): dark gray (7.5YR-4/1), saturated, 70% fine sand, 30% silt	
15		Bottom of Boring 15.0 feet Backfilled with bentonite chip.	

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-12

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 155489**N** 1288528**E** (NAD83)	
LOCATION: Kent, WA - Bldg. 18-62 (indoor)	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/25/17	
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by hand-auger from 0-3'		



DEPTH (feet)	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
0–1.3		10-inch concrete slab 6-inches of washed rock bedding
1.3–9.5	0.0 (2) 0.0 (4) 0.0 (6) 0.2 (8)	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): gray (7.5YR-5/1), moist to wet, 20% gravel, 70-75% sand, 5-10% silt -no perched water
9.5–14	1.2 (10) 0.1 (12) 0.0 (14)	SILT (ML): gray (7.5YR-5/1), wet, 100% silt, plastic -organic silt interbed
14–15		SILTY SAND (SM): dark gray (7.5YR-4/1), saturated, 70% fine sand, 30% silt
15		Bottom of Boring 15.0 feet Backfilled with bentonite chip.

Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB12-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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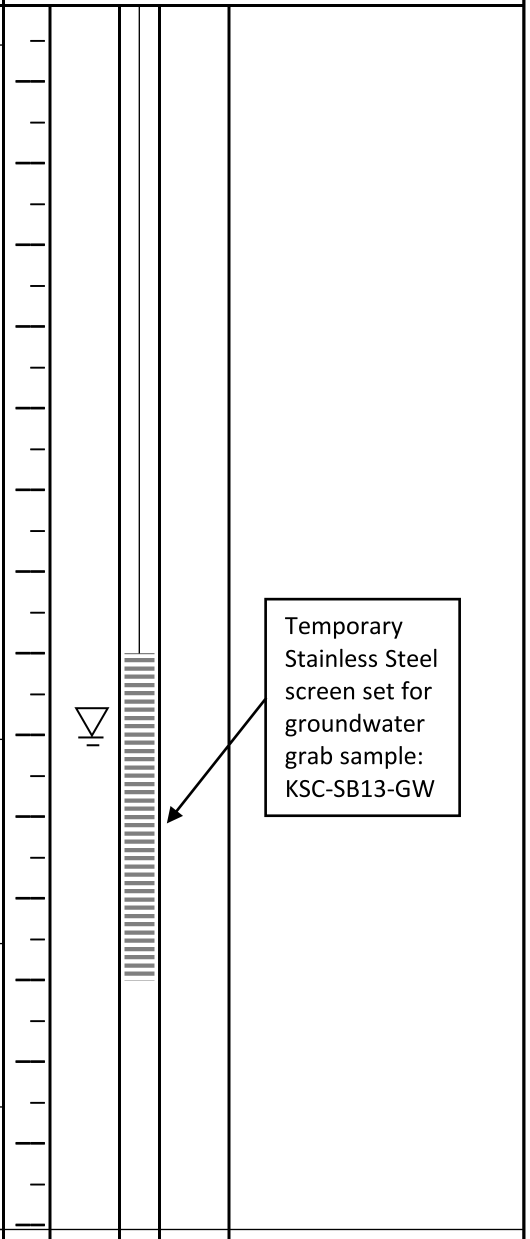
LOG OF SB-13

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 155513**N** 1288898**E** (NAD83)	
LOCATION: Kent, WA - West of Bldg. 18-67	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/26/17	
DRILLING EQUIPMENT: Geoprobe 6600	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by vac-truck from 0-5'		

DEPTH (feet)	SAMPLES Lab Sample	Sample Recovery	Blows/Foot	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
					4-inch asphalt concrete
1					
2				0.0	
3					
4					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown (7.5YR-5/3), moist, 22% gravel, 70% sand, 8% silt
5				0.0	
6					
7				0.2	
8					
9					
10				0.0	POORLY GRADED SAND (SP): gray (7.5YR-5/1), saturated, 100% medium to coarse sand
11					
12				0.1	SILT (ML): gray (7.5YR-5/1), wet, 100% silt, plastic
13					
14					SILTY SAND (SM): dark gray (7.5YR-4/1), saturated, 70% fine sand, 30% silt Trace thin roots
15				0.0	Bottom of Boring 15.0 feet Backfilled with bentonite chip.
16					
17					
18					
19					
20					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB13-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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LOG OF SB-14

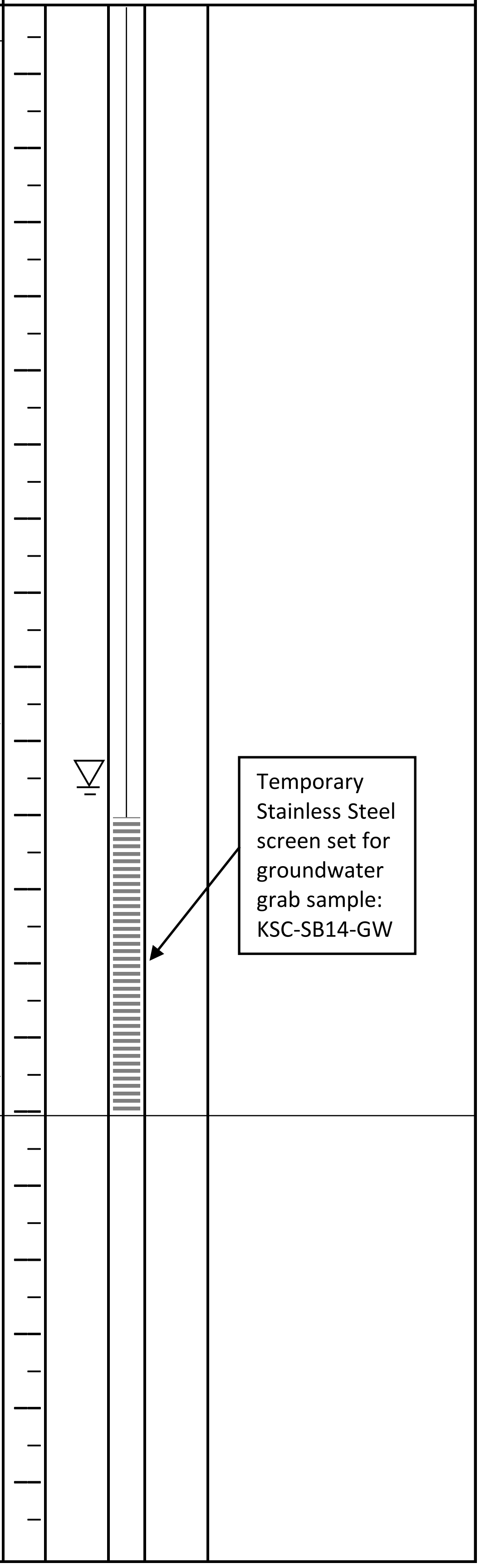
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156944**N** 1288394**E** (NAD83)
LOCATION: Kent, WA - West of Bldg. 18-42	SURFACE ELEVATION:
DRILLING CONTRACTOR: Cascade	DATE: 1/26/17
DRILLING EQUIPMENT: Geoprobe 6600	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper — REG. NO.: 1600

NOTES: Boring cleared by vac-truck from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	Sample Recovery	Blows/Foot	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
0					3-inch asphalt concrete
2.5				0.0	
4					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown (7.5YR-5/3), moist, 30% gravel, 60% sand, 10% silt
5				0.1	
7.5				0.0	
9.5					-no perched water
10				0.1	
11					SILT (ML): gray (7.5YR-5/1), wet, 100% silt, plastic
12.5				0.0	
15				0.2	POORLY GRADED SAND (SP): dark gray (7.5YR-4/1), saturated, 100% fine sand
					Bottom of Boring 15.0 feet Backfilled with bentonite chip.

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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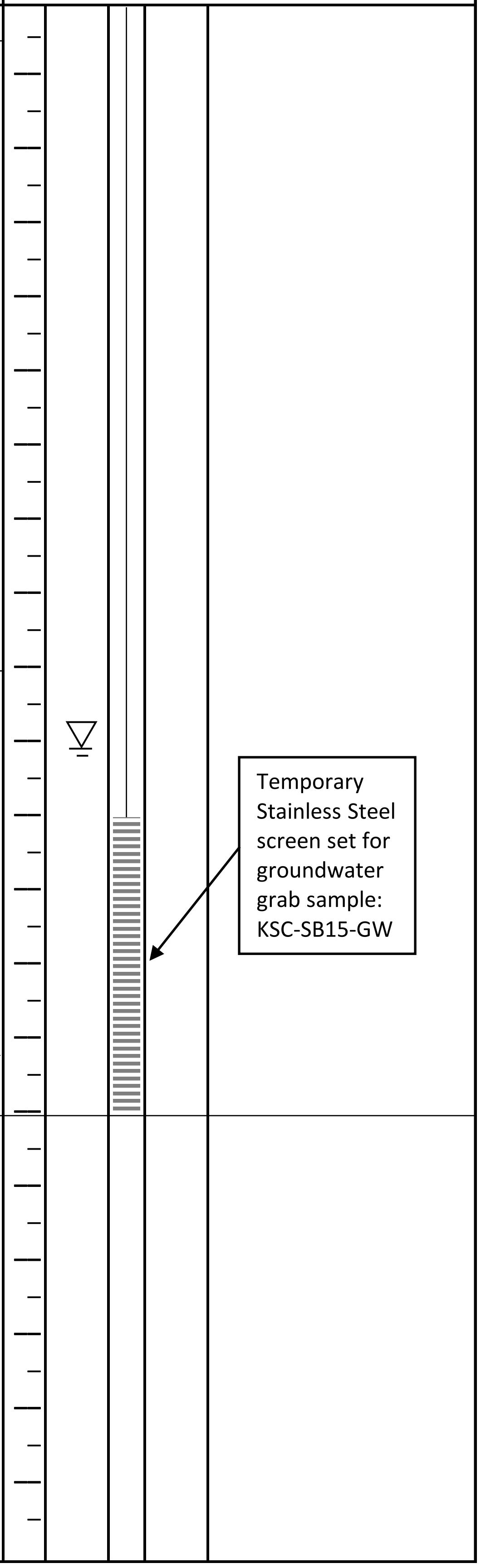
LOG OF SB-15

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156919**N** 1288373**E** (NAD83)
LOCATION: Kent, WA - West of Bldg. 18-42	SURFACE ELEVATION:
DRILLING CONTRACTOR: Cascade	DATE: 1/26/17
DRILLING EQUIPMENT: Geoprobe 6600	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600
NOTES: Boring cleared by vac-truck from 0-5'	

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blows/Foot	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
0					3-inch asphalt concrete
1					
2				0.1	
3					
4					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown (7.5YR-5/3), moist, 30% gravel, 60% sand, 10% silt
5				0.0	
6					
7				0.1	
8					
9					-organics, grass, roots
10				0.0	
11					SILT (ML): gray (7.5YR-5/1), wet, 100% silt, plastic
12				0.1	
13					-reddish oxidation
14					POORLY GRADED SAND (SP): dark gray (7.5YR-4/1), saturated, 100% fine sand with trace organics
15				0.1	Bottom of Boring 15.0 feet Backfilled with bentonite chip.
16					
17					
18					
19					
20					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB15-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

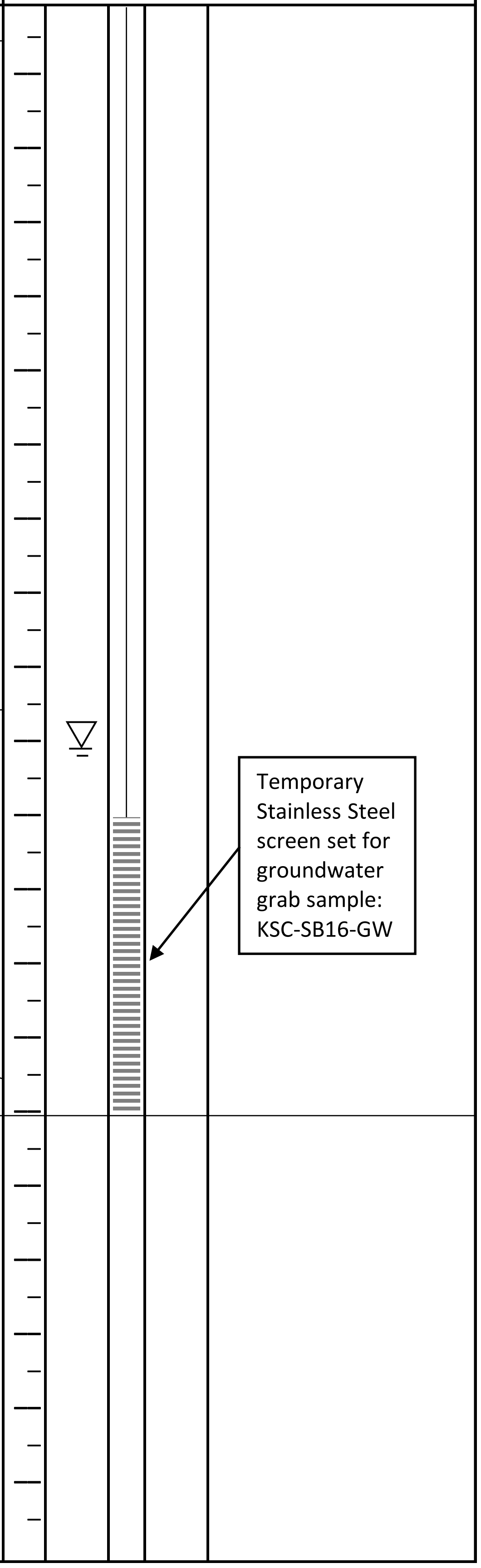
LOG OF SB-16

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156895**N** 1288390**E** (NAD83)	
LOCATION: Kent, WA - West of Bldg. 18-42	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/26/17	
DRILLING EQUIPMENT: Geoprobe 6600	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by vac-truck from 0-5'		

DEPTH (feet)	Lab Sample	Sample Recovery	Blows/Foot	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
0-0.25					3-inch asphalt concrete
0.25-9.5				0.1 0.1 0.0	POORLY GRADED SAND WITH GRAVEL (SP): brown (7.5YR-5/3), moist, 30% gravel, 65% sand, 5% silt -silty sand grading to silt
9.5-14				0.0 0.0	SILT (ML): gray (7.5YR-5/1), wet, 100% silt, plastic -reddish oxidation
14-15				0.0	POORLY GRADED SAND (SP): dark gray (7.5YR-4/1), saturated, 100% fine sand
15					Bottom of Boring 15.0 feet Backfilled with bentonite chip.

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



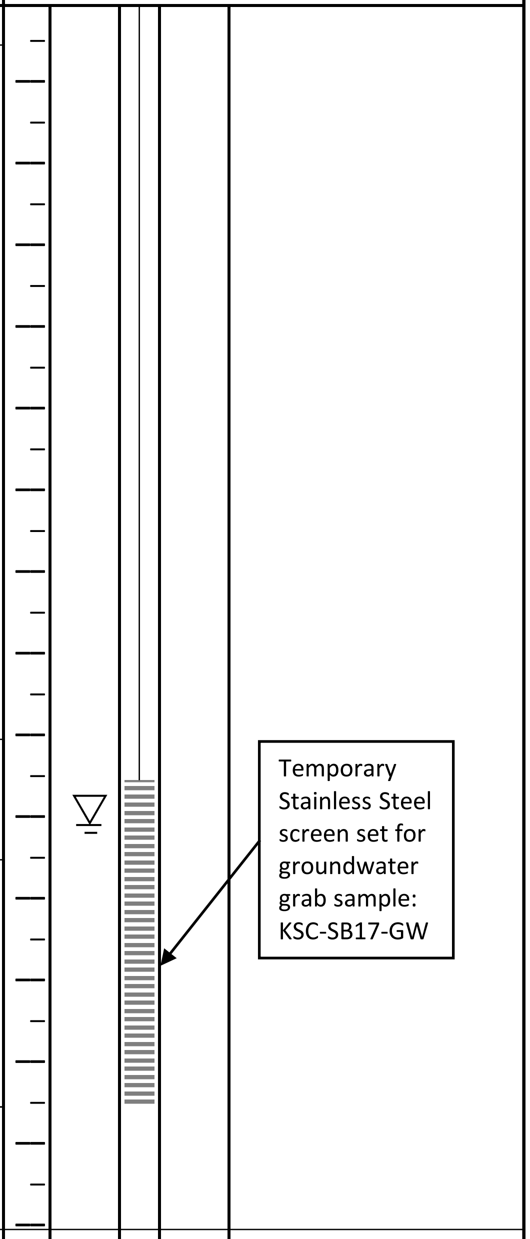
Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-17

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156599**N** 1288393**E** (NAD83)	
LOCATION: Kent, WA - West of Bldg. 18-41	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/26/17	
DRILLING EQUIPMENT: Geoprobe 6600	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by vac-truck from 0-5'		

DEPTH (feet)	SAMPLES				VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Lab Sample	Sample Recovery	Blows/Foot	PID (ppm)		
					8-inch concrete	
				0.1	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown (7.5YR-5/3), moist, 30% gravel, 60% sand, 10% silt	
				0.0		
				0.1		
				0.0	SILT (ML): gray (7.5YR-5/1), wet, 100% silt, plastic	
				0.2	POORLY GRADED SAND (SP): brown (7.5YR-5/3), saturated, 100% fine to medium sand	
				0.0	SILT WITH ORGANICS (ML-OL): gray-brown (7.5YR-5/1-5/4), wet, 90% silt, 10% organics with trace organics	
					Bottom of Boring 15.0 feet Backfilled with bentonite chip.	



Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB17-GW

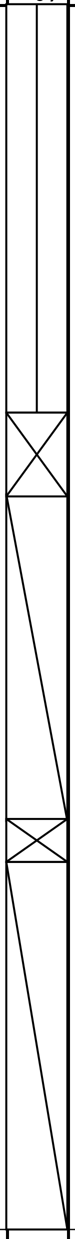
Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

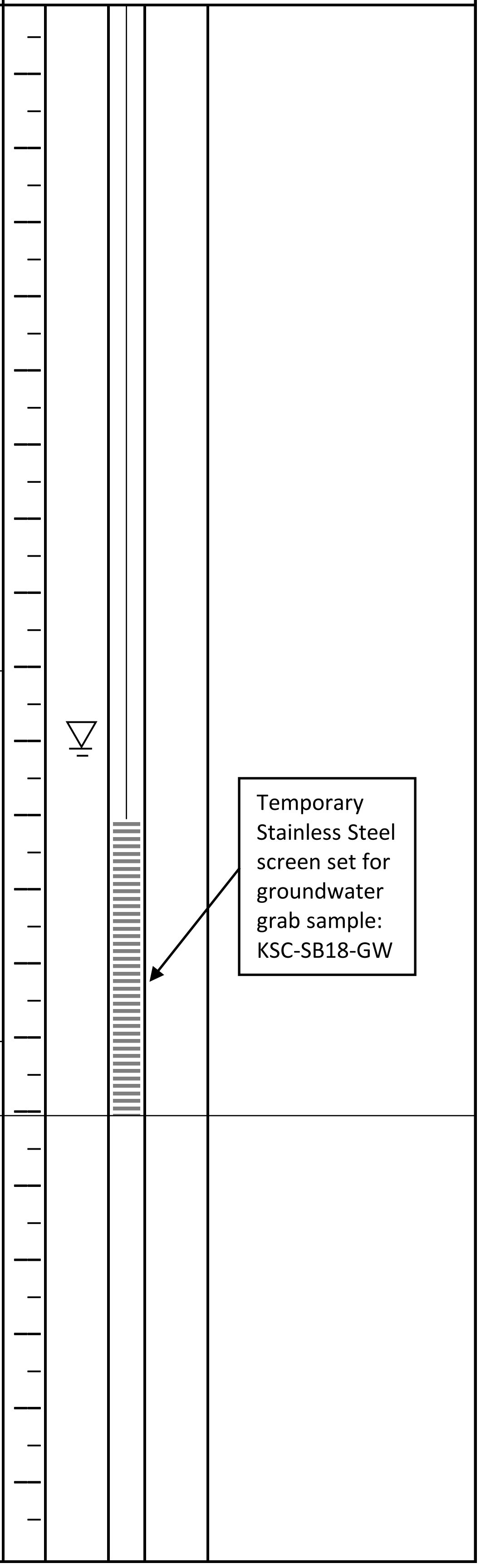
LOG OF SB-18

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156551**N** 1288362**E** (NAD83)	
LOCATION: Kent, WA - West of Bldg. 18-41	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Cascade	DATE: 1/27/17	
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by vac-truck from 0-5'		

DEPTH (feet)	SAMPLES				VISUAL SOIL DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Lab Sample	Sample Recovery	Blows/Foot	PID (ppm)	<u>Soil Group Name (USCS):</u> color, moisture, density/consistency, grain size, other discriptors	
					Washed gravel surfacing	
1						
2				0.1		
3						
4					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown (7.5YR-5/3), moist, 20% gravel, 65% sand, 15% silt	
5						
6						
7				0.1		
8						
9					-no perched water	
10				0.0		
11					SILT (ML): gray (7.5YR-5/1), wet, 100% silt	
12				0.2		
13						
14					SILT WITH SAND (ML): gray-brown (7.5YR-5/1-5/4), wet, 55% silt, 40% sand, 5% organics	
15				0.0	Bottom of Boring 15.0 feet Backfilled with bentonite chip.	
16						
17						
18						
19						
20						





Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-19

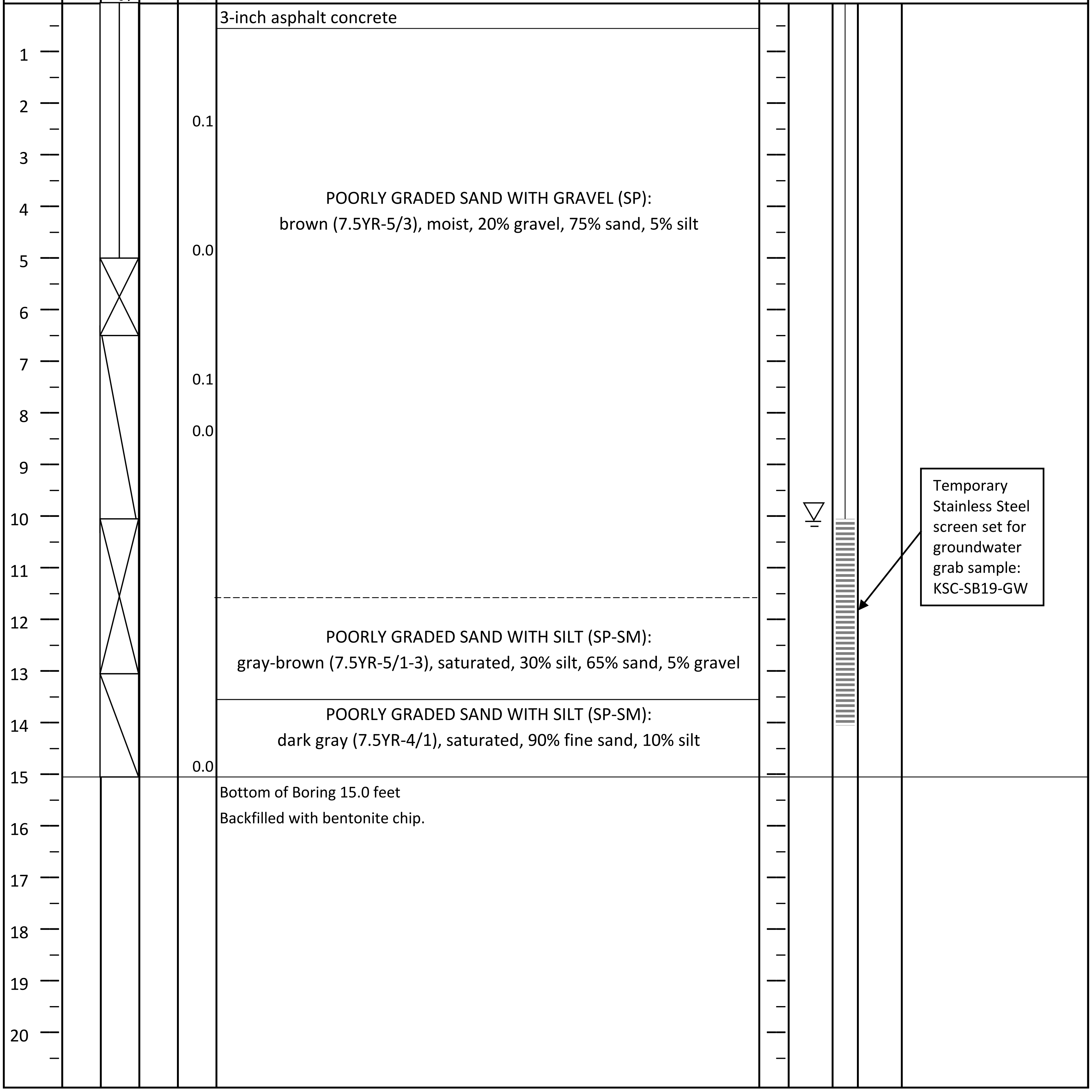
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156561**N** 1288422**E** (NAD83)
LOCATION: Kent, WA - West of Bldg. 18-41	SURFACE ELEVATION:
DRILLING CONTRACTOR: Cascade	DATE: 1/25/17
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600

NOTES: Boring cleared by vac-truck from 0-5'

DEPTH (feet) | SAMPLES: Lab Sample, Sample Recovery, Blows/Foot, PID (ppm) | VISUAL SOIL DESCRIPTION | WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors



3-inch asphalt concrete

POORLY GRADED SAND WITH GRAVEL (SP):
brown (7.5YR-5/3), moist, 20% gravel, 75% sand, 5% silt

POORLY GRADED SAND WITH SILT (SP-SM):
gray-brown (7.5YR-5/1-3), saturated, 30% silt, 65% sand, 5% gravel

POORLY GRADED SAND WITH SILT (SP-SM):
dark gray (7.5YR-4/1), saturated, 90% fine sand, 10% silt

Bottom of Boring 15.0 feet
Backfilled with bentonite chip.

Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB19-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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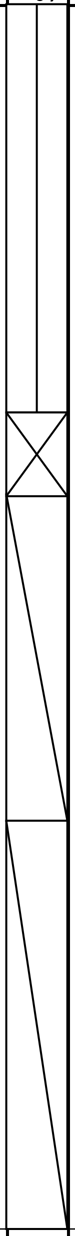
LOG OF SB-20

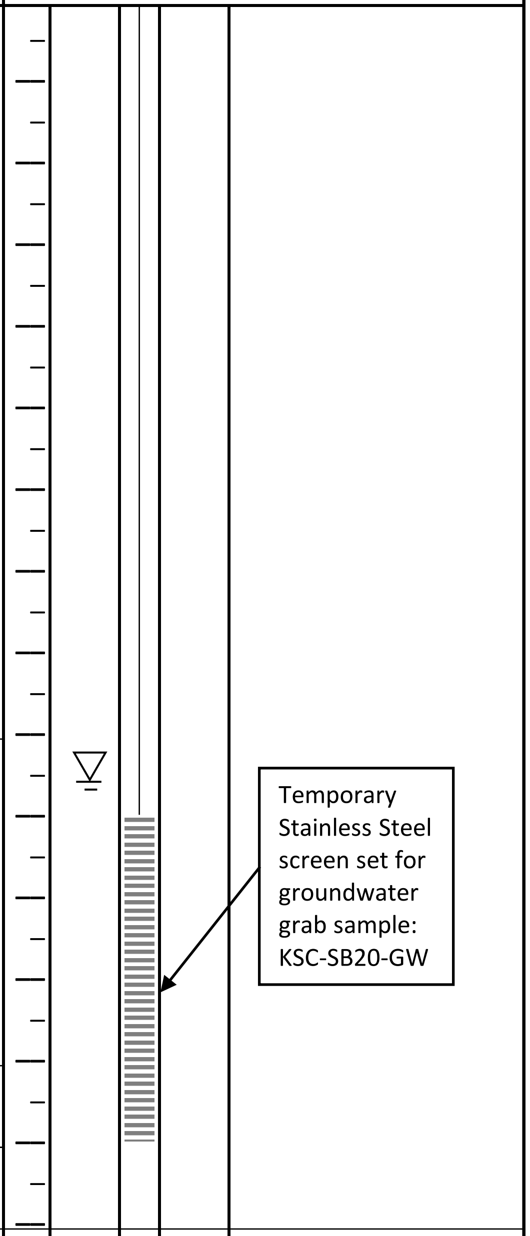
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156522**N** 1288388**E** (NAD83)
LOCATION: Kent, WA - West of Bldg. 18-41	SURFACE ELEVATION:
DRILLING CONTRACTOR: Cascade	DATE: 1/27/17
DRILLING EQUIPMENT: Geoprobe 7730DT	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600

NOTES: Boring cleared by vac-truck from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	Sample Recovery	Blows/Foot	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Washed gravel surfacing	
1–9				0.1 0.1 0.1	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown (7.5YR-5/3), moist, 20% gravel, 65% sand, 15% silt -no perched water	
9–13				0.2 0.0	SILT (ML): gray (7.5YR-5/1), wet, 100% silt	Temporary Stainless Steel screen set for groundwater grab sample: KSC-SB20-GW
13–14					POORLY GRADED SAND WITH SILT (SP-SM) gray (7.5YR-5/1), saturated, 30% silt, 70% sand	
14–15				0.0	POORLY GRADED SAND (SP) dark gray (7.5YR-4/1), saturated, 100% fine sand	
15					Bottom of Boring 15.0 feet Backfilled with bentonite chip.	





Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

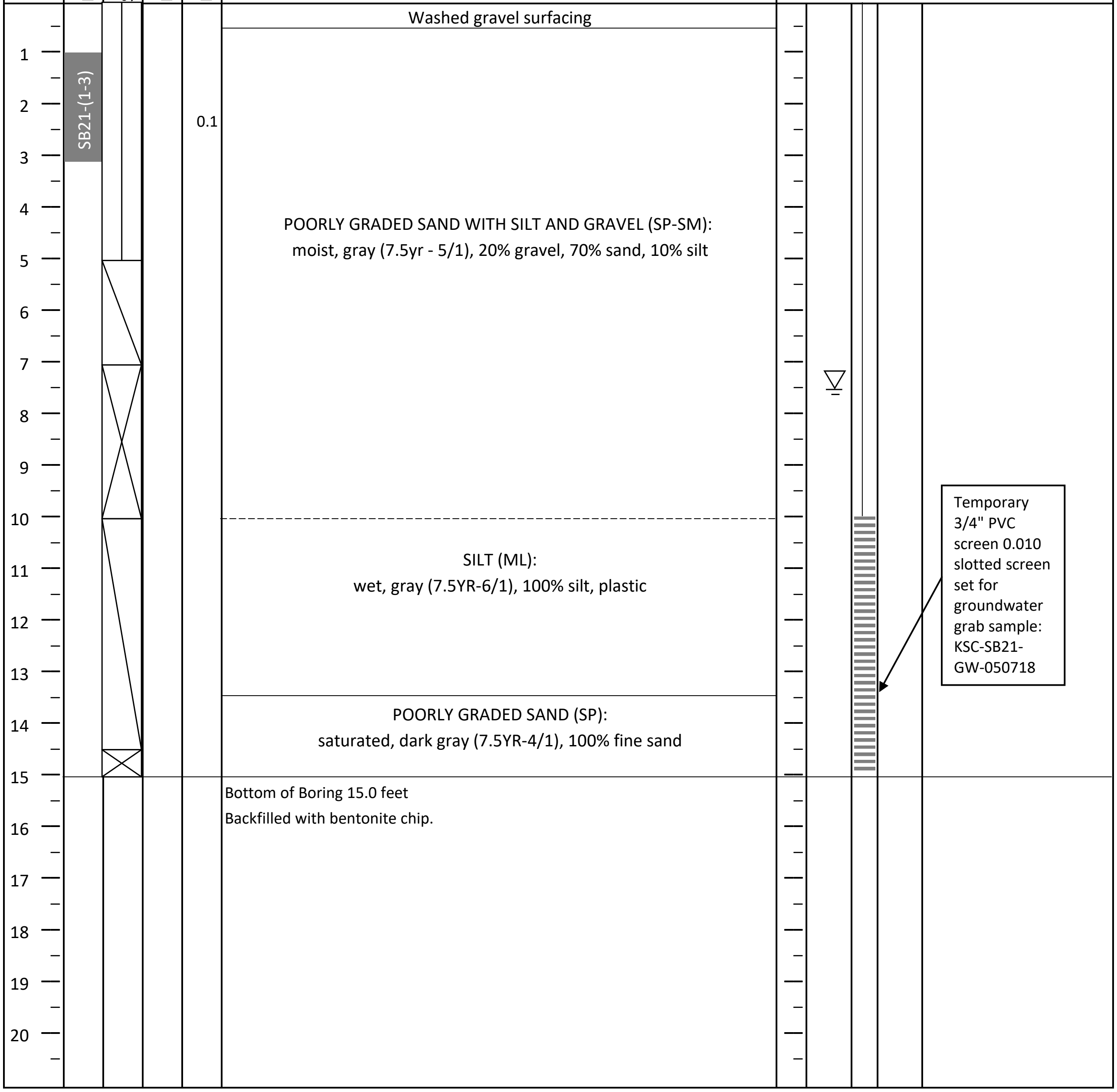
DALTON OLMSTED FUGLEVAND

LOG OF SB-21

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156866.8**N** 1288133.2**E** (NAD83)	
LOCATION: Kent, WA - West of Bldg. 18-59	SURFACE ELEVATION: 29'	
DRILLING CONTRACTOR: Holt	DATE: 5/7/18	
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by airknife/vac-truck from 0-5'		

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blows/Foot	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Washed gravel surfacing

POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM):
moist, gray (7.5yr - 5/1), 20% gravel, 70% sand, 10% silt

SILT (ML):
wet, gray (7.5YR-6/1), 100% silt, plastic

POORLY GRADED SAND (SP):
saturated, dark gray (7.5YR-4/1), 100% fine sand

Bottom of Boring 15.0 feet
Backfilled with bentonite chip.

Temporary 3/4" PVC screen 0.010 slotted screen set for groundwater grab sample: KSC-SB21-GW-050718

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

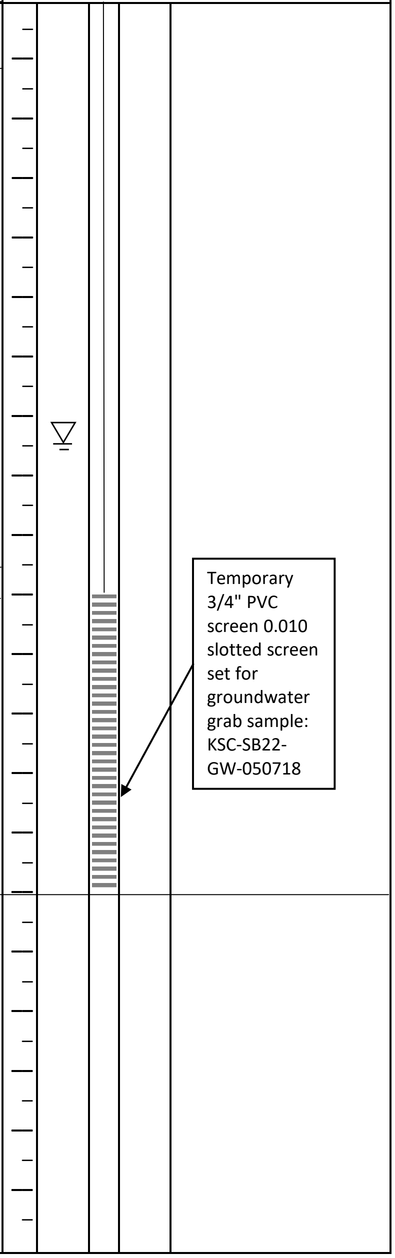
LOG OF SB-22

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156807.2**N** 1288256.8**E** (NAD83)	
LOCATION: Kent, WA - South of Bldg. 18-59	SURFACE ELEVATION: 29'	
DRILLING CONTRACTOR: Holt	DATE: 5/7/18	
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by airknife/vac-truck from 0-5'		

DEPTH (feet)	SAMPLES Lab Sample	Sample Recovery	Blows/Foot	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
1					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): moist, brown(7.5yr-5/3) with roots, 10% gravel, 20% silt, 70% sand
2	SB22-(1-3)			0.1	
5					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): moist, gray (7.5yr - 5/1), 20% gravel, 70% sand, 10% silt
10					SILT (ML): wet/gray 100% silt, plastic
13					POORLY GRADED SAND (SP): saturated, dark gray (7.5YR-4/1), 100% fine sand
15					Bottom of Boring 15.0 feet Backfilled with bentonite chip.

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary 3/4" PVC screen 0.010 slotted screen set for groundwater grab sample: KSC-SB22-GW-050718

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

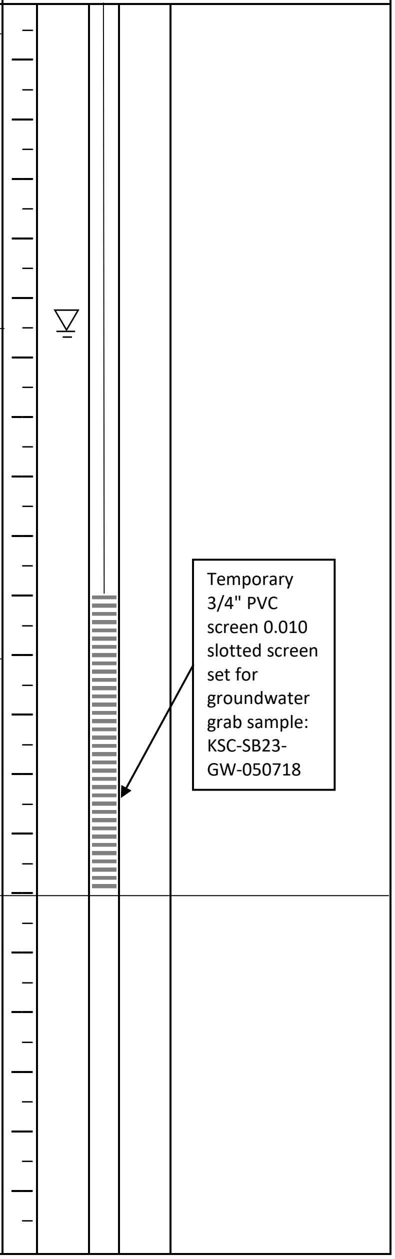
LOG OF SB-23

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156596.5**N** 1288207.3**E** (NAD83)	
LOCATION: Kent, WA - West, North of Substation	SURFACE ELEVATION: 26'	
DRILLING CONTRACTOR: Holt	DATE: 5/7/18	
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 15.0'	
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper	
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper	REG. NO.: 1600
NOTES: Boring cleared by airknife/vac-truck from 0-5'		

DEPTH (feet)	SAMPLES Lab Sample	 Sample Recovery	 Blows/Foot	 PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors
					6-inch concrete
2	SB23-(1-3)			0.1	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): wet, brown (7.5YR-5/3) 20% gravel, 70% sand, 10% silt
8					SILT (ML): wet, gray (7.5YR-5/1), 100% silt, plastic
13					POORLY GRADED SAND (SP): saturated, dark gray (7.5YR-4/1), 100% fine sand
15					Bottom of Boring 15.0 feet Backfilled with bentonite chip and concrete patch.

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary 3/4" PVC screen 0.010 slotted screen set for groundwater grab sample: KSC-SB23-GW-050718

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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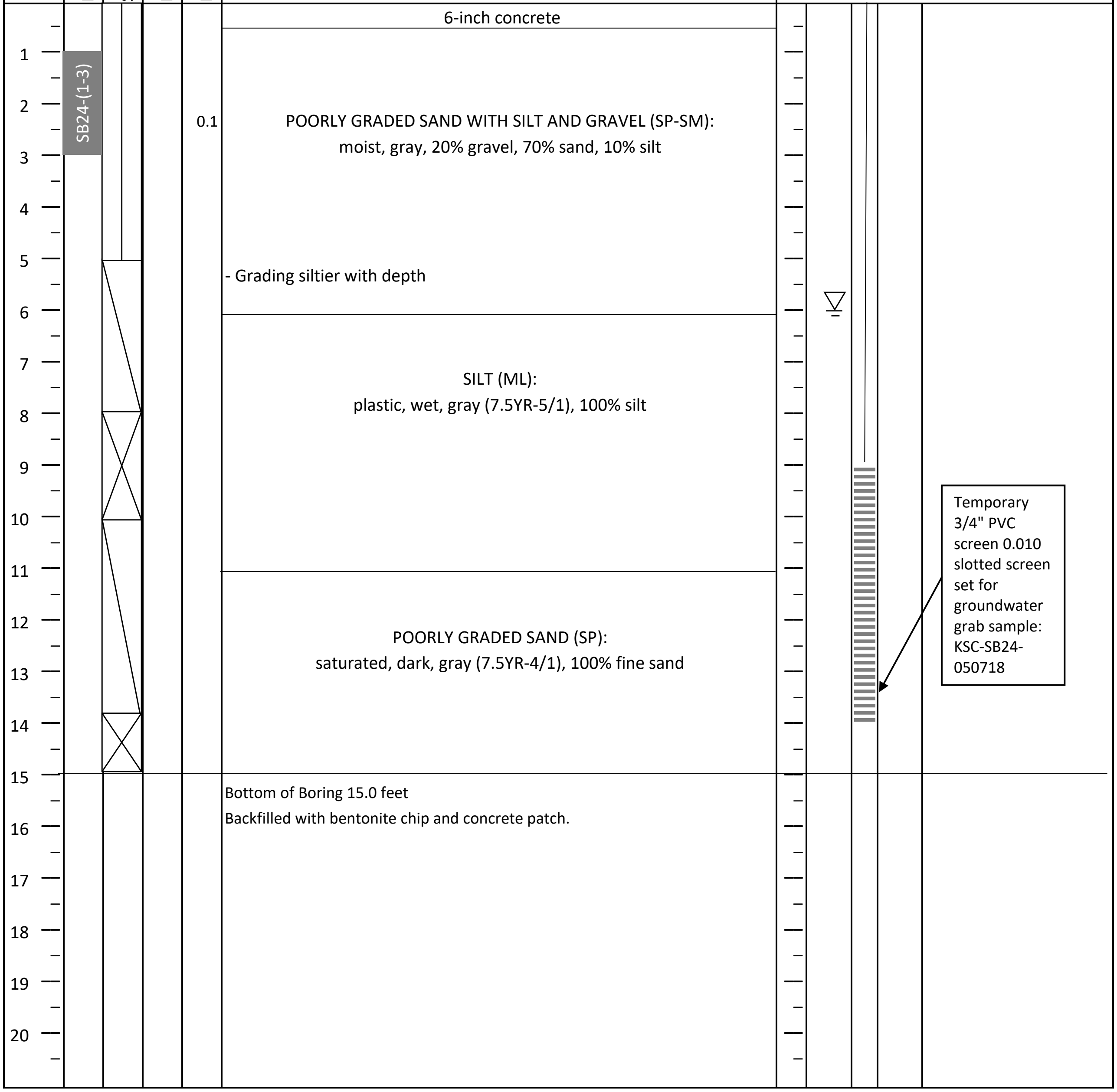
LOG OF SB-24

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156594.5**N** 1288275.4**E** (NAD83)
LOCATION: Kent, WA - Center, North of substation	SURFACE ELEVATION: 27'
DRILLING CONTRACTOR: Holt	DATE: 5/7/18
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper — REG. NO.: 1600

NOTES: Boring cleared by airknife/vac-truck from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blows/Foot	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



6-inch concrete

POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM):
moist, gray, 20% gravel, 70% sand, 10% silt

- Grading siltier with depth

SILT (ML):
plastic, wet, gray (7.5YR-5/1), 100% silt

POORLY GRADED SAND (SP):
saturated, dark, gray (7.5YR-4/1), 100% fine sand

Bottom of Boring 15.0 feet
Backfilled with bentonite chip and concrete patch.

Temporary 3/4" PVC screen 0.010 slotted screen set for groundwater grab sample: KSC-SB24-050718

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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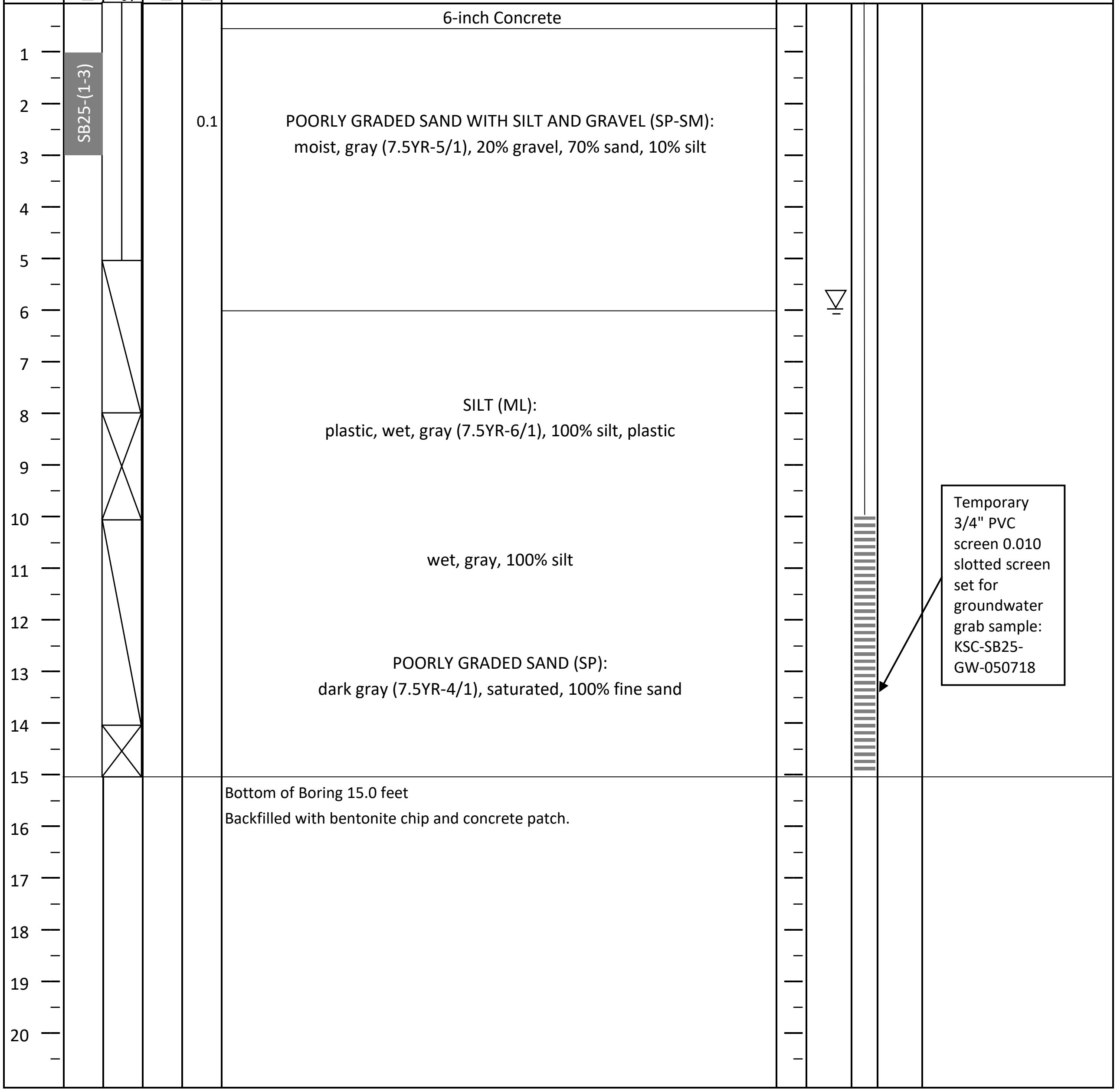
LOG OF SB-25

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: 156596.2**N** 1288346.0**E** (NAD83)
LOCATION: Kent, WA -East , North of Substation	SURFACE ELEVATION: 28'
DRILLING CONTRACTOR: Holt	DATE: 5/7/18
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 15.0'
DRILLING METHOD: Direct-Push	LOGGED BY: D. Cooper
SAMPLING METHOD: 2" dia. X 5' Macro w/acrylic liner	RESPONSIBLE PROF.: D. Cooper REG. NO.: 1600

NOTES: Boring cleared by airknife/vac-truck from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blows/Foot	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other discriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					6-inch Concrete	
1 - 3	SB25-(1-3)			0.1	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): moist, gray (7.5YR-5/1), 20% gravel, 70% sand, 10% silt	
					SILT (ML): plastic, wet, gray (7.5YR-6/1), 100% silt, plastic	
					wet, gray, 100% silt	
					POORLY GRADED SAND (SP): dark gray (7.5YR-4/1), saturated, 100% fine sand	
15					Bottom of Boring 15.0 feet Backfilled with bentonite chip and concrete patch.	



Temporary 3/4" PVC screen 0.010 slotted screen set for groundwater grab sample: KSC-SB25-GW-050718

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-26

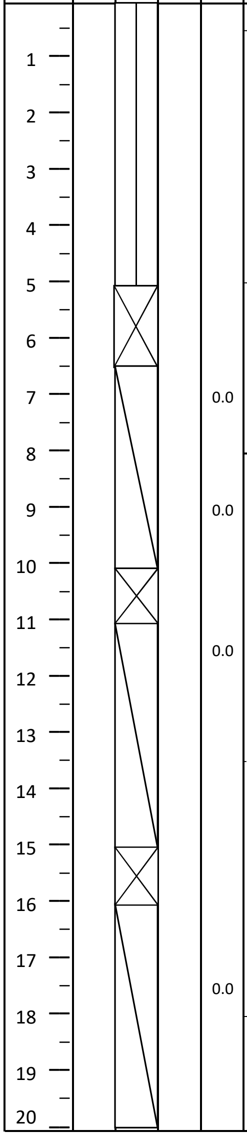
Sheet 1 of 2

PROJECT: Boeing KSC RI	COORDINATES: 156587.3923N 1287844.721E (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/2/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 42.0 ft / ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray / REG. NO.: 2557

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet) | SAMPLES: Lab Sample, Sample Recovery, Blow Counts, PID (ppm) | VISUAL SOIL DESCRIPTION | WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors



Grassy surface

POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM):
brown, dry, 55% fine to medium sand,
35% fine to medium gravel, 10% fines, with occassional cobbles

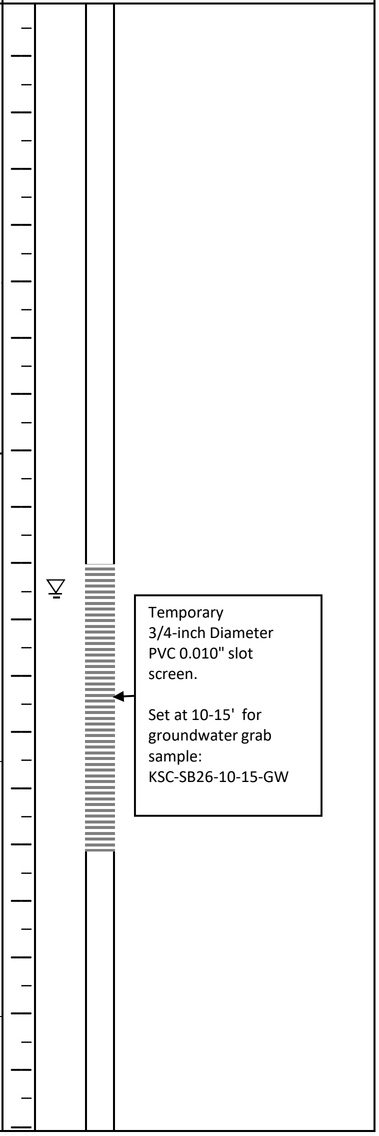
POORLY GRADED SAND (SP):
dark grey(10YR-4/1), wet, 85% fine to medium sand,
10% medium gravel, 5% non plastic fines

SILT (ML):
grey (10YR-5/1), moist, firm, 95% non-plastic fines,
5% fine sand, with occassional rootlets and fine sand lenses

SILTY SAND (SM):
dark grey (10YR-3/1), wet, 60% fine sand, 40% non-plastic fines

POORLY GRADED SAND (SP):
black (10YR-2/1), wet, 95% fine to coarse sand, 5% fines,

-wood fragments



Temporary 3/4-inch Diameter PVC 0.010" slot screen.

Set at 10-15' for groundwater grab sample: KSC-SB26-10-15-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

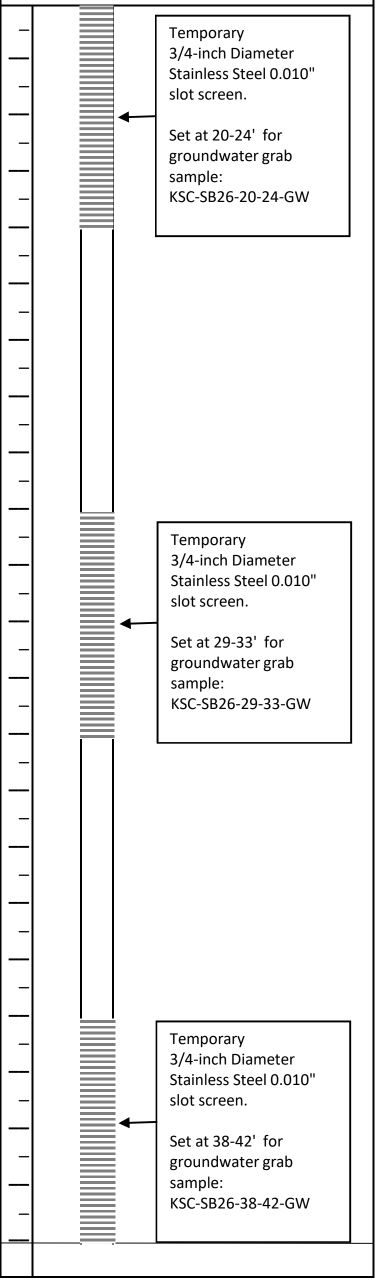
LOG OF SB-26

Sheet 2 of 2

PROJECT: Boeing KSC RI	COORDINATES: 156587.3923N 1287844.721E (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/2/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 42.0 ft / ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray / REG. NO.: 2557

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blow Counts	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
20					SP continued. medium to coarse sand	
21						
22				0.0	fine sand	
23					medium to coarse sand	
24						
25					fine to medium sand with occassional wood debris	
26						
27				0.0		
28						
29						
30						
31						
32				0.0		
33						
34						
35						
36						
37				0.0		
38						
39					POORLY GRADED SAND with SILT (SP-SM): black (10YR-2/1), wet 90% fine sand, 10% non-plastic fines	
40						
41						
42					Bottom of Boring 42.0' ; Backfilled with bentonite chips.	



Temporary 3/4-inch Diameter Stainless Steel 0.010" slot screen.

Set at 20-24' for groundwater grab sample: KSC-SB26-20-24-GW

Temporary 3/4-inch Diameter Stainless Steel 0.010" slot screen.

Set at 29-33' for groundwater grab sample: KSC-SB26-29-33-GW

Temporary 3/4-inch Diameter Stainless Steel 0.010" slot screen.

Set at 38-42' for groundwater grab sample: KSC-SB26-38-42-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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LOG OF SB-27

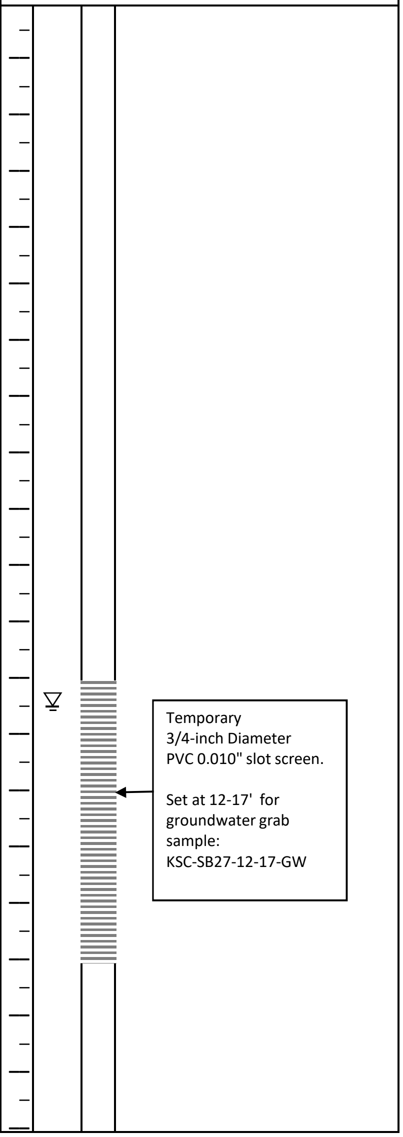
Sheet 1 of 2

PROJECT: Boeing KSC RI	COORDINATES: 156383.6864N 1287618.871E (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/3/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 44.0 ft ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray REG. NO.: 2557

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors
0					Asphalt at surface POORLY GRADED SAND with SILT and GRAVEL (SP-SM) dry, 60% fine to medium sand, 30% medium coarse gravel, 10% fines upper 2' contain less cobbly gravel (road base) - larger rocks started at 2'
5					slough
8					POORLY GRADED SAND with SILT and GRAVEL (SP-SM): dark grey (10YR-4/1), dry 70% fine to medium sand, 20% fine to medium gravel, 10% non-plastic fines
9				0.0	
10.5					slough
13				0/0.2	
14					SILTY SAND (SM): black (10YR-2/1), wet 85% fine sand, 15% non-plastic fines
17				0/0.3	
18					POORLY GRADED SAND with SILT (SP-SM): black (10YR-2/1), wet 90% fine to medium sand, 10% non-plastic fines
20					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary
3/4-inch Diameter
PVC 0.010" slot screen.

Set at 12-17' for
groundwater grab
sample:
KSC-SB27-12-17-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-27

Sheet 2 of 2

PROJECT: Boeing KSC RI	COORDINATES: 156383.6864N 1287618.871E (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/3/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 44.0 ft ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray REG. NO.: 2557
NOTES: Boring cleared by Air-Knife from 0-5'	

DEPTH (feet)	SAMPLES Lab Sample	 Sample Recovery	 Blow Counts	 PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SP-SM continued	
21						
22				0.0		
23					- wood fragments	
24					- wood fragments - silt stringers (1 cm)	Temporary 3/4-inch Diameter stainless steel 0.010" slot screen. Set at 22-26' for groundwater grab sample: KSC-SB27-22-26-GW
25						
26					POORLY GRADED SAND (SP): black (10YR-2/1), wet 95% fine to medium sand, <5% non-plastic fines occassional wood fragments	
27						
28				0/0.4		
29						
30					▼ Silt content increases POORLY GRADED SAND with SILT (SP-SM): black (10YR-2/1), wet 90% fine to medium sand, 10% non-plastic fines occassional silt stringers and wood fragments.	
31						
32						Temporary 3/4-inch Diameter PVC 0.010" slot screen. Set at 31-35' for groundwater grab sample: KSC-SB27-31-35-GW
33				0/0.4		
34						
35						
36						
37				0/0.6		
38						
39						
40						
41						Temporary 3/4-inch Diameter PVC 0.010" slot screen. Set at 40-44' for groundwater grab sample: KSC-SB27-40-44-GW
42						
43						
44					Bottom of boring 44.0 feet; Backfilled with bentonite chip	

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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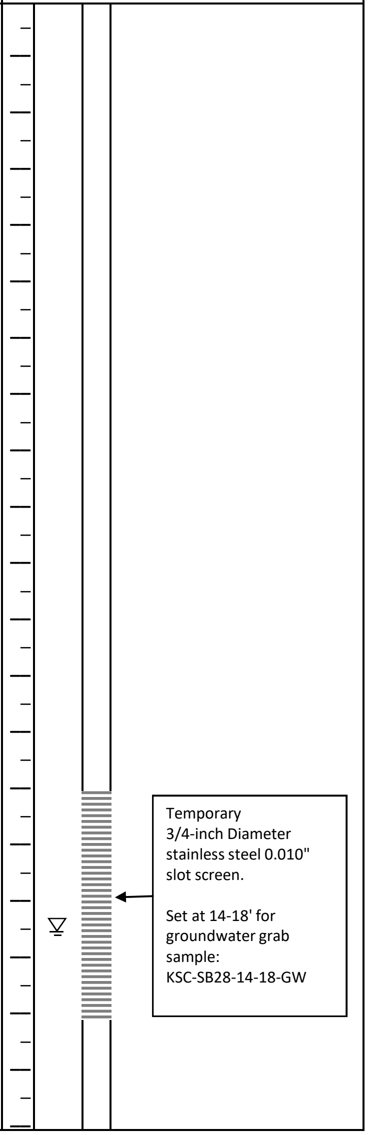
LOG OF SB-28

Sheet 1 of 2

PROJECT: Boeing KSC RI	COORDINATES: 156261.997N 1287830.96E (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/2/2018 and10/3/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 36.0 ft ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray REG. NO.: 2557
NOTES: Boring cleared by Air-Knife from 0-5'	

DEPTH (feet)	SAMPLES: Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0-5					Grass at surface POORLY GRADED SAND with SILT and GRAVEL (SP-SM): dry, 60% fine to medium sand, 30% medium to coarse gravel, 10% fines	
5-9.5				0.0	POORLY GRADED SAND with SILT and GRAVEL (SP-SM): brown (10YR-5/3), dry, 70% fine to medium sand, 20% medium to coarse gravel, 10% non-plastic fines	
9.5-18.5				0/0.3	SILT (ML): grey (10YR-5/1), moist, firm, 95%non-plastic fines, <5% fine sand - rock prevented recovery	
18.5-20					POORLY GRADED SAND (SP): dark grey (10YR-3/1), wet, 95% fine sand, <5% fines	



Temporary
3/4-inch Diameter
stainless steel 0.010"
slot screen.

Set at 14-18' for
groundwater grab
sample:
KSC-SB28-14-18-GW

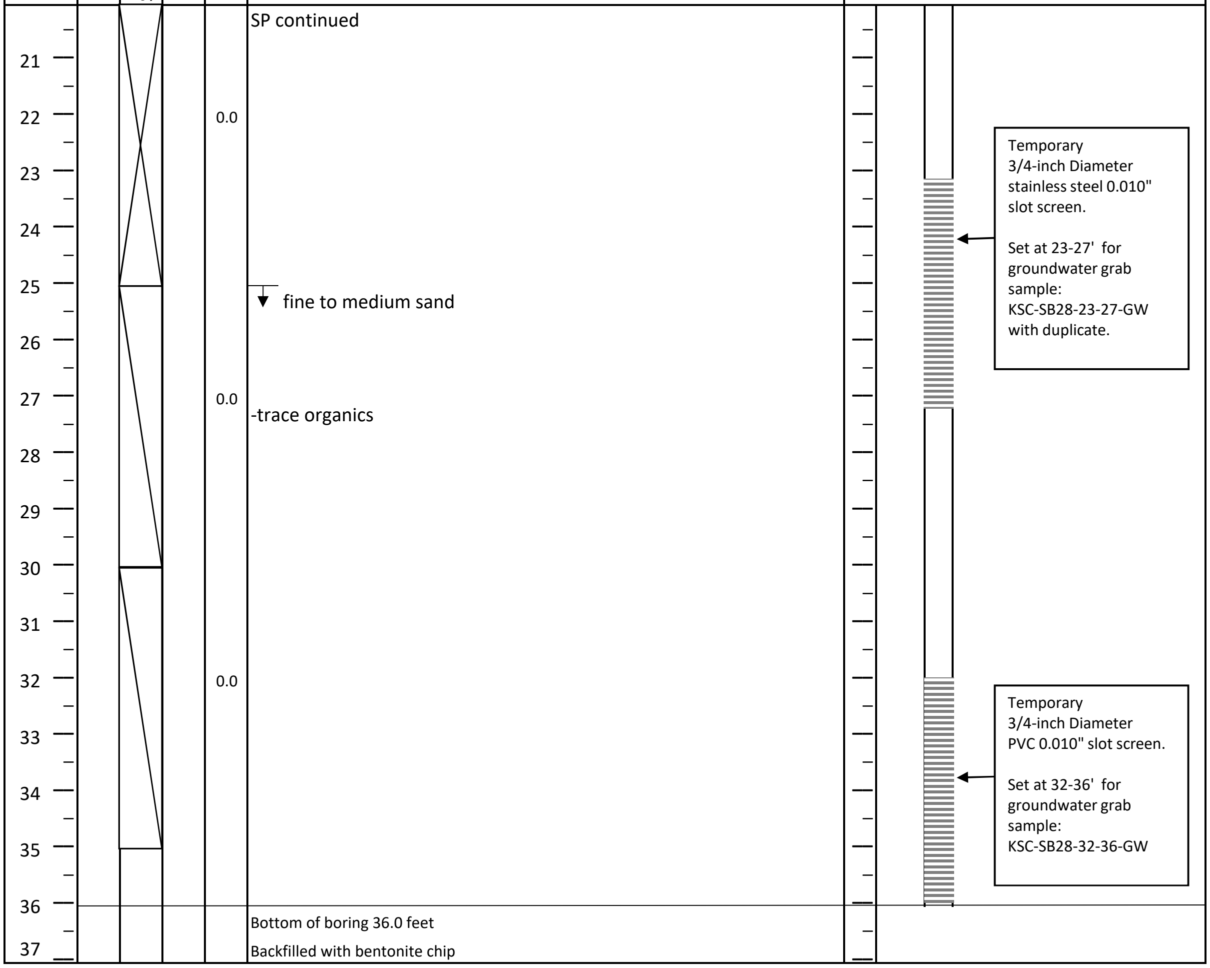
Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-28

Sheet 2 of 2

PROJECT: Boeing KSC RI	COORDINATES: 156261.997N 1287830.96E (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/2/2018 and10/3/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 36.0 ft ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray REG. NO.: 2557
NOTES: Boring cleared by Air-Knife from 0-5'	

DEPTH (feet)	SAMPLES: Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



SP continued

fine to medium sand

-trace organics

Temporary 3/4-inch Diameter stainless steel 0.010" slot screen.

Set at 23-27' for groundwater grab sample: KSC-SB28-23-27-GW with duplicate.

Temporary 3/4-inch Diameter PVC 0.010" slot screen.

Set at 32-36' for groundwater grab sample: KSC-SB28-32-36-GW

Bottom of boring 36.0 feet

Backfilled with bentonite chip

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-29

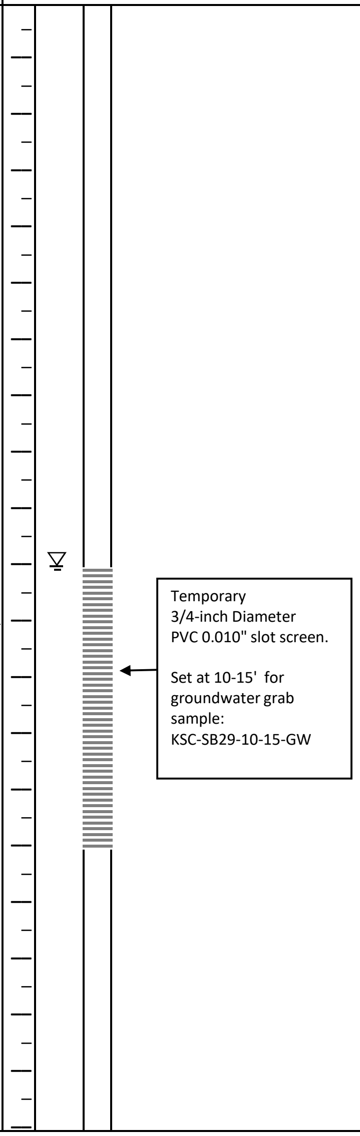
Sheet 1 of 2

PROJECT: Boeing KSC RI	COORDINATES: 155402.5473N 1288745.896E (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/4/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 41.0 ft — ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray — REG. NO.: 2557

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES: Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors
					asphalt and concrete surface with road base
1					POORLY GRADED SAND (SP), medium brown, dry, 90% fine to medium sand, 5% medium gravel, 5% non-plastic fines
6				0.0	
7				0.4/0.8	
8					POORLY GRADED SAND with SILT (SP-SM), greyish brown (10YR-4/2), dry, 85% fine to medium sand, 10% non-plastic fines, 5% fine gravel
9				0.0	
10				0.0	becomes wet
11					SILT (ML): dark grey (10YR-4/1), wet, firm, 95% low plasic fines.
12				0/0.6	
13				0.0	
14					10% fine sand, soft
17				0/0.7	30% fine sand
18				0.0	
19					SILTY SAND (SM): dark grey (10YR-4/1), wet, 70% fine sand, 30% non-plastic fines
20					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary 3/4-inch Diameter PVC 0.010" slot screen.

Set at 10-15' for groundwater grab sample: KSC-SB29-10-15-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

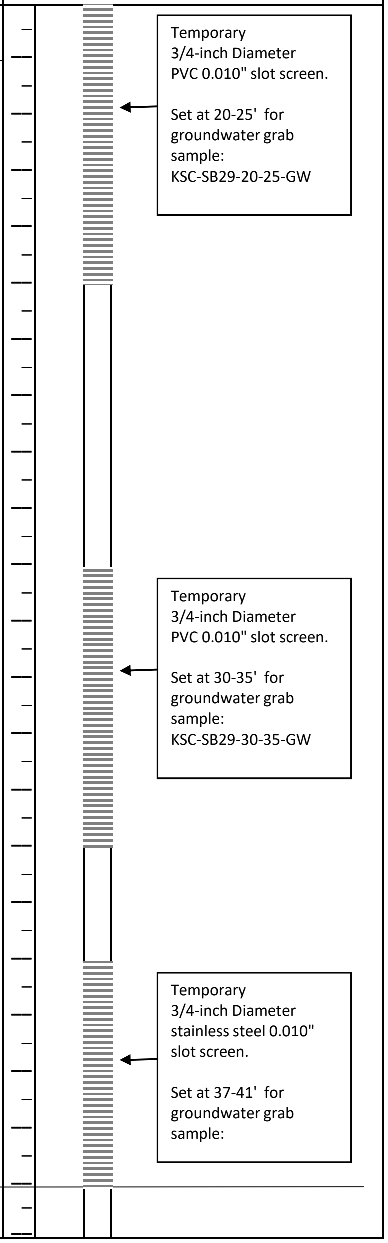
LOG OF SB-29

Sheet 2 of 2

PROJECT: Boeing KSC RI	COORDINATES: 155402.5473N 1288745.896E (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/4/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 41.0 ft ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray REG. NO.: 2557
NOTES: Boring cleared by Air-Knife from 0-5'	

DEPTH (feet)	SAMPLES Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors
					SM continued: 60% sand, 40% non-plastic fines
21				0.0	SILT with SAND (ML): dark grey (10YR-4/1), wet, soft, 85% fines, 15% fine sand
22					SILT (ML): dark grey (10YR-4/1), wet, firm, 95% fines, 5% fine sand
23					
24				0/0.7	SILT with SAND (ML): dark grey (10YR-4/1), wet, firm, 80% fines, 20% fine sand
25					SILTY SAND (SM): dark grey (10YR-4/1), wet, 60% fine sand, 40% non-plastic fines, silt content fluctuates throughout.
26					
27				0/0.5	
28				0.0	
29					
30					silt content decreases to 15%
31					
32				0/0.6	
33					silt content increases to 35%
34				0.0	SILT (ML): dark grey (10YR-4/1), wet, 95% non-plastic fines, 5% fine sand, ▼ moist, with peat and organic fragments
35					
36					
37				0/0.6	SILTY SAND (SM): very dark grey (10YR-3/1), wet, 80% fine sand, 20% non-plastic fines
38					
39					
40					
41					Bottom of boring 41.0 feet
42					Backfilled with bentonite chip

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary 3/4-inch Diameter PVC 0.010" slot screen.

Set at 20-25' for groundwater grab sample: KSC-SB29-20-25-GW

Temporary 3/4-inch Diameter PVC 0.010" slot screen.

Set at 30-35' for groundwater grab sample: KSC-SB29-30-35-GW

Temporary 3/4-inch Diameter stainless steel 0.010" slot screen.

Set at 37-41' for groundwater grab sample:

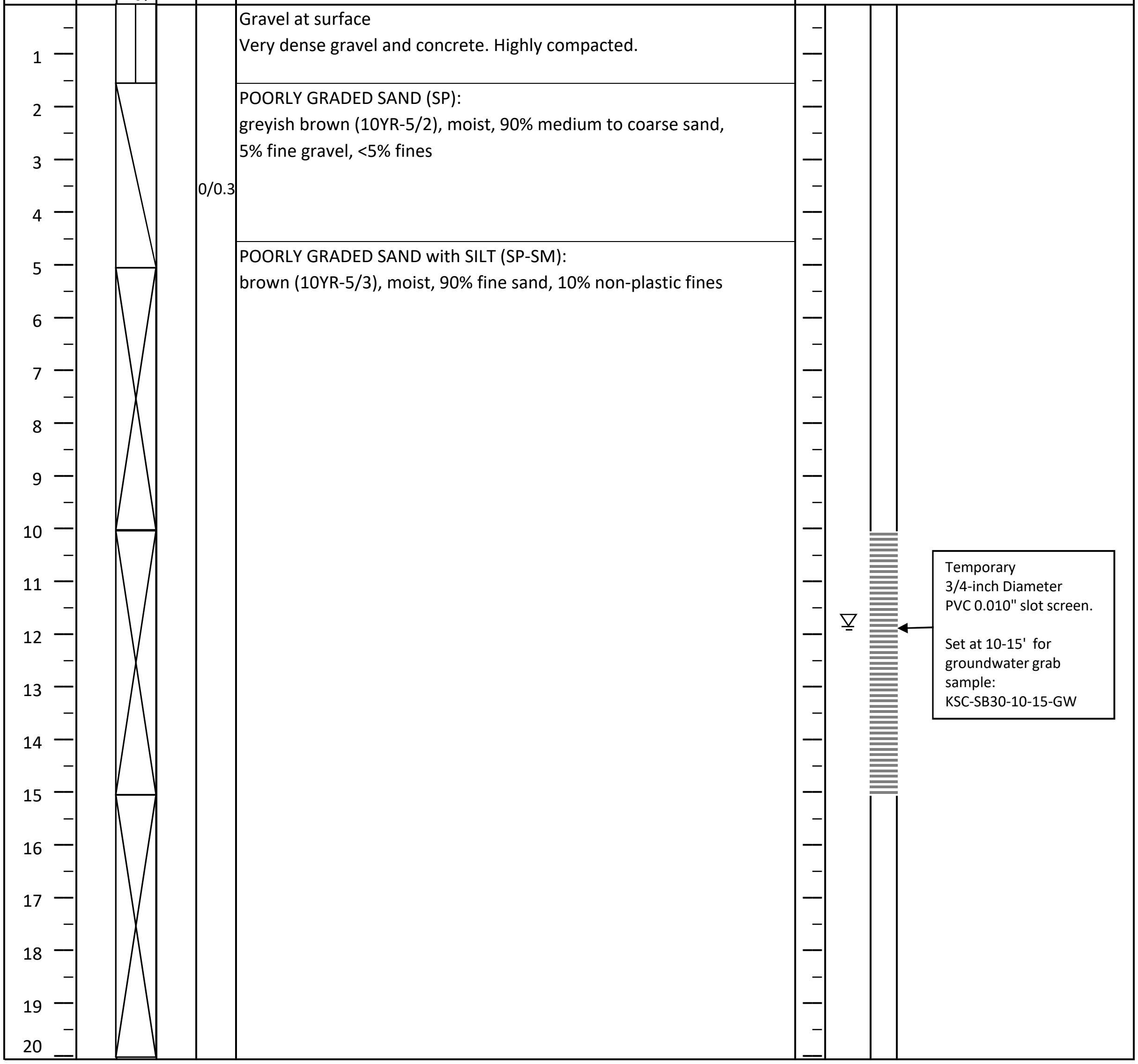
Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-30

Sheet 1 of 2

PROJECT: Boeing KSC RI	COORDINATES: 155249.0374N 1288772.383E (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/4/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 42.0 ft ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray REG. NO.: 2557
NOTES: Boring cleared by Air-Knife from 0-5'	

DEPTH (feet)	SAMPLES: Lab Sample	SAMPLES: Sample Recovery	SAMPLES: Blow Counts	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0–1.5					Gravel at surface Very dense gravel and concrete. Highly compacted.	
1.5–4.5				0/0.3	POORLY GRADED SAND (SP): greyish brown (10YR-5/2), moist, 90% medium to coarse sand, 5% fine gravel, <5% fines	
4.5–20					POORLY GRADED SAND with SILT (SP-SM): brown (10YR-5/3), moist, 90% fine sand, 10% non-plastic fines	Temporary 3/4-inch Diameter PVC 0.010" slot screen. Set at 10-15' for groundwater grab sample: KSC-SB30-10-15-GW



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

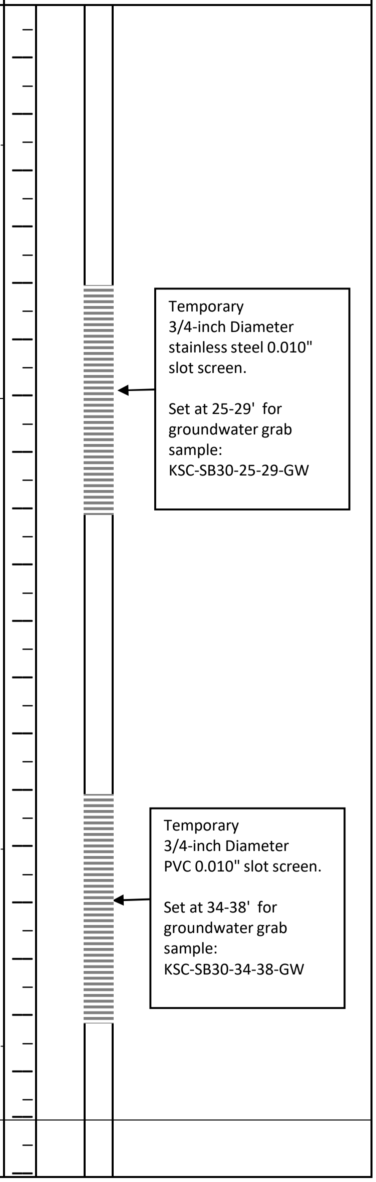
LOG OF SB-30

Sheet 2 of 2

PROJECT: Boeing KSC RI	COORDINATES: 155249.0374N 1288772.383E (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/4/2018 (drilling)	
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 42.0 ft'	ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray	
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray	REG. NO.: 2557
NOTES: Boring cleared by Air-Knife from 0-5'		

DEPTH (feet)	SAMPLES Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors
					SP-SM continued
21					
22				0.0	
23					
24					
25					
26					GRAVELLY SILT (ML): very dark grey (10YR-3/1), wet, very soft, 60% non-plastic fines, 40% fine gravel
27					
28				0/0.4	SILTY SAND (SM): very dark grey (10YR-3/1), wet, 65% fine sand, 35% non-plastic fines
29					
30					
31					
32					
33				0/0.4	
34					
35					
36					SILT with SAND (ML): very dark grey (10YR-3/1), wet, very soft, 80% non-plastic fines, 20% fine sand
37				0/0.6	
38					
39					SILT (ML): dark grey (10YR-4/1), moist, firm, with organic/peat matter.
40					Bottom of boring 40.0 feet
41					Backfilled with bentonite chip

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary 3/4-inch Diameter stainless steel 0.010" slot screen.

Set at 25-29' for groundwater grab sample: KSC-SB30-25-29-GW

Temporary 3/4-inch Diameter PVC 0.010" slot screen.

Set at 34-38' for groundwater grab sample: KSC-SB30-34-38-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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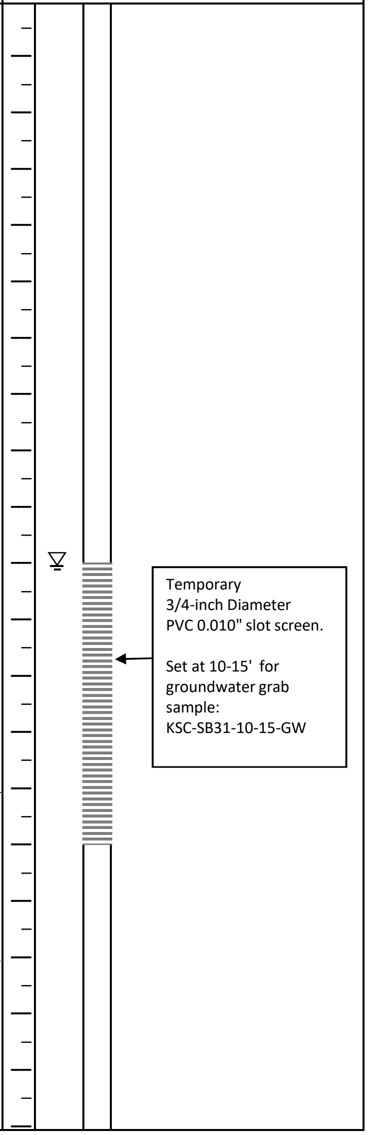
LOG OF SB-31

Sheet 1 of 2

PROJECT: Boeing KSC RI	COORDINATES: 155021.1084N 1288792.631E (NAD83)		
LOCATION: Kent, WA	SURFACE ELEVATION:		
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/5/2018 (drilling)		
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 42.0 ft	ECOLOGY ID:	
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray		
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray		REG. NO.: 2557
NOTES: Boring cleared by Air-Knife from 0-5'			

DEPTH (feet)	SAMPLES Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Gravel at surface	
1				0.0	Very dense gravel and concrete. Highly compacted.	
2					POORLY GRADED SAND with GRAVEL (SP) greenish grey (10Y-5/1), dry, 60% fine to coarse sand,	
3					40% fine to medium gravel wood chip	
4				0/1.0	asphalt chip	
5						
6						
7						
8				0/0.6		
9				0.0		
10					wet	
11				0/0.6		
12						
13				0.0		
14					SILTY SAND (SM):	
15					wet, 70% fine sand, 30% non-plastic fines	
16						
17				0.0	SILT (ML):	
18				0/0.6	dark grey (10YR-4/1), wet, soft, 95% low plastic fines, 5% fine sand	
19						
20						



Temporary
3/4-inch Diameter
PVC 0.010" slot screen.

Set at 10-15' for groundwater grab sample:
KSC-SB31-10-15-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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FUGLEVAND

LOG OF SB-31

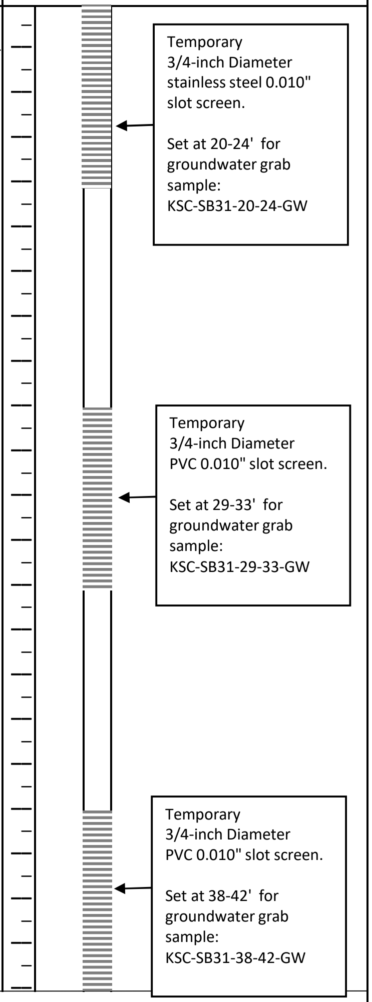
Sheet 2 of 2

PROJECT: Boeing KSC RI	COORDINATES: 155021.1084**N** 1288792.631**E** (NAD83)
LOCATION: Kent, WA	SURFACE ELEVATION:
DRILLING CONTRACTOR: Holt	DATE: 10/1/2018 (Air-Knife) 10/5/2018 (drilling)
DRILLING EQUIPMENT: Geoprobe 7822 DT	TOTAL DEPTH OF BORING: 42.0 ft ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: T. Gray
SAMPLING METHOD: 5' x 1.5' acetate liner	RESPONSIBLE PROF.: T. Gray REG. NO.: 2557

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES				VISUAL SOIL DESCRIPTION
	Lab Sample	Sample Recovery	Blow Counts	PID (ppm)	Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors
21				0.0	SILTY SAND (SM): dark gray (10YR-4/1), wet, firm, 65% fine sand, 35% non-plastic fines, occassional organic material and silty layers
22					
23					
24				0/0.6	
25					
26					
27					
28					
29					
30					
31					
32				0/0.7	
33					silt lense
34					
35					
36					
37				0/0.6	
38					
39					SM continued
40					
41					
42					Bottom of boring 42.0 feet Backfilled with bentonite chip

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary
3/4-inch Diameter
stainless steel 0.010" slot screen.

Set at 20-24' for groundwater grab sample:
KSC-SB31-20-24-GW

Temporary
3/4-inch Diameter
PVC 0.010" slot screen.

Set at 29-33' for groundwater grab sample:
KSC-SB31-29-33-GW

Temporary
3/4-inch Diameter
PVC 0.010" slot screen.

Set at 38-42' for groundwater grab sample:
KSC-SB31-38-42-GW

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

DALTON OLMSTED FUGLEVAND

LOG OF SB-32

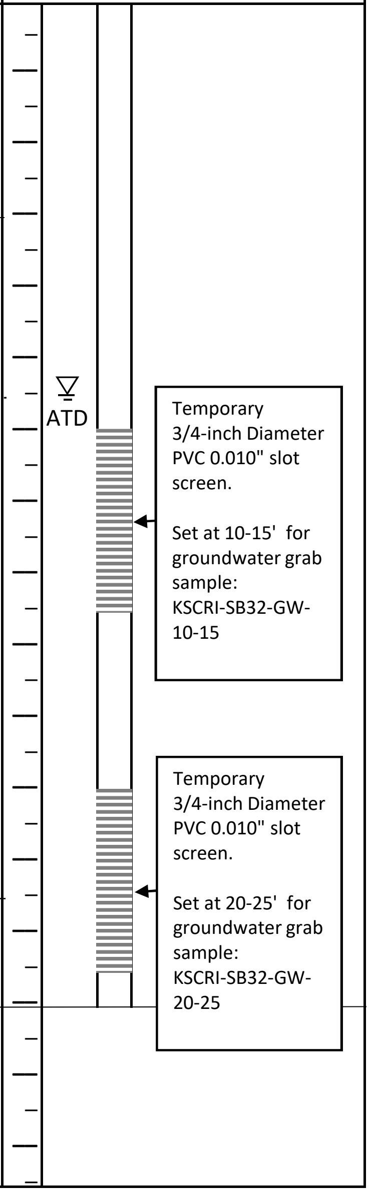
Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: **N**156631.6 **E**1287759.4 (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Holt	DATE: 2/25/2020	
DRILLING EQUIPMENT: Geoprobe 7800	TOTAL DEPTH OF BORING: 25 ft	ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: A.Cerruti	
SAMPLING METHOD: 5' x 1.5" acetate liner	RESPONSIBLE PROF.: D.Cooper	REG. NO.: 1600

NOTES: Boring cleared by Air-Knife from 0-5'

DEPTH (feet)	SAMPLES Lab Sample (GW)	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors
0–1					- 3" asphalt over 5" crushed rock
2				0.0	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown, moist, dense, 70% fine to medium sand, 20% fine to medium gravel, 10% non-plastic fines
4				0.0	
5					SILT (ML):
6				0.0	gray, moist, firm, 100% non-plastic silt
12				0.0	SILTY SAND (SM): dark gray, saturated, loose, 40% non-plastic silt with 60%fine sand; silt content decreases with depth
16				0.0	
21				0.0	
23					POORLY GRADED SAND (SP): very dark gray, saturated, loose, 100% fine to medium sand - with organics and silt interbed at 24.4'
25					Bottom of Boring 25' bgs Temporary boring abandoned with 3/8" Bentonite Chips

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Temporary 3/4-inch Diameter PVC 0.010" slot screen.

Set at 10-15' for groundwater grab sample: KSCRI-SB32-GW-10-15

Temporary 3/4-inch Diameter PVC 0.010" slot screen.

Set at 20-25' for groundwater grab sample: KSCRI-SB32-GW-20-25

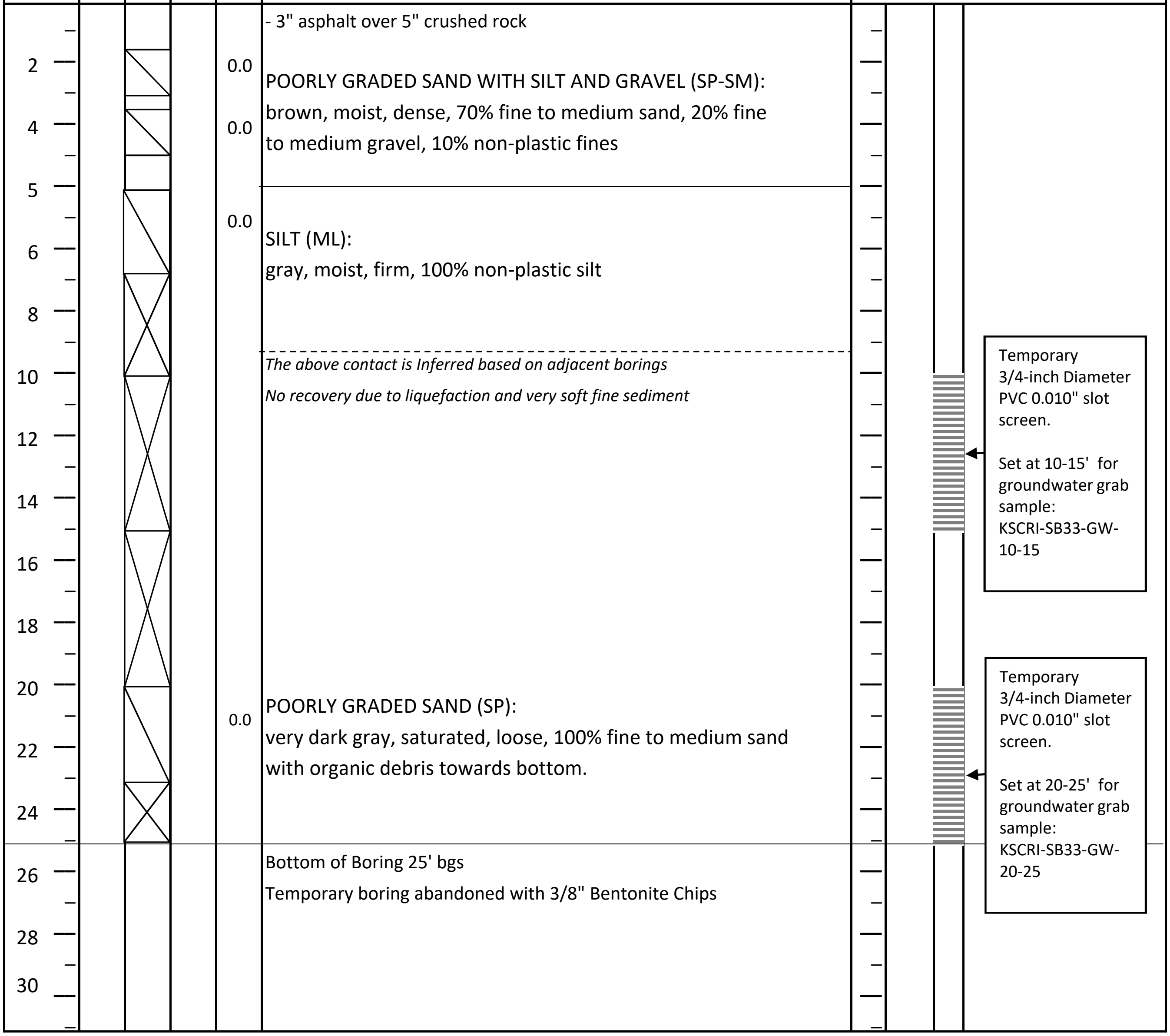
Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-33

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: **N**156630.2 **E**1287847.0 (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Holt	DATE: 2/25/2020	
DRILLING EQUIPMENT: Geoprobe 7800	TOTAL DEPTH OF BORING: 25 ft	ECOLOGY ID: N/A
DRILLING METHOD: Direct-Push	LOGGED BY: A.Cerruti	
SAMPLING METHOD: 5' x 1.5" acetate liner	RESPONSIBLE PROF.: D.Cooper	REG. NO.: 1600
NOTES: Boring cleared by Air-Knife from 0-5'		

DEPTH (feet)	SAMPLES: Lab Sample (GW)	SAMPLES: Sample Recovery	SAMPLES: Blow Counts	SAMPLES: PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0-5				0.0 0.0	- 3" asphalt over 5" crushed rock POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown, moist, dense, 70% fine to medium sand, 20% fine to medium gravel, 10% non-plastic fines	
5-9.5				0.0	SILT (ML): gray, moist, firm, 100% non-plastic silt	
9.5-20					*The above contact is Inferred based on adjacent borings* *No recovery due to liquefaction and very soft fine sediment*	Temporary 3/4-inch Diameter PVC 0.010" slot screen. Set at 10-15' for groundwater grab sample: KSCRI-SB33-GW-10-15
20-25				0.0	POORLY GRADED SAND (SP): very dark gray, saturated, loose, 100% fine to medium sand with organic debris towards bottom.	Temporary 3/4-inch Diameter PVC 0.010" slot screen. Set at 20-25' for groundwater grab sample: KSCRI-SB33-GW-20-25
25					Bottom of Boring 25' bgs Temporary boring abandoned with 3/8" Bentonite Chips	



Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SB-34

Sheet 1 of 1

PROJECT: Boeing KSC RI	COORDINATES: **N**156629.6 **E**1288012.3 (NAD83)	
LOCATION: Kent, WA	SURFACE ELEVATION:	
DRILLING CONTRACTOR: Holt	DATE: 2/25/2020(Air-Knife) 2/26/2020(drilling)	
DRILLING EQUIPMENT: Geoprobe 7800	TOTAL DEPTH OF BORING: 25 ft	ECOLOGY ID:
DRILLING METHOD: Direct-Push	LOGGED BY: A.Cerruti	
SAMPLING METHOD: 5' x 1.5" acetate liner	RESPONSIBLE PROF.: D.Cooper	REG. NO.: 1600
NOTES: Boring cleared by Air-Knife from 0-5'		

DEPTH (feet)	SAMPLES Lab Sample (GW)	Sample Recovery	Blow Counts	PID (ppm)	VISUAL SOIL DESCRIPTION Soil Group Name (USCS): color, moisture, density/consistency, grain size, other descriptors	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					- 3" asphalt over 5" crushed rock	
2				0.0	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM): brown, moist, dense, 70% fine to medium sand, 20% fine to medium gravel, 10% non-plastic fines	
4				0.0		
5						
6					SILT (ML): gray, moist, firm, 100% non-plastic silt	ATD
8				0.0		
10					SILTY SAND (SM): dark gray, saturated, loose, 30% non-plastic silt with 70% fine sand; silt content decreases with depth	
11				0.0		
12					- sand becomes fine to medium as silt content decreases	Temporary 3/4-inch Diameter PVC 0.010" slot screen. Set at 10-15' for groundwater grab sample: KSCRI-SB34-GW-10-15
16					- sand becomes very fine and silt content increases	
17				0.0		
19				0.0		
22					POORLY GRADED SAND (SP): dark gray, saturated, loose, 100% fine to medium sand	Temporary 3/4-inch Diameter PVC 0.010" slot screen. Set at 20-25' for groundwater grab sample: KSCRI-SB34-GW-20-25
23				0.0		
24						
26					Bottom of Boring 25' bgs Temporary boring abandoned with 3/8" Bentonite Chips	
28						
30						

Note: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

LOG OF SUBSURFACE EXPLORATIONS

DOF DALTON OLMSTED FUGLEVAND

LOGGED BY Dave Cooper, DOF
DRILLING CONTRACTOR DOF
COMPLETED 18-Apr-19

PROJECT: Boeing KSC, Seattle, WA
EXPLORATION METHOD: SS Hand Auger
LOCATION: Perimeter of Buildings 18-25 and 18-28

Hand Auger Boring No.	Sample Description	Sample No. and depth ft.	Analytical Results mg/kg dry wt.
	Building 18-25		
HA1	0-1.0' 1" washed gravel		
	1.0'-2.8' Saturated, brown, gravelly, SAND, with silt	1.0-1.5	
		2.5-2.8	
HA2	0-0.5' 1" washed gravel		
	0.5-2.5' Wet, brown, gravelly, SAND, with silt	0.5-1.0	
		2.0-2.5	
HA3	0-0.5' 1" washed gravel		
	0.5'-2.5' Wet, brown, gravelly, SAND, with silt	0.5-1.0	
		2.0-2.5	
HA4	0-0.2' Landscape Bark atop visqueen plastic		
	0.2'-1.0' Wet, brown, silty, SAND	0.2-0.5	
	1.0-2.0' Moist, light brown, gravelly, SAND	1.5-2.0	
	Building 18-28		
HA5	0-0.3' 1" washed gravel atop visqueen plastic		
	0.3'-2.3' Wet, brown, gravelly, SAND, with silt	0.3-0.8	
		1.8-2.3	
HA6	0-0.8' 1" washed gravel atop visqueen plastic		
	0.8'-2.3' Wet, brown, gravelly, silty, SAND	0.8-1.3	
		1.8-2.3	
HA7	0-0.5' 1" washed gravel atop visqueen plastic		
	0.5'-2.5' Wet, brown, gravelly, silty, SAND	0.5-1.0	
		2.0-2.5	
HA8	0-0.8' 1" washed gravel atop visqueen plastic		
	0.8'-2.3' Wet, brown, gravelly, silty, SAND	0.8-1.3	
		1.8-2.3	
HA9	0-0.5' 1" washed gravel atop visqueen plastic		
	0.5'-2.5' Wet, brown, gravelly, silty, SAND	0.5-1.0	
		2.0-2.5	
HA10	0-0.5' 1" washed gravel atop visqueen plastic		
	0.5'-2.5' Wet, brown, gravelly, silty, SAND	0.5-1.0	
		2.0-2.5	

DP-01

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SP/ SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, damp) [Fill]	
2	1	d3		0.0				
4						ML	Gray, SILT with clay (no odor, no sheen) (medium stiff, wet) [Native]	
6	2	d3		0.0				ATD
8								
10	3	d3		0.0				
12								
14	4	d3		0.0				
						SP	Gray, silty, fine SAND (no odor, no sheen) (medium dense, wet)	
16							-No recovery from 16-20 ft	
18	5	d3		--				
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.

LANDAU ASSOCIATES

Project Striker
Kent, Washington

Log of Boring DP-01

DP-01

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level

Drilling Method: Geoprobe™

Ground Elevation (ft):

20

Boring Completed 07/28/10
Total Depth of Boring = 20.0 ft.

22

24

26

28

30

32

34

36

38

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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.

25195.001 7/13/11 N:\PROJECTS\025195.001.GPJ SOIL BORING LOG

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Project Striker
Kent, Washington

Log of Boring DP-01

Figure
B-2
(2 of 2)

DP-02

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):	Water Level
0						SP/ SM	Brown, fine SAND with silt and gravel (no odor, no sheen) (medium dense, damp) [Fill]	
2	1	d3		0.0				
						SP/ SM	Gray, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, moist to wet)	
4								
6	2	d3		0.0				
								▽ ATD
8						ML	Gray, SILT with clay and organics (no odor, no sheen) (medium stiff, wet) [Native]	
10	3	d3		0.0				
12								
14	4	d3		0.0				
16								
18	5	d3		0.0				
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.

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Kent, Washington

Log of Boring DP-02

Figure

B-3
(1 of 2)

DP-02

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
20						ML	Gray, SILT with sand (no odor, no sheen) (medium stiff, wet)	
22	6	d3		0.0		SP/SM	Gray, fine SAND with silt (no odor, no sheen) (medium dense, wet)	
24								

Boring Completed 07/29/10
Total Depth of Boring = 24.0 ft.

26
28
30
32
34
36
38
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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

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Kent, Washington

Log of Boring DP-02

Figure
B-3
(2 of 2)

DP-03

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Description	Water Level
0						SP/ SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, moist to wet) [Fill]	
2	1	d3		0.0				
4								
6	2	d3		35				
7						SP/ SM	Gray, fine to medium SAND with silt and gravel (odor, sheen) (medium dense, wet)	▽ ATD
8								
10	3	d3		20		SP/ SM	Brown to gray, fine to medium SAND with silt, clay and gravel (odor, no sheen) (medium dense, wet)	
12							-No recovery from 12-16 ft	
14	4	d3		--				
16								

Boring Completed 07/29/10
Total Depth of Boring = 16.0 ft.

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.

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Kent, Washington

Log of Boring DP-03

Figure
B-4

DP-04

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE		GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol		Water Level
0					SM	Brown, silty, fine SAND with gravel (no odor, no sheen) (medium dense, damp to moist) [Fill]	
2	1	d3		0.0			
4							
6	2	d3		0.0	ML	Brown, SILT with sand and gravel (no odor, no sheen) (medium stiff, wet) [Native]	∇ ATD
					ML	Gray, SILT with sand and gravel (no odor, no sheen) (medium stiff, wet)	
8							
					SP	Gray, fine to medium SAND with gravel (no odor, no sheen) (medium dense, wet)	
10	3	d3		0.0			
					ML	Gray, SILT with clay (no odor, no sheen) (medium stiff, wet)	
12							

Boring Completed 07/29/10
Total Depth of Boring = 12.0 ft.

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.

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Log of Boring DP-04

Figure
B-5

DP-05

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SP/ SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, damp) [Fill]	
2	1	d3		0.0				
						SM	Brown, silty, fine to medium SAND with gravel (no odor, no sheen) (medium dense, damp)	
4								
6	2	d3		0.0		SP/ SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, moist to wet)	
8							-No recovery 8-16 ft	∇ ATD
10	3	d3		--				
12								
14	4	d3		--				
16								

Boring Completed 07/29/10
Total Depth of Boring = 16.0 ft.

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.

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Log of Boring DP-05

Figure
B-6

DP-07

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):	Water Level
0						SP	Brown, medium SAND with gravel (no odor, no sheen) (loose, damp) [Fill]	
2	1	d3		0.0		SP/ SM	Gray, fine SAND with silt (no odor, no sheen) (medium dense, moist to wet)	
4								
								▽ ATD
6	2	d3		0.0		ML	Gray, SILT with clay (no odor, no sheen) (medium stiff, wet) [Native]	
8								

Boring Completed 07/29/10
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.

DP-08

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						AC	Asphalt	
						SP/SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, damp to moist) [Fill]	
2	1	d3		0.0				
4								
6	2	d3		0.0		ML	Gray, SILT with clay (no odor, no sheen) (medium stiff, wet) [Native]	▽ ATD
8								

Boring Completed 07/29/10
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.

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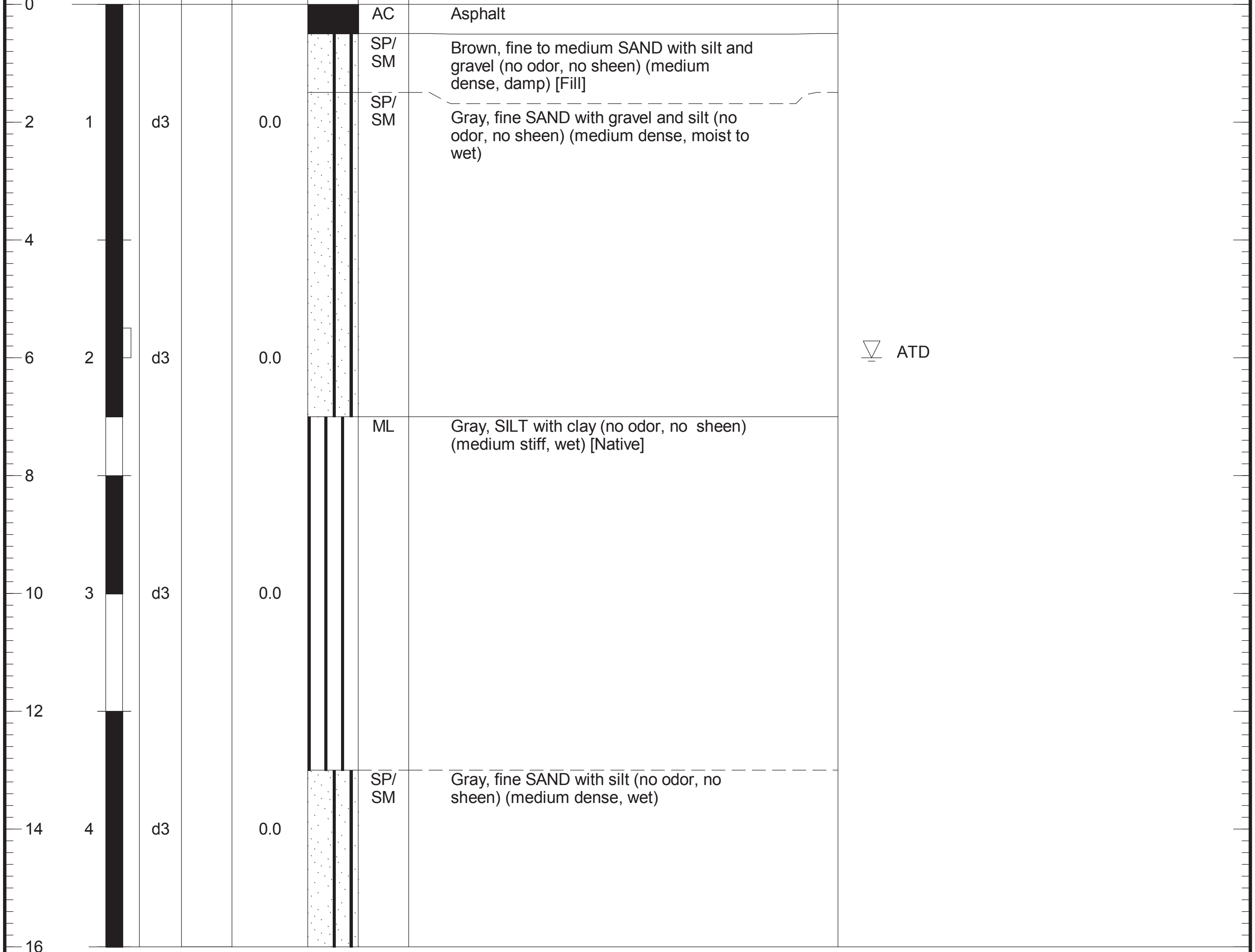
Log of Boring DP-08

Figure
B-8

DP-09



SAMPLE DATA

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)
2	1	d3		0.0
6	2	d3		0.0
10	3	d3		0.0
14	4	d3		0.0

SOIL PROFILE

Drilling Method: Geoprobe™

Ground Elevation (ft):

USCS Symbol	
AC	Asphalt
SP/SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, damp) [Fill]
SP/SM	Gray, fine SAND with gravel and silt (no odor, no sheen) (medium dense, moist to wet)
ML	Gray, SILT with clay (no odor, no sheen) (medium stiff, wet) [Native]
SP/SM	Gray, fine SAND with silt (no odor, no sheen) (medium dense, wet)

GROUNDWATER

Water Level

▽ ATD

Boring Completed 07/29/10
Total Depth of Boring = 16.0 ft.

Notes:
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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.

25195.001 7/13/11 N:\PROJECTS\025195.001.GPJ SOIL BORING LOG

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Log of Boring DP-09

Figure
B-9

DP-11

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SP/ SM	Brown, fine SAND with silt (no odor, no sheen) (medium dense, damp to moist) [Fill]	
2	1	d3		0.0				
4								
6	2	d3		0.0		ML	Gray, SILT with clay (no odor, no sheen) (medium stiff, wet) [Native]	∇ ATD
8								
10	3	d3		0.0				
12						SP/ SM	Gray, fine SAND with silt (no odor, no sheen) (medium dense, wet)	
14	4	d3		0.0				
						ML	Gray, SILT with sand (no odor, no sheen) (medium stiff, wet)	
16								
18								
20								

Boring Completed 07/30/10
Total Depth of Boring = 16.0 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.

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Log of Boring DP-11

Figure
B-10

DP-13

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):	Water Level
0						SP/ SM	Brown, fine SAND with silt (no odor, no sheen) (medium dense, moist) [Fill]	
2	1	d3		0.0				
5						SP	Brown, medium to coarse SAND (no odor, no sheen) (medium dense, wet)	▽ ATD
6	2	d3		0.0				
8								

Boring Completed 07/30/10
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.

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Log of Boring DP-13

Figure
B-11

DP-15

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE		GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol		Water Level
0					SP	Brown, medium to coarse SAND with gravel (no odor, no sheen) (medium dense, damp) [Fill]	
2	1	d3		0.0	SP	Gray, fine to medium SAND with trace silt (no odor, no sheen) (medium dense, damp to moist)	
4							
					SP/ SM	Gray, medium to coarse SAND with silt (no odor, no sheen) (medium dense, moist to wet)	
					ML	Gray, SILT with clay (no odor, no sheen) (medium stiff, wet) [Native]	
6	2	d3		0.0			▽ ATD
8							
					ML	Gray, sandy SILT (no odor, no sheen) (medium stiff, wet)	
10	3	d3		0.0			
12							
14	4	d3		0.0	SP/ SM	Gray, fine to medium SAND with silt (no odor, no sheen) (medium dense, wet)	
16							

Boring Completed 07/30/10
Total Depth of Boring = 16.0 ft.

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.

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Log of Boring DP-15

Figure
B-12

DP-16

Drilling Method: Geoprobe™

Ground Elevation (ft):

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	SOIL PROFILE	Water Level
0					SP/SM	Brown, medium to coarse SAND with silt (no odor, no sheen) (medium dense, damp) [Fill]	
					SP/SM	Gray, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, damp)	
2	1	d3		0.0	SP/SM	Gray, fine SAND with silt (slight odor, no sheen) (medium dense, damp)	
					SP/SM	Gray, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, damp to moist)	
4					SP/SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, moist to wet)	
6	2	d3		0.0	ML	Gray, SILT with clay (no odor, no sheen) (medium stiff, moist to wet) [Native]	▽ ATD
8					SP/SM	Gray, fine to medium SAND with silt (no odor, no sheen) (medium dense, wet)	
10	3	d3		0.0			
12					ML	Gray, SILT with clay and sand (no odor, no sheen) (medium stiff, wet)	
					SP/SM	Gray, fine SAND with silt (no odor, no sheen) (medium dense, wet)	
14	4	d3		0.0			
16							
18							
20							

Boring Completed 07/30/10
Total Depth of Boring = 16.0 ft.

Notes:
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2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
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Log of Boring DP-16

Figure
B-13

DP-17

Drilling Method: Geoprobe™

Ground Elevation (ft):

	SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						AC	Asphalt	
						SP/ SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, damp to moist) [Fill]	
	1	d3		0.0				
						ML	Gray SILT with sand (no odor, no sheen) (medium stiff, wet) [Native]	ATD
	2	d3		0.0				
						SP	Gray, fine to medium SAND with trace silt (no odor, no sheen) (medium dense, wet)	
10								

Boring Completed 01/27/11
Total Depth of Boring = 10.0 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.

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Log of Boring DP-17

Figure
B-14

DP-18

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):	Water Level
0						SP/ SM	Brown, fine to medium SAND with silt, gravel, and trace organics (no odor, no sheen) (medium dense, moist) [Fill]	
2	1	d3		0.0				
4						SM	Gray, silty, fine to medium SAND (no odor, no sheen) (medium dense, wet)	ATD
6						ML	Gray SILT (no odor, no sheen) (medium stiff, wet) [Native]	
8	2	d3		0.0				
						SP/ SM	Gray, fine SAND with silt (no odor, no sheen) (medium dense, wet)	
10								

Boring Completed 01/27/11
Total Depth of Boring = 10.0 ft.

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.

DP-19

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe^{TM} Ground Elevation (ft):	Water Level
0						AC	Asphalt	
						SP/ SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (medium dense, moist) [fill]	
2	1	d3		0.0		SP/ SM	Gray, fine to medium SAND with silt and gravel (no odor, no sheen) (dense, moist)	
4						SP/ SM	Brown, fine to medium SAND with silt and trace gravel (no odor, no sheen) (dense, moist to wet)	▽ ATD
6	2	d3		0.0		ML	Gray, SILT with sand (no odor, no sheen) (medium stiff to stiff, moist to wet) [Native]	
8						SP/ SM	Gray, fine SAND with silt (no odor, no sheen) (medium dense, wet)	
10								

Boring Completed 01/27/11
Total Depth of Boring = 10.0 ft.

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.

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Log of Boring DP-19

Figure
B-16

DP-20

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):	Water Level
0						SM	Brown, silty, fine to medium SAND with gravel (no odor, no sheen) (medium dense to dense, moist) [Fill]	
	1	d3		0.0				
6								▽ ATD
	2	d3		0.0				
8						ML	Gray, SILT (no odor, no sheen) (medium stiff to stiff, wet) [Native]	
						SP/ SM	Gray, fine SAND with silt (no odor, no sheen) (medium dense, wet)	
10								

Boring Completed 01/27/11
Total Depth of Boring = 10.0 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.

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Log of Boring DP-20

Figure
B-17

DP-21

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE		GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol		Water Level
0					SM	Dark Brown, organic rich, silty, fine to medium SAND (organic-like odor, no sheen) (medium dense, moist) [Fill]	
					SP/ SM	Brown, fine to medium SAND with silt, and concrete fragments and gravel (no odor, no sheen) (dense, moist to wet)	
2	1	d3		0.0			
					SP	Gray, fine to medium SAND with trace silt (no odor, no sheen) (medium dense, wet)	▽ ATD
4							
6	2	d3		0.0	SM	Gray, silty, fine SAND (no odor, no sheen) (medium dense, wet)	
8							

Boring Completed 01/26/11
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.

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Log of Boring DP-21

Figure
B-18

DP-22

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE		GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol		Water Level
0					AC	Asphalt	
					SP/ SM	Brown, fine to coarse SAND with silt and gravel (no odor, no sheen) (dense, moist) [Fill]	
2	1	d3		0.0			
					SP/ SM	Gray, fine to medium SAND with silt and trace gravel (no odor, no sheen) (medium dense, wet)	
4							∇ ATD
6					ML	Gray, SILT with sand (no odor, no sheen) (medium stiff, wet) [Native]	
8	2	d3		0.0			
10							

Boring Completed 01/26/11
Total Depth of Boring = 10.0 ft.

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.

DP-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):	Water Level
0						AC	Asphalt	
						SP/ SM	Brown, fine to coarse SAND with silt and gravel (no odor, no sheen) (medium dense, damp) [Fill]	
2	1	d3		0.0		SP/ SM	Gray, fine to medium SAND with silt and trace gravel (no odor, no sheen) (medium dense, moist)	
4								
							No recovery, rock in sampler	
6								▽ ATD
	2	d3		0.0				
8						SM	Gray, silty, fine to medium SAND (no odor, no sheen) (medium dense, wet) [Native]	
10								
12								
14								
16								
18								
20								

Boring Completed 01/26/11
Total Depth of Boring = 10.0 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.

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Project Striker Kent, Washington	Log of Boring DP-23	Figure B-20

DP-24

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						AC	Asphalt	
						SP/ SM	Brown, fine to coarse SAND with silt and gravel (no odor, no sheen) (medium dense, wet) [Fill]	ATD
2	1	d3		0.0		SM	Brown, silty, fine to medium SAND with trace gravel (no odor, no sheen) (dense, wet)	
4						SP/ SM	Gray, fine to medium SAND with silt (hydrocarbon-like odor, slight sheen) (medium dense, wet)	
	2	d3		3.8		ML	Gray, SILT (no odor, no sheen) (stiff, wet) [Native]	
						SM	Gray, silty, fine to medium SAND (no odor, no sheen) (medium dense, wet)	
10								

Boring Completed 01/26/11
Total Depth of Boring = 10.0 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.

25195.001 7/13/11 N:\PROJECTS\025195.001.GPJ SOIL BORING LOG

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Project Striker
Kent, Washington

Log of Boring DP-24

Figure
B-21

DP-24a

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):	Water Level
0						AC	Asphalt	ATD
						GP	Gravel Base Coarse	
						SM	Light brown, silty, fine to coarse SAND with gravel (no odor, no sheen) (medium dense, damp)	
2								
	1	d3		8.5				
4				0.3				
6						GM	Brown, silty, sandy, medium to coarse GRAVEL (no odor, no sheen) (medium dense, damp)	
				38.7				
						ML	Grey clayey SILT (petroleum-like odor, no sheen) (medium stiff, moist) [Native]	
	2	d3						
8								
							Strongest petroleum-like odor at 9-10 ft	
				40.9				
10								ATD
						SP-SM	Grey, fine SAND with silt (no odor, no sheen) (medium dense, wet)	
12								
	3	d3						
14								

Boring Completed 05/20/11
Total Depth of Boring = 15.0 ft.

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.

DP-24b

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe^{TM} Ground Elevation (ft):	Water Level
0						AC	Asphalt	
						SM	Brown, silty, gravelly, fine to coarse SAND (no odor, no sheen) (dense, damp) [Fill]	
2				0.4				
	1	d3						
4								
6								
						ML	Grey, clayey SILT (no odor, no sheen) (medium stiff, moist) [Native]	
	2	d3						
8								
						SP	Grey, fine SAND with trace silt (slight petroleum-like odor, no sheen) (medium dense, wet)	
				14.8				
10								▽ ATD
							no odor at 11-12 ft	
12								
	3	d3						
14								

Boring Completed 05/20/11
Total Depth of Boring = 15.0 ft.

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.

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Kent, Washington

Log of Boring DP-24b

Figure
B-23

DP-24c

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Geoprobe™

Ground Elevation (ft):

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Description	Water Level
0					AC	Asphalt	
					GP	Gravel Base Coarse	
					SM	Grey to brown, gravelly, silty, fine to coarse SAND (no odor, no sheen) (dense, damp)	
2				1.3			
	1	d3					
4							
6							
					SM	Grey, silty, fine SAND (no odor, no sheen) (medium dense, moist)	
				2.1			
	2	d3					
8							
							∇ ATD
10							
12							
14							
16							
18							
20							

Boring Completed 05/20/11
Total Depth of Boring = 10.0 ft.

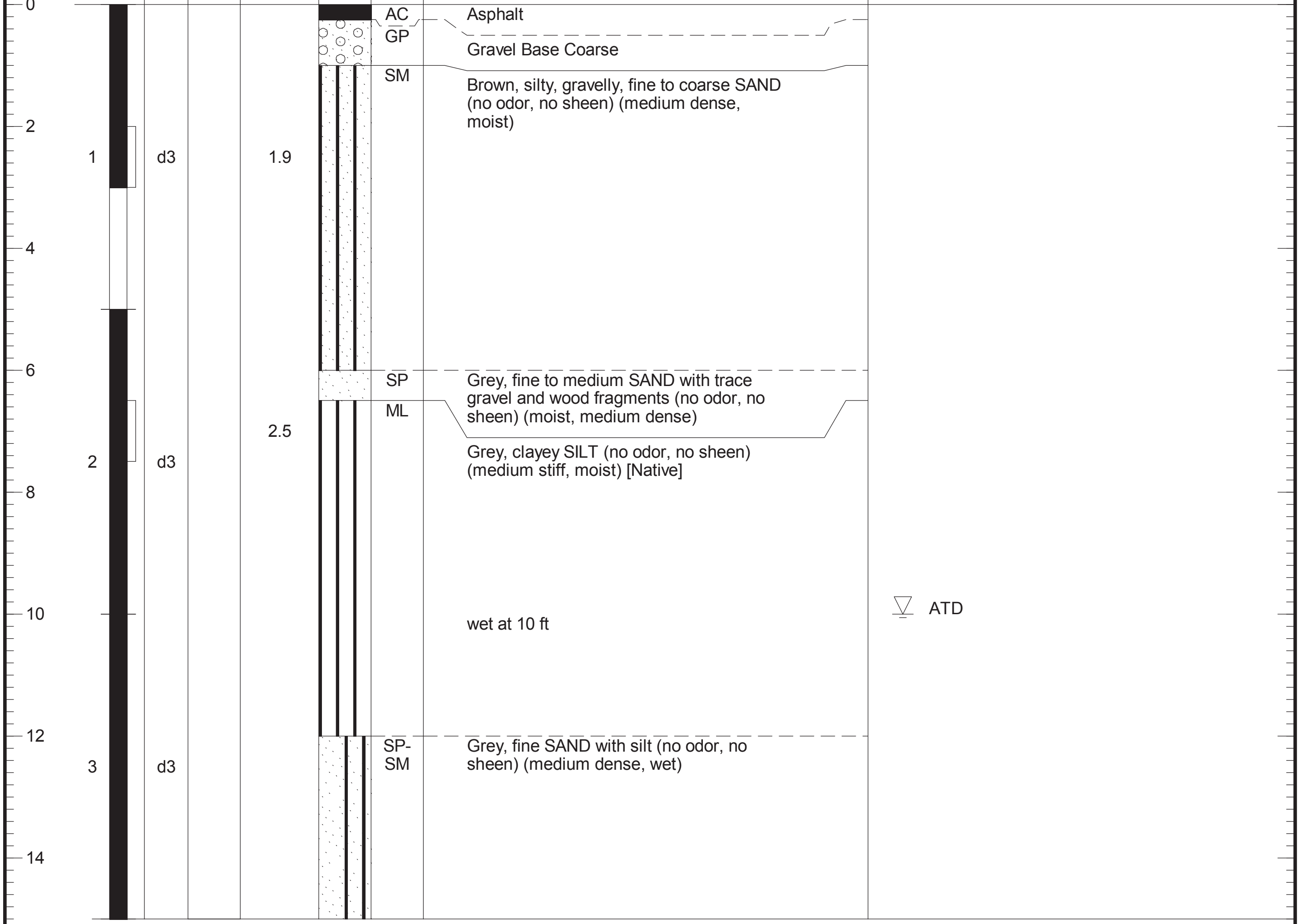
Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

DP-24d

SAMPLE DATA | **SOIL PROFILE** | **GROUNDWATER**

Drilling Method: Geoprobe™

Ground Elevation (ft):



Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Description	Water Level
0					AC	Asphalt	
					GP	Gravel Base Coarse	
					SM	Brown, silty, gravelly, fine to coarse SAND (no odor, no sheen) (medium dense, moist)	
2	1	d3		1.9			
6					SP	Grey, fine to medium SAND with trace gravel and wood fragments (no odor, no sheen) (moist, medium dense)	
	2	d3		2.5	ML	Grey, clayey SILT (no odor, no sheen) (medium stiff, moist) [Native]	
10						wet at 10 ft	ATD
12	3	d3			SP-SM	Grey, fine SAND with silt (no odor, no sheen) (medium dense, wet)	

Boring Completed 05/20/11
Total Depth of Boring = 15.0 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.

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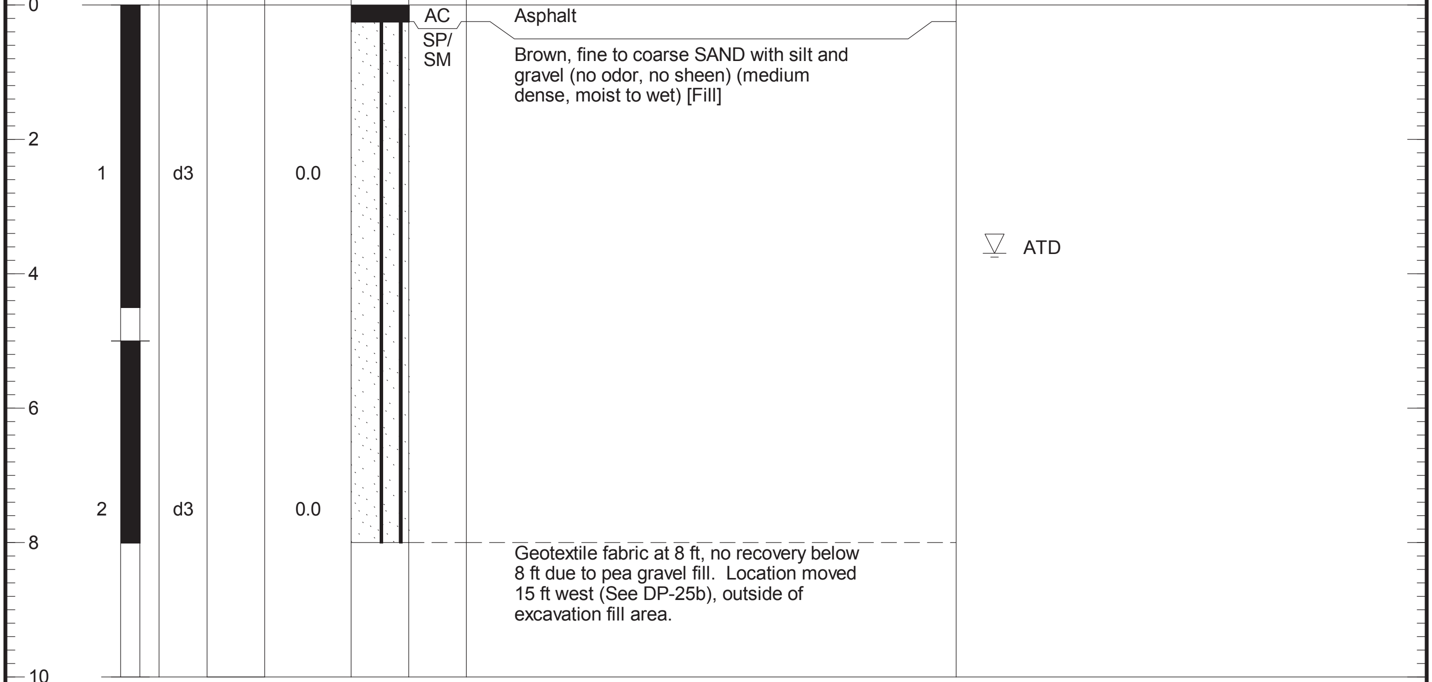
Log of Boring DP-24d

Figure
B-25

DP-25



Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Description	Water Level
0					AC	Asphalt	
					SP/ SM	Brown, fine to coarse SAND with silt and gravel (no odor, no sheen) (medium dense, moist to wet) [Fill]	
2	1	d3		0.0			
4							∇ ATD
6	2	d3		0.0			
8						Geotextile fabric at 8 ft, no recovery below 8 ft due to pea gravel fill. Location moved 15 ft west (See DP-25b), outside of excavation fill area.	
10							

Boring Completed 01/26/11
Total Depth of Boring = 10.0 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.

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Project Striker Kent, Washington	Log of Boring DP-25	Figure B-26

DP-25b

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE		GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol		Water Level
0					AC	Asphalt	
					SP/SM	Brown, fine to coarse SAND with silt and gravel (no odor, no sheen) (medium dense, moist to wet) [Fill]	
2	1	d3		0.0			
4							ATD
					SM	Gray, silty, fine to medium SAND (hydrocarbon-like odor, no sheen) (medium dense, wet)	
6							
					ML	Gray, SILT (no odor, no sheen) (medium stiff, wet) [Native]	
	2	d3		6.1			
8							
					SM	Gray, silty, fine SAND (no odor, no sheen) (medium dense, wet)	
10							

Boring Completed 01/26/11
Total Depth of Boring = 10.0 ft.

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.

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Kent, Washington

Log of Boring DP-25b

Figure
B-27

DP-26

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):	Water Level
0						SP/ SM	Brown, fine to medium SAND with silt, gravel, and organics (no odor, no sheen) (loose, moist to wet) [Fill]	
2	1	d3		0.0				ATD
7	2	d3		0.0		SP/ SM	Gray, fine to medium SAND with silt and trace gravel (no odor, no sheen) (medium dense, wet) [Native]	
9.5						ML	Gray, SILT with sand (no odor, no sheen) (medium stiff, wet) [Native]	
10								

Boring Completed 01/25/11
Total Depth of Boring = 10.0 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.

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Log of Boring DP-26

Figure
B-28

DP-27

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):	Water Level
0						SP/ SM	Brown, fine to medium SAND with silt, gravel, and organics (no odor, no sheen) (medium dense to dense, moist to wet) [Fill]	
2								
	1	d3		0.0				
4								
								∇ ATD
6								
	2	d3		0.0				
8								
						ML	Gray, SILT with sand (no odor, no sheen) (medium stiff, moist to wet) [Native]	
10								
12								
	3	d3		0.0				
14								
						ML	Brown, organic rich, Silt (organic odor, no sheen) (medium stiff, moist)	
16								
18								
20								

Boring Completed 01/25/11
Total Depth of Boring = 15.0 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.

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Log of Boring DP-27

Figure
B-29

DP-28

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SM	Brown, silty, fine to medium SAND with gravel and trace organics (no odor, no sheen) (medium dense, moist) [Fill]	
2								
	1	d3		0.0				
						SP	Gray, fine to medium SAND with trace gravel and trace silt (no odor, no sheen) (medium dense, wet)	
4								
6								∇ ATD
	2	d3		0.0				
8								
10								

Boring Completed 01/25/11
Total Depth of Boring = 10.0 ft.

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.

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Log of Boring DP-28

Figure
B-30

DP-29

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE		GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol		Water Level
0					SM	Brown, silty, fine to medium SAND with gravel (no odor, no sheen) (medium dense, moist to wet) [Fill]	
2	1	d3		0.0			
7	2	d3		0.0			
8							ATD
9.5					SM	Gray, silty, fine to medium SAND with gravel and trace organics (no odor, no sheen) (medium dense, wet)	
10							

Boring Completed 01/25/11
Total Depth of Boring = 10.0 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.

25195.001 7/13/11 N:\PROJECTS\025195.001.GPJ SOIL BORING LOG

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Log of Boring DP-29

Figure
B-31

DP-30

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Geoprobe^{TM} Ground Elevation (ft):	Water Level
0						SP/ SM	Brown, fine to medium SAND with silt, gravel, and organics (no odor, no sheen) (medium dense, moist to wet) [Fill]	
	1	d3		0.0				
								ATD
						SP/ SM	Gray, fine to medium SAND with silt and trace gravel (no odor, no sheen) (medium dense, wet)	
	2	d3		0.0				
						ML	Gray, sandy, SILT (no odor, no sheen) (medium stiff, wet) [Native]	
10								

Boring Completed 01/25/11
Total Depth of Boring = 10.0 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.

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Log of Boring DP-30

Figure
B-32

DP-31

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SP/SM	Brown, fine to medium SAND with silt and gravel (no odor, no sheen) (dense, moist) [Fill]	
2	1	d3		0.0		SM	Gray, silty, fine SAND with trace organics (no odor, no sheen) (medium dense, wet) [Native]	
4								
6	2	d3		0.0				▽ ATD
8								

Boring Completed 01/26/11
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.

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Log of Boring DP-31

DP-32

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Geoprobe™

Ground Elevation (ft):

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						SP/ SM	Brown, fine to medium SAND with silt, gravel, and trace organics (no odor, no sheen) (medium dense, moist) [Fill]	
2	1	d3		0.0				
						SP/ SM	Gray, fine to medium SAND with silt and trace organics (no odor, no sheen) (medium dense, moist to wet) [Native]	
4								
								∇ ATD
6	2	d3		0.0				
							Mottling at 7.5 ft	
8								
10								
12								
14								
16								
18								
20								

Boring Completed 01/26/11
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.

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Log of Boring DP-32

Figure
B-34

DP-33

Drilling Method: Geoprobe™

Ground Elevation (ft):

SAMPLE DATA					SOIL PROFILE		GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol		Water Level
0					ML	Brown, SILT with organics (no odor, no sheen) (medium stiff, damp to moist) [Native]	
2	1	d3		0.0			
					SP/ SM	Gray with red mottling, fine to medium SAND with silt and trace organics (no odor, no sheen) (medium dense, wet)	∇ ATD
6	2	d3		0.0			
8							

Boring Completed 01/26/11
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.

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Log of Boring DP-33

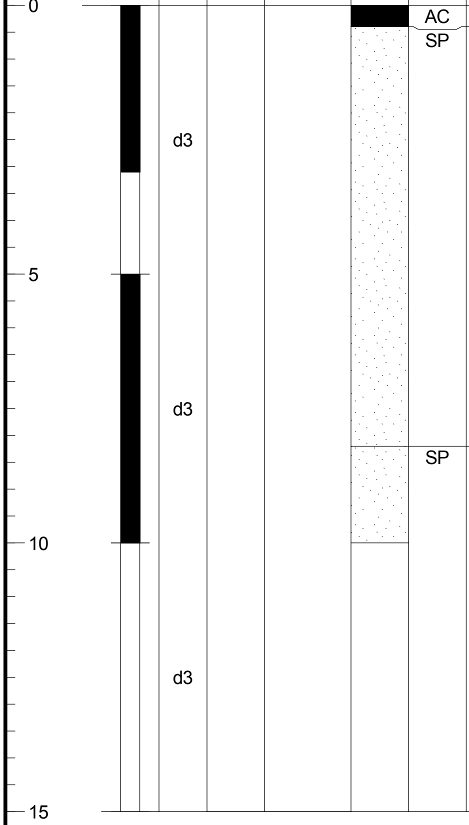
Figure
B-35

LAI1

SAMPLE DATA	SOIL PROFILE	GROUNDWATER
Depth (ft) / Sample Number & Interval / Sampler Type / Blows/Foot / PID (ppm)	Graphic Symbol / USCS Symbol	Water Level

Drilling Method: Direct Push

Ground Elevation (ft): not measured



Asphalt concrete pavement

Brownish-gray, medium to course SAND with gravel; no odor, no sheen (medium dense, damp)

(FILL)

Soil sample: KSC-LAI1-(1-3)

Dark gray, fine SAND; no odor, no sheen (medium dense, moist to wet)

(ALLUVIUM)

Soil sample: KSC-LAI1-S(8-10)

- No recovery

Groundwater sample: KSC-LAI1-GW

▽ ATD

Boring Completed 11/14/17
Total Depth of Boring = 15.0 ft.

20

25

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.

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ SOIL BORING LOG

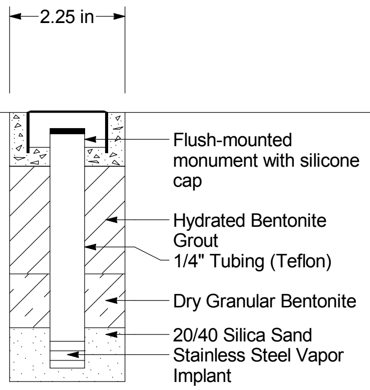
Landau Associates

Boeing Kent Space Center Kent, Washington	Log of Boring LAI1	Figure A-2

LAI2

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0						AC	Asphalt concrete pavement	
		d3				SP	Brownish-gray, medium to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)** **Soil sample: KSC-LAI2-S(1-3)**	
5		d3				SP	**Soil sample: KSC-LAI2-S(6.3-8.3)**	
						SP	Dark gray, fine SAND; no odor, no sheen (medium dense, moist) **(ALLUVIUM)**	
						ML	Dark gray SILT; no odor, no sheen (medium stiff, wet)	
10								▽ ATD
		d3					**Groundwater sample: KSC-LAI2-GW**	
15								

Soil Gas Monitoring Well Detail
(DOE#: BKF020)



Boring Completed 11/14/17
Total Depth of Boring = 15.0 ft.

Soil Gas Monitoring Well Completed 11/14/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

20

25

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.
4. **ECY Unique Well Number BKF020**

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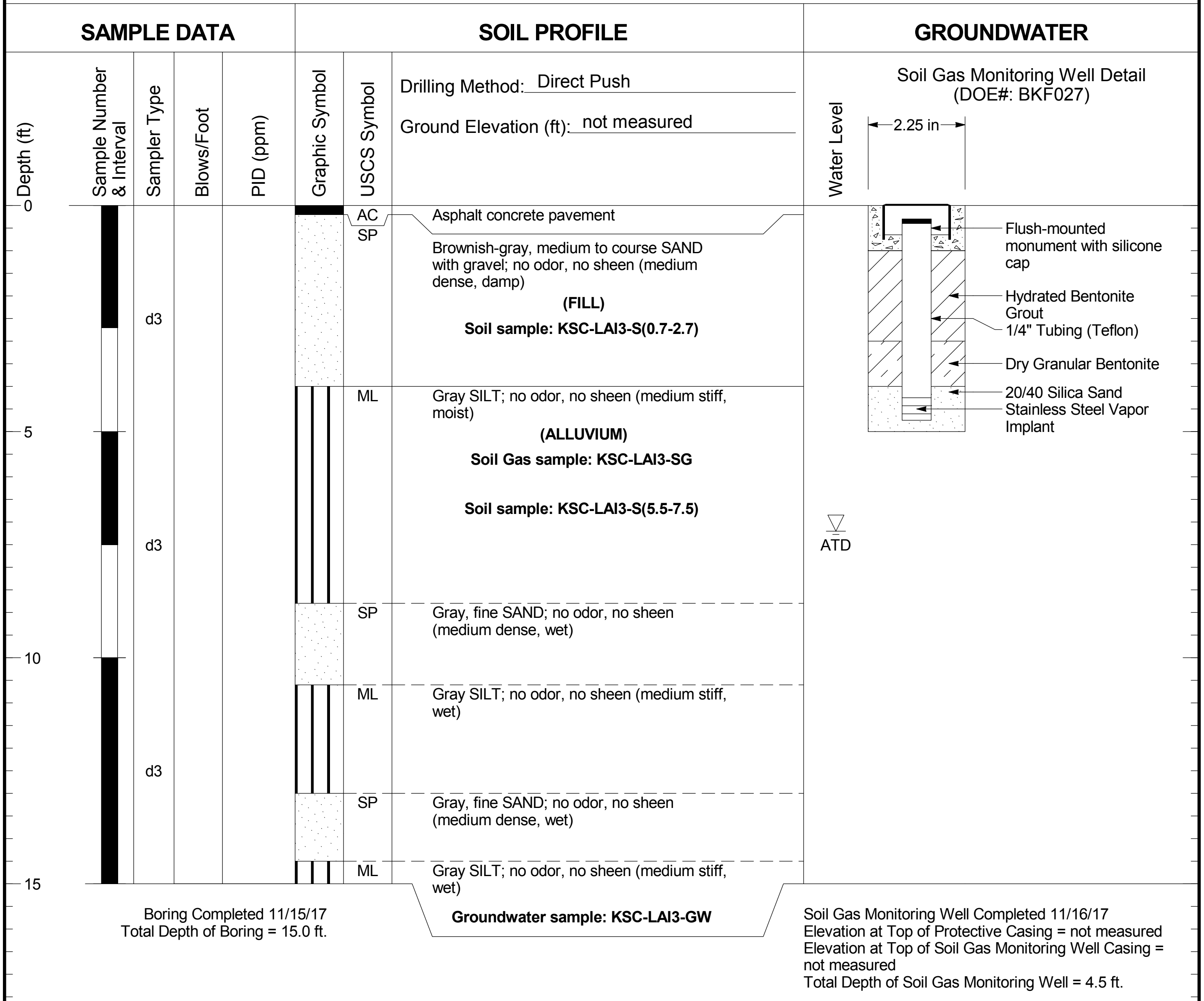
Boeing Kent Space Center
Kent, Washington

Log of Soil Gas Monitoring Well LAI2

Figure
A-3

LAI3



Drilling Method: Direct Push

Ground Elevation (ft): not measured

AC — Asphalt concrete pavement

SP — Brownish-gray, medium to course SAND with gravel; no odor, no sheen (medium dense, damp)

(FILL)

Soil sample: KSC-LAI3-S(0.7-2.7)

ML — Gray SILT; no odor, no sheen (medium stiff, moist)

(ALLUVIUM)

Soil Gas sample: KSC-LAI3-SG

Soil sample: KSC-LAI3-S(5.5-7.5)

SP — Gray, fine SAND; no odor, no sheen (medium dense, wet)

ML — Gray SILT; no odor, no sheen (medium stiff, wet)

SP — Gray, fine SAND; no odor, no sheen (medium dense, wet)

ML — Gray SILT; no odor, no sheen (medium stiff, wet)

Groundwater sample: KSC-LAI3-GW

Boring Completed 11/15/17
Total Depth of Boring = 15.0 ft.

Soil Gas Monitoring Well Completed 11/16/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF027**

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ WELL LOG

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Log of Soil Gas Monitoring Well LAI3

Figure
A-4

LAI4

SAMPLE DATA		SOIL PROFILE		GROUNDWATER
Depth (ft)	Sampler Type	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0	d3	AC	Asphalt concrete pavement	
		SP	Brownish-gray, medium to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)** **Soil sample: KSC-LAI4-S(0.7-2.7)**	
5				
	d3	SP	Dark gray, fine SAND; no odor, no sheen (medium dense, moist) **(ALLUVIUM)** **Soil sample: KSC-LAI4-S(6.7-8.7)**	
		PT	Brown PEAT with silt and sand; no odor, no sheen (medium dense, moist)	
10		ML	Gray SILT; no odor, no sheen (medium stiff, wet)	▽ ATD
		SP	Dark gray, fine SAND; no odor, no sheen (medium dense, wet)	
	d3	ML	Dark gray, SILT with sand; no odor, no sheen (medium stiff, wet) **Groundwater sample: KSC-LAI4-GW**	
15				
20				
25				

Boring Completed 11/15/17
Total Depth of Boring = 15.0 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.

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Kent, Washington

Log of Boring LAI4

Figure
A-5

LAI5

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0						AC	Asphalt concrete pavement	
		d3				SP	Brownish-gray, medium to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)**	
5		d3				ML	Gray SILT; no odor, no sheen (medium stiff, moist) **(ALLUVIUM)**	
						SP	Dark gray, fine SAND; no odor, no sheen (medium dense, wet)	ATD
10		d3					- No recovery	
15							**Groundwater sample: KSC-LAI5-GW**	
20								
25								

Boring Completed 11/16/17
Total Depth of Boring = 15.0 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.

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Log of Boring LAI5

Figure
A-6

LAI6

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
0		d3				AC	Groundwater not encountered.
						SP	
5							

Drilling Method: Direct Push

Ground Elevation (ft): not measured

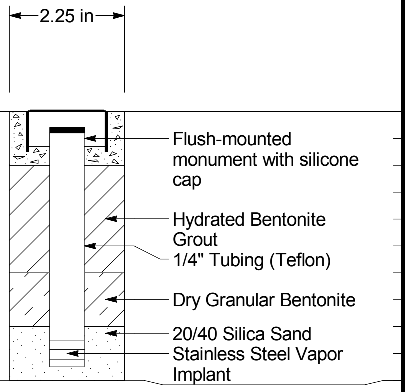
AC – Asphalt concrete pavement

SP – Brownish-gray, medium to course SAND; no odor, no sheen (medium dense, damp)

(FILL)

Soil Gas sample: KSC-LAI6-SG

Soil Gas Monitoring Well Detail
(DOE#: BKF025)



Boring Completed 11/16/17
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 11/16/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

10

15

20

25

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.
4. **ECY Unique Well Number BKF025**

LANDAU ASSOCIATES

Boeing Kent Space Center
Kent, Washington

Log of Soil Gas Monitoring Well LAI6

Figure
A-7

LAI7

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0						AC	Asphalt concrete pavement	
		d3				SP	Brownish-gray, medium to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)** **Soil sample: KSC-LAI7-S(1-3)**	
5								
		d3				ML	Gray, SILT with sand interbeds; no odor, no sheen (medium stiff, wet) **(ALLUVIUM)** **Soil sample: KSC-LAI7-S(8-10)**	∇ ATD
10							- No recovery	
		d3					**Groundwater sample: KSC-LAI7-GW**	
15								
20								
25								

Boring Completed 11/15/17
Total Depth of Boring = 15.0 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.

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Log of Boring LAI7

Figure
A-8

LAI8

SAMPLE DATA

SOIL PROFILE

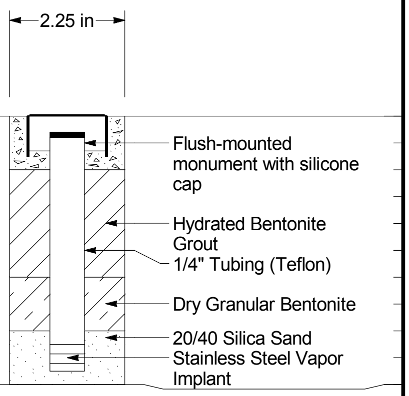
Drilling Method: Direct Push

Ground Elevation (ft): not measured

GROUNDWATER

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Description	Water Level
0						AC	Asphalt concrete pavement	Groundwater not encountered.
		d3				SP	Brownish-gray, fine to course SAND with gravel; no odor, no sheen (medium dense, moist) **(FILL)** **Soil Gas sample: KSC-LAI8-SG**	
5								

Soil Gas Monitoring Well Detail
(DOE#: BKF475)



Boring Completed 05/21/18
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 05/21/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF475**

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ WELL LOG

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Log of Soil Gas Monitoring Well LAI8

Figure
A-9

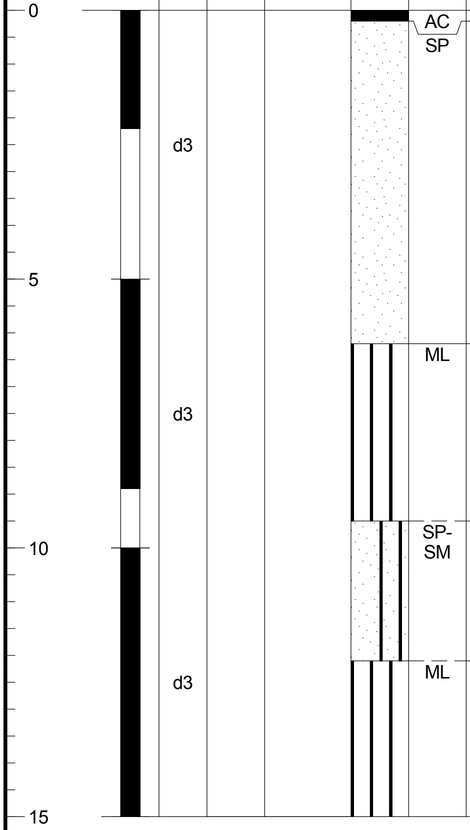
LAI9

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Depth (ft) | Sample Number & Interval | Sampler Type | Blows/Foot | PID (ppm) | Graphic Symbol | USCS Symbol | Water Level

Drilling Method: Direct Push

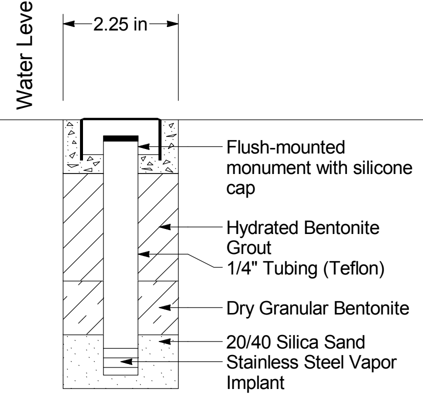
Ground Elevation (ft): not measured



USCS Symbol	Description
AC	Asphalt concrete pavement
SP	Brownish-gray, medium to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)** **Soil Gas sample: KSC-LAI9-SG**
ML	Gray, SILT with sand; no odor, no sheen (medium stiff, moist) **(ALLUVIUM)**
SP-SM	Dark gray, fine SAND with silt; no odor, no sheen (medium dense, wet)
ML	Gray SILT; no odor, no sheen (medium stiff, wet) **Groundwater sample: KSC-LAI-GW**

Water Level: ∇ ATD

Soil Gas Monitoring Well Detail
(DOE#: BKF021)



Boring Completed 11/15/17
Total Depth of Boring = 15.0 ft.

Soil Gas Monitoring Well Completed 11/15/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF021**

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Kent, Washington

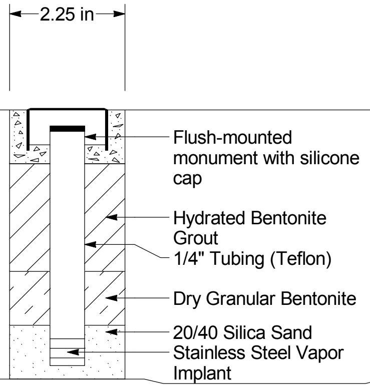
Log of Soil Gas Monitoring Well LAI9

Figure
A-10

LAI10

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0						AC	Asphalt concrete pavement	Groundwater not encountered.
		d3				SP	Brownish-gray, medium to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)**	
5							**Soil Gas sample: KSC-LAI10-SG**	

Soil Gas Monitoring Well Detail
(DOE#: BKF026)



Boring Completed 11/16/17
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 11/16/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

10

15

20

25

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.
4. **ECY Unique Well Number BKF026**

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Log of Soil Gas Monitoring Well LAI10

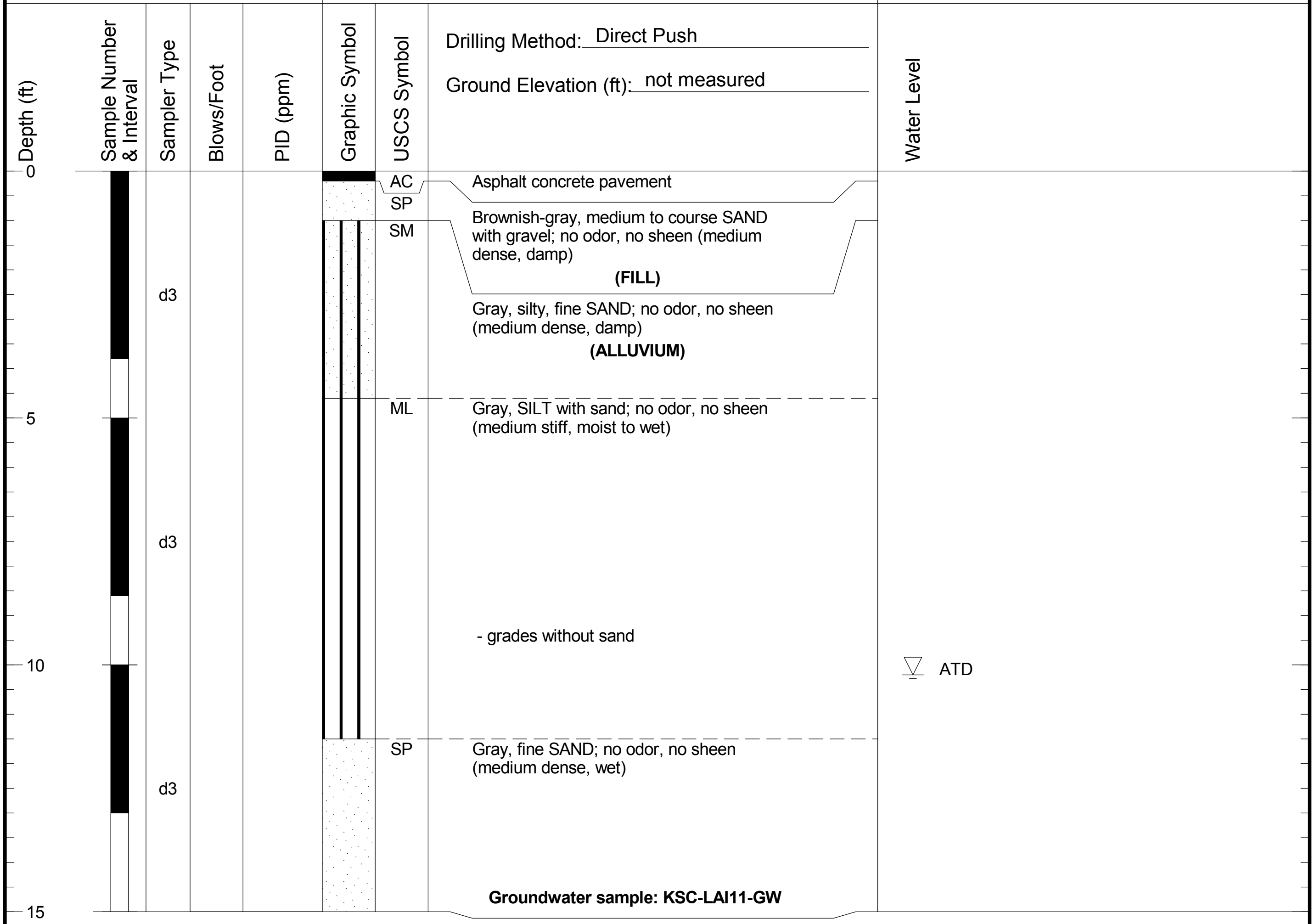
Figure
A-11

LAI11

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Direct Push

Ground Elevation (ft): not measured



Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						AC	Asphalt concrete pavement	
						SP	Brownish-gray, medium to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)**	
		d3				SM	Gray, silty, fine SAND; no odor, no sheen (medium dense, damp) **(ALLUVIUM)**	
5						ML	Gray, SILT with sand; no odor, no sheen (medium stiff, moist to wet)	
		d3					- grades without sand	
10								∇ ATD
		d3				SP	Gray, fine SAND; no odor, no sheen (medium dense, wet)	
15							**Groundwater sample: KSC-LAI11-GW**	
20								
25								

Boring Completed 11/15/17
Total Depth of Boring = 15.0 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.

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ SOIL BORING LOG

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Log of Boring LAI11

Figure
A-12

LAI12

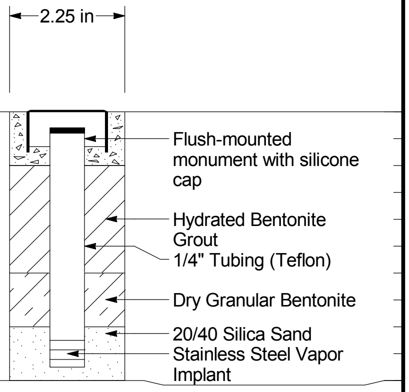
SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Direct Push

Ground Elevation (ft): not measured

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0		d3				SP	Gray, fine to course SAND; no odor, no sheen (medium dense, damp) **(FILL)** **Soil Gas sample: KSC-LAI12-SG**	Groundwater not encountered.
5								
10								
15								
20								
25								

Soil Gas Monitoring Well Detail
(DOE#: BKF479)



Boring Completed 05/21/18
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 05/21/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF479**

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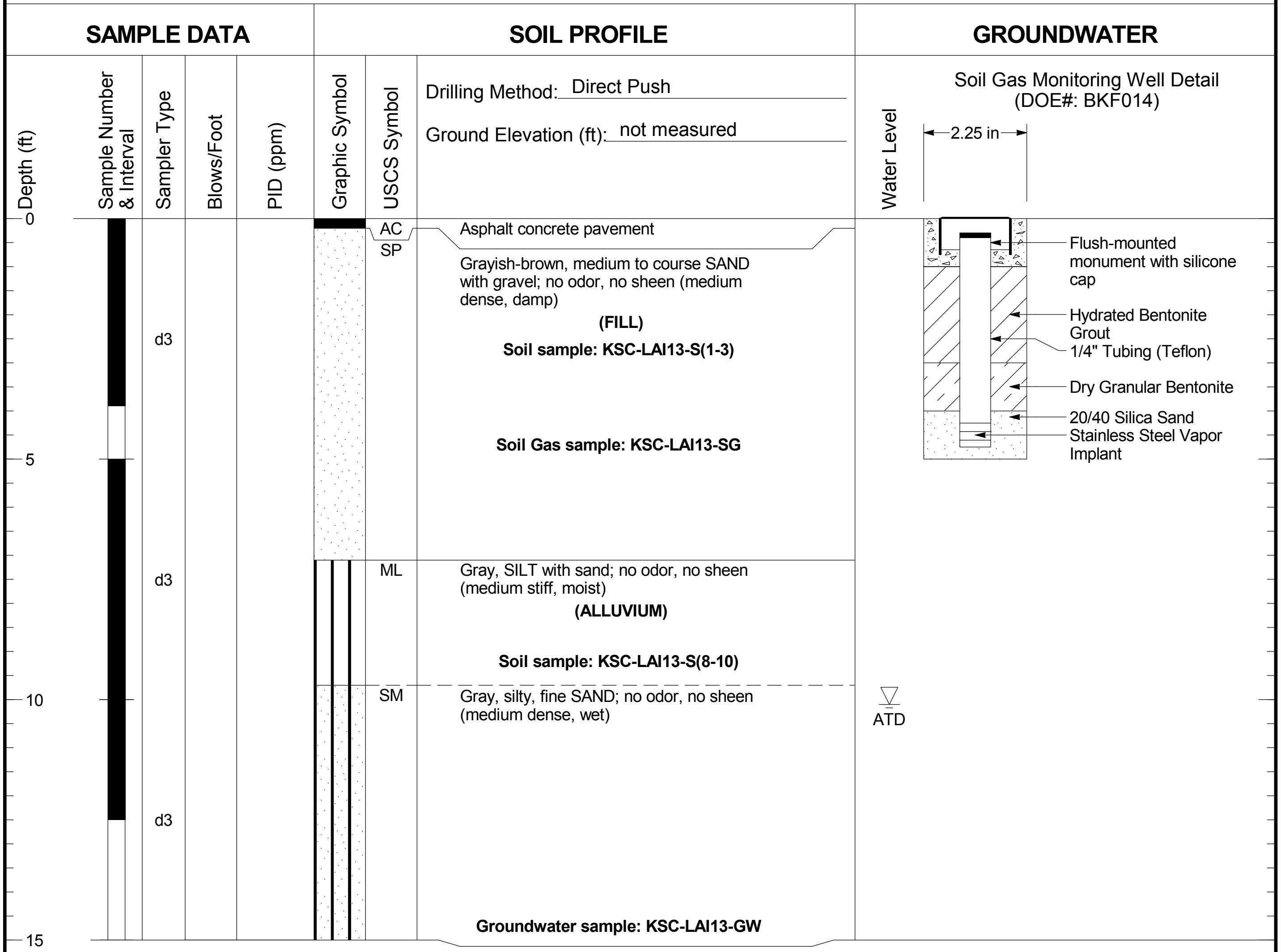
Log of Soil Gas Monitoring Well LAI12

Figure
A-13

LAI13



Drilling Method: Direct Push

Ground Elevation (ft): not measured

Soil Gas Monitoring Well Detail
(DOE#: BKF014)

AC — Asphalt concrete pavement

SP — Grayish-brown, medium to course SAND with gravel; no odor, no sheen (medium dense, damp)

(FILL)

Soil sample: KSC-LAI13-S(1-3)

Soil Gas sample: KSC-LAI13-SG

ML — Gray, SILT with sand; no odor, no sheen (medium stiff, moist)

(ALLUVIUM)

Soil sample: KSC-LAI13-S(8-10)

SM — Gray, silty, fine SAND; no odor, no sheen (medium dense, wet)

Groundwater sample: KSC-LAI13-GW

Boring Completed 11/13/17
Total Depth of Boring = 15.0 ft.

Soil Gas Monitoring Well Completed 11/13/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not mesured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

20

25

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.
4. **ECY Unique Well Number BKF014**

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Log of Soil Gas Monitoring Well LAI13

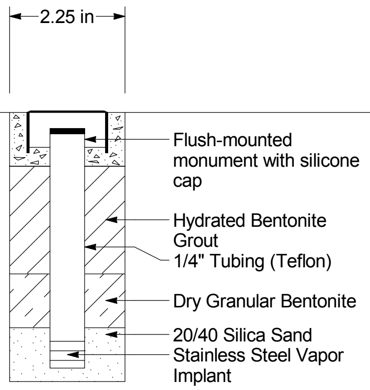
Figure
A-14

LAI14

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	SOIL PROFILE	Water Level
							Drilling Method: Direct Push Ground Elevation (ft): not measured	
0						SP	Gray, fine to coarse SAND with gravel (crushed concrete); no odor no sheen (very dense, damp) **(FILL)**	
				.7				
							Soil sample: KSC-LAI14-S(1-2.4)	
		d3						
							Soil Gas sample: KSC-LAI14-SG	
5								
				.2				
		d3					**Soil sample: KSC-LAI14-S(7.5-9.3)**	
								∇ ATD
10							- becomes wet	
		d3						
				.3				
15							**Groundwater sample: KSC-LAI14-GW**	
				.1				
		d3						
						SP-SM	Dark brown, fine SAND with silt; no odor, no sheen (medium dense, wet) **(ALLUVIUM)**	
20								
25								

GROUNDWATER

Soil Gas Monitoring Well Detail
(DOE#: BKF016)



Boring Completed 07/10/18
Total Depth of Boring = 20.0 ft.

Soil Gas Monitoring Well Completed 11/13/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF016**

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Log of Soil Gas Monitoring Well LAI14

Figure
A-15

LAI15

SAMPLE DATA

SOIL PROFILE

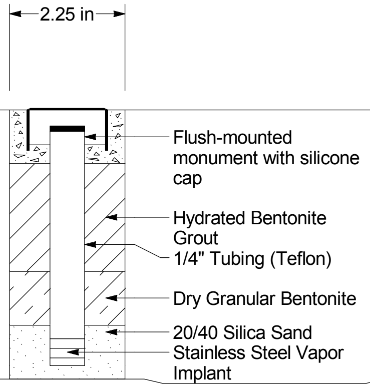
Drilling Method: Direct Push

Ground Elevation (ft): not measured

GROUNDWATER

Soil Gas Monitoring Well Detail
(DOE#: BKF015)

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Description	Water Level
0		d3				SP	Brownish-gray, fine to course SAND with gravel (crushed concrete); no odor, no sheen (very dense, damp) **(FILL)**	Groundwater not encountered.
5							**Soil gas sample: KSC-LAI15-SG**	
10								
15								
20								
25								



Boring Completed 11/13/17
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 11/13/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF015**

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Kent, Washington

Log of Soil Gas Monitoring Well LAI15

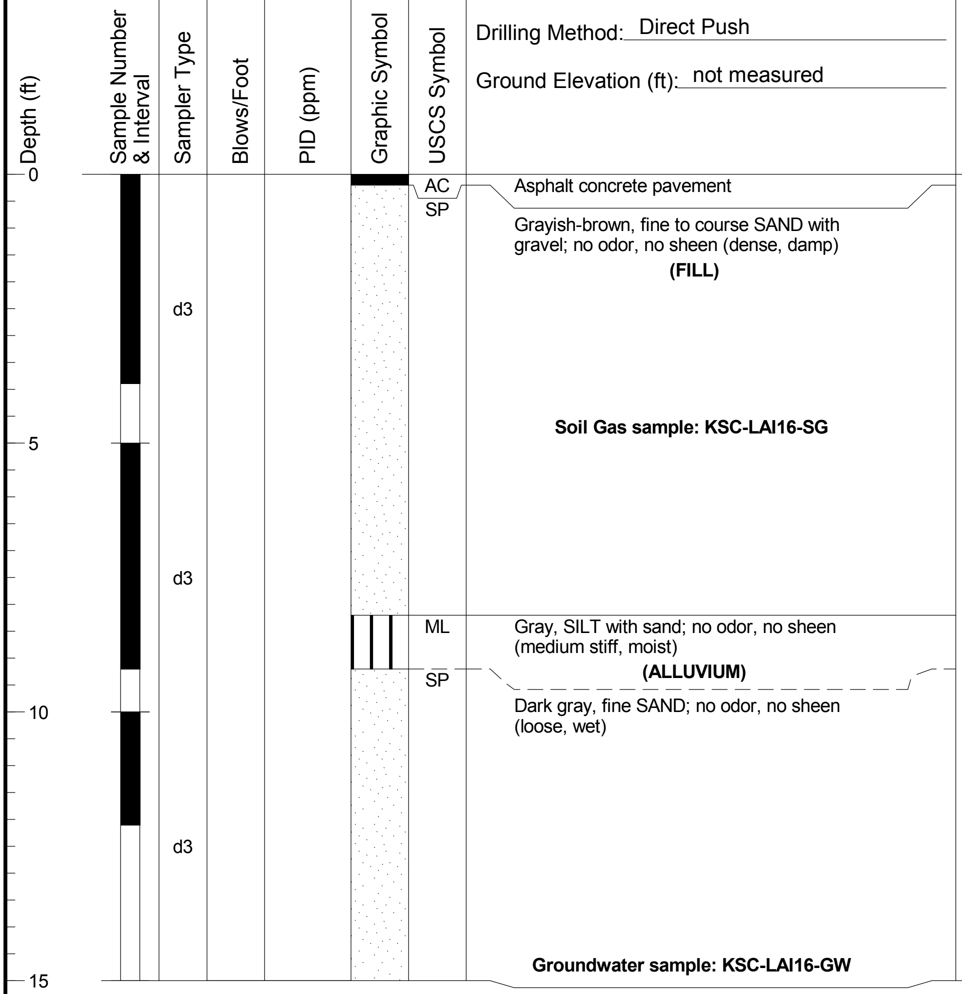
Figure
A-16

LAI16

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

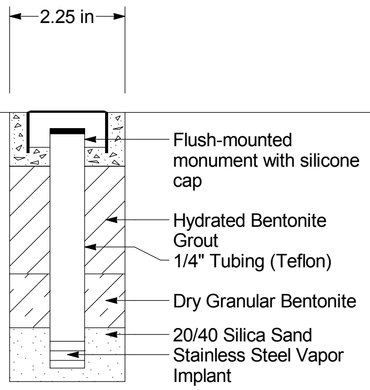
Drilling Method: Direct Push

Ground Elevation (ft): not measured



USCS Symbol	Description
AC	Asphalt concrete pavement
SP	Grayish-brown, fine to course SAND with gravel; no odor, no sheen (dense, damp) **(FILL)** **Soil Gas sample: KSC-LAI16-SG**
ML	Gray, SILT with sand; no odor, no sheen (medium stiff, moist) **(ALLUVIUM)**
SP	Dark gray, fine SAND; no odor, no sheen (loose, wet) **Groundwater sample: KSC-LAI16-GW**

Soil Gas Monitoring Well Detail
(DOE#: BKF017)



Boring Completed 11/13/17
Total Depth of Boring = 15.0 ft.

Soil Gas Monitoring Well Completed 11/13/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF017**

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ WELL LOG

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Kent, Washington

Log of Soil Gas Monitoring Well LAI16

Figure
A-17

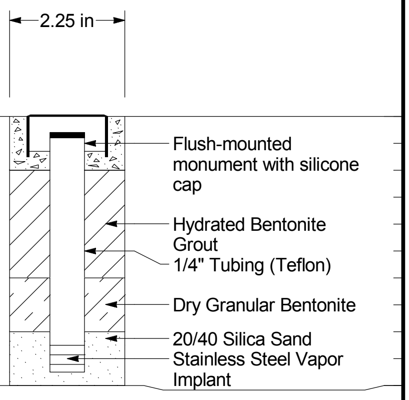
LAI17

Drilling Method: Direct Push

Ground Elevation (ft): not measured

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0		d3				SP	Grayish-brown, fine to course SAND with gravel; no odor, no sheen (dense, damp) **(FILL)**	Groundwater not encountered.
5							**Soil Gas sample: KSC-LAI17-SG**	
10								
15								
20								
25								

Soil Gas Monitoring Well Detail (DOE#: BKF022)



Boring Completed 11/15/17
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 11/15/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF022**

LAI18

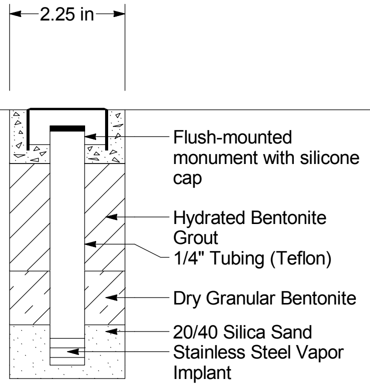
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	SOIL PROFILE	Water Level
0						AC	Asphalt concrete pavement	
						SP	Brownish-gray, fine to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)** **Soil sample: KSC-LAI18-S(1-3)**	
		d3						
5							**Soil Gas sample: KSC-LAI18-SG**	
						SP	Dark gray, fine SAND; no odor, no sheen (medium dense, wet) **(ALLUVIUM)** **Soil sample: KSC-LAI18-S(6-8)**	
		d3						
10								ATD
		d3						
15							- No recovery	
		d3						
20							**Groundwater sample: KSC-LAI18-GW**	
25								

Drilling Method: Direct Push

Ground Elevation (ft): not measured

GROUNDWATER

Soil Gas Monitoring Well Detail
(DOE#: BKF018)



Boring Completed 11/13/17
Total Depth of Boring = 20.0 ft.

Soil Gas Monitoring Well Completed 11/13/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF018**

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Kent, Washington

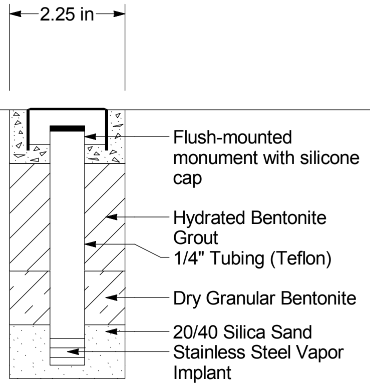
Log of Soil Gas Monitoring Well LAI18

Figure
A-19

LAI19

SAMPLE DATA				SOIL PROFILE		GROUNDWATER
Depth (ft)	Sampler Type	Blows/Foot	PID (ppm)	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0				GP	Brown, sandy, fine to course GRAVEL; no odor, no sheen (dense, damp) **(FILL)**	
	d3		0		**Soil sample: KSC-LAI19-S(1.5-3)**	
					Soil Gas sample: KSC-LAI19-SG	
5			0.2			
	d3					
10				ML	Brown, SILT with sand; no odor, no sheen (stiff, damp) **(ALLUVIUM)**	
				SP	Brown-red, fine SAND; no odor, no sheen (dense, damp)	
	d3		0	ML	Brown with iron oxide staining, clayey, SILT; no odor, no sheen (stiff, wet) **Soil sample: KSC-LAI19-S(11-13)** - grades to gray and without clay	▽ ATD
15				SM	Brown, silty, fine SAND; no odor, no sheen (dense, wet)	
	d3		0	ML	Gray SILT; no odor, no sheen (stiff, wet)	
20					**Groundwater sample: KSC-LAI19-GW**	
25						

Soil Gas Monitoring Well Detail
(DOE#: BKF023)



Boring Completed 07/11/18
Total Depth of Boring = 20.0 ft.

Soil Gas Monitoring Well Completed 11/16/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF023**

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Log of Soil Gas Monitoring Well LAI19

Figure
A-20

LAI20

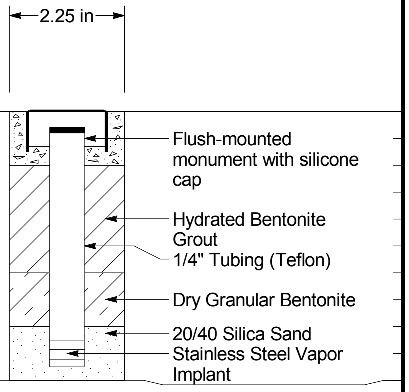
SAMPLE DATA · SOIL PROFILE · GROUNDWATER

Drilling Method: Direct Push

Ground Elevation (ft): not measured

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0		d3				SP	Brownish-gray, fine to course SAND with gravel (medium dense, damp) **(FILL)** **Soil Gas sample: KSC-LAI20-SG**	Groundwater not encountered.
5								
10								
15								
20								
25								

Soil Gas Monitoring Well Detail
(DOE#: BKF024)



Boring Completed 11/16/17
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 11/16/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF024**

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Kent, Washington

Log of Soil Gas Monitoring Well LAI20

Figure
A-21

LAI21

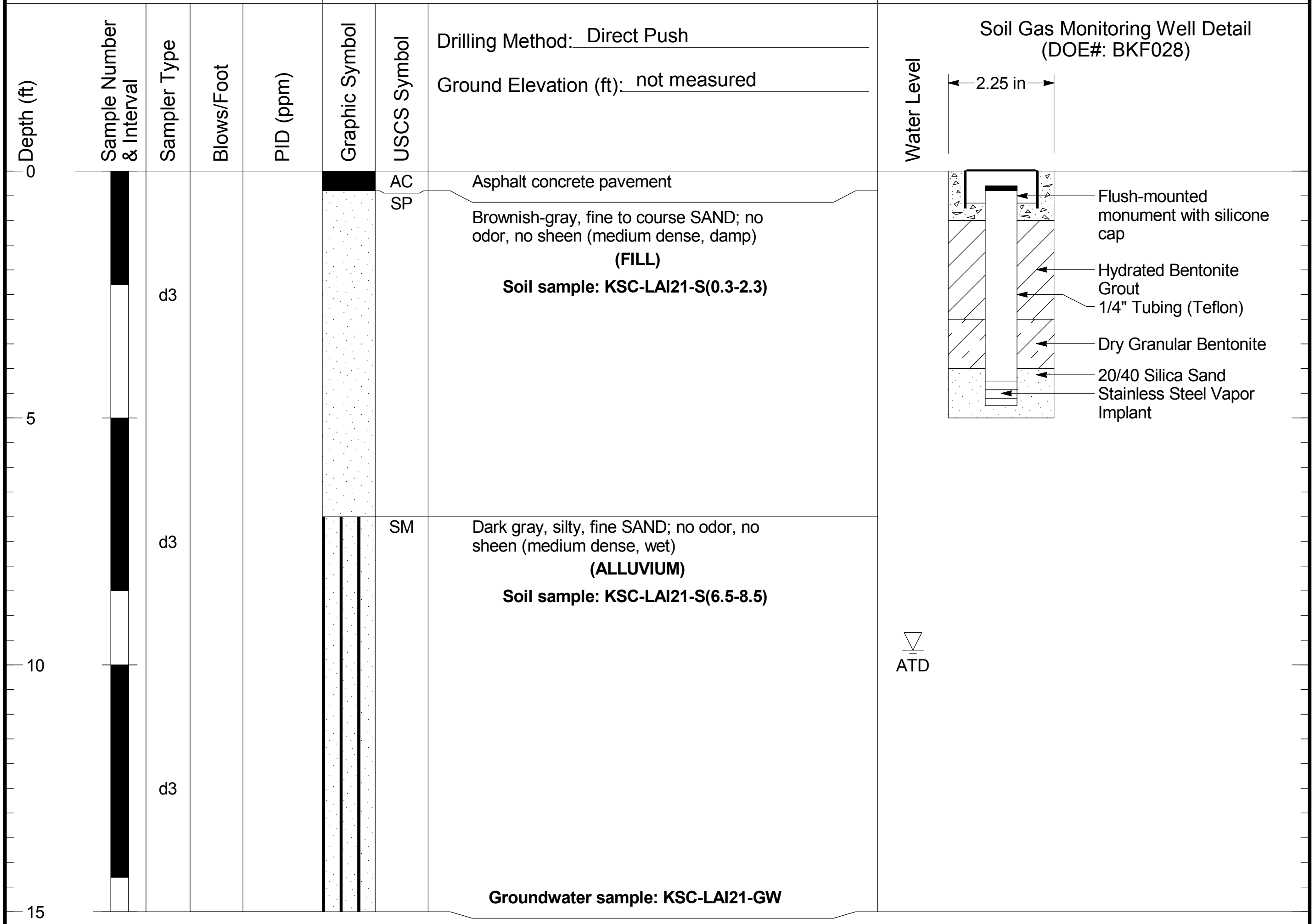
SAMPLE DATA

SOIL PROFILE

GROUNDWATER

Drilling Method: Direct Push

Ground Elevation (ft): not measured



USCS Symbol	Description
AC	Asphalt concrete pavement
SP	Brownish-gray, fine to course SAND; no odor, no sheen (medium dense, damp) **(FILL)** **Soil sample: KSC-LAI21-S(0.3-2.3)**
SM	Dark gray, silty, fine SAND; no odor, no sheen (medium dense, wet) **(ALLUVIUM)** **Soil sample: KSC-LAI21-S(6.5-8.5)** **Groundwater sample: KSC-LAI21-GW**

Boring Completed 11/14/17
Total Depth of Boring = 15.0 ft.

Soil Gas Monitoring Well Completed 11/16/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF028**

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Boeing Kent Space Center
Kent, Washington

Log of Soil Gas Monitoring Well LAI21

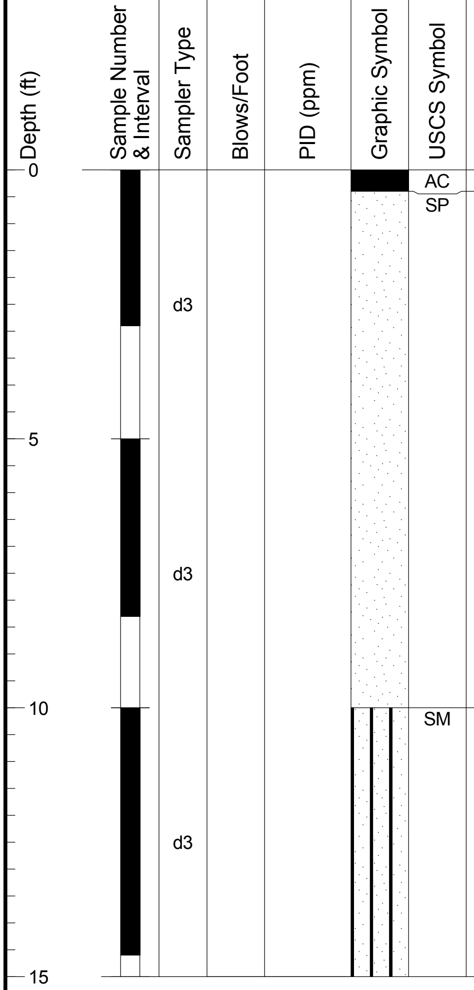
Figure
A-22

LAI22

SAMPLE DATA	SOIL PROFILE	GROUNDWATER

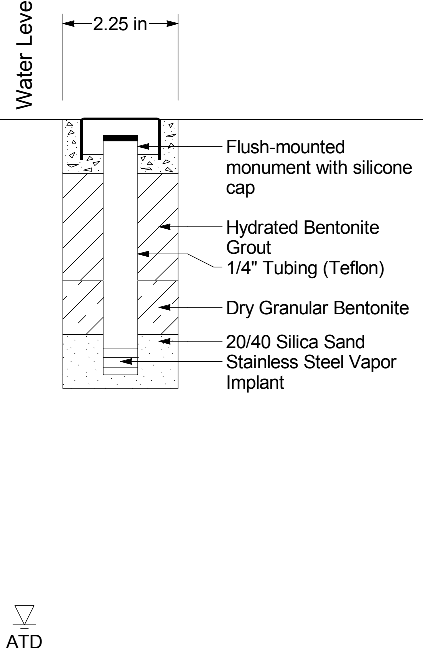
Drilling Method: Direct Push

Ground Elevation (ft): not measured



USCS Symbol	Description
AC	Asphalt concrete pavement
SP	Brownish-gray, fine to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)** **Soil sample: KSC-LAI22-S(6.3-8.3)**
SM	Dark gray, silty, fine SAND; no odor, no sheen (medium dense, wet) **(ALLUVIUM)** **Soil sample: KSC-LAI22-S(10-12)** **Groundwater sample: KSC-LAI22-GW**

Soil Gas Monitoring Well Detail (DOE#: BKF019)



Boring Completed 11/14/17
Total Depth of Boring = 15.0 ft.

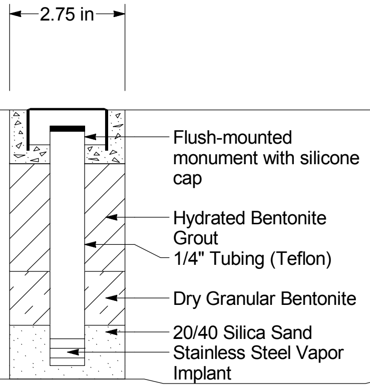
Soil Gas Monitoring Well Completed 11/14/17
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

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.
4. **ECY Unique Well Number BKF019**

LAI30

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0	▮				■	AC	Asphalt concrete pavement	Groundwater not encountered.
	▮	d3			▨	SP	Brownish-gray, fine to course SAND with gravel; no odor, no sheen (very dense, damp) **(FILL)** **Soil Gas sample: KSC-LAI30-SG**	
5								

Soil Gas Monitoring Well Detail
(DOE#: BKF480)



Boring Completed 05/22/18
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 05/22/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

10

15

20

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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.
4. **ECY Unique Well Number BKF480**

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ WELL LOG

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Kent, Washington

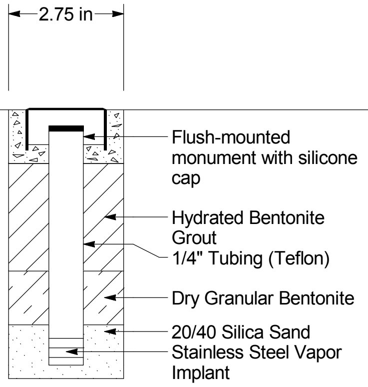
Log of Soil Gas Monitoring Well LAI30

Figure
A-24

LAI31

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0		d3		0		AC SP	Asphalt concrete pavement Brown, gravelly, fine to course SAND; no odor, no sheen (medium dense, damp) **(FILL)** **Soil Gas sample: KSC-LAI31-SG**	
5		d3		0		ML SP-SM	Gray, clayey SILT; no odor, no sheen (medium stiff, damp) **(ALLUVIUM)** Brown, fine SAND with silt; no odor, no sheen (medium dense, damp)	
10		d3		0		ML	**Soil sample: KSC-LAI31-S(10-11)** - becomes wet Gray, clayey SILT; no odor, no sheen (medium stiff, wet)	ATD
15		d3		0		SP-SM	Gray, fine SAND with silt; no odor, no sheen (medium dense, wet) **Groundwater sample: KSC-LAI31-GW**	
20								
25								

Soil Gas Monitoring Well Detail
(DOE#: BKF481)



Boring Completed 07/12/18
Total Depth of Boring = 20.0 ft.

Soil Gas Monitoring Well Completed 05/22/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF481**

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ WELL LOG

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Kent, Washington

Log of Soil Gas Monitoring Well LAI31

Figure
A-25

LAI32

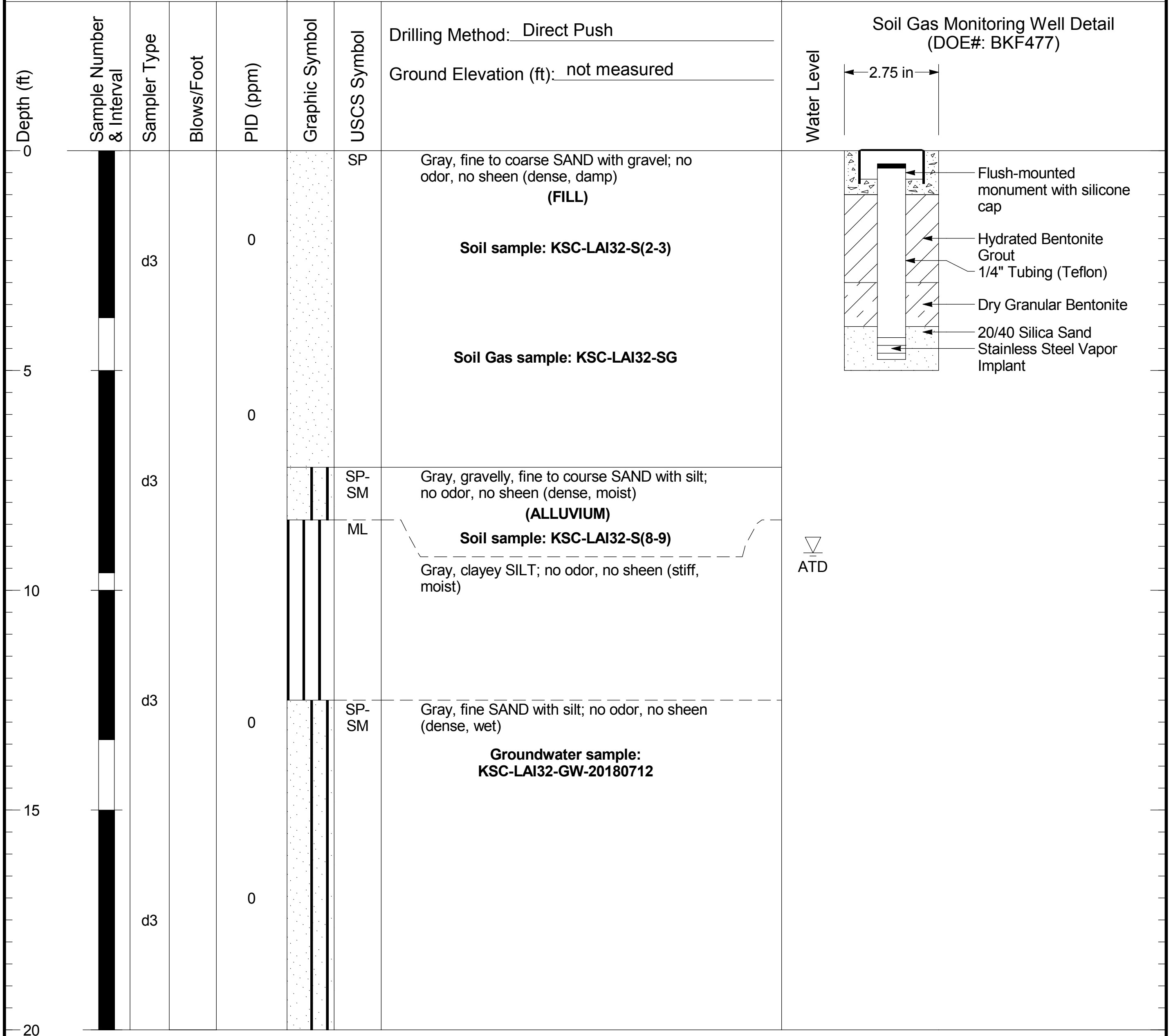
SAMPLE DATA

SOIL PROFILE

GROUNDWATER

Drilling Method: Direct Push

Ground Elevation (ft): not measured



Gray, fine to coarse SAND with gravel; no odor, no sheen (dense, damp)

(FILL)

Soil sample: KSC-LAI32-S(2-3)

Soil Gas sample: KSC-LAI32-SG

Gray, gravelly, fine to course SAND with silt; no odor, no sheen (dense, moist)

(ALLUVIUM)

Soil sample: KSC-LAI32-S(8-9)

Gray, clayey SILT; no odor, no sheen (stiff, moist)

Gray, fine SAND with silt; no odor, no sheen (dense, wet)

Groundwater sample:
KSC-LAI32-GW-20180712

Boring Completed 07/12/18
Total Depth of Boring = 20.0 ft.

Soil Gas Monitoring Well Completed 05/21/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

25

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.
4. **ECY Unique Well Number BKF477**

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Kent, Washington

Log of Soil Gas Monitoring Well LAI32

Figure
A-26

LAI33

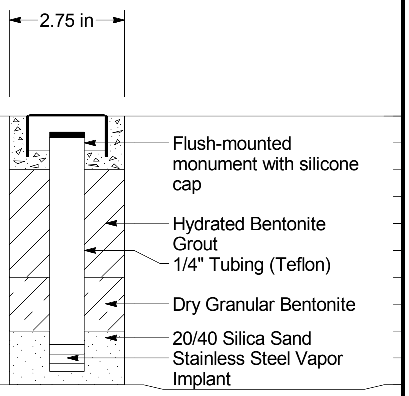
SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Direct Push

Ground Elevation (ft): not measured

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Description	Water Level
0		d3				AC	Asphalt concrete pavement	Groundwater not encountered.
						SP	Brownish-gray, fine to course SAND with gravel; no odor, no sheen (medium dense, damp) **(FILL)** **Soil Gas sample: KSC-LAI33-SG**	
5								
10								
15								
20								
25								

Soil Gas Monitoring Well Detail
(DOE#: BKF478)



Boring Completed 05/21/18
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 05/21/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF478**

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ WELL LOG

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Kent, Washington

Log of Soil Gas Monitoring Well LAI33

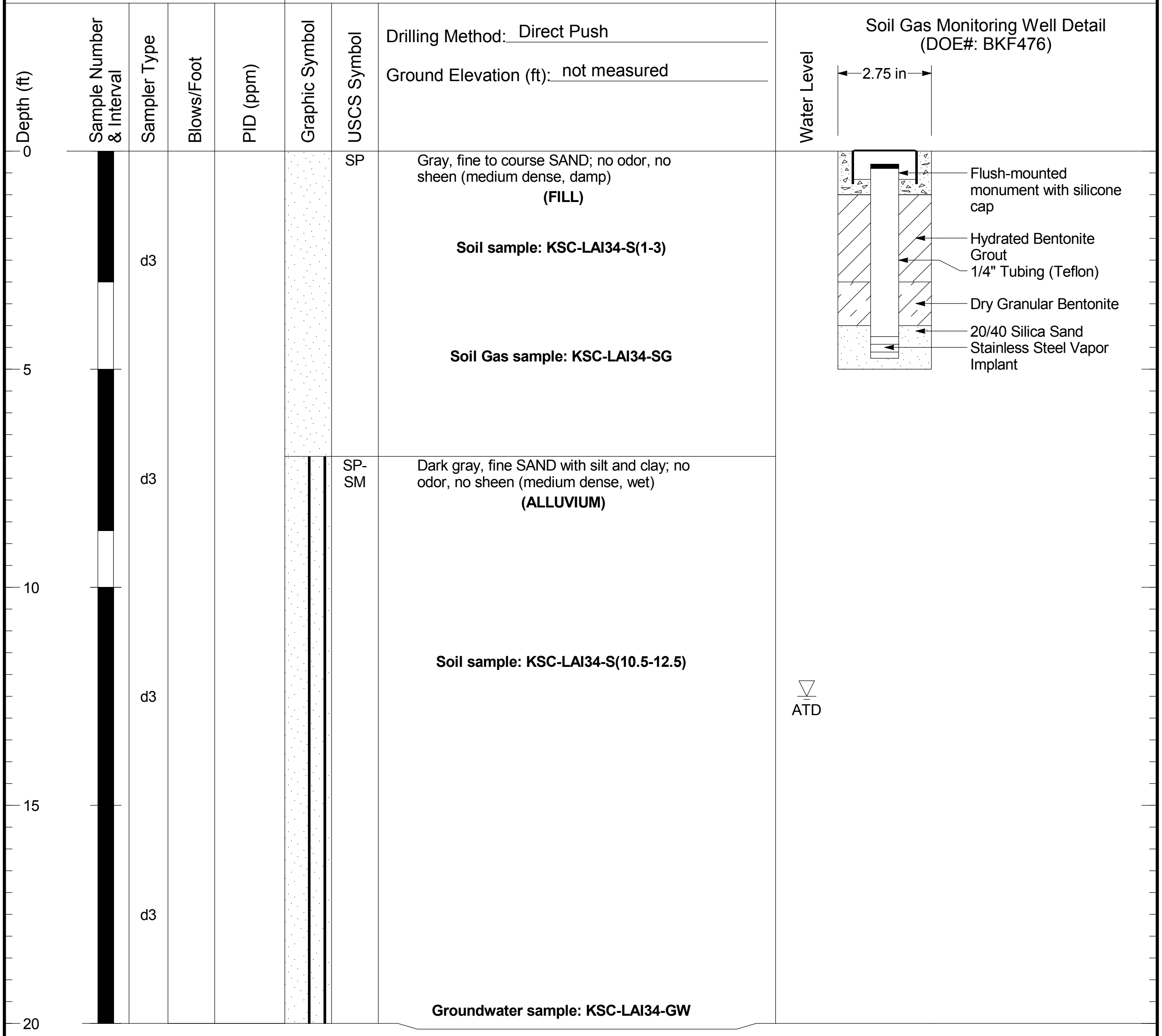
Figure
A-27

LAI34

SAMPLE DATA	SOIL PROFILE	GROUNDWATER

Drilling Method: Direct Push

Ground Elevation (ft): not measured



SP — Gray, fine to course SAND; no odor, no sheen (medium dense, damp)
(FILL)

Soil sample: KSC-LAI34-S(1-3)

Soil Gas sample: KSC-LAI34-SG

SP-SM — Dark gray, fine SAND with silt and clay; no odor, no sheen (medium dense, wet)
(ALLUVIUM)

Soil sample: KSC-LAI34-S(10.5-12.5)

Groundwater sample: KSC-LAI34-GW

Boring Completed 05/21/18
Total Depth of Boring = 20.0 ft.

Soil Gas Monitoring Well Completed 05/21/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKF476**

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Kent, Washington

Log of Soil Gas Monitoring Well LAI34

Figure
A-28

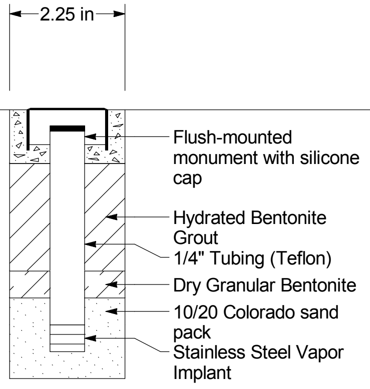
LAI35

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Water Level
0						AC	Asphalt concrete pavement	
				0.0		GP	Brown, sandy, fine to course GRAVEL; no odor, no sheen (medium dense, damp) **(FILL)**	
		d3						
5							**Soil Gas sample: KSC-LAI35-SG**	
				0.0		SP	Brown, fine to course SAND with gravel; no odor, no sheen (medium dense, damp) **(ALLUVIUM)** **Soil sample: KSC-LAI35-S(7.5-8.5)**	
		d3						
						ML	Gray, clayey SILT; no odor, no sheen (medium stiff, wet)	▽ ATD
10						SP	Brown, fine to course SAND with gravel; no odor, no sheen (medium dense, wet)	
		d3				ML	Gray, clayey SILT; no odor, no sheen; iron oxide staining (medium stiff, wet)	
				0.0		SP-SM	Gray, fine SAND with silt; no odor, no sheen (medium dense, wet) **Groundwater sample: KSC-LAI35-GW**	
15								

Drilling Method: Direct Push

Ground Elevation (ft): not measured

Soil Gas Monitoring Well Detail
(DOE#: BKF612)



Boring Completed 07/18/18
Total Depth of Boring = 15.0 ft.

Soil Gas Monitoring Well Completed 07/18/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

20

25

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.
4. **ECY Unique Well Number BKF612**

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ WELL LOG

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Log of Soil Gas Monitoring Well LAI35

Figure
A-29

LAI36

SAMPLE DATA

Depth (ft) | Sample Number & Interval | Sampler Type | Blows/Foot | PID (ppm)

SOIL PROFILE

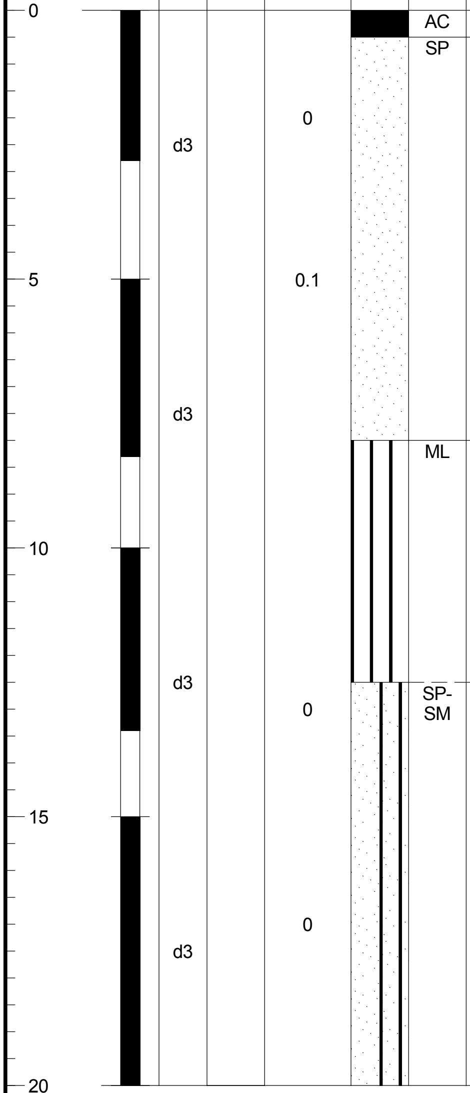
Graphic Symbol | USCS Symbol

Drilling Method: Direct Push

Ground Elevation (ft): not measured

GROUNDWATER

Water Level



AC — Asphalt concrete pavement

SP — Brown, fine to course SAND with gravel; no odor, no sheen (medium dense, damp)

(FILL)

Soil Gas sample: KSC-LAI36-SG

ML — Gray, clayey, SILT; no odor, no sheen (medium stiff, damp to moist)

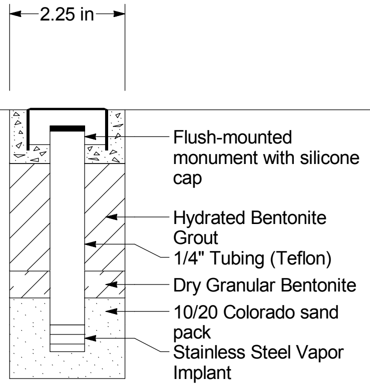
(ALLUVIUM)

- 11.7 - 12.5 iron oxide staining

SP-SM — Gray, fine SAND with silt; no odor, no sheen (medium dense, wet)

Groundwater sample: KSC-LAI35-GW

Soil Gas Monitoring Well Detail
(DOE#: BKX637)



▽ ATD

25

Boring Completed 07/12/18
Total Depth of Boring = 20.0 ft.

Soil Gas Monitoring Well Completed 07/12/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BKX637**

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Kent, Washington

Log of Soil Gas Monitoring Well LAI36

Figure
A-30

LAI37

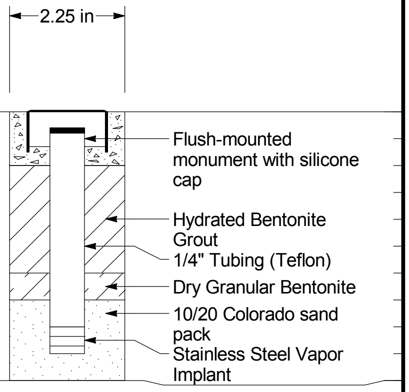
SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Direct Push

Ground Elevation (ft): not measured

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Description	Water Level
0		d3		0		GP	Brown, sandy, fine to course GRAVEL; no odor, no sheen (dense, damp) **(FILL)** **Soil sample: KSC-LAI37-S(2.7-3.7)** **Soil Gas sample: KSC-LAI37-SG**	Groundwater not encountered.
5								

Soil Gas Monitoring Well Detail
(DOE#: BJR718)



Boring Completed 07/11/18
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 07/11/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

10

15

20

25

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.
4. **ECY Unique Well Number BJR718**

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Kent, Washington

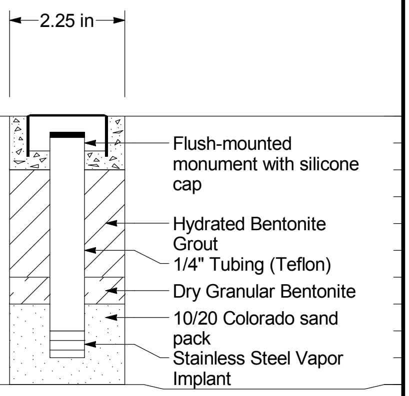
Log of Soil Gas Monitoring Well LAI37

Figure
A-31

LAI38

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0		d3		0.1		GP	Brown, sandy, fine to course GRAVEL; no odor, no sheen (dense, damp) **(FILL)** **Soil sample: KSC-LAI19-S(3-3.6)** **Soil Gas sample: KSC-LAI38-SG**	Groundwater not encountered.
5								

Soil Gas Monitoring Well Detail
(DOE#: BKX598)



Boring Completed 07/11/18
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 07/11/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

10

15

20

25

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.
4. **ECY Unique Well Number BKX598**

25213.21 9/5/18 N:\PROJECTS\25213.210.GPJ WELL LOG

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Kent, Washington

Log of Soil Gas Monitoring Well LAI38

Figure
A-32

LAI39

SAMPLE DATA

SOIL PROFILE

GROUNDWATER

Depth (ft) | Sample Number & Interval | Sampler Type | Blows/Foot | PID (ppm) | Graphic Symbol | USCS Symbol

Drilling Method: Direct Push

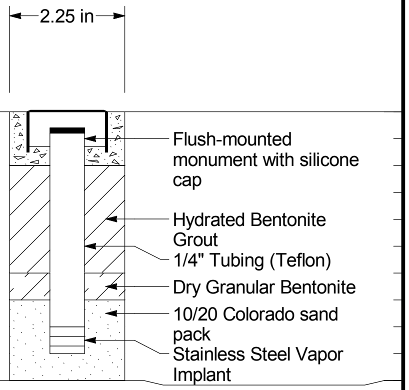
Ground Elevation (ft): not measured

Water Level

Soil Gas Monitoring Well Detail
(DOE#: BJR999)

Depth (ft)	Sampler Type	PID (ppm)	USCS Symbol	Description
0	d3	0	GP	Brown, sandy, fine to course GRAVEL; no odor, no sheen (dense, damp) **(FILL)** **Soil sample: KSC-LAI-S(2-3)** **Soil Gas sample: KSC-LAI39-SG**
5				

Groundwater not encountered.



Boring Completed 07/11/18
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 07/11/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

10

15

20

25

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.
4. ECY Unique Well Number BJR999

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Log of Soil Gas Monitoring Well LAI39

Figure
A-33

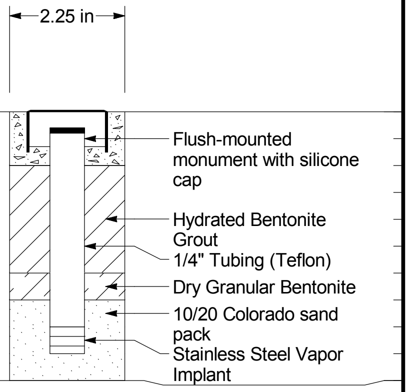
LAI40

Drilling Method: Direct Push

Ground Elevation (ft): not measured

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0		d3		0		GP	Brown, sandy, fine to course GRAVEL; no odor, no sheen (dense, damp) **(FILL)** **Soil sample: KSC-LAI40-S(3-4)** **Soil Gas sample: KSC-LAI40-SG**	Groundwater not encountered.
5								

Soil Gas Monitoring Well Detail
(DOE#: BRX597)



Boring Completed 07/11/18
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 07/11/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 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.
4. **ECY Unique Well Number BRX597**

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Kent, Washington

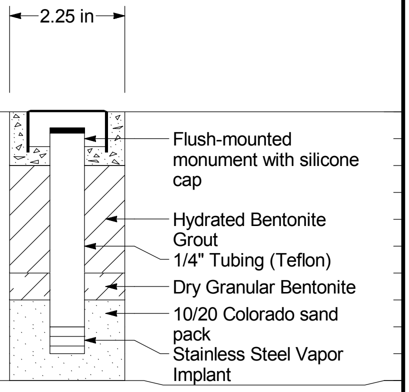
Log of Soil Gas Monitoring Well LAI40

Figure
A-34

LAI43

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0	0–2.2	d3			○	GP	Brown, sandy, fine to coarse GRAVEL; no odor, no sheen (medium dense, damp) **(FILL)** **Soil Gas sample: KSC-LAI43-SG**	Groundwater not encountered.
5								

Soil Gas Monitoring Well Detail
(DOE#: BKX636)



Boring Completed 07/12/18
Total Depth of Boring = 5.0 ft.

Soil Gas Monitoring Well Completed 07/12/18
Elevation at Top of Protective Casing = not measured
Elevation at Top of Soil Gas Monitoring Well Casing = not measured
Total Depth of Soil Gas Monitoring Well = 4.5 ft.

10

15

20

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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.
4. **ECY Unique Well Number BRX636**

LANDAU ASSOCIATES

Boeing Kent Space Center Kent, Washington	Log of Soil Gas Monitoring Well LAI43	Figure A-35

LAI44

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0				0		GP	Brown to gray, sandy, fine to coarse GRAVEL; no odor, no sheen (dense, damp) **(FILL)**	
		d3						
5								
				0				
		d3					**Soil sample: KSC-LAI-S(7-8)** - 7.4 to 7.6 asphalt - becomes wet	ATD
10						SP	Brown, gravelly, fine to coarse SAND; no odor, no sheen (medium dense, wet) **(FILL)** **Groundwater sample: KSC-LAI44-GW**	
		d3						
				0				
						ML	Gray, clayey SILT; no odor, no sheen (stiff, moist to wet) **(ALLUVIUM)**	
						SP	Gray, fine SAND; no odor, no sheen (medium dense, wet)	
15								

Boring Completed 07/18/18
Total Depth of Boring = 15.0 ft.

20

25

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.

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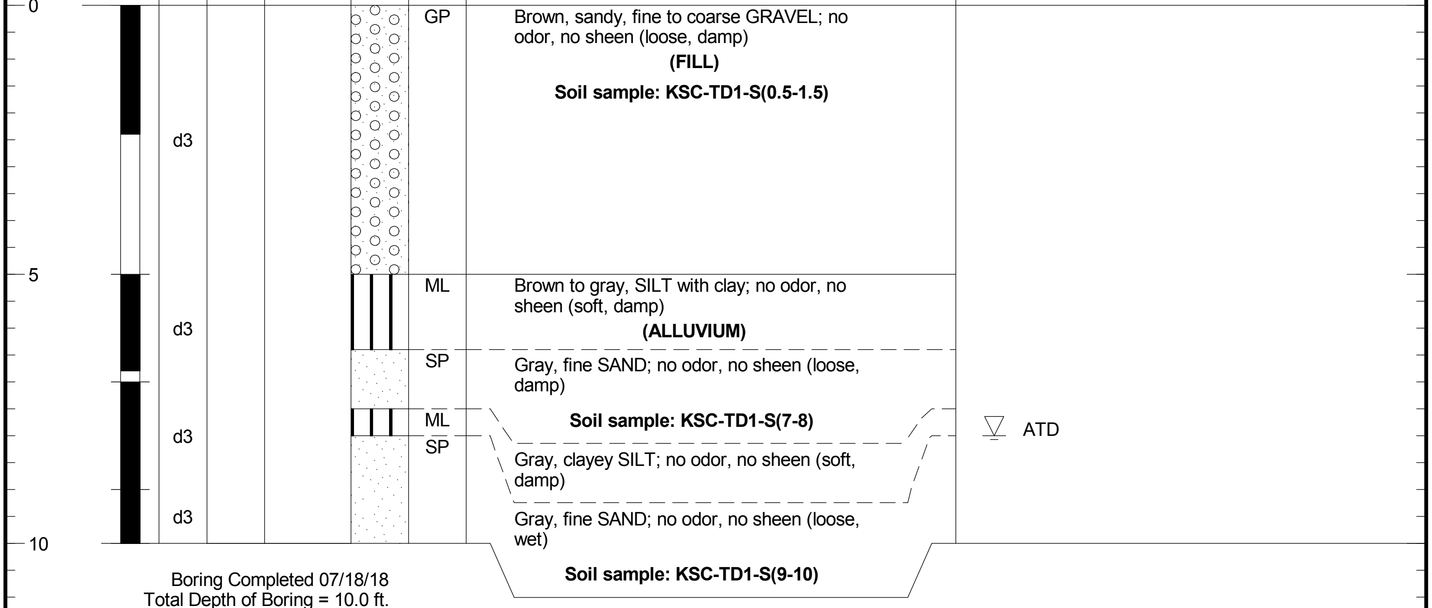
Boeing Kent Space Center Kent, Washington	Log of Boring LAI44	Figure A-36

TD1

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0		d3				GP	Brown, sandy, fine to coarse GRAVEL; no odor, no sheen (loose, damp) **(FILL)** **Soil sample: KSC-TD1-S(0.5-1.5)**	
5		d3				ML	Brown to gray, SILT with clay; no odor, no sheen (soft, damp) **(ALLUVIUM)**	
						SP	Gray, fine SAND; no odor, no sheen (loose, damp) **Soil sample: KSC-TD1-S(7-8)**	
		d3				ML	Gray, clayey SILT; no odor, no sheen (soft, damp)	ATD
		d3				SP	Gray, fine SAND; no odor, no sheen (loose, wet) **Soil sample: KSC-TD1-S(9-10)**	
10								



Boring Completed 07/18/18
Total Depth of Boring = 10.0 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

Boeing Kent Space Center
Kent, Washington

Log of Boring TD1

Figure
A-37

TD2

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	Water Level
0						GP	Brown, sandy, fine to coarse GRAVEL; no odor, no sheen (loose, damp) **(FILL)** **Soil sample: KSC-TD2-S(0-1)**	
		d3					No recovery	
5		d3				SP-SM	Gray, fine SAND with silt; no odor, no sheen (loose, wet) **(ALLUVIUM)** **Soil sample: KSC-TD2-S(7-8)**	▽ ATD
		d3						
		d3				CL	Gray, silty CLAY with red staining and wood pieces (soft, wet) **Soil sample: KSC-TD2-S(9-10)**	
10								
15								
20								
25								

Boring Completed 07/18/18
Total Depth of Boring = 10.0 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

Boeing Kent Space Center
Kent, Washington

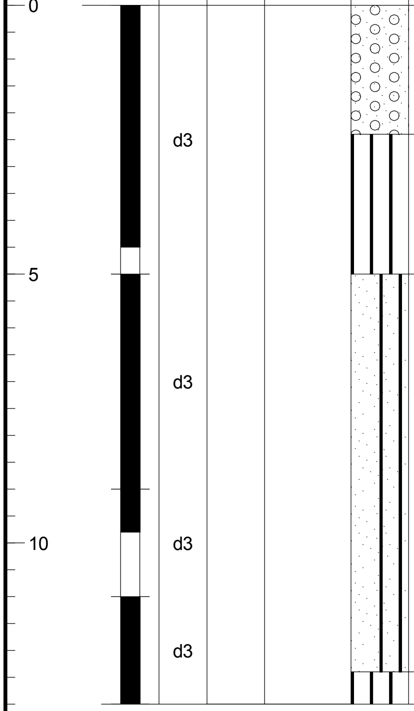
Log of Boring TD2

Figure
A-38

TD3

Drilling Method: Direct Push

Ground Elevation (ft): not measured



SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						GP	Brown, sandy, fine to coarse GRAVEL; no odor, no sheen (loose, damp) **(FILL)** **Soil sample: KSC-TD3-S(0.5-1.5)**	
		d3				ML	Gray, SILT with clay; no odor, no sheen (soft, damp) **(ALLUVIUM)**	
5		d3				SP-SM	Gray, silty, fine SAND; no odor, no sheen (loose, moist to wet)	∇ ATD
10		d3					**Soil sample: KSC-TD3-S(9-10)**	
		d3				ML	Gray, clayey SILT; no odor, no sheen (soft, wet)	

Boring Completed 07/18/18
Total Depth of Boring = 13.0 ft.

15

20

25

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

Boeing Kent Space Center
Kent, Washington

Log of Boring TD3

Figure
A-39

TE1

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Direct Push Ground Elevation (ft): not measured	
0		d3				GP	Brown, sandy, fine to coarse GRAVEL; no odor, no sheen (loose, damp) **(FILL)** **Soil sample: KSC-TE1-S(0.5-1.5)**	Groundwater not encountered.
						ML	Gray with iron oxide staining, clayey SILT; no odor, no sheen (soft, damp) **(ALLUVIUM)**	
						SP-SM	Brown, silty, fine SAND; no odor, no sheen (loose, damp) **Soil sample: KSC-TE1-S(4-5)**	
5								

Boring Completed 07/18/18
Total Depth of Boring = 5.0 ft.

10

15

20

25

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

Boeing Kent Space Center
Kent, Washington

Log of Boring TE1

Figure
A-40

TE2

Drilling Method: Direct Push

Ground Elevation (ft): not measured

SAMPLE DATA					SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0		d3				GP	Brown, sandy, fine to coarse GRAVEL; no odor, no sheen (loose, damp) **(FILL)**	
						ML	Gray with iron oxide staining, clayey SILT; no odor, no sheen (soft, damp) **(ALLUVIUM)** **Soil sample: KSC-TE2-S(0.5-1.5)**	
						SP-SM	Brown, silty, fine SAND; no odor, no sheen (loose, moist to wet) **Soil sample: KSC-TE2-S(4-5)**	∇ ATD
5								

Boring Completed 07/18/18
Total Depth of Boring = 5.0 ft.

10

15

20

25

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

Boeing Kent Space Center
Kent, Washington

Log of Boring TE2

Figure
A-41

TE3

SAMPLE DATA | SOIL PROFILE | GROUNDWATER

Drilling Method: Direct Push

Ground Elevation (ft): not measured

Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol		Water Level
0						GP	Brown, sandy, fine to coarse GRAVEL; no odor, no sheen (loose, damp) **(FILL)** **Soil sample: KSC-TE2-S(0.5-1.5)**	
		d3				ML	Gray with iron oxide staining, clayey SILT; no odor, no sheen (soft, damp) **(ALLUVIUM)**	
						SP-SM	Gray, silty, fine SAND; no odor, no sheen (loose, moist to wet) **Soil sample: KSC-TE2-S(4-5)**	∇ ATD
5								
10								
15								
20								
25								

Boring Completed 07/18/18
Total Depth of Boring = 5.0 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

Boeing Kent Space Center
Kent, Washington

Log of Boring TE3

Figure
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Appendix C

Survey Information

BOEING KENT SPACE CENTER
MONITOR WELLS
JULY 2017

MONITOR WELL NUMBER		NORTHING	EASTING	RIM ELEV. OF CASE	TOP OF PIPE ELEV.	PIPE TYPE
MW-1		157,218.0	1,288,399.3	29.87	29.59	2" PVC
MW-2		156,911.0	1,289,528.0	28.98	28.58	2" PVC
MW-3		155,979.9	1,289,581.4	28.78	28.47	2" PVC
MW-4		155,134.9	1,289,093.6	29.18	28.86	2" PVC
MW-5		155,231.7	1,288,197.2	30.29	29.83	2" PVC
MW-6		156,258.2	1,288,065.8	29.47	29.17	2" PVC
		156,258.1	1,288,065.8	30.03	29.68	2" PVC
MW-7		156,575.9	1,287,632.9	28.27	27.92	2" PVC
		156,576.5	1,287,633.1	28.61	28.26	2" PVC

Coordinate System and Zone: Washington State Plane, North Zone Coordinates
Horizontal Datum: NAD 83(91), North Zone, US FEET.
Vertical Datum: NAVD88, US FEET.

To convert elevations shown hereon to NGVD29 elevations please SUBTRACT 3.54 feet.

Survey completed on July 21, 2017 by Duane Hartman and Associates

DHA Project No.: 17-2689

07/31/17

BOEING KENT SPACE CENTER
MONITOR WELLS
JULY 2020

MONITOR WELL NUMBER	NORTHING	EASTING	RIM ELEV. OF CASE	TOP OF PIPE ELEV.	Ground Surface Elevation	PIPE TYPE
MW-6	156,258.1	1,288,065.8	30.03	29.68	--	2" PVC
MW-7	156,576.5	1,287,633.1	28.61	28.26	--	2" PVC
MW-8	156,629.0	1,287,945.9	28.46	28.08	--	2" PVC
MW-9	156,954.3	1,288,157.4	30.06	29.60	--	2" PVC
MW-10	155,300.6	1,288,824.5	29.54	29.12		2" PVC
NDP-1	156,708.2	1,287,718.5	--	--	27.35	--
NDP-2	156,726.2	1,287,862.7	--	--	27.25	--
NDP-3	156,832.1	1,287,871.8	--	--	27.19	--
NDP-4	156,877.2	1,288,008.5	--	--	29.4	--

Coordinate System and Zone: Washington State Plane, North Zone Coordinates
Horizontal Datum: NAD 83(91), North Zone, US FEET.
Vertical Datum: NAVD88, US FEET.

To convert elevations shown hereon to NGVD29 elevations please SUBTRACT 3.54 feet.

Survey completed on July 14, 2020 by Duane Hartman and Associates

BOEING KENT SPACE CENTER
STAFF GUAGE ELEVATON SURVEY
SEPTEMBER 2019

STAFF GUAGE NUMBER	NORTHING	EASTING	4.00 MARK ON STAFF GUAGE	GROUND ELEVATON
SG-1	156,688.4	1,288,009.0	20.78	16.08
SG-2	156,629.8	1,289,787.8	21.34	16.24
SG-3	155,011.3	1,289,740.0	23.79	19.59

Coordinate System and Zone: Washington State Plane, North Zone Coordinates
Horizontal Datum: NAD 83(91), North Zone, US FEET.
Vertical Datum: NAVD88, US FEET.

To convert elevations shown hereon to NGVD29 elevations please SUBTRACT 3.54 feet.

Survey completed on September 19, 2019 by Duane Hartman and Associates

BOEING KENT SPACE CENTER
MONITOR WELLS
JUNE 2021

MONITOR WELL NUMBER	NORTHING	EASTING	RIM ELEV. OF CASE	TOP OF PIPE ELEV.	PIPE TYPE
MW-11	156,891.3	1,288,042.6	29.32	28.87	2" PVC
MW-12	156,735.4	1,287,860.2	27.20	26.85	2" PVC
POND H2O SURFACE	156,853.8	1,287,852.8	19.80		WATER SURFACE

WATER
SURFACE
ELEVATION

Coordinate System and Zone: Washington State Plane, North Zone Coordinates
Horizontal Datum: NAD 83(91), North Zone, US FEET.
Vertical Datum: NAVD88, US FEET.

To convert elevations shown hereon to NGVD29 elevations please SUBTRACT 3.54 feet.

Survey completed on June 8, 2021 by Duane Hartman and Associates

DHA Project No.: 21-3127 06/14/2021

Appendix D

MSDS Blasocut 4000 Strong

BLASER SWISSLUBE INC
Westgate Industrial Park
Goshen, New York 10924

Tel. (914) 294-3200
Fax (914) 294-3102

Blaser
Swisslube Inc.

MATERIAL SAFETY DATA SHEET
BLASOCUT 4000 STRONG, ART. NO. 872

367 oc

HMIS

PRODUCT IDENTIFICATION

MANUFACTURER: BLASER SWISSLUBE INC
ADDRESS: Westgate Industrial Park
GOSHEN NY 10924
EMERGENCY PHONE NUMBER: (914) 294-32[illegible]0

PRODUCT NAME: BLASOCUT 4000 STRONG Art. No. 872
PRODUCT TYPE: Water Soluble Metal Working Coolant, Mineral Oil based

PRODUCT COMPOSITION

Blasocut 4000 Strong is a tested, nonhazardous mixture of :
(As defined by 29 CFR 1910.1200)

INGREDIENT:	**%**	**CAS NO:**
Severely Hydrotreated Mineral Oil	30-50	64742-52-5
Anionic emulsifiers	25-35	68608-26-4 61790-44-1
Chlorinated paraffins	5-15	61788-76-9
Polar additives	2-5	8016-28-2 61788-66-7
Corrosion and Fungi inhibitors	0.5-1	
Odorant and Dye (technical grade of food dye)	<0.1	

Stabilizers (Total 0.1-0.5%):
Na-benzoate; 2,3-pentandiol,2-methyl; Ca-acetate; alpha-Tocopherol; citric acid; tartaric acid; ascorbic acid; ascorbylpalmitate; oleylsarcosine; 1-hydroxyethyl-2-oleyl-imidazolin and glycerin

Blasocut 4000 Strong DOES NOT CONTAIN as an ingredient phenols, nitrites,, formaldehydes or formaldehyde releasing substances, heavy metals (such as Lead, Mercury etc.), active sulfur, arsenic PCB, PCT, TCDD or other Dioxin related substances. PCA content less than 10 ppm (GC).

All ingredients of Blasocut 4000 Strong are listed on the TSCA Chemical Substances Inventory

Blasocut does not contain nor is it manufactured with Ozone Depleting Substances as defined in the Federal Clean Air Act Amendments of 1990, sections 602 and 611.

Date of Issue: March 26, 1993
Supersedes: REV.#7, 10/28/91
Prepared by: N. Blaser, VP, GM, Blaser Production Inc.

VENDOR 4060
MSDS # 68547 Tron

MATERIAL SAFETY DATA SHEET
BLASOCUT 4000 STRONG, ART. NO. 872

HEALTH HAZARD DATA

Blasocut 4000 Strong has been extensively tested as a whole for it's health hazards:

LD50 of concentrate: >15g/kg	Ames Test: Negative
Eye Irritation: Negative	Skin Sensitizing: Negative

Copies of the actual tests conducted by independent laboratories are available for inspection on request.

Routes of Entry:	Inhalation?	Skin?	Ingestion?
	Unlikely	No	Accidental only

Health Hazards (Acute/Chronic): None/None Carcinogenicity: none
OSHA Regulated: No
Signs and Symptoms of Exposure: None established
Medical Conditions Generally Aggravated by Exposure: Not established

EXPOSURE LIMITS:
OSHA regulation 29 CFR 1910.1000 establishes an exposure limit for Oil Mist in Air. The applicability of this exposure limit to emulsions has not been established.

OSHA 29 CFR 1910.1000 for Oil Mist in Air: 5mg/m^3
ACGIH: TLV for Oil Mist in Air: 5mg/m^3

EMERGENCY and FIRST AID PROCEDURES:

Skin Contact:	Wash with plenty of fresh water (good personal hygiene practices are sufficient). Remove any contaminated clothing and launder before reuse.
Eye contact:	Rinse with Plenty of fresh water for 20 Min. Consult Physician if necessary
Inhalation:	Remove to fresh air
Ingestion:	DO NOT INDUCE VOMITING, PULMONARY ASPIRATION HAZARD, consult a Physician without delay. If involuntary vomiting occurs, ensure that mouth is below hip level!

BLASER SWISSLUBE INC
Westgate Industrial Park
Goshen, New York 10924

Tel. (914) 294-3200
Fax (914) 294-3102

Blaser
Swisslube Inc.

MATERIAL SAFETY DATA SHEET
BLASOCUT 4000 STRONG, ART. NO. 872

CHEMICAL and PHYSICAL PROPERTIES of the COMPLETE PRODUCT

Boiling point: 572°F	**Pour point:** -22°F
Specific Gravity: 0.976g/cm^3	**Solubility in water:** emulsifies
Vapor pressure: Not volatile	**Volatiles, %:** nil
pH @ 5% fresh: 8.9	**pH @ 5% after 24hrs.:** 8.7

Appearance and odor: Green liquid / pleasant odor (almonds)

FIRE and EXPLOSION HAZARD DATA

Flash Point: 367°F (Cleveland open Cup)
Explosion limits: not applicable
Auto Ignition Temperature: >572°F

Hazardous Combustion Products: Oxides of Carbon, Nitrogen and traces of oxides of chlorine and sulfur, HCl

Products formed under ABNORMAL CONDITIONS: Thermal decomposition of the concentrate above 176°F may produce trace amounts of HCl

Fire Fighting Media: CO_2, dry chemical, foam

Special Fire Fighting Procedures: Wear self contained breathing apparatus when fighting fires in confined spaces.
Cool exposed containers with water mist.

Unusual Fire or Explosion Hazards: none

REACTIVITY DATA

Stability: Stable.

Conditions to Avoid: Avoid direct solar irradiation of drums. Good and safe housekeeping procedures suggest that ALL combustible materials be stored away from strong oxidizers

Incompatibility (Materials to Avoid): Concentrate:
strong oxidizers (as any other combustible materials)
End use dilutions: Magnesium

Hazardous Decomposition or Byproducts: Thermal Decomposition (Concentrate) above 176°F: Trace amounts of HCl

Hazardous Polymerization or Byproducts: Will not Occur

BLASER SWISSLUBE INC.
Westgate Industrial Park
Goshen, New York 10924
Tel. (914) 294-3200
Fax (914) 294-3102

Blaser Swisslube Inc.

MATERIAL SAFETY DATA SHEET
BLASOCUT 4000 STRONG, ART. NO. 872

PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to Be Taken in Case Material is Released or Spilled: As with any other Industrial Lubricating Oil, use oil-binding agents Spills or leaks may cause slippery conditions

Waste Disposal Methods: Split emulsion with adsorbing agents, salts or ultra-filtration. Dispose according to all applicable Federal, State and Local Regulations

Precautions to Be Taken in Handling/Storing: Avoid direct solar irradiation of Concentrate Drums

Other Precautions: Do not store with strong oxidizers

CONTROL MEASURES

Respiratory Protection: Not generally required

Ventilation: Normal general ventilation is sufficient

Protective Gloves: Not required (not recommended around moving parts or Machinery unless a tight fitting glove is used)

Eye Protection: Industrial Safety Glasses are recommended [Policy decision]

Other Protective Equipment or Clothing: None required

Work/Hygienic Practices: Thorough personal hygiene and clean working practices are sufficient

ENVIRONMENTAL, REGULATORY AND SUPPLEMENTAL INFORMATION

NFPA 704:	HEALTH: 1	FLAMMABILITY:1	REACTIVITY:0	
NFPA STORAGE: IIIB				
HMIS:	HEALTH:0	FLAMMABILITY:1	REACTIVITY:0	CONTACT:0

SARA TITLE III INFORMATION:

IMMEDIATE HEALTH (Acute): No	REACTIVE HAZARD: No
DELAYED HEALTH (Chronic): No	SUDDEN PRESSURE RELEASE: No
FIRE HAZARD: No	

Blasocut 4000 Strong does not contain any ingredients listed on the SARA Title III, Section 313 List or CERCLA List of Chemicals Blasocut 4000 Strong, as sold, does not meet the criteria of a hazardous waste as defined under 40CFR 261, in that it does not exhibit the characteristics of a hazardous waste of Subpart C, nor is it listed as a hazardous waste under Subpart D. It is the end-user's responsibility to determine the regulatory status of the waste at time of disposal.

Appendix E

Stormwater Pollution Prevention Plan

Stormwater Pollution Prevention Plan (SWPPP)
Boeing Space Center (BSC) Kent
Washington Department of Ecology
(WDOE) Permit # WAR-000481

July 2021

Prepared by:
The Boeing Company
Boeing Defense, Space and Security (BDS) Puget Sound (PS)
Environment, Health and Safety (EHS)

Printed copies, other than the signed and stamped original, are for reference only. The Boeing BDS Puget Sound EHS Manager is responsible for maintaining the official signed and stamped original plan.

SWPPP CERTIFICATION FORM

The Permitee shall use this form to sign and certify that the Stormwater Pollution Prevention Plan (SWPPP) is complete, accurate and in compliance with Conditions S3 and S8 of the Industrial Stormwater General Permit.

- A SWPPP certification form needs to be completed and attached to all SWPPPs.
- Each time a Level 1, 2, or 3 Corrective Action is required, this form needs to be re-signed and re-certified by the Permitee, and attached to the SWPPP.

Is this SWPPP certification in response to a Level 1, 2 or 3 Corrective Action? ☐ **Yes** ☒ **No**
If Yes:

- Type of Corrective Action?: Level 1 ☐ Level 2 ☐ Level 3 ☐
- Date SWPPP update/revision completed: 7/26/21

"I certify under penalty of law that this SWPPP and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate information to determine compliance with the Industrial Stormwater General Permit. Based on my inquiry of the person or persons who are responsible for stormwater management at my facility, this SWPPP is, to the best of my knowledge and belief, true, accurate, and complete, and in full compliance with Permit Conditions S3 and S8, including the correct Best Management Practices from the applicable Stormwater Management Manual. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

John Sherman — Puget Sound Senior Manager, Environment
Operator's Printed Name * — Title

Operator's Signature * — Date

***** Federal regulations require this document to be signed as follows:

> For a corporation, by a principal executive officer of at least the level of vice president; for a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or for a municipality, state, federal, or other public facility, by either a principal executive officer or ranking elected official.

This document shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if: 1) The authorization is made in writing by a person described above and submitted to Ecology, and 2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

Changes to authorization: If an authorization under number 2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of number 2 above shall be submitted to Ecology prior to, or together with, any reports, information, or applications to be signed by an authorized representative.

ABSTRACT

In 1987, amendments to the Clean Water Act (CWA) of 1972 specified that those industrial facilities with the potential for the discharge of pollutants to the waters of the United States obtain a National Pollutant Discharge Elimination System (NPDES) permit. Section 402(p) sets NPDES stormwater discharge permit guidelines for federal and state agencies. The Washington Department of Ecology (WDOE) is authorized to issue stormwater permits to qualifying industries in the State of Washington. The NPDES and State Waste Discharge Baseline General Permit for Stormwater Discharges Associated with Industrial Activities (herein referred to as the Industrial Stormwater General Permit, ISGP) permit number for the Kent Space Center is WAR-000481, effective January 1, 2020.

The ISGP requires that each permitted site prepares and implements a Stormwater Pollution Prevention Plan (SWPPP). This plan must include an assessment of current site activities that may impact stormwater and the specifications Best Management Practices (BMPs) for the prevention or treatment of stormwater pollution. The SWPPP shall contain a site map, a detailed assessment of the facility, a detailed description of the BMPs, Spill Prevention and emergency Cleanup Plan (SPECP), and a sampling plan. A summary of ISGP required reports and submittals, on-site documentation and activities can be found in the Appendices.

TABLE OF CONTENTS

REFERENCES

1) Hazardous Materials and Hazardous Waste Management, PRO-2610
2) Stormwater Management Manual for Western Washington, July 2019
3) WAC 173-303, WAC 173-304
4) WDOE Publication #15-03-044 “Stormwater Sampling Manual: A guide for the Industrial Stormwater General Permit”, December 2015
5) 40 CFR 122

DEFINITIONS

Best Management Practices: Schedule of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control facility site run-off, spills or leaks, sludge or waste disposal, or drainage from raw material storage.

The Industrial Stormwater General Permit: NPDES and State Waste Discharge Baseline General Permit for Stormwater Discharges Associated with Industrial Activities. The permit number for the Boeing Space Center facility is WAR-000481.

Roll off Containers: Include containers for accumulating cardboard, wood, concrete debris, and asphalt.

Significant Amounts: Amounts of pollutants that are amenable to treatment or prevention or that have the potential to cause or contribute to a violation of surface or ground water quality or sediment management standards.

Site: Land or water area where any "facility or activity" is physically located or conducted.

Solid Waste Containers: Include the solid waste dumpsters. They also include roll-off containers for accumulating soil, construction debris; data destroy paper, and water jet slurry.

Stormwater: Stormwater run-off, snowmelt run-off, and surface run-off and drainage.

Stormwater Drainage System: Constructed and natural features which function together as a system to collect, convey, channel, hold, inhibit, retain, detain, infiltrate, or divert stormwater.

ACRONYMS and ABBREVIATIONS

ARI	Analytical Resources, Inc.
AST	Aboveground Storage Tank
BDS	Boeing Defense, Space & Security
BMP	Best Management Practice
CAA	Clean Air Act
CB	Catch Basin
CERCLA	Comprehensive Environmental Response Compensation & Liability Act
CFR	Code of Federal Regulations
CMA	Calcium magnesium acetate
CMP	Corrugated Metal Pipe
CWA	Clean Water Act
DMR	Discharge Monitoring Report
EA	Environmental Affairs
EHS	Environment, Health & Safety
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
IRS	Incident Reporting System
ISGP	Industrial Stormwater General Permit
LAT	Latitude
LON	Longitude
NPDES	National Pollutant Discharge Elimination System
OWS	Oil Water Separator
PMI	Planned Maintenance Inspection
PSCAA	Puget Sound Clean Air Agency
POTW	Publicly Owned Treatment Works
SARA	Superfund Amendment and Reauthorization Act
SWPPP	Stormwater Pollution Prevention Plan
SWPPT	Stormwater Pollution Prevention Team
TSS	Total Suspended Solids
UST	Underground Storage Tank
WDOE	Washington Department of Ecology

1.0 CONTROL AND DISTRIBUTION

The Industrial Stormwater General Permit (ISGP) requires that the SWPPP be retained on-site and be made available to a representative of the WDOE upon request. A copy of this plan will be maintained at the contiguous Boeing site:

Environment, Health & Safety
9-51 Building
9725 East Marginal Way South
Tukwila, WA 98108

All reports, certifications, or information required by the ISGP (specifically permit number WAR-000481 issued to the Kent facility) will be signed by an authorized representative, as specified in the ISGP.

1.1 Revisions

Revisions will be performed as required by the current ISGP. A summary of the revisions is provided in the Appendices.

1.1.1 Plan Review and Updates

The SWPPP will be modified in accordance with guidelines outlined in the Industrial Stormwater General Permit. Revisions will be monitored at the individual sites and will be incorporated, as required (if significant changes have occurred at the site), into a revised plan on an annual basis. These revisions will be the responsibility of the site environmental engineer and will be maintained by the environmental engineer.

SWPPP Update:

Per ISGP criteria, the site engineer will review the SWPPP and, as required, produce a new revision and file it. The SWPPP shall be revised more frequently if there are significant changes to site operations or structures

Non-Routine Updates:

Modifications to the SWPPP will be made under the following conditions:

- Upon notification by WDOE, or an authorized representative, that the SWPPP does not meet permit requirements (such as the release of new permit requirements).
- Whenever there is a change in design, construction, operation or maintenance of any BMP which cause(s) the SWPPP to be less effective in controlling the pollutants.
- Site Inspection indicates that pollutant source descriptions or the BMPs identified in the SWPPP are inadequate, due to the actual or potential discharge of a significant pollutant.
- Ecology requires additional BMPs when the permitee exceeds benchmark values for required sampling.

1.2 Roles and Responsibilities

The SWPPP is maintained and revised by Central Puget Sound Environmental Engineering. Stormwater monitoring inspections, corrective actions, non-routine updates, and implementation of best management practices are the responsibility of Central Puget Sound Environmental Engineering.

2.0 FACILITY LOCATION AND GENERAL DESCRIPTION

The Boeing Space Center is located in Kent Washington. The site address is:

20403 68th Avenue South
Kent, Washington 98032

The site is within the City of Kent, Washington and consists of 69 acres owned by the Boeing Company. There are a total of thirteen buildings on the site. The primary aerospace related operations are microelectronic component fabrication, aircraft engine buildup, various laboratories, and engineering (office) support. The facility's primary North American Industry Classification System (NAICS) code is 336411 (Aircraft Manufacturing). The majority of the buildings on-site provide office support for engineering, finance, IT, and management organizations. Buildings with unique functions are summarized below.

18-26 – Office
18-41 – Laboratories, Shipping-receiving and Office Space
18-54 – Boilers and Chillers
18-55 – Primary Electrical Switchyard
18-61 – Laboratories/Office Space/ Spares Storage (1st floor)
18-62 – Aircraft engine buildup

The site discharges to two waterbodies, one of which is Mill creek, a tributary of Spring Brook Creek and the Duwamish River, which flows along 68th street and is discharged to by three Boeing outfalls. The remaining Boeing outfall discharges to a municipal pond which then drains to the City of Kent stormwater drainage ditch (also occasionally referred to as Boeing Ditch). The stormwater drainage ditch flows along south of the pond area (at South 212th St.) then north at 68th Ave S, discharging into Mill Creek. Site maps contained in this plan illustrate the storm drain system, drainage basins, and risk areas for the potential of stormwater pollution. The Boeing Space Center is bounded on the west by Boeing Realty Pacific Gateway property, on the east and north by the Pacific Gateway at West Valley property, and on the South by South 208th Street.

2.1 Stormwater Discharges

Stormwater from the entire site is collected by a conventional storm sewer system with catch basins. This system is composed of, an OWS, associated piping, and two detention ponds. A stormwater treatment system is under construction in the northeast area of the site.

2.1.1 Storm Drain System

Stormwater run-off from the site drains directly into Mill Creek and a municipal pond which flows into an unnamed receiving water body bordering the southeast corner of the West Campus. The receiving water ("Drainage Ditch", "Boeing Ditch". City of Kent Pond) flows from the City of Kent Green River Natural Resources area to Mill Creek. The Green River Natural Resources area is a combined stormwater detention and wetland habitat facility. There are several rock check dams that provide detention and slow the flow rates within the drainage ditch. An adult fish screen was installed in the drainage ditch in 1996. The drainage ditch is located just south of the main West Valley Highway entrance to the West Campus. Its purpose is to block adult fish migration into the sewer lagoons via the ditch. Overall, the waterway is heavily vegetated with grass along its course. To ensure flow rates are maximized it is routinely inspected and maintained by King County Drainage District #1.

In February 2013, a 65 acre parcel on the west and south portions of the site was sold. The site's storm system was modified for the sale. A major storm line storm (30 in diameter, 1700 ft. long) was installed west of the 18-25 building. The new storm system was designed to ensure no stormwater from the sold parcel does not commingle with the Boeing storm system. The site's North Detention Pond was modified. The pond's surface area was reduced to approximately ½ acre; however, its depth was increased to provide additional stormwater treatment. The pond is designed to overflow into two existing 54 inch diameter pipes. These two pipes continue for 2,000ft before discharging into Mill Creek.

The buildings situated on the sold parcel include, the 18-01, 18-03, 18-05, 18-06 and 18-20 buildings. These buildings are located in drainage area named outfalls 24, 25, 25A, 26, 27 and 28. These outfalls discharge into the drainage ditch along South 212th Street which is no longer located on Boeing property. These outfalls will be maintained by the new property owner of the sold parcel.

A stormwater treatment/detention facility was built in November 1993 southeast of the 18-63 Building. This facility consists of a combination detention/wet pond (south detention pond) with a biofiltration swale. The facility treats the runoff from several locations that include the area of the former 18-63 building, the parking lots west and south of the area and the open fields located to the south. Outflow from the detention pond passes through a biofiltration swale which discharges to the drainage ditch and then to Mill Creek. The facility was sized to handle additional development in the southeast portion of the west campus.

In 2019, a 54 acre parcel on the north and east portions of the site was sold. Buildings on the sold parcel (18-43, 18-42, and 18-50) were demolished as part of the sale. The 18-28, 18-15, and 18-59 buildings were also demolished but the property remains a part of the Boeing site. The site's storm system is currently being modified during a course of several building demolitions and utility severance phases throughout 2020/2021. Modifications still in work to the storm system include isolating Boeing drainage areas from the sold property, installation of bioswales, and a sand filtration stormwater treatment system. The future storm system will continue to drain to both Mill Creek and the drainage ditch via an isolated piping system/easement through the Pacific Gateway at West Valley property. During the period of time in 2020/2021 in which the storm system severance project is in work, there will be some comingling of stormwater between the Boeing property and the Pacific Gateway at West Valley property. Boeing and the property owners have implemented an interim stormwater plan which mostly eliminates comingling of stormwater.

The 18-61, 18-62 building and the paved area east of these buildings drain to a water quality pond installed in 2020, which discharges to a municipal pond and then the drainage ditch. The east end of the 18-61 Building has a covered area with a containment trench for all loading and unloading operations. The trench is equipped with a shut-off valve. In the event of a spill, the valve may be closed to prevent spills from entering the storm system.

The 18-41, building and the parking lot east of it drain directly into Mill Creek. The stormwater runoff from the fueling area pad is treated by an OWS and discharged to the sanitary sewer. A stormwater vault with downturned pipe elbow and oil absorption pads treats the un-infiltrated stormwater received from the area around the 1,000,000 gallon water tank adjacent to the 18-51 Building before being discharged to the north 54" storm line.

In addition to storm drain covers (see Section 3.2.4), there are storm drain shut-off valves employed at a few key locations as well as catch basin filter inserts. In the corridor between the 18-61 and 18-62 buildings, in the main transportation lane, there is a shut-off valve a trench that discharges to storm. On the east side of the 18-61 Building, in the secondary containment trench at the loading dock, there is another shut-off valve. The valve is normally closed and is opened only to drain accumulations of precipitation that may blow underneath the covered loading dock. There is a shut-off valve for the on-site decant station that drains to sanitary sewer.

Catch basin filters are installed on a temporary basis. The filters are typically in areas where there is short term construction activity in process. Filters are not used on a permanent basis.

2.1.2 Surface Water Drainage

Surface stormwater from the site drains into Mill Creek. Mill Creek drains into Spring Brook Creek. Spring Brook Creek is pumped through the Black River pump station into the Green River. The Green River flows to the west of the site on the west side of Russell Road.

Runoff from the southern portion of the campus is collected in a water quality pond which discharges to a municipal pond, which flows to Boeing ditch and then Mill Creek.

The central and northern portion of the campus drainage flows into the north detention pond and through two 54 inch corrugated metal culverts into Mill Creek at South 204th Street.

The Green River passes to the west of the site and is separated from the site by Russell Road and a levied riverbank. The site no longer borders the river due to sales of various parcels of the site. There is no direct discharge of stormwater to the river.

2.1.2 Off-Site Drainage

The drainage from the North Detention Pond flows through the two 54 inch culverts to Mill Creek. The culverts do not have back flow preventers. Mill Creek backs up the 54 inch pipes during periods of heavy rains and high river levels. Due to the diminishing size of the facility and fewer sources of rain water into the detention pond there is very little runoff that discharges into the 2 54-inch pipes. During periods where Mill creek swells due to high rains (or other reasons) the creek does back up into the 2 54-inch pipes. This causes situations where there is no flow out of the pipes, even during heavy rain events.

3.0 POTENTIAL POLLUTANT SOURCE INVENTORY

The inventory of potential pollutants includes a narrative of those materials that may impact stormwater and a site map that identifies structures, materials and potential pollutant source locations.

3.1 Site Map

Detailed site information, including drainage areas and potential pollutant information, is depicted on the site map included in the Appendices. This exhibit will be updated whenever alterations that may impact stormwater are implemented.

3.1.1 Map Components

The site map is to scale and includes the following:

- Location of major structures, buildings, and paved areas
- The size of the property in acres
- Direction of stormwater flow (using arrows)
- Stormwater drainage, conveyance, and discharge structures, including MS4s where stormwater discharges to them

- Outline of stormwater drainage areas for each stormwater discharge point off site (including discharges to groundwater)
- Locations of all stormwater monitoring points
- Locations of stormwater inlets and outfalls with a unique identification number for each sampling point and discharge point, indicating any that are identified as substantially identical, and identification by name of any other party that owns any stormwater drainage or discharge structures.
- Locations of all receiving water in the immediate vicinity of the facility
- Conditionally approved non-stormwater discharges
- Location of areas of potential and actual pollutant contact
- Areas of existing and potential soil erosion that could result in a significant amount of turbidity, sediment, or other pollutants
- Adjacent (off-site) areas of potential impact
- Storage tanks
- Waste management areas
- Areas of industrial activity with potential for stormwater pollution
- Locations of fueling and vehicle maintenance areas

Information used to prepare the site map includes site assessments by Environmental Engineering personnel, existing drawings, and SWPPT input.

3.2 Industrial Pollutant Sources

3.2.1 Roof Contaminants

Dry filter paint booths, laboratory fume hoods, laboratory equipment, dust collectors, boilers, cooling towers, air handling units, and ventilation equipment are located at this site and typically exhaust to the building roofs. Other equipment located on most of the building roofs are used in conjunction with heating, cooling, and ventilation. Air emission sources are normally inspected under the PM system or other maintenance checklist system, with inspection intervals varying between daily to 1 year. An inventory of air emission sources is provided in the Appendices.

There are three stacks for the 18-54 Building boilers. There was no evidence of contamination from these stacks. There are nine cooling towers located at ground level east of the 18-54 Building, in a landscaped area. These cooling towers drain to the sanitary sewer. There is another cooling tower located just northwest of the 18-54 Building in a landscaped area. This cooling tower was deactivated. There are no immediate plans to reactivate it.

The 18-42, 18-61and 18-62 buildings have galvanized roofs. They are coated with a factory-baked finish. The roofs of the other site building are constructed from fiberglass-impregnated asphalt. A project to coat galvanized equipment and material on the 18-61, 18-62 and18-41 rooftops is underway, and expected to be complete in mid-September of 2020.

Contaminants from roof construction materials are considered to be a moderate risk.

3.2.2 Solid Waste Management

Solid waste is handled by Boeing Facilities & Asset Management Group and Boeing Licensed Transportation. Solid waste (non-hazardous trash generated on a routine basis) is managed in leak-free dumpsters with lids. These are typically located outdoors in uncovered areas. The dumpsters are transported by forklift to the 18-62

Building recycling area. They are emptied into solid waste huge-haul containers which rest on a concrete pad that drains to the sanitary sewer via an oil water separator.

The sanitary sewer OWS near the 18-61 Building is also occasionally utilized for as needed disposal of street sweeper waste. Street sweeper wastes are dumped into a drainable container which is located on a concrete pad. Liquids from the street sweeper solids drain from the specially designed container to a baffled OWS tank and then drain to the sanitary sewer. This process eliminates any potential pollution from disposing of street sweeper waste in huge hauls. Typically, street sweeping and disposal of street sweeps waste are managed by an independent contractor. Street sweep wastes are shipped off-site.

3.2.3 Material and Equipment Storage

The vast majority of material and equipment used on the site is stored and used occasionally. Sometimes there is a need to store equipment and industrial materials in uncovered containers. Stored materials include tubskids, bare metal stock, pallets, SA dollies, crates, metal racks and trailer vans.

Construction equipment such as backhoes or cranes are sometimes used on the site and are parked outdoors. This equipment can leak lubricants and coolants. Also, equipment such as portable generators and compressors are used throughout the site. These are typically gasoline or diesel powered and are fueled in doors from small containers.

The 18-62 Building South Yard has a storage area for facility equipment, raw metal stock, and periodic construction project support equipment. Manual material handling equipment such as tubskids, SA dollies, wood pallets, and surplus equipment is also stored in this area. The 18-62 East Yard has manufactured aircraft parts staged in wooden containers, awaiting use inside the building.

Load test weights are staged south of the 18-62 Building. Weights may be steel encased lead weights, painted steel or painted Kirksite weights. Unpainted lead weights are not used at the site.

Forklifts are stored South of the 18-61 building. Forklifts are maintained regularly and inspected for leaks by the Facilities & Asset Management group.

Site Environmental personnel perform periodic inspections of the site, including critical storage areas. If inappropriately staged material, waste, or equipment is discovered, appropriate measures are enacted to cover or remove the items as required.

3.2.4 Tanks and Drums

Industrial materials and byproducts, chemicals for use in industrial processes and hazardous materials and wastes may be stored in tanks or drums. See the Appendices for a complete tank inventory.

3.2.4.1 Portable Tanks

There are no portable tanks utilized on this site.

3.2.4.2 Oil and Gas Tanks

There are nine aboveground diesel tanks, three underground diesel tanks, and one underground gasoline tank at the site. There is a complete list of tanks, both above and below ground, referenced in the Appendices.

Each of the outdoor fuel tanks has secondary containment that was designed to hold 110% of the volume of the tank. Fuel tanks are inspected monthly for leaks, cracks, loss of fuel, and containment integrity. Most are used as storage tanks supporting emergency generators. The underground tanks support vehicle fueling and alternative boiler operations. As such, most of the tanks are seldom used except to assure that they are in good working order. They are filled using a tanker truck equipped with a nozzle (with automatic shut-off) which minimizes the risk of a spill.

The majority of the tanks have a containment area (concrete berm) surrounding a double-walled tank. This containment area can be closed off during filling operations thereby further reducing the risk of a spill.

Oil and gas tanks are considered to be moderate stormwater risks at this site.

3.2.4.3 Hazardous Waste Tanks and Drums

Solid and liquid hazardous wastes are accumulated at collection stations inside buildings where the wastes are generated. Liquid wastes are held in areas with secondary containment. At this site, most waste is generated in the 18-61 Building. All containerized hazardous wastes are centrally accumulated and managed by Environmental Services personnel at the 18-62 Building. Hazardous waste is removed from the shops and brought to the building by covered vehicle or by cart in most cases. At times, banded and palletized loads of drums will be moved by forklift.

The accumulation and storage of hazardous wastes at this site are considered to be minor stormwater pollution risks.

3.2.4.4 Hazardous Materials Tanks and Drums

Hazardous materials, both liquid and solid, are centrally stored and managed by Environmental Services personnel at the 18-62 Chemical Management Facilities. The largest material containers normally handled are 1.5 cubic yard shams and 55-gallon drums. Chemicals, in small user-sized containers are delivered from these chemical management facilities to shops in covered vehicles or push carts where they are placed in Fire Department approved flammable storage cabinets. At times, banded and palletized drums are moved by forklift. Shop inventories are strictly controlled and managed by Environmental Services.

Tanks and drums are considered a minor stormwater pollution risk.

3.2.5 Chemical Materials and Products

The 18-62 Chemical Management facility receives chemicals, stores materials, and delivers to labs and shops as needed. The chemicals dispensed from this area are small quantity/packaged products that are transported by truck from the 18-62, to the shops by Environmental Services personnel. Larger quantities are dispensed less frequently from this area as most materials are “kitted” down into smaller packages for use that produces less waste.

3.2.6 Fueling Stations

The site has a fueling station used for the transfer of gasoline and diesel fuels to mobile vehicles and equipment. It includes two underground fuel storage tanks and a 200 square foot pad of Portland cement. An OWS that discharges to the sanitary sewer system serves as a treatment BMP for this location and is equipped with an emergency shutoff valve. The fueling station is maintained in accordance with all applicable regulations.

3.2.7 Material Handling

The site stores solid materials such as gravel, sand, soil, concrete, building supplies and metal products outside. Berms, dikes, catch basin inserts, filter fabric or covers are used to prevent run-off and discharge of pollutants. For large items which do not have leachable coatings, temporary outdoor uncovered storage is acceptable. Small construction projects which generate temporary uncontaminated soil piles, the soil can be stored on pervious surface to prevent runoff.

3.2.8 Hazardous Waste Handling

Hazardous wastes are accumulated at waste stations inside of buildings and managed per the site's hazardous waste policies. Specially trained Environmental Services personnel handle all hazardous waste.

This building has secondary containment for the storage area, but most of the loading/unloading activity occurs outside where there is no secondary containment. Drums of liquid and solid hazardous wastes are consolidated and staged in the building in preparation for off-site disposal by a licensed transporter to a permitted TSD facility. Storm drain covers or stormwater system shut off valves are located in the immediate vicinity to mitigate the risk to stormwater.

3.2.9 Transportation

Raw and hazardous materials are transported on-site to and from each building by Boeing licensed vehicles. They are unloaded with forklifts by forklift drivers and associated personnel. The decrease of industrial activity has lessened the amount of transportation needed for this site.

Transportation of material and wastes on the site is considered to be a moderate stormwater pollution risk.

3.2.10 Vehicle Maintenance and Cleaning

Vehicle washing and maintenance is not conducted on-site. Infrequent repair and maintenance can occur outdoors when equipment fails.

3.2.11 Dust and Particulate Generators

There are no specific outdoor operations that generate dust or particulate. Puget Sound Clean Air Agency (PSCAA) regulations require that air pollution devices be properly sealed to prevent the release of any particulate matter. An inventory of air emission sources at the site can be found in the Appendices.

18-41 Building
There are two dust collectors inside door E-1 that collect dust and assorted debris from a manufacturing area. There is no evidence of any particulate on the ground from these units.

On the north side of the building there is a collector for a paper shredding operation. The paper shreds are recycled. The operation has been significantly reduced from previous years. The collector blows dust into a specially designed container and 55-gallon drum. Both containers are located within an enclosed structure and are not exposed to stormwater. PM inspections are performed to ensure that the paper shredder is operating correctly and to perform regular housekeeping. There is, however, the potential for dust particles to escape outside the structure.

18-61 Building
The vacuum dust collector system located on the south side of the 18-61 Building consists of a dust collector unit and approximately 20 vacuum cleaning-system hose drops. Some assembly functions within the building require drilling holes in aluminum, steel or titanium and occasional cutting of parts. These processes generate small chips and shavings of metal, which are vacuumed up along with any dirt and dust particles. Bits of wire, plastic wire insulation and assorted small pieces of debris may also be vacuumed up. The vacuum system is also connected to approximately two shoe cleaning devices that scrub shoes to prevent dirt and dust from being tracked into clean rooms.

There are two Torit dust collectors located on the south side of the building. They are connected to a small machine shop that fabricates small packaging parts. The dust collectors are connected to band saws, sanders, and grinders. They collect aluminum and other metal particulates.

18-62 Building
There is one inactive Rotoclone dust collector located on the north side of the 18-62 Building. It has been disconnected from electrical power.

3.2.12 Non- Stormwater Discharges and Pollutants

Fire Systems
Discharges to the storm drain system from emergency firefighting activities and from fire suppression system testing (e.g., potable water and fire extinguishing chemicals) are conditionally authorized, as listed in Section S5.D.2 of the ISGP. When an incident is determined to be under control or otherwise extinguished the site will access any impact to the stormwater system. A determination will be made if any remedial clean-up efforts are warranted and reasonable to implement.

Fire system test water is an existing non-stormwater discharge source at the facility. Potable water is utilized in all fire sprinkler systems. Fire systems include sprinklers, emergency showers, and eye wash sinks. The test water flows to nearby non-paved areas, landscaped areas or to the storm drains system. Water infiltrates into the ground at the non-paved areas and landscaped areas. Water that drains on paved surfaces is aerated naturally prior to reaching the stormwater system catch basins. Boeing personnel add no chemicals to the fire system.

Boeing Fire Department conducts certain tests annually and semi-annually. There are several points of discharge located at around the site. Approximately half of the site’s fire system maintenance discharges are discharged to landscaped areas. There is seldom any discoloration or sediment in the discharge. There is no need to filter or otherwise treat the discharge. Discharges that reach the stormwater system are typically non-chlorinated by flowing along the pavement prior to entering the system. Only potable city water is used in the fire prevention system. No additives or chemicals are added to the system.

Irrigation
The site contains several landscaped areas. These areas are maintained with automated sprinkler systems. The systems are designed to water the grounds per seasonal requirements. Best efforts are made to ensure the

sprinkler spray is directed toward landscaped areas and not the surrounding pavement. Site plumbers monitor the sprinklers for direction of spray, broken or faulty valves and other system maintenance needs.

3.2.13 Deicing and Anti-Icing Operations

Deicing and/or anti-ice compounds are used on the site's main transportation corridors, sidewalks and building entrances to control ice and snow. Common deicers used on highways and streets include calcium magnesium acetate (CMA), calcium chloride, magnesium chloride, sodium chloride, urea, and potassium acetate. The deicing and anti-ice compounds become pollutants when they are conveyed to storm drains or to surface water after application. Improper application practices increase the potential for pollution. Leaks and spills of these chemicals can also occur during their handling and storage.

3.2.14 Construction

Construction stormwater pollution risks, such as erosion and run-off, are managed in accordance with appropriate construction BMPs. Slurry-water from concrete cutting is settled and decanted to sanitary sewer or shipped with cutting solids to be recycled off-site. There is infrequent outdoor construction at this site. When the site has construction activities the stormwater pollution risk will depend on the size, location and type of activity. For any construction project that will disturb one acre of more of ground surface, a Construction Stormwater General Permit may be required.

3.2.15 Other Outdoor Industrial Activity

There are no outdoor activities at the site that are considered to be industrial activities.

3.2.16 Past Spills and Leaks

Potential for pollutants to be present in stormwater is lessened by use of the Spill Prevention and Control Countermeasures (SPCC) Plan (see reference section). For those incidents that do involve spills of hazardous materials, 40 CFR 110, 40 CFR 117, 40 CFR 302, and WAC 173-303 provide reporting requirements of spills. A three year summary of spills is included in the Appendices.

3.3 Summary

Stormwater pollution risk at the site as a whole is generally minor. Specific significant to moderate stormwater pollution risks are: solid waste management in huge-hauls, tub skids, and dumpsters; on-site transportation of hazardous material and waste; and oil and gasoline tanks.

Additional Concerns: Vehicular traffic, including private and company vehicles, pose the risk of leaks of fluids such as fuels, lubricants, and coolants. Forklifts can be a source of hydraulic leaks that can commonly occur around heavy lift equipment.

4.0 BEST MANAGEMENT PRACTICES (BMPs)

BMPs are schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce pollution to waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs are further categorized as operational, source control, erosion and sediment control, and treatment. The Stormwater Management Manual (SWMM) is the primary source of information for developing site BMPs for compliance with the Ecology Industrial Stormwater General Permit.

4.1 Operational BMPs

4.1.1 Stormwater Pollution Prevention Teams

The SWPPT consists of personnel from Environmental Engineering, and other groups as listed below, that focus on water quality issues. The primary purpose of this team is to gather the information needed to develop, write and maintain the SWPPP, implement the goals stated in the plan and modify the plan as needed. The team will identify pollutant sources and develop BMPs to address these concerns. Once BMPs are identified, team members will aid in implementation, on-going compliance, and site inspections. One or more of the team members will complete quarterly stormwater sampling-and monthly site inspections at their assigned sites. Groups that may be impacted or involved in BMP implementation, such as Facilties & Asset Management Engineering, Maintenance, and Material Handling organizations are consulted as needed.

Title	Organization	SWPPP Processes Responsibilities
Environmental Engineering stormwater focal(s)	EHS	Development, implementation, maintenance, modifications
Environmental Engineering staff	EHS	Support/ back up for stormwater focal
Environmental Management	EHS	Support and approval for site stormwater program and SWPPP processes
Facilities & Asset Leadership	F&AM	Support and approval for F&AM staff stormwater roles and responsibilities,
Facilities & Asset Management Engineering	F&AM	SWPPP implementation, maintenance, and modification Support to Environmental Engineering
Facilities & Asset Management Crafts	F&AM	Implementation support

Specific responsibilities include the following:

Environmental Engineering

- Overall administrative responsibilities for permit compliance
- SWPPP development, implementation, maintenance
- Determination of appropriate BMPs
- Reporting and agency relations
- Conducting required SWPPP inspections
- Oversee and/or perform stormwater monitoring activities, inspections, sample collection
- DMR and other document submittal requirements to Ecology
- Availability for emergency situations (24 hours) for spill reporting and notification

Facilties & Asset Management Engineering

  - Provides technical support regarding site infrastructure, primarily stormwater system, utility design, building materials, capital improvement initiatives, and other requirements to support implementation of the site stormwater permit.

4.1.2 Good Housekeeping

The following good housekeeping BMPs are considered applicable in the SWMM and adhered to at the Facility, unless noted otherwise.

- Promptly contain and clean up solid and liquid pollutant leaks and spills including oils, solvents, fuels, and dust from manufacturing operations on an exposed soil, vegetation, or paved area.
- Do not hose down pollutants from any area to the ground, storm drain, conveyance ditches, or receiving water. Convey pollutants before discharge to a treatment system approved by the local jurisdiction. However, spraying for dust control is not a typical occurrence at the site.
- Sweep all appropriate surfaces with vacuum sweepers quarterly, or more frequently as needed, for the collection and disposal of dust and debris that could contaminate stormwater. Use mechanical sweepers, and manual sweeping as necessary to access areas that a vacuum sweeper can’t reach to ensure that all surface contaminants are routinely removed.
- Clean oils, debris, sludge, etc. from all stormwater facilities regularly, including catch basins, settling/detention basins, OWS, boomed areas, and conveyance systems to prevent the contamination of stormwater. The frequency of maintenance is determined by the particular BMP and the site’s historical experience in maintaining the BMP. Site Environmental Engineering is responsible for determining if any materials or waste are hazardous per state and federal regulations. Refer to “Ecology Requirements for Generators of Dangerous Wastes” in Volume I, Chapter 2 of the SWMM for references to assist in handling potentially dangerous waste.
- Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas, subjected to pollutant material leaks or spills. Promptly repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater.
- Do not connect floor drains in potential pollutant source areas to storm drains, surface water, or to the ground.

In addition to these BMPs from the SWMM, the Permit also specifically requires the following good housekeeping BMPs:

- Identify and control all on-site sources of dust to minimize stormwater contamination from the deposition of dust on areas exposed to precipitation.
- Inspect and maintain bag houses monthly to prevent the escape of dust from the system. Immediately remove any accumulated dust at the base of exterior bag houses.
- Keep all dumpsters under cover or fit with a storm resistant lid that must remain closed when not in use. (Tarps are not considered storm resistant.)

The following recommended additional good housekeeping BMPs are implemented as applicable/required in the course of the site’s routine daily activities.

4.1.2.1 Street Sweeping

Street sweeping refers to the removal of accumulated dust, dirt, and debris from impervious surfaces (i.e. transportation corridors, parking areas, storage areas, etc.) with the use of mechanical equipment. The site stormwater engineer periodically evaluates current sweeping practices and modifies site practices as required/ recommended modifications. The following activities are evaluated:

- Increase the frequency of sweeping operations in high pollutant loading areas.
- Where possible, increase the number of monthly passes.
- Where possible, increase the number of annual passes to clean out hard to reach areas.

Per the 2020 permit, street sweeping of the site is mandatory once per quarter. The site's standard practice is to sweep the site at least 3 times per month. A vendor is contracted to perform site street sweeping. The vendor is required to use a regenerative air street sweeper. Street sweeping is performed through the PM system. Areas to be swept routinely are indicated in a site map which is provided to the vendor. These areas are primarily the site's main transportation roads, loading and unloading areas, and staging areas. Additional sweeping may occur if site conditions require. Manual sweeping of specific areas may be performed where the street sweeper is not accessible. In addition to bi-monthly street sweeping and manual sweeping, litter/debris removal is conducted once per week through a separate PM.

4.1.2.2 Solid Waste Management

The following sections describe the practices implemented to minimize contamination of stormwater from solid waste management practices.

The following BMPs should be considered:

- Every effort will be made to store or accumulate solid waste according to company requirements, regional regulations/requirements, and applicable building and safety codes.
- Solid waste containers shall be in good condition without corrosion or leaking seams.
- Solid waste containers shall be replaced if they are leaking. If replacement is impossible or may be delayed they should be kept under cover, or lined and covered with plastic to prevent contaminants from entering the stormwater system.

Compactors or 40 yard roll-offs are typically used to collect nonhazardous solid waste (trash) at the site central accumulation area. These roll-offs are staged on a pad which drains to a sanitary sewer OWS. These roll offs are not covered until they are being prepared for transportation offsite.

Dumpsters are managed as follows:

- All dumpsters are sealed so that liquids will not leak. Dumpsters have waterproof and storm resistant covers to prevent accumulation of precipitation. Covers are in place when loading or unloading is not occurring.
- The routine practice is to use dedicated blue dumpsters with attached lids. These dumpsters are typically emptied daily. They are repaired or replaced if they are leaking. Lids are also repaired if needed.
- If needed tub-skids or 5x5's may be used temporarily to collect trash, provided they are not leaking and are covered. If used, these units are emptied to the central accumulations roll-off as soon as possible
- Dumpster loading and unloading practices are conducted such that spillage does not occur.
- As part of routine site operations, a few dumpsters will be inspected at random to ensure that proper operational practices are being followed.
- Site fork lift operators are instructed to remove broken dumpsters from use when repairs are required. Leaking, damaged or non-operational dumpsters will be repaired or phased out.

4.1.3 Preventative Maintenance

The site uses a program called Planned/Preventative Maintenance (PM) to implement a series of regularly scheduled inspections and routine service. The program includes periodic inspections, minor repairs, overhauls of industrial equipment, and other activities performed on a periodic basis. Job orders are submitted to a Coordinator who then adds them to the PMI database system. During the appropriate week, scheduled job orders are distributed to the personnel responsible for completing the tasks. Completed jobs are returned to the Supervisor with comments. The supervisor signs and submits them to the Coordinator for historical recordkeeping. The PMI Program is used to meet the requirements set forth in this plan.

The following preventative maintenance BMPs are considered applicable in the SWMM and are adhered to at the Facility, unless noted otherwise.

- Prevent the discharge of unpermitted liquid or solid wastes, process wastewater, and sewage to ground or surface water, or to storm drains that discharge to surface water, or to the ground. Conduct all oily parts cleaning, steam cleaning, or pressure washing of equipment or containers inside a building, or on an impervious contained area, such as a concrete pad. Direct contaminated stormwater from such an area to a sanitary sewer where allowed by the local sewer authority, or to other approved treatment.
- If a contaminated surface must be pressure washed, collect the resulting washwater for proper disposal (usually involves plugging storm drains, or otherwise preventing discharge and pumping or vactoring up washwater, for discharge to sanitary sewer or for vactor truck transport to a waste water treatment plant for disposal).
- Do not pave over contaminated soil unless it has been determined that ground water has not been and will not be contaminated by the soil. Call Ecology for assistance.
    - Any areas of suspected or known soil contamination are managed according to federal and state requirements. Boeing Remediation organizations implement and monitor all required protocols groundwater contamination before any paving or area development is implemented.
- Construct impervious areas that are compatible with the materials handled. Portland cement concrete, asphalt, or equivalent material may be used.
- Use drip pans to collect leaks and spills from industrial/commercial equipment such as cranes at ship/boat building and repair facilities, log stackers, industrial parts, trucks and other vehicles stored outside.
    - Any heavy equipment staged at the site is maintained to prevent spill or drips from old or warn parts. Drip pans are not typically required under normal circumstance. In the event a drip is discovered from a piece of equipment, service is performed on the equipment to repair as required.
    - On-site portable generators that are in use and running for up to a 2-week period are required to have a daily shift inspection (3x per day) conducted to ensure proper functionality, proper use of the equipment and the absence of leaks and spills. If a portable generator is in use for 2 or more weeks at a time they will be covered and fitted with secondary containment to ensure the risk of a spill or failure is mitigated.
- At industrial and commercial facilities, drain oil and fuel filters before disposal. Discard empty oil and fuel filters, oily rags and other oily solid waste into appropriately closed and properly labeled containers, and in compliance with the Uniform Fire Code or International Building Code.
- For the storage of liquids use containers, such as steel and plastic drums, that are rigid and durable, corrosion resistant to the weather and fluid content, non-absorbent, water tight, rodent-proof, and equipped with a close fitting cover.

- For the temporary storage of solid wastes contaminated with liquids or other potential polluted materials use dumpsters, garbage cans, drums and comparable containers, which are durable, corrosion resistant, non-absorbent, non-leaking, and equipped with either a solid cover or screen cover to prevent littering. If covered with a screen, the container must be stored under a roof or other form of adequate cover.
    - Some materials that do not contain potential pollutants are not always stored in covered containers. These containers may or may not be leak-proof. These materials include scrap metal (with no dirt or oily residue), scrap electrical wire, racks, or other scrap building materials (with no liquid or other contaminants), scrap cardboard (with no food contamination), scrap wood (with no peeling paint, sawdust), soda pop cans (enclosed in plastic bags).
- Where exposed to stormwater, use containers, piping, tubing, pumps, fittings, and valves that are appropriate for their intended use and for the contained liquid.

In addition to these BMPs from the SWMM, the Permit also specifically requires the following preventative maintenance BMPs.

- Clean catch basins when the depth of debris reaches 60% of the sump depth. In addition, the Permittee must keep the debris surface at least 6 inches below the outlet pipe.
- Maintain ponds, tanks/vaults, catch basins, swales, filters, oil/water separators, drains, and other stormwater drainage/treatment facilities in accordance with the maintenance standards set forth in the SWMM, other guidance documents or manuals approved in accordance with S3.A.3.c, demonstrably equivalent BMPs per S3.A.3.d, or an O&M Manual submitted to Ecology in accordance with S8.D.
- Inspect all equipment and vehicles during monthly site inspections for leaking fluids such as oil, antifreeze, etc. Take leaking equipment and vehicles out of service or prevent leaks from spilling on the ground until repaired.
- Clean up spills and leaks immediately (e.g., using absorbents, vacuuming, etc.) to prevent the discharge of pollutants.

4.1.4 Spill Prevention and Emergency Cleanup Plan (SPECP):

Many of the Structural Source Control BMPs noted in this SWPPP satisfy the requirements of the SPECP. Specific BMPs that have common requirements of the SPECP are Fueling at Dedicated Stations; Spills of Oil and Hazardous Waste; and Storage of Liquid, Food Waste, or Dangerous Waste. In addition to the requirements of these BMPs, the site implements other operational BMPs to satisfy the requirement of the SPECP.

SPECP Requirement (a)

Store all hazardous substances, petroleum/oil liquids, and other chemical solid or liquid materials that have potential to contaminate stormwater on an impervious surface that is surrounded with a containment berm or dike that is capable of containing 10% of the total enclosed tank volume of 110% of the volume contained in the largest tank, whichever is greater, or use double-walled tanks.

SPECP Requirement (b)

Prevent precipitation from accumulating in containment areas with a roof or equivalent structure or include a plan on how it will manage and dispose of accumulated water if a containment area cover is not practical.

SPECP Requirement (c)

Locate spill kits within 25 feet of all stationary fueling stations, fuel transfer stations, mobile fueling units, and used oil storage/transfer stations. At a minimum, spill kits shall include:

i) Oil absorbents capable of absorbing 15 gallons of fuel.
ii) A storm drain plug or cover kit.

iii) A non-water containment boom, a minimum of 10 feet in length with a 12 gallon absorbent capacity.
iv) A non-metallic shovel.
v) Two five-gallon buckets with lids.

BMP Referenced from: Storage of Liquid, Food Waste, or Dangerous Waste BMPs

Spill clean-up kits are staged in dispersed areas of the site and at fueling stations. They are maintained through the site PM system. These kits are inspected monthly. Each kit is stationed within 25 feet of the fueling island.

SPECP Requirement (d, e)

Do not lock shut-off fueling nozzles in the open position. Do not "top-off" tanks being refueled. Block, plug or cover storm drains that receive runoff from areas where fueling, during fueling.

BMP Referenced from: BMP Fueling at Dedicated Stations

Signs are posted at the fueling stations instructing users to not top off vehicles and to not lock fueling nozzles in the open position during fueling.

The site uses polyurethane storm drain covers as a primary emergency spill containment device. The covers are staged at various locations around the site. A PM has been initiated to inspect the drain covers on a periodic basis. A list of the areas where these covers are staged is noted on the PM.

Polyurethane covers are staged at various locations along transportation corridors and solid and hazardous waste/material handling areas. At fuel loading/unloading areas both polyurethane and neoprene covers are available.

Signs are posted instructing drivers to cover nearby catch basins with the neoprene storm drain covers while fueling. Covers are replaced in their containers after fueling.

Other SPECP Requirements (f-i)

- Use drip pans or equivalent containment measures during all petroleum transfer operations.
- Locate materials, equipment, and activities so that leaks are contained in existing containment and diversion systems (confine the storage of leaky or leak-prone vehicles and equipment awaiting maintenance to protected areas).
- Use drip pans and absorbents under or around leaky vehicles and equipment or store indoors where feasible. Drain fluids from equipment and vehicles prior to on-site storage or disposal.
- Maintain a spill log that includes the following information for chemical and petroleum spills: date, time, amount, location, and reason for spill; date/time clean-up completed, notifications made and staff involved.

BMP Referenced from: Preventative Maintenance and the BMP for Maintenance and Repair of Vehicles and Equipment BMPs.

The site maintains records of all spills for stormwater and other environmental compliance requirements. Spills that result in a release to the environment are reported to the applicable regulatory agencies in accordance with local, state and federal requirements. The site tracks the following spill information: site, date/time, location, material, quantity, released to (e.g., storm, air, etc.), reason for release, percent recovered, date/time of clean-up, agency notification info, IRS report info, engineering representative, open/closed status.

In addition to the requirements of the SPECP prescribed by the permit, the site implements additional practices and procedures to comply with spill prevention and response requirements.

Spill prevention and response procedures are addressed in a number of regulatory documents maintained by Environmental Engineering (see Reference section). These plans have been implemented and are updated when changes occur. Ecology and King County (the local sewer authority), among other agencies, shall be notified immediately if any regulated spill reaches the environment, sanitary or storm sewers or surface waters.

Selected Environmental Engineering personnel are on-call 24-hours a day, 7-days a week for response to environmental incidents including spills. In the event a spill reaches a sanitary or a storm sewer, ground water, or surface water Ecology and/or the local sewer authority is notified immediately. Notification complies with federal, state and local spill reporting requirements.

Appropriate spill response and clean up equipment is maintained by the site EVCTs. The inventories for most on-site spill response equipment are outlined in the site SPCC Plan. A complete list of this equipment is available for reference. This equipment includes salvage drums or containers (such as high density polyethylene, polypropylene or polyethylene sheet-lined steel), polyethylene or equivalent disposal bags, an emergency response guidebook; safety gloves/clothes/equipment, shovels or other soil removal equipment, oil containment booms and absorbent pads. All are stored in an impervious container.

4.1.5 Employee Training

Each Boeing facility who is responsible to maintain an Industrial Stormwater Permit will have all employees trained on stormwater pollution prevention, regardless of employees function. The Boeing training course #79088 has been directly pushed to all employees annually since August 1, 2015. This training covers general stormwater pollution prevention awareness as well as specific function responsibilities (forklift employee, flightline employee, etc…). This training fulfills the requirements set forth in ISGP section S3.B.5 “employee training”. The training is mandatory one time per year and is tracked by the Boeing training system.

Also, Employees whose duties generate hazardous waste are required to take Boeing training course # TR011275. This training has supplemental information regarding spill response.

All Boeing employees are responsible for reporting spills to the facility emergency response number as soon as they can.

An employee awareness program is periodically launched, via various Boeing media, to highlight stormwater pollution prevention activities and communicate regulatory requirements.

4.1.6 Inspection and Recordkeeping

The following sections discuss the inspection, reporting, and record keeping requirements of the SWPPP.

4.1.6.1 Monthly Inspections

Inspections are conducted in accordance with the requirements of the site’s ISGP. Environmental Engineering inspects stormwater discharges at outfalls where industrial activities occur in their respective drainage areas. Facilties & Asset Management conducts the inspections of dust collectors for pollutant emissions using the Planned Maintenance system in accordance with PSCAA requirements. A monthly inspection checklist and user guidance document has been developed for the site to ensure that all permit inspection requirements are met. In the event of a non-compliance or a noteworthy observation is discovered, the form provides for notation of corrective actions and follows up activities. These forms are included in the Appendices. Complete details regarding the site’s inspection practices are discussed in the Monitoring Plan section of this SWPPP.

4.1.6.2 Quarterly Stormwater Sampling

The Boeing Company has contracted with Landau Associates to perform stormwater sampling at the appropriate outfalls as identified on the site stormwater sampling Chain of Custody. On occasion, site environmental engineering may conduct sampling. Chain of Custody forms are updated each quarter by site Environmental Engineering to ensure the appropriate parameters are sampled at each outfall. Complete details regarding the site's stormwater sampling practices are discussed in the Monitoring Plan section of this SWPPP.

4.1.6.3 Reports

The primary routine reports required per the ISGP are the monthly inspection checklists, quarterly Discharge Monitoring Reports (DMRs), and the Annual Report. Noncompliance reports and other non-routine correspondences are submitted to Ecology as necessary. SWPPPs and completed monthly inspection checklists are maintained on-site. DMRs and all other correspondences are submitted electronically via Ecology's Water Quality Permitting Portal – DMR application.

The site Enablon Compliance Calendar is used to ensure all site environmental compliance reports and plans are completed on their respective due dates. The Calendar indicates each report and plan with its due date. The report is reviewed monthly in staff meetings to ensure it receives appropriate visibility. Plans that become delinquent receive special attention from management until the report or plan is noted as complete.

4.1.6.4 Record Keeping

All records, including inspections, laboratory reports, spill reports, correspondence, etc., concerning stormwater management issues will be kept in the office of Environmental Engineering at the following location:

9-51 Building
Boeing Developmental Center
9725 East Marginal Way South
Tukwila, WA 98108

Typically, the past five years of records are readily available at the site. Latter years of records are sent to Boeing document retention storage. Iron Mountain and Boeing have well established contractual procedures to ensure documents are maintained according to Boeing's requirements. The retention period for documents is clearly noted for each document sent to document storage. Documents are destroyed automatically when the noted retention period expires. Some documents with an indefinite record retention "hold" are identified and stored as such. Site environmental engineering determines all retention periods for all environmental documents.

4.1.7 Illicit Discharges

Reference Structural Source Control BMP 4.2.4 Illicit Discharges to Storm Drains.

4.2 Operational and Structural Source Control BMPs by Industrial Activity

The Permit requires Permittees to implement all BMPs that are considered applicable in the SWMM based on the industrial activities employed at the Facility. The following sections provide specific descriptions of the BMPs that are required by the Permit and applied at the Facility. For additional BMPs, refer to the Appendices for the SWMM sections for each BMP category.

4.2.1 BMPs for Deicing and Anti-Icing Operations – Airports and Streets

Street deicers are selected that cause the least environmental impact. Only minimum quantities of deicers (or anti-icers) are used. Products are not applied in the immediate vicinity of storm drains if possible. Acetate or acetate/salt blends are typically used. Liquid products are preferred over granular products. Products that contain some percentage of CMA are used. Pure road salt urea and ammonium sulfate are not used.. During significant snow/freezing events, sand may be used. If so, sand is swept up as soon as possible after the event. De-icing agents and sand are stored in a manner where they are not exposed to stormwater.

Each season, Facilties & Asset Management prepares a snow storm preparedness plan. This plan shows areas of the site where deicers/anti-icers are to be used. The plan also indicates the priority levels for areas where these products will be applied. Safety concerns are the primary criteria for determining these priorities. Typically these products are applied to sidewalks, pedestrian walkways at intersections and building entrances. High use parking lots are usually the second priority areas. At the beginning of the winter season, site Environmental Engineering and Facilties & Asset Management review the specific products that are planned for use that season. Environmental Engineering periodically reviews new products that come on the market for their effectiveness, cost and potential impact to the environment.

Application of deicers for aircraft is not applicable to this site.

4.2.2 BMPs for Dust Control at Manufacturing Areas

Dust collectors that discharge indoors are not a threat to stormwater pollution. Some of the dust collectors that exhaust to the outdoors may be regulated by the PSCAA. These dust collectors are inspected under the PM system on a regular basis. By implementing the requirements of PSCAA for these dust collectors, pollutants are prevented from impacting the environment. Dust collectors that are not regulated under PSCAA, are inspected under the PM system to satisfy the requirements of the Inspections section of the permit (S7). In the event, the inspections indicate pollutants are found during the inspection, a PM work order will be initiated to repair the dust collector as necessary.

4.2.3 BMPs for Fueling at Dedicated Stations

The Kent site has a dedicated fueling station used for the transfer of gasoline and/or diesel fuels from a stationary pumping station to mobile vehicles or equipment. The fueling station includes an under-ground fuel storage tanks.

The station is constructed on an impervious concrete pad. Fuel nozzles have automatic shut-off devices that are checked monthly per air quality control regulations (PSCAA). The site has trained employees and contractors that can respond and clean up spills. Spill clean-up materials are staged at the fueling island. Employees are required to stay with vehicles during fueling.

Neoprene and polyurethane storm drain covers are conspicuously staged at the fuel station. Signs are posted stating that the neoprene covers shall be placed over catch basins in the vicinity of the fuel station during fueling. Polyurethane covers are also available in the event of a spill.

A catch basin located on the concrete pad connects to a coalescing plate OWS and subsequently discharges to storm. Any spills from the fueling station would be treated in this unit. Vehicles are not staged on the concrete pad area before or after fueling

4.2.4 BMPs for Illicit Discharges to Storm Drains

Illicit discharges include process water, domestic wastewater, and noncontact cooling water. This site does not have any wastewaters that discharged to the storm system. All domestic sewer lines discharge to the sanitary sewer and there are no manufacturing or plant operation processes that discharge non-contact cooling water to the storm system.

Visual inspections were conducted at known discharge points. When any illicit discharges were discovered, appropriate measures were implemented to correct the discrepancy. As new buildings and shops were established over time, all process wastewaters are routed to the sanitary sewer or to tanks or sumps for offsite disposal as a matter of standard practice.

Per Section S7 of the permit, the site is required to inspect sampling locations and areas where stormwater associated with industrial activity is discharged off-site to a storm system or to waters of the state. These locations (outfalls) are listed on the site inspection checklist (see Appendices). The inspection includes observations for process wastewaters, non-contact cooling waters, and domestic sewage. The monthly inspections are typically done during non-storm events when any illicit discharges would be readily observed. None of these discharges have been observed since the monthly inspection requirement began in 2010.

In the event an illicit discharge is observed, its location, flow rate, color, and any other applicable information will be documented and investigated. Site storm system, sanitary system, and building drawings will be referenced to identify the source. If required, drawings will be updated based on findings of the illicit discharge investigation. Per permit requirements, the site is required to notify Ecology of the discovery of an illicit discharge within seven days and eliminate the discharge within 30 days. However, Boeing’s standard practice is to notify Ecology and eliminate the discharge as soon as possible.

4.2.5 BMPs for Landscaping and Lawn/Vegetation Management

Herbicides, insecticides, and rodenticides are applied on-site and the Site Environmental and Facility’s staff regulates their usage. Only approved chemicals are being applied by fully trained and licensed personnel.

4.2.5.1 Site Management Plan

All pesticides, rodenticides, and herbicides will be managed as follows:

Pesticide, rodenticides, and herbicide applications will be performed in accordance with all applicable regulations, applicator training and licensing, and available guidance. Application of materials, and use and placement of equipment, will be done to minimize stormwater contamination. Considerations for spray, granular broadcast, and rodenticide equipment handling to prevent stormwater contamination will include the following:

- Container handling, storage, and transport
- Proper material and equipment for application
- Spray direction, wind velocity and direction
- Area of application and proximity to water bodies or conveyances
- Precipitation and weather forecast
- Empty container disposal
- Spill reporting
- Proper training and licensing of applicator
- Rodenticide equipment will be placed to protect them from precipitation, and will be secured to prevent spillage

Boeing uses an independent contractor to perform landscaping activities at the site. The contractor follows the requirements noted above as applicable to the products being used. These activities include mowing grass, pruning hedges, and application of fertilizers and herbicides. Applications of herbicides are tracked and logged on a project sheet. The chemical name, amount used, and date are recorded. The vendor only uses products that have been approved by federal, state, and local regulations. The vendor coordinates with Boeing when they intend to use a new product that has not been used at the site previously. As a matter of industry practice, the vendor use products that are the most environmentally friendly products available. The vendor also assesses new products as they become available on the market. Herbicides are not used near waters of the state. Products are used per manufacturer's directions. Only minimal amounts of products are used.

The contractor's Integrated Pest Management Plan is as follows:

- Herbicides are applied only once annually on a schedule. A pre-emergent is applied in the spring for weed control. The whole site is not treated, only the areas where the weeds are the worst with spot sprays as needed. Insecticides are not sprayed on turf or ornamentals unless there is an infestation spotted. The vendor contacts Boeing prior to performing any non- routine spraying.
- The IPM practice is to only apply pesticides when absolutely needed.
- Per WSDA requirements, the vendor records the application-site, the weather conditions, the product used, and the concentration. Records are kept for seven years.
- The vendor typically uses Glyphosate 41% concentration for non-selective weed control and 2-4-D products for broadleaf selective turf applications.
- For turf fertilization applications the vendor typically applies 3-1-2 ratios of NPK annually. For plant fertilizations the vendor applies a 9-9-9 NPK ratio.
- Landscape waste is recycled and re-used mostly in topsoil mixes.
- Beauty bark is applied in some landscaped areas to assist with weed control

Pesticides, herbicides, and fertilizers are not stored on-site. The vendor removes any unused products or chemicals at the end of the work day. The vendor disposes of all empty containers per applicable regulations. In the event of a spill, the vendor is instructed to contact Boeing immediately for proper spill response.

Lawn clippings, leaves, tree and bush clippings are sent off site for composting. On occasion dried clippings are mulched back into the lawn.

4.2.5.2 Moss Control

Moss control products are used on an infrequent basis. Moss may accumulate on roofs or paved areas that receive limited daylight during the winter months. Moss is only removed for safety reasons and occasionally for aesthetic purposes and is typically removed by pressure washing. Moss control products for lawns are used occasionally. The contractor is required to use the product per manufacturer's directions. Some moss control products (e.g., Moss B Ware) have zinc as their active ingredient and their use should be avoided if possible.

4.2.5.3 Pest/Rodent Control

Boeing uses and independent contractor for rodent and mice control. Locked bait boxes are located at various areas of the site. Boxes have an identifying number posted on them for tracking and maintenance. The boxes are situated in a manner where stormwater does not run through the box. On occasion, Boeing may set up traps for wasps, bees, or other insects. These traps pose no potential for release of insecticides to the environment. Insecticides are never applied in a broadcast manner to the land. No other pesticides are used at the site.

The pest control contractor provides Boeing an annual contractor document enforcement letter to insure Boeing that they are in total compliance with all requirements. The contractor states that they are fully knowledgeable of the standards for vegetation, pest management and storm water requirements. They are required to comply with all safety/hazard considerations and possess Washington state licenses in the proper categories. In addition, they receive periodic updates automatically from industry web sites since they are a member of the Northwest Pest Management Association.

The vendor provides their employees with written instructions and classroom training for education, storage and handling, chemical use/application, PPE (personal protection equipment), transportation, and disposal.

4.2.6 BMPs for Loading and Unloading Areas for Liquid and Solid Material

Loading and unloading of liquid and solid materials is typically conducted at shipping and receiving. It can also occur at outside storage areas, fueling areas, and storage tanks for materials and waste. Section 4.2.1 “Fueling Stations” of this plan provides specific information regarding fueling best management practices at the site. All loading and unloading areas are inspected on a monthly basis.

Storm drain covers are strategically placed at several locations around the site including loading and unloading areas. Street sweeping may be occasionally required in these areas due to windblown leaf and dirt debris. In the event site inspections indicate an area requires sweeping, Environmental Engineering will request service to be conducted. Employees working in these areas have received appropriate training to prevent and respond to spills.

Most materials delivered to these areas are non-bulk and containerized and any spills or are addressed per the site’s standard spill prevention and response procedures. Typically leaks can come from vehicles or forklift hydraulic or fuel lines.

Most of the site’s loading and unloading areas are covered. For large bulk items or uncovered loading or loading areas, materials are typically staged outdoors for a minimum amount of time. Non-bulk materials are either delivered to their point of use location or to the main shipping and receiving area of the associated building. With the exception of transporting drums, all non-bulk materials are stored in covered and contained areas. While awaiting shipment or transfer inside the plant, drums are typically staged outdoors for no longer than 48 hours. These drums are closed and banded on a pallet.

Most ASTs at the site contain diesel fuel. There is a complete list of the material stored in the sites aboveground and underground tanks in the Appendices.

Other federal and state environmental regulatory requirements control the maintenance and spill prevention procedures for storage tanks.

- The federal Oil Pollution Prevention regulations dictate the requirements for management of oil in tanks and containers.
    - This site has a Spill Prevention and Countermeasures Plan and Contingency Plan.
- The federal Resource Conservation and Recovery Act and the Washington State Dangerous Waste regulations control management of dangerous waste in tanks and containers.
    - This site has a Hazardous Waste Management Plan.

The site inspects aboveground tanks periodically in accordance with these regulations. The site uses the PM system to control and ensure the inspection process is completed as required. These regulations and their associated plans capture the requirements of the BMP as noted in the BMP for “Storage of Liquids in Permanent Aboveground Tanks” in the SWMM for Western Washington”.

The following specific BMPs from the SWMM have been implemented as necessary for the various storage tanks:

- Tank shall include an overfill protection system;

- Tanks shall be surrounded by a secondary containment of a volume equal to or greater than 10% of the total enclosed tank volume or 110% of the volume of the largest tank, or use double-walled tanks;
- Tanks shall be built on impervious pads to prevent loss of spilled material;
- Outlets from tank area shall have positive control to prevent discharge from the tank area;
- Stormwater accumulated in dike areas shall be frequently inspected for contamination and then, as appropriate, released to ensure spill prevention capacity is not compromised;
- Tanks shall be protected from vehicles with posts or other barriers;
- Double walled tanks do not need additional containment systems.

4.2.7 BMPs for Maintenance and Repair of Vehicles and Equipment

Section 3 "Pollutant Source Inventory" describes vehicle and equipment cleaning at the site. Vehicle maintenance activities and vehicle cleaning occur in the same shop. All maintenance is conducted indoors. Floor drains in this shop are connected to the sanitary sewer. However vehicle maintenance and cleaning wastes are not permitted to be discharged to these drains. The shop has a dedicated area for draining automotive fluids and pressure washing. This area drains to a sump which pumps to a dedicated tank. The accumulated wastewaters are nonhazardous and are sent offsite for disposal.

4.2.8 BMPs for Maintenance of Stormwater Drainage and Treatment Systems

The site storm system is inspected on an annual basis through the PM system. Two PMs are initiated for the storm system inspection process; one for the site catch basins and the other for the site OWS.

The catch basin PM requires units be inspected for the following:

- General structural condition,
- Frame and gate condition,
- Condition of the filter sock insert if any,
- Overgrowth of vegetation,
- Description of any other items that require maintenance or attention.

The OWS PM requires units be inspected for the following:

- Presence of any oil sheen in effluent discharge,
- Presence of sediment, oil, trash, and debris accumulations,
- Need to install or replace absorbent pans,
- General working condition of any covers, ladders, gates, and baffles,
- Any visual damage to the vault structure and inlet/outlet pipes,
- Description of any other items that require maintenance or attention.

The catch basin inspection results are noted on a spreadsheet which lists all the site's catch basins. The OWS inspection results are noted on individual worksheets which have been prepared for each OWS. A site map is provided that identifies the components of the storm system. The catch basins and OWS have unique identifying numbers that are used on the inspection checklists. Site Environmental Engineering reviews the inspection results and determines any cleaning or maintenance requirements. Catch basins are cleaned when the sediment levels are 60% of the height from the bottom of the basin to the invert of the lowest pipe into or out of the catch basin. Criteria to clean OWS is based on overall assessment of the inspection findings, length of time since last the last cleaning and other site factors that may impact stormwater compliance requirements.

In the event cleaning of any of the storm system is required, the work will be performed by an independent contractor. A PM is initiated to facilitate funding, scheduling and performing the cleaning project.

Boeing Facilties & Asset Management Group is responsible for the structural maintenance of the storm system. In the event that work needs to be conducted on the system a job will be initiated through the PM system for Facilties & Asset Management to complete the required work.

The site's storm systems are designed in accordance with applicable federal, state, and local requirements. High sewer capacity discharges and heavy sediment discharges are prevented due to appropriate design of these systems

The site labels most catch basins with a torch down stencil. The stencil reads "Dump No Waste - Drains to Stream". An annual PM is initiated for Facilties & Asset Management to review the stencils for deterioration and replace if necessary. Typically stencils are placed at catch basin located in the main site roads and areas of industrial activity.

Storm system cleaning wastewater and sludge are typically disposed of by the contractor performing the cleaning or their subcontractor. The contractor is required to manage these waste streams in accordance with applicable federal, state, and local requirements. Non-hazardous stormwater sludge is solidified and sent to a Boeing pre-approved Sub-Title D landfill. Wastewaters are treated per the vendor's Treatment, Storage and Disposal (TSD) facility discharge permit specifications and discharged to the local sanitary sewer system.

Depending on the PCB concentration, PCB contaminated sludge is solidified and sent to a Boeing pre-approved Sub-Title C landfill. Materials above the landfill acceptable concentration limits for RCRA wastes are sent to a Boeing pre-approved incinerator.

4.2.9 BMPs for Washing and Steam Cleaning Vehicles/Equipment/Building Structures

Vehicle, equipment, and building wash water are considered process wastewater. Therefore these operations will be managed accordingly.

4.2.9.1 Vehicle and Equipment Cleaning

Automotive cleaning and maintenance work is not done onsite except in special urgent cases. If the incoming vehicles or equipment are being stored outside they are inspected for leaks or drips. If the vehicle or equipment leaks, it is moved inside. If this is not possible, drip pans or other containers of adequate size are put under the leaking or dripping part and checked regularly.

All maintenance work is done inside. Drip pans are placed under parts being dismantled or systems being drained to collect liquids (oil, anti-freeze, and transmission or brake fluids). All used oils, filters; wash water, liquid waste (including batteries and their management) or other pollutants generated during maintenance are collected and disposed of in accordance with applicable regulatory requirements.

Service vehicles that require washing are sent off site to another Boeing facility with a dedicated car wash shop.

4.2.9.2 Building Washing

Building exteriors may require pressure washing as surface preparation for painting, coating, or other maintenance work. Typically these wash waters contain dirt and/or paint chips. On occasion chemical cleaning products may be used. These wash waters are collected and disposed to sanitary sewer or offsite disposal. Tarps or other coverings may be used to capture runoff from the washing operations. Catch basins in the vicinity of the cleaning operation are covered as a precautionary measure.

In the event a building is being cleaned without removal of paint chips or use of chemicals, catch basins may also be plugged and used to collect wash waters. These wash waters are pumped to drums or tanks for disposal. Wash water is not permitted to enter the storm system. Wash water may also be allowed to drain to pervious landscaped areas if the wash waters are free of pollutants (other than dirt) and pose no impact to soil or vegetation.

4.2.10 BMPs for Painting/Finishing/Coating of Vehicles, Buildings & Equipment

Painting, finishing, or coating of vehicles is not performed at the site.

4.2.10.1 Building Painting

Over time, the site performs periodic maintenance of building exterior surfaces. These surfaces include building walls, roofs, overhangs, gutters and other ancillary structures. This activity requires surface preparation by pressure washing or scraping of loose paint.

Wastewater from these activities is collected and sent for offsite disposal to an appropriate treatment facility. Typically contractors are hired to perform major painting jobs. Boeing painters typically perform routine and minor painting jobs. All persons are trained in the appropriate use of spray equipment and proper disposal and clean-up methods. Painting is performed during dry periods to ensure proper curing and eliminate any possibility of wash off to the storm system. Painting materials are never stored outdoors. All spills are cleaned up immediately per the site’s spill response procedures. Any spills to the environment are reported in accordance with the applicable regulations. Brushes and other tools are cleaned indoors at the site as oppose to outdoors in the work area.

When roofs are painted all efforts are made to prevent pressure washing or any wash water from reaching the roof drains. Pressure washing allows for minimal use of water. Any waste wash water is wet-vacuumed and disposed of properly. Pressure washing equipment, hoses and paint products are typically staged on the roof during the process. Therefore, roof drains are typically temporarily blocked as a precautionary measure for possible spills.

Landscaping and surrounding buildings are protected from overspray. Typically these areas are covered with tarps during pressure washing and painting. No wash water or overspray is allowed to reach the storm system or the soil.

4.2.11 BMPs for Roof/Building Drains at Manufacturing and Commercial Buildings

Stormwater run-off from roofs and sides of buildings of manufacturing and commercial buildings can be sources of pollutants. This contamination is caused by leaching of roofing materials, building vents, and other air emission sources. Most industrial Boeing sites have buildings that may have contaminants deposited onto roofs from one or more of these sources.

Maintenance of air handling units, training for maintenance workers, and proper selection of roofing materials, periodic roof maintenance and good housekeeping are among the methods employed to control pollutants.

Some of the sites buildings have the possibility to deposit contaminants from air handling units connected to certain manufacturing processes. The site implements the PM system to perform required maintenance and inspections of equipment that is regulated under the CAA. These processes are not likely to produce pollutants since they are in good working order and are maintained to minimize production and spread of contaminants.

Manufacturing and office buildings may have materials that may leach metals. Per the requirement of the ISGP, the site is required to meet benchmarks for zinc and copper in its stormwater runoff. As necessary, the site identifies possible sources of zinc and copper contamination. These sources are replaced or coated as needed. As a matter of policy, new structures are made of suitable materials or coated as roof structures are upgraded and maintained over time.

When the site has to repair or maintain its roof and associated structures the work will be conducted during the dry season when it is reasonably expected that no storm events will occur. This reduces the likelihood of stormwater becoming contaminated from these efforts.

4.2.12 BMPs for Soil Erosion and Sediment Control at Industrial Sites

The site has no industrial activities that take place on unpaved areas. On occasion, there may be small construction projects at the site. The following BMPs will be considered for all site construction work:

- Temporary covering
- Fabric fencing
- Rip-rap
- Sediment trapping using ponds
- Permanent seeding
- Stabilization and protection of disturbed areas as soon as possible
- Minimization of disturbed areas and duration of exposure

Construction projects that involve soil-disturbing activities greater than one acre are regulated under the WDOE Construction Stormwater Permit. Site specific SWPPPs are prepared for each project per the requirements of the permit.

4.2.13 BMPs for Spills of Oil and Hazardous Substances

The site engages in storing and consuming more than 1,320 gallons of oil. This and other criteria require the site to have a SPCC Plan as described in 40 CFR Part 110. Refer to this plan for information regarding response activities for oil spills and hazardous substances releases. Refer to the SPECP found in the Operational BMPs section of this SWPPP for additional spill response information.

4.2.14 BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers

The site utilizes steel and plastic drums to store accumulated food wastes, vegetable and animal grease, used oil, cleaning chemicals, and dangerous wastes. Leaks and spills of pollutants materials during handling and storage are the primary sources of pollutants. Containers with these products are often stored outdoors on a temporary and/or permanent basis

When practical and permitted by regulatory requirements, most materials are stored indoors unless it is impracticable due to site constraints or Uniform Building Code requirements. Containment measures for specific liquid materials or wastes may be installed depending on the nature of the material and the volume of containers.

Containers are only staged outdoors for brief periods of time in the course of transporting them about the site and may not necessarily be in a covered area.

Tight fitting lids are placed on most containers. Lids are removed while the container is in use. Lids for metal open top drums are sealed closed with metal band rings with nut and bolt locks. Metal and plastic drum for liquid materials utilize screw caps that can be hand or wrench tightened. Drip pans may be placed beneath mounted container taps while filling and unloading of liquid containers if necessary.

Container storage areas are inspected for corrosion, structural failure, spills, leaks, overfills and failures. Containers and lids are replaced if leaks or spills are found upon inspection. Leaks and spills are cleaned up immediately.

Solid waste containers (dumpsters) are staged outdoors. The dumpsters contain custom fitting lids that remain closed when not in use. Dumpsters are transported to a central solid waste staging area where they are turned via forklift into a dedicated roll-off. The roll-off is staged over a concrete pad which drains to an OWS with debris filters prior to discharge to the sanitary sewer system.

Certain recyclable products have specific outdoor storage procedures. Clean recyclable cardboard and empty aluminum beverage cans are collected in closed plastic bags. Clean scrap wood (unpainted), electrical scrap wire and metal and scrap stock metal are all segregated into specific containers. All of these recycle products are staged in uncovered 5x5’s or tubskids.

All dangerous wastes are managed in accordance with applicable federal, state, and local regulations. Storage of reactive, ignitable, and flammable liquids complies with requirements all applicable regulatory requirements. Dangerous wastes containers are stored outdoors in designated areas that are covered, bermed, and paved in order to contain leaks and spills. The volume of the secondary containment is determined by applicable dangerous waste regulations. Containers of all liquid dangerous wastes are stored in containment.

Other non-dangerous waste streams that are staged outdoors may or may not be staged in secondary containment. The determination to provide secondary containment is based on such factors as type of material, volume of material, storage time in the area, surrounding surface area (pavement, landscaping) and proximity to the stormwater system. Engineering judgment is used to make the determination as to whether secondary containment is required.

Contaminated stormwater in containment areas is collected in drums or tanks. Such contaminate stormwater is pumped directly to the sanitary sewer if within applicable discharge limits. If the contaminated stormwater requires treatment, it is shipped off-site prior to discharge to the sanitary system.

Boeing sites are secured by fences, guarded gate entry, site guard patrol, or a combination of these measures. No drums are stored in areas where unauthorized persons may gain access to them and cause accidental spillage, pilferage, or unauthorized use.

4.2.15 BMPs for Storage of Liquids in Permanent Aboveground Tanks

The site contains a number of above-ground tanks containing liquids (material and wastes) that are equipped with some or all of the following; valve drains, vents, pumps and bottom hose connections. Most ASTs at the site contain diesel fuel. A complete list of the sites aboveground and underground tanks is contained in the Appendices. Leaks and spills can occur at connections during liquid transfer. Trucks are required to have basic spill response equipment such as absorbent material and pads.

Tanks are located in impervious secondary containment are double walled tanks. Containment areas provide containment for 10 percent of the total enclosed tank volume or 110 percent of the largest tank. Secondary containment or double walled tanks are used for all tanks located outdoors when required by applicable regulatory agencies. A building is generally considered secondary containment for tanks located indoors. If it is determined that a release from an indoor tank could exit the building secondary containment, double walled tanks or trenches at the base are typically installed.

Tanks that are regulated under the site's SPCC plan have tank overfill protection equipment as required per regulatory requirements

Tanks and associated containment areas are inspected on a regularly established basis through the PM system. Tanks that are subject to regulation under the Washington State Dangerous Waste Regulations or Oil Pollution Prevention Regulations are inspected per the requirements of these regulations. Tanks not regulated under these regulations are also inspected. Tank inspection frequency is determined by past site experience, frequency of use, and type of material it contains. Documentation for all tank inspections is maintained in accordance with the respective regulatory agency requirements.

If warranted, protective guards are installed around tanks to protect from accidental contact with vehicles or forklifts. Refer to the BMPs for Spill Prevention and Response Procedures, Spills of Oil and Hazardous Substances, and Good Housekeeping for additional information.

4.2.16 BMPs for Storage or Transfer (Outside) of Raw Materials, Byproducts, or Finished Products

The site does not store finished products or byproducts from manufacturing outdoors. Products produced in the site shops are packaged and shipped off-site once completed. On occasion plant building materials, production tools, or production parts may be stored outdoors in uncovered areas for intermittent periods of time. This section notes some of these areas and BMPs in place.

The site implements Good Housekeeping as an Operational BMP. Areas where solid materials or products are stored are inspected periodically to ensure they are operational and maintained. These areas are never hosed down as part of the area good housekeeping practices. These areas can be swept to clean up any loose solid materials.

Gravel and sand stockpiles are enclosed in concrete bermed areas, which further prevent runoff from these piles. As noted in the BMP "Soil and Erosion and Sediment Control" site maintenance activities may require excavation of small paved areas that create dirt stockpiles. These piles are covered with plastic sheeting and placed on pervious areas if possible. They are typically replaced back to the ground in a brief period of time.

Large stockpiles or parts that cannot be covered are typically only associated with major construction or demolition projects, which are managed under project specific permits and SWPPPs.

4.3 Treatment BMPs

4.3.1 Oil Water Separators

The site has a one coalescing plate OWS that discharges to the stormwater system that is located to capture runoff from the propane tank in the fueling area. It is inspected annually and cleaned on an as needed basis. Reference the BMP "Maintenance of Stormwater Drainage and Treatment Systems" in the Structural Source Control BMPs section of this plan for additional information.

4.3.2 Biofiltration Treatment/Detention

The site contains two detention ponds at the northwest corner and southeast corners of the site. The northeast system was installed in 1979 per city ordinance requirements. The southeast system was installed in 2020 per city redevelopment standards. The systems provide hydraulic capacity and detention support. The systems are not specifically designed as metal uptake treatment systems. However, some treatment for sediment is expected to be realized from flow control, vegetation absorption, and solids removal. As noted in the "Facility Description" of this plan, the site's north detention pond was modified in 2013. The pond surface area was decreased and the depth of the pond was increased. The new design provides for greater storage and water quality attainment.

4.3.3 Catch Basin Treatment Units

Grate Inlet Filter units were once installed in four catch basins to mitigate risk from Boeing Licensed Transportation activities in the area. These units are designed to treat for metals (e.g., zinc, copper, lead), phosphorus, TSS, and oils & grease. (These units have been removed as the activity longer operates in this area-2018)

5.0 STORMWATER MONITORING PLAN

The current WDOE Industrial Stormwater General Permit requires that each SWPPP for an industrial facility include a stormwater monitoring plan with specified elements. The plan is required to address how the permitted facility conducts quarterly stormwater sampling and monthly inspections. Monitoring Requirements are set forth in the permit Section S4. Quarterly monitoring of authorized stormwater discharges began with the second quarter of 2003. The January 2020 permit changed sampling requirements from the previous permit.

5.1 Monthly Site Inspections

Monthly site inspections are conducted at designated stormwater sampling locations and other areas and outfalls where stormwater associated with industrial activity is discharged off-site, to waters of the State or to a storm sewer system that drains to waters of the State. The following outfall descriptions will indicate those outfalls containing areas of industrial activity. These inspections are not required to be completed during a storm event nor are discharges required from the outfall to perform this inspection. A site specific checklist with guidance documents has been prepared in order to complete the monthly inspections.

Inspections are conducted for the following parameters: floating materials, visible oil sheen, discoloration, turbidity and odor. However, the permit does not require a sample for turbidity be taken during these inspections. The inspector will note any appearance of disturbed sediment. The inspection requires observation for any illicit discharges such as domestic wastewater, noncontact cooling water, or process wastewater (including leachate). If an illicit discharge is discovered, Boeing shall notify Ecology within seven days and eliminate the illicit discharge within 30 days. The inspection also requires a verification of any potential pollutant sources and the accuracy of the site SWPPP map. Additionally, the inspection requires an assessment of the effectiveness of the site BMPs.

The inspection checklist will indicate the date and times of the inspection, locations inspected, required certifications and signatures per section S7.C.1 of the permit. Any findings will be documented and reported as required per section S9.F of the permit. The inspection checklists are required to be kept on-site for Ecology review. The completed monthly inspection checklists will be filed in the Environmental Engineering office. The stormwater monthly inspection checklist template and guidance document are included in the Appendices of this plan.

5.1.1 Identification of Points of Discharge

For the specific locations and coordinates of discharge points and outfalls reference Appendices.

Drainage Area 20
Two 54 inch pipes discharge stormwater into this section of Mill Creek from the Drainage Area 20 which discharges to Outfalls 20A and 20B (also known as 20C and 20D, respectively). This area consists of approximately 33 acres. By sampling up the conveyance system at manholes 20.236M and 20.237M the samples are not influenced by backflow from Mill Creek. At these locations, the samples are considered to be representative of the site's actual discharge.

As noted on the site risk assessment map this drainage area contains the following industrial processes:

- Vehicle fueling station
- One million gallon water storage tanks for emergency firefighting situations
- Several emergency generators with associated diesel storage tanks

Visual monitoring of Outfalls 20A and 20B, can be performed by observing the end of these pipes from the sidewalk over the east bank of the creek. These pipes are partially submerged but are usually identifiable.

Drainage Area 13
This drainage area encompasses the area for the 18-61 and 18-62 buildings, and surrounding yards/parking. The 18-62 Building houses an aircraft engine buildup line and various shop and office areas. The 18-61 Building contains the site Environmental Analysis Lab, assorted Manufacturing Research and Development Labs (MR&D) laboratories and several office areas). It previously contained a chemical storage facility, which was re-located to the 18-59 Building in 2003.

This drainage area contains a parking lot on the southeast area of the site, as well as a parking lot South of the 18-62 building. The southeast parking area is sometimes used to stage aircraft parts for later use inside the 18-62 building production area. The south parking area is a pervious graveled area. The storm drain system that had been built around the perimeter of the (demolished) 18-63 Building remains in place. The majority of the runoff from this area permeates through the gravel. The remaining area is paved for parking of employee vehicles and occasional temporary materials/equipment storage. All parts stored outside do not contain fuel or liquids and are kept inside their transportation packaging (wooden boxes, etc) until they are brought inside the building. The drainage area also includes a transportation corridor between the 18-61 and 18-62 buildings.

Area 13 drains to Pond A, a water quality pond installed in 2020 as part of a site divestiture and drainage re-routing project. From there, stormwater discharges to a detention pond located on City of Kent property. This pond receives stormwater from various other businesses in the area. Monthly inspections and quarterly samples are conducted at CB80, just before the flow exits Boeing property.

Drainage Area 18
This drainage area consists of the two main entry gates and transportation corridors from the site. This drainage area contains a portion of a large parking lot on the southeast area of the site. Although trucks, employee vehicles and deliveries (including chemicals) may pass through this drainage area, the associated outfall is not expected to contain a large amount of pollutants. Monthly inspections and quarterly samples are conducted at SP-18, a manhole North of the 18-61 building. This area is being temporarily pumped into the 54" lines while the final conveyance for this portion of the site is under construction.

Drainage Areas 24, 25, 25A, 26, 27, 28
These drainage areas were part of the parcel that was sold in February 2013. They are no longer part of Boeing operations and are thereby no longer monitored or regulated under the site stormwater permit.

Drainage Areas 19, 21 and 22
These areas were part of the parcel that was sold in January 2020. They are no longer part of Boeing operations and are thereby no longer monitored or regulated under the site stormwater permit.

Drainage areas 14, 15, 16 and 17
These areas were combined in 2020 to form Drainage Area 13.

5.2 Quarterly Stormwater Sampling

5.2.1 Representative Sampling Determination

The following discharge locations are representative of the facility's industrial activity. They will be sampled on a quarterly basis. Reference Section 5.1.1 and Appendices for discussion regarding types of industrial activities and potential pollutants in these areas:

Discharge Location 13 (CB80)
Discharge Location 18 (SP18)
Discharge Location 20C (20A)
Discharge Location 20D (20B)

5.2.2 Sampling Timing and Frequency

The permit states that a sample must be collected within the first twelve hours of discharge. A sample may be taken after twelve hours but an explanation must be documented in the sampling record. In addition, a sample must be collected during the "first fall storm event" which occurs on or after September 1st. Samples may be single grab, time proportional, or flow proportional. Permitee may also take multiple samples in a quarter and average the values (for individual parameters, except pH and visible oil sheen) to determine if they meet the respective parameter benchmark for the quarter. Boeing does not need to sample outside of regular business hours, during unsafe conditions, or during quarters where there is no discharge.

In order to satisfy these requirements in a reasonable and structured procedure, the site will follow the following guidelines:

- As a matter of routine practice, the site will attempt to sample the first storm event of the quarter where there is discharge.
- If it is not possible to collect a sample within the first twelve hours of discharge, engineering will note so on the site sampling record and collect the sample as soon as practicable after the first twelve hours.
- Landau Associates and site engineering will review local weather reports, typically from Boeing Field airport, to determine storm duration and estimated discharge times.
- The site will not be required to take additional samples that quarter.

Previous experience indicates the only reason a sample will probably not be taken during the first twelve hours of a storm event is that the storm event duration and the sites "regular business hours" did not overlap in such a manner as to obtain the sample within the first twelve hours of discharge.

Sampling the first storm event of the quarter will also increase the likelihood that the site will obtain a sample during the “first fall storm event”. This practice will also promote the likelihood that the site would not miss obtaining a sample during any quarter where there was discharge from the representative outfall during business hours. Samples are not required during a quarter where there was no storm event with discharge during regular business hours. A DMR will be submitted every quarter. In the event no sample had been taken; the reason must be noted on the DMR under comments.

Normally the site elects to take grab samples in lieu of other sampling techniques. Site engineering may also elect to take additional samples within the same quarter if a parameter exceeded its respective benchmark limit (excluding pH and visible sheen). This is not a permit requirement and is the sole discretion of site engineering to implement. If multiples samples are taken, site engineering will coordinate with Landau Associates by providing a revised Chain of Custody for that specific sampling event. All sample results, included average values, will be reported on the DMR per permit requirements.

5.2.3 Sampling Location, Collection, and Handling Procedure

The stormwater samples will be collected by one of several trained Landau Associates staff. These staff members have been trained to collect samples per WDOE Publication No. 15-03-044 “Stormwater Sampling Manual: A guide for the Industrial Stormwater General Permit”. This manual contains all references that were cited for its development.

These samples will be stored in a cooler or refrigerator until they are transported to Analytical Resources Inc. (ARI) laboratories located in Tukwila, WA. ARI is a WDOE accredited laboratory. Parameters for analysis are as follows:

Parameter	Method	Container	Preservation	Holding Time
Metals (Zn, Cu)	EPA 200.8	500mL HDPE	5mL 1:1 HNO_3	28 Days
Turbidity	Meter	500mL HDPE	Cool <6ºC	48 Hours
pH	Meter	500mL HDPE	Cool <6ºC	ASAP
Fecal Coliform	SM 9222D	250mL Plastic	Cool <4ºC	6 Hours
E. Coli	EPA 1603	250mL Plastic	Cool <4ºC	6 Hours
TPH-Dx	NWTPH-Dx	1L Amber	Cool <4ºC	7 days

Turbidity and pH are exempt from permit requirement S4.D Laboratory Accreditation and these parameters can be analyzed by a calibrated meter by Landau Associates staff or sent to the accredited lab for analysis.

The following table summarizes the sampling requirements for the site. However the sampling requirements may change from quarter to quarter as the site achieves Consistent Attainment at each sampling location. Any revisions to sampling requirements will be reflected in the Chain of Custody for the applicable quarter.

Parameter
Total Zinc and Total Copper
Oil Sheen
Turbidity
pH
Fecal Coliform
E. Coli
Total Petroleum Hydrocarbons

5.2.4 Review of Monitoring Results

Two things need to happen to appropriately manage stormwater monitoring data. First, the monitoring results obtained as part of stormwater sampling must be submitted to Ecology on a quarterly basis, via the DMR. If no sample is collected, the DMR must still be submitted with a written explanation as to why there was no sample taken. Second, the monitoring results from stormwater sampling must be compared to the benchmark values to assess the effectiveness of the current BMPs in preventing pollutants from entering stormwater.

Values at or below benchmark values are considered unlikely to cause a water quality violation, and consistent attainment of benchmark values over eight consecutive quarters results in reduced monitoring to a fourth quarter "annual sample" for that parameter (unless significant process changes take place at the Facility) for a period of 3 years (12 quarters). For the purposes of tallying "consecutive quarterly samples":

- Do not include any quarters in which Boeing should have collected a sample, but did not. If this occurs, the tally of consecutive quarterly samples is reset to zero.
- Do not include any quarters in which Boeing did not collect a sample because there was no discharge during the quarter. These quarters are not included in the calculation of eight consecutive quarters, but do not reset the tally (i.e. they are skipped over).

The annual sample must be taken during the 4th quarter. Boeing may average the annual sample with any other samples taken over the course of the 4th quarter. The annual sample does not need to be collected during the first fall storm event. If Boeing's annual sample exceeds a benchmark during consistent attainment, Boeing can no longer claim consistent attainment for the parameter that exceeded the benchmark and must resume quarterly sampling for that parameter.

If Boeing performs monitoring more than once per quarter, all of the monitoring results for each parameter (except pH and visible oil sheen) shall be averaged and the average then compared to the benchmark value. If more than one sample is collected during a 24-hour period, the daily average of the individual grab sample results collected during that 24-hour period must first be calculated, then use the daily average to calculate a quarterly average.

Regardless of whether any samples are collected or any benchmarks have been exceeded, DMRs need to be submitted for each quarter; on the DMR form it can be noted if consistent attainment has been achieved for any of the monitoring parameters.

Unlike exceedances of effluent limits, exceedance of benchmark values does not constitute a violation of the Permit because benchmark values are not water quality standards and are not Permit limits. However, an exceedance is an indicator that additional measures should be taken to reduce the entry of pollutants into stormwater at the Facility. These response measures range from implementing additional operational BMPs (Level 1 Corrective Action) to implementing stormwater treatment BMPs (Level 3 Corrective Action).

5.2.5 Reporting Requirements and Record Keeping

The sampler will complete and sign a Quarterly Stormwater Monitoring and Sampling form for each sampling procedure to be filed in the Environmental Engineering office. A blank sampling form is provided in the Appendices. A monthly inspection checklist will be completed, signed by the Environmental Engineer, and filed. Submittal of monthly inspection checklists is not required. A Discharge Monitoring Report (DMR) must be completed and submitted electronically to the WDOE on a quarterly basis. If there was no sample collected due to insufficient storm events, submit the DMR marking the "no discharge" check box and include a written explanation. DMRs must also be submitted quarterly if monitoring has been suspended as a result of consistent attainment of benchmark values. If monitoring has been suspended based on consistent attainment, submit the form marking the "consistent attainment" check box. DMRs must be submitted to Ecology by the DMR due dates in the table below:

Reporting Period	**Months**	**DMR Due Date**
1st Quarter	January – March	May 15
2nd Quarter	April - June	August 15
3rd Quarter	July – September	November 15
4th Quarter	October - December	February 15

If a Level One Response report is required (exceedance of one or more benchmark values) it will be filed on-site with other quarterly sampling records.

Environmental Engineering is responsible for ensuring samples are collected, records are maintained and required reports are submitted to the WDOE. The engineer will prepare the DMR online for electronic signature by the appropriate level of management in the Ecology portal. The engineer will then retrain a copy of the submitted DMR and others records required. The engineer will maintain records of quarterly sampling, sampling results, monthly inspections, letters, DMRs and other reports submitted to the WDOE. Corrective action tracking and other appropriate data collected, including laboratory reports provided by the laboratory, shall also be maintained by Environmental Engineering as required by the permit. All lab reports shall include the following information: date of analysis, parameter name, CAS number (if applicable), analytical method(s), individual who performed the analysis, method detection limit (MDL), laboratory quantitation level (QL) achieved by the lab, reporting units, sample results, and quality assurance/quality control (QA/QC) data. The records will be maintained in the Environmental Engineering office.

Preventative maintenance records are retained by the Facilties & Asset Management group as required by Boeing and permit records retention requirements.

In addition, the Permittee shall submit a complete and accurate Annual Report to Ecology covering the prior year's Permit compliance activities no later than May 15 of each year using Ecology's Water Quality Permitting Portal – Permit Submittals application, unless a waiver from electronic reporting has been granted according to Permit Condition S9.B.3. Annual reports are not required if the Permittee did not have permit coverage during the previous calendar year. The annual report shall include corrective action documentation as required in Permit Condition S8.BD. If a corrective action is not yet completed at the time of submission of the annual report, the Permittee must describe the status of any outstanding corrective action(s). Permittees shall retain a copy of all annual reports onsite for Ecology review and shall include the following information with each annual report:

- Identify the condition triggering the need for corrective action review.
- Describe the problem(s) and identify the dates they were discovered.
- Summarize any Level 1, 2, or 3 Corrective Actions completed during the previous calendar year and include the dates it completed the corrective actions.
- Describe the status of any Level 2 or 3 Corrective Actions triggered during the previous calendar year, and identify the date it expects to complete corrective actions.

APPENDIX A – SPACE CENTER SITE MAP

Current map is on file in Environmental Engineering, Boeing DC site. The map may be inserted in the desk reference copy of this document to be more readily available for reference.

Site SPCC Map

Current map is on file in Environmental Engineering, Boeing DC site. The map may be inserted in the desk reference copy of this document to be more readily available for reference.

APPENDIX B – AIR EMISSION INVENTORY

BLDG	AREA	COLUMN	FLR	SOURCE	MAKE	CONTROL	EMISSION	INST	BOE PID	REC
18-41	SECURE MECHANICAL RM	DR N 4A	1	VACCUM SYSTEM 775	SPENCER 775	NA	ALUM, STEEL, DIRT	1990	07-604611	350
18-41	SECURE MECHANICAL RM	DR N 4A	1	VACCUM SYSTEM 450	SPENCER 450	NA	ALUM, STEEL, DIRT	1990	07-604612	349
18-54	BOILER ROOM	N 1	1	BOILER #2	CLEAV/BROOKS	NONE	GAS/OIL 33.5 MIL BTU	2007	07-62549	96
18-54	BOILER ROOM	N 1	1	BOILER #3	CLEAV/BROOKS	NONE	GAS/OIL 60 MIL BTU	1964	PO-610100	98
18-54	BOILER ROOM	N 1	1	BOILER #4	CLEAV/BROOKS	NONE	GAS/OIL 60 MIL BTU	1964	PO-610101	97
18-59	GAS PUMP	WEST S		NOZZEL, GAS		STAGE 2	BENZENE, ECT	1992	93-K00230	315
18-59	UST KS-38, GAS	WEST S		10K GAL GAS UST		STAGE 1	BENZENE, ECT	1992	93-K00230	248
18-61	DESIGN ENG LAB	M 5	1	PAINT BOOTH	BINKS	DRY FILTER	VOC	1989	30-261255	104
The following items have no NOC with PSCAA but are inspected & maintained in the same manner as those with an NOC										CFM
18-62			1	Dust Collector	Sternvent	Dry Filter	Sawdust	2015	-	

APPENDIX C – TANK INVENTORY

Type	Tank ID	Bldg.	Location	Volume (gal)	Content	Construction	Leak Prev	Leak Detect	Corr Prot
AM	KSA-99	18-41	W. yd.	400	diesel	STL/dew	CB	IM	enamel
AM	KSA-93	18-51	inside	165	diesel	STL/sw	Trench	Leak S	nr
AM	KSA-94	18-51	inside	250	diesel	STL/sw	Trench	Leak S	nr
AM	KSA-95	18-51	inside	250	diesel	STL/sw	Trench	Leak S	nr
AM	KSA-58	18-59	S. yd.	1000000	water	STL/dew	none	none	nr
AM	KSA-102	18-61	So Side	430	diesel	STL/dew	CB	IM	enamel
AM	KSA-59	18-61	dr.N-1	550	diesel	STL/dew	Berm	VI	paint
AM	KSA-45	18-62	dr. N-4	550	diesel	STL/dew	CB	IM	NC
FW	KS-46*	18-61	E. yd.	38000	fire water	cncrt	nr	nr	nr
OWS	KS-21	18-62	S. yd.	15000	decant water	FRP/dew	CB	nr	NC
UM	KS-20	18-54	W. yd.	30000	diesel	FRP/dew	CB	IM	NC
UM	KS-45	18-54	W. yd.	6000	diesel	FRP/dew	CB	IM	nr
UM	KS-38	18-59	W. yd.	10000	unlead. gas	FRP/dew	CB	IM	NC
UM	KS-39	18-59	W. yd.	1000	diesel	FRP/dew	CB	IM	NC

AM	Aboveground liquid material tank
DW	Dangerous or Hazardous waste tank
UM	Underground liquid material tank
WM	Waste water tank regulated by POTW(METRO)
WN	Waste water tank regulated by NPDES
YY	sump
AST	Aboveground storage tank
TSD	Treatment, Storage, Disposal
UST	Underground storage tank
WGN	Waste generator
WTU	Waste water treatment unit

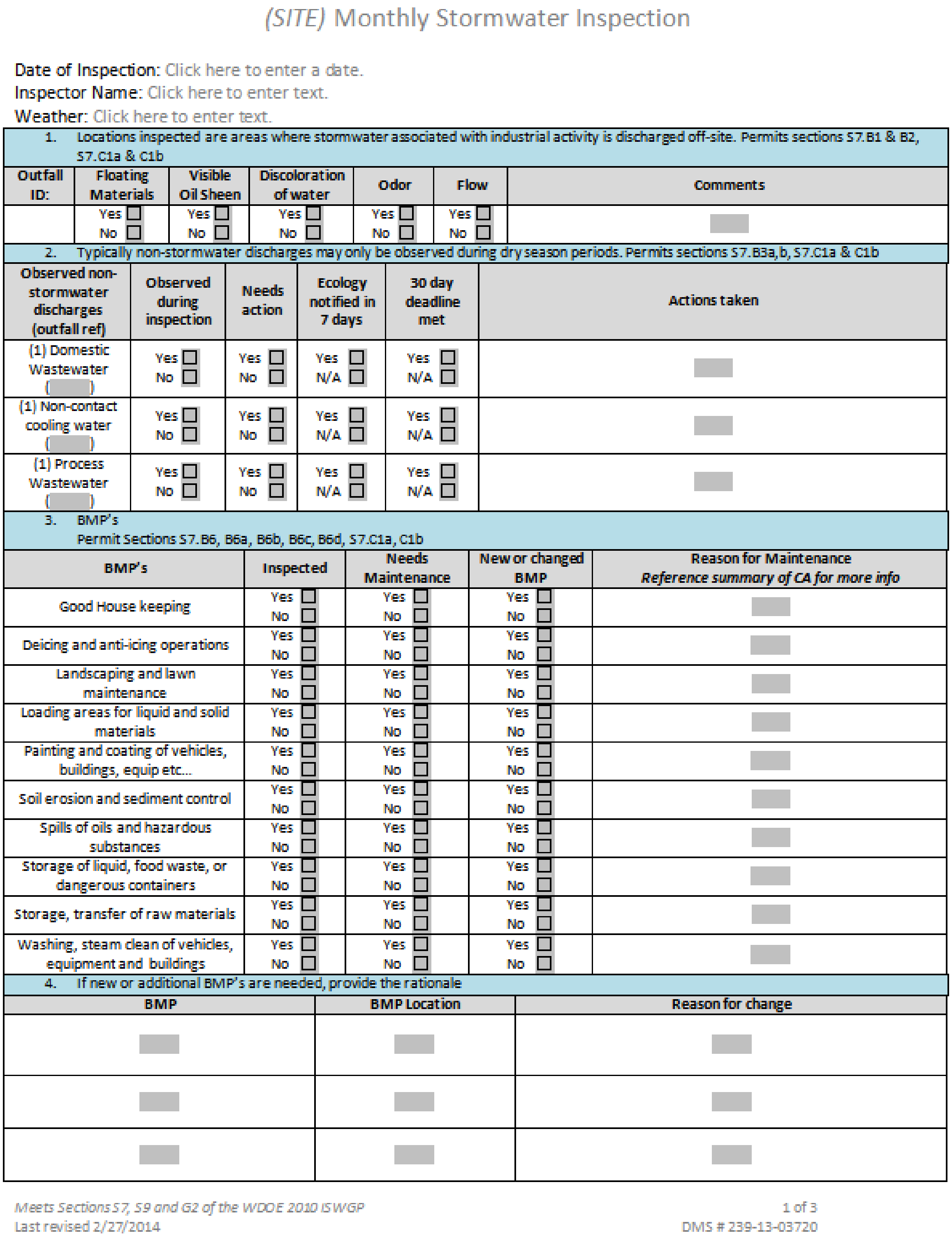
XMP	Exempt
na	not applicable
nr	not required
C.I	Cast iron
CRS	Corrosion resistant steel
Cu	copper
D.I.	Deionized water
dew	double wall
FRP	Fiberglass reinforced plastic
PE	polyethylene
GLV	galvanized steel
PVC	Polyvinyl chloride
STL	carbon steel
sw	single wall
CPT	Cathodic Protection Test

*Vault only

APPENDIX D – SPILL LOG

No reportable spills have occurred during the 2020 ISGP cycle. Any reportable spills will be documented in this section should they occur.

APPENDIX E – STORMWATER MONTHLY INSPECTION CHECKLIST AND QUARTERLY STORMWATER MONITORING AND SAMPLING FORM



(SITE) Monthly Stormwater Inspection

Date of Inspection: Click here to enter a date.
Inspector Name: Click here to enter text.
Weather: Click here to enter text.

1. Locations inspected are areas where stormwater associated with industrial activity is discharged off-site. Permits sections S7.B1 & B2, S7.C1a & C1b

Outfall ID:	Floating Materials	Visible Oil Sheen	Discoloration of water	Odor	Flow	Comments
	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	

2. Typically non-stormwater discharges may only be observed during dry season periods. Permits sections S7.B3a,b, S7.C1a & C1b

Observed non-stormwater discharges (outfall ref)	Observed during inspection	Needs action	Ecology notified in 7 days	30 day deadline met	Actions taken
(1) Domestic Wastewater ( )	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ N/A ☐	Yes ☐ N/A ☐	
(1) Non-contact cooling water ( )	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ N/A ☐	Yes ☐ N/A ☐	
(1) Process Wastewater ( )	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ N/A ☐	Yes ☐ N/A ☐	

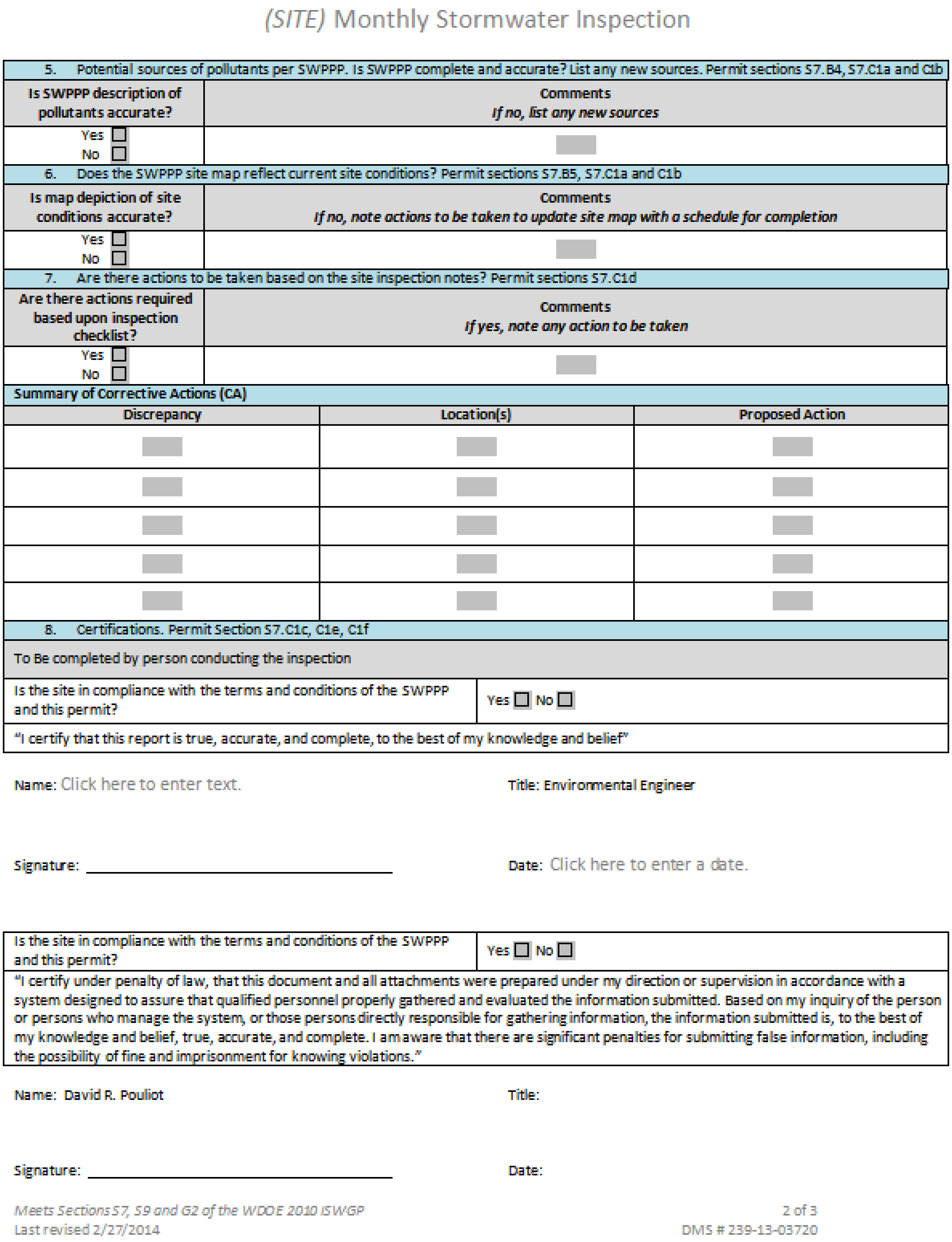
3. BMP's
Permit Sections S7.B6, B6a, B6b, B6c, B6d, S7.C1a, C1b

BMP's	Inspected	Needs Maintenance	New or changed BMP	Reason for Maintenance *Reference summary of CA for more info*
Good House keeping	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Deicing and anti-icing operations	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Landscaping and lawn maintenance	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Loading areas for liquid and solid materials	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Painting and coating of vehicles, buildings, equip etc…	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Soil erosion and sediment control	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Spills of oils and hazardous substances	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Storage of liquid, food waste, or dangerous containers	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Storage, transfer of raw materials	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	
Washing, steam clean of vehicles, equipment and buildings	Yes ☐ No ☐	Yes ☐ No ☐	Yes ☐ No ☐	

4. If new or additional BMP's are needed, provide the rationale

BMP	BMP Location	Reason for change

Meets Sections S7, S9 and G2 of the WDOE 2010 ISWGP 1 of 3
Last revised 2/27/2014 DMS # 239-13-03720



(SITE) Monthly Stormwater Inspection

5. Potential sources of pollutants per SWPPP. Is SWPPP complete and accurate? List any new sources. Permit sections S7.B4, S7.C1a and C1b	
Is SWPPP description of pollutants accurate?	**Comments** *If no, list any new sources*
Yes ☐ No ☐	
6. Does the SWPPP site map reflect current site conditions? Permit sections S7.B5, S7.C1a and C1b	
Is map depiction of site conditions accurate?	**Comments** *If no, note actions to be taken to update site map with a schedule for completion*
Yes ☐ No ☐	
7. Are there actions to be taken based on the site inspection notes? Permit sections S7.C1d	
Are there actions required based upon inspection checklist?	**Comments** *If yes, note any action to be taken*
Yes ☐ No ☐	

Summary of Corrective Actions (CA)

Discrepancy	Location(s)	Proposed Action

8. Certifications. Permit Section S7.C1c, C1e, C1f	
To Be completed by person conducting the inspection	
Is the site in compliance with the terms and conditions of the SWPPP and this permit?	Yes ☐ No ☐
"I certify that this report is true, accurate, and complete, to the best of my knowledge and belief"	

Name: Click here to enter text.

Title: Environmental Engineer

Signature: ______________________________

Date: Click here to enter a date.

Is the site in compliance with the terms and conditions of the SWPPP and this permit?	Yes ☐ No ☐
"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."	

Name: David R. Pouliot

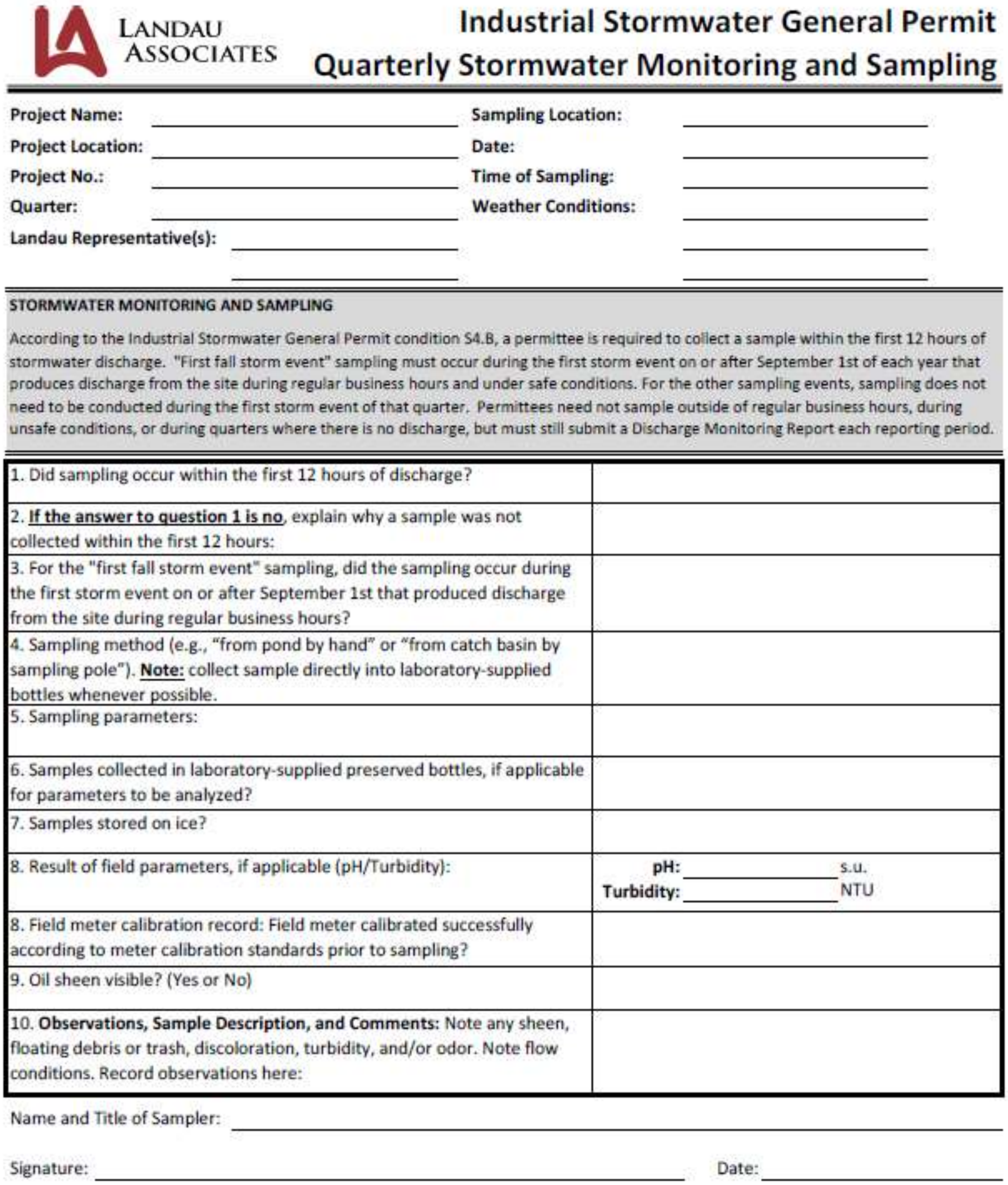
Title:

Signature: ______________________________

Date:

Meets Sections S7, S9 and G2 of the WDOE 2010 ISWGP
Last revised 2/27/2014

2 of 3
DMS # 239-13-03720



LANDAU ASSOCIATES

Industrial Stormwater General Permit
Quarterly Stormwater Monitoring and Sampling

Project Name: ______________________
Project Location: ______________________
Project No.: ______________________
Quarter: ______________________
Landau Representative(s): ______________________

Sampling Location: ______________________
Date: ______________________
Time of Sampling: ______________________
Weather Conditions: ______________________

STORMWATER MONITORING AND SAMPLING

According to the Industrial Stormwater General Permit condition S4.B, a permittee is required to collect a sample within the first 12 hours of stormwater discharge. "First fall storm event" sampling must occur during the first storm event on or after September 1st of each year that produces discharge from the site during regular business hours and under safe conditions. For the other sampling events, sampling does not need to be conducted during the first storm event of that quarter. Permittees need not sample outside of regular business hours, during unsafe conditions, or during quarters where there is no discharge, but must still submit a Discharge Monitoring Report each reporting period.

1. Did sampling occur within the first 12 hours of discharge?	
2. **<u>If the answer to question 1 is no</u>**, explain why a sample was not collected within the first 12 hours:	
3. For the "first fall storm event" sampling, did the sampling occur during the first storm event on or after September 1st that produced discharge from the site during regular business hours?	
4. Sampling method (e.g., "from pond by hand" or "from catch basin by sampling pole"). **Note:** collect sample directly into laboratory-supplied bottles whenever possible.	
5. Sampling parameters:	
6. Samples collected in laboratory-supplied preserved bottles, if applicable for parameters to be analyzed?	
7. Samples stored on ice?	
8. Result of field parameters, if applicable (pH/Turbidity):	**pH:** __________ s.u. **Turbidity:** __________ NTU
8. Field meter calibration record: Field meter calibrated successfully according to meter calibration standards prior to sampling?	
9. Oil sheen visible? (Yes or No)	
10. **Observations, Sample Description, and Comments:** Note any sheen, floating debris or trash, discoloration, turbidity, and/or odor. Note flow conditions. Record observations here:	

Name and Title of Sampler: ______________________

Signature: ______________________ Date: ______________________

APPENDIX F – STORMWATER OUTFALL IDENTIFICATION

OUTFALL NUMBER	**LATITUDE**	**LONGITUDE**	**LATITUDE**	**LONGITUDE**
	DEGREES, MINUTES, SECONDS		***DECIMAL DEGREES***	
13	47° 24' 56.3"	-122° 14' 59.44"	47.415639	-122.249844
18	47°25'09"	122°14'59"	47.419167	-122.249722
20A	47°25'14"	122°14'59"	47.420556	-122.249722
20B	47°25'14"	122°14'59"	47.420556	-122.249722

Industrial Activity?	**Discharge Point**	**LATITUDE**	**LONGITUDE**	**LATITUDE**	**LONGITUDE**
		DEGREES, MINUTES, SECONDS		***DECIMAL DEGREES***	
Y	**13**	47° 24' 58.17"	-122° 15' 10.13"	47.416157	-122.252813
N	**18**	47°25'9.1515"	122°15'15.3252"	47.419191	-122.254157
Y	**20C**	47°25'14.1384"	122°15'8.5896"	47.420594	-122.252386
Y	**20D**	47°25'14.2134"	122°15'8.586"	47.420615	-122.252385

🟨 indicates sampling point

APPENDIX G – BMPs AND ACTIONS TAKEN FOR LEVEL 2/3 RESPONSES

2010/2011
Outfall 20A

- Installed access structures to two 2000 ft. major storm system lines. Conducted storm line cleaning of these pipes from site detention pond to Mill Creek

2012
Outfall 14

- Increased street sweeping from once to twice per month
- Conducted a source control study to identify pollutant sources. Re-graded and stabilized specific areas of the outfall 14 drainage area.
- Revised container and equipment staging practices to minimize truck traffic in the area to minimize drag out

Outfall 16

- Increased street sweeping from once to twice per month
- Initiated source control to identify pollutant sources. Sampled runoff from structures considered to be possible pollutant sources

2013
Outfall 14

- Installed catch basin filters at all catch basins after re-grading and stabilization project

Outfall 16

- Continued source control study. Increased sampling plan to identify additional possible pollutant sources.

2014
Outfall 16

- Galvanized walkways on the 18-61 roof were removed and painted to reduce leaching of zinc into the storm system.
- The entire 16 drainage area was jet-cleaned to remove contaminates

2020
Outfall 14, 15, 16, 18 (OF 16 Level 2)

- Galvanized equipment on the 18-61, 18-62 and 18-41 roofs were removed or painted to reduce leaching of zinc into the storm system.

APPENDIX H – SUMMARY OF DOCUMENT REVISIONS

July 2021 **Tarah Erickson**

- Updated drainage area changes from 2020-2021 construction and addition of Pond B
- Updated discharge points
- Updated building numbers and equipment lists
- Updated site background to include 2020 divestiture and sale
- Added 2020 roof coating project for level 2 corrective action

September 2020 **Tarah Erickson**

- Updated sampling parameters list to include new parameters added in 2020
- Updated section describing roof coating activities in 2020

January 2020 **Landau Associates/Tarah Erickson**

- Removed references to the 2015 Permit & updated for the 2020 Permit
- Revised/updated procedures to match the new 2020 ISGP
- Updated SWMM references, including BMPs (section 4.1), to the 2019 version
- Added section 5.2.4
- Updated sections 5.1, 5.2.2, 5.2.3 and 5.2.5
- Updated site activity descriptions, site property sale information, future storm system plans and outfall changes.

September 2017 **Tarah Erickson**

- Changed “antifreeze” to “anti-ice” where applicable

June 2017 **Chad Budworth**

- Updated record storage location

October 2016 **Jolene Brokenshire**

- Updated hazardous material/waste plan references – removed
- Updated training reference
- Updated EVCT references
- Revised samplers to Landau Associates

April 2016 **Jolene Brokenshire**

- Updated Certification Page
- Removed references to the 18-24 & 35 buildings. They were demolished at the end of 2015.
- Minor administrative updates
- Removed reference to KS-7 (UST removed during 18-24/35 demo)

January 2015 **Jolene Brokenshire**

- Updated the Abstract
- Removed references to the EAL

- Included references to ARI
- Removed references to the 2010 Permit & updated for the 2015 permit
- Changed references to the Engineering offices to the 9-08.4
- Updated SWMM references to the 2012 version
- Updated sampling point determinations
- Updated section 5.2.3

August 2014 **Jolene Brokenshire**

- Updated to remove discharge location 14 as a representative sampling point and an area of industrial activity.
- Updated Appendix F – Outfall coordinates
- Updated drainage area/ discharge location descriptions
- Updated Sampling Point Locations 20A and 20B to reduce influence of backflow from the creek

2014 Revisions **Jolene Brokenshire/ Paul Morin**

Formatting

- Revised formatting to align better with other BDS SWPPPs

Certification Form

- Updated form from current permit

Facility description

- Revised facility description to reflect Striker Sale
- Noted removal of buildings, new site acreage, removal of outfalls, modifications to storm system and North Detention Pond

Industrial Activities

- Revised load test weight information
- Noted processes no longer applicable due to sale including the 162000 gal tank, 18-22 dust collectors, cooler heat exchangers on 18-11, and activities associated with 18-06 cafeteria, fire system discharges, cooling tower discharges.
- Noted Licensed Transportation presence in 18-43 parking lot.

Monitoring Plan

- Revised description of sampling equipment
- Outfall location deletions from Striker sale.
- Outfall 14 new BMPs

BMPs

- Updated Operational and Structural Source Control BMP section to reflect current practices and align with other PS BDS SWPPPs, the permit, and the SWMM
- Updated SWPPP table-defined by role and responsibility.
- Updated monthly inspection description
- Updated employee training program

Appendices

- Deleted references to tanks, dust collectors, scrubbers located on sold parcel
- Revised spill log to note three year report requirement
- Revised Monthly Inspection Checklist information
- Revised outfall location summary, added decimal for lat/long
- Added Appendix to note Level 2 and 3 Response BMPs and Actions

April 2010 Revisions

- Revised Sampling Plan
- Revised permit number prefix from SOO to WAR
- Added description of sampling points 14.26M and 16.26M
- Deleted language regarding visual inspections at specific outfalls as required by previous permit. Added language to address visual inspections at outfalls of industrial activity per current permit requirements
- Revised sampling parameters, sample collection requirements, equipment required per 2010 permit requirements.
- Added language regarding discretionary sampling for reference data and averaging sample results for DMR reporting.
- Added 2010 permit monthly inspections section to SWPPP document. (Retained previous permits' inspection files.)

February 2010 Revisions

- Updated org title from BDS to BDS. Updated group title from SHEA to EHS
- Updated last revision date
- Pollution Prevention team – updated names and phone numbers
- Updated Certification signature title block (not signed for this revision)

October 2008 Revisions

Control and Distribution

- Revised language to note that SWPPP will be re-certified annually, regardless if any updates have been incorporated.

General notes

- Removed references and required language and formatting for use through Document Release.
- References to Outfall 20 revised to refer to two discrete outfalls 20A and 20B

2. A) Visual Monitoring for Outfalls 24-28

- Noted planned stormwater drawing update for confirmation of Outfalls 24-28 locations, piping infrastructure

2. E) Analytical Parameters

- Revised language regarding sampling revisions due to consistent attainment and Level 2 and 3 Response status
- Added table to illustrate current Consistent Attainment and Level 2/3 Response status.

2. F) Sample collection /Handling Procedures

- Minor edits noting use of poly bottles permissible and glass not required (due to CA for Oil and Grease).

3. A) Operational Source Controls

- Added Nathaniel Gulion to SWPPP team.
- Employee Training
- Added reference to No Leaking Vehicle Stormwater Awareness Program in 2008

3. B) Structural and Operational Source Controls

- De-Icing and Anti-ice Operations – Corrected language that states we only use acetate based deicers. Added language stating site we continue to look at environmentally friendly alternatives.
- Maintenance and Repair of Vehicles and Equipment- Added language about Genie Hydraulic Booms and replacing O-rings annually during inspections as matter of routine

5. References

- Added reference to location of SWPPP WORD file on I drive

7. Appendices

- Aboveground Diesel tanks – revised containment from building to trench for KSA 93,94,95

Dust Collectors - deleted Aluminum and Steel dust collectors at 18-61

APPENDIX I – SUMMARY OF SUBMITTALS, ON-SITE DOCUMENTATION AND REQUIRED ACTIVITIES

Summary of Industrial Stormwater General Permit Reports and Submittals

Permit Section	Submittal	Frequency	Due Date
S1.F	Conditional "No Exposure" Certification Form	As necessary	As necessary, with renewals every 5 years
S2.A	Application for Permit Coverage	As necessary	As necessary
S2.B	Request Modification of Permit Coverage	As necessary	As necessary
S2.D	Request Transfer of Coverage	As necessary	As necessary
S8.D	Level 3 Engineering Report	As necessary	May 15, prior to Level 3 deadline
S8.D	Level 3 O&M Manual	As necessary	30 days after Level 3 installation
S9.B	DMRs	1/quarter	February 15; May 15; August 15; November 15
S9.C	Annual Report	1/year	May 15
S9.D	SWPPP, if requested by Ecology	Per Ecology request	Within 14 days of request
S9.F	Noncompliance Notification	As necessary	Within 30 days of noncompliance event
G8	Duty to Reapply	1/permit cycle	July 3, 2024

DMR = Discharge Monitoring Report
O&M = operations and maintenance
SWPPP = Stormwater Pollution Prevention Plan
Ecology = Washington State Department of Ecology

Summary of Required On-Site Documentation

The Permittee shall make all plans, documents, and records required by this permit (ISGP) immediately available to Ecology or the local jurisdiction upon request; or within 14 days of a written request from Ecology.

Per the ISGP Condition S9.D.1, the Permittee shall retain the following documents onsite for a minimum of five years:

a. A copy of this permit.
b. A copy of the permit coverage letter.
c. Records of all sampling information specified in Condition S4.B.4.
d. Inspection reports including documentation specified in Condition S7.
e. Any other documentation of compliance with permit requirements.
f. All equipment calibration records.
g. All BMP maintenance records.
h. All original recordings for continuous sampling instrumentation.
i. Copies of all laboratory reports as described in Condition S4.B.5.
j. Copies of all reports required by this permit.
k. Records of all data used to complete the application for the Permit.

Summary of Selected Permit-Required Activities

Permit Condition	Activity Description	Frequency
S7	Monthly Inspections	Qualified personnel conduct and document visual inspections of the site monthly on the monthly inspection checklist.
S3.B.4.b.i&ii	Apply BMPs by Industrial Activity	As needed
S3.B.4.b.i.5	Employee Training	At least once per year for employees who have duties in areas of industrial activities subject to this permit. At a minimum, the training plan shall include: a) The content of the training, an overview of what is in the SWPPP, how employees make a difference in complying with the SWPPP and preventing contamination of stormwater, spill response procedures, good housekeeping, maintenance requirements, and material management practices. b) How the Permittee will conduct training. c) The frequency/schedule of training. The Permittee shall train employees annually, at a minimum. d) A log of the dates on which specific employees received training.
S7.B.6	BMP Inspections	At least once per month during monthly inspections.
S3.B.4.b.i.2.a	Vacuum Sweeping	Vacuum paved surfaces with a vacuum sweeper (or a sweeper with a vacuum attachment) to remove accumulated pollutants a minimum of once per quarter.
S3.B.4.b.i.3.a	Catch Basin Cleaning	As needed, when depth of debris reaches 60 percent of the sump depth and when the depth of debris reaches 6 inches below outlet pipe.
S6.C.2.d	Storm Drain Line Cleaning	At least once in the term of the Permit, remove accumulated solids from storm drain lines (including inlets, catch basins, sumps, conveyance lines, and oil/water separators) on or beneath the Facility.

Permit Condition	Activity Description	Frequency
S3.B.4.b.i.2.d	Cover Solid Waste Storage Containers	Keep all dumpsters under cover or fit with a storm resistant lid that must remain closed when not in use. (Tarps are not considered storm resistant).
S7	Stormwater Observations	At least once per quarter during qualifying storm events (check for oil sheen) and also during monthly inspections, if conducted during a storm event.
S4	Sampling	Sampling at applicable stormwater discharge locations shall be conducted within the first 12 hours of a storm event at least once per quarter: • 1st Quarter = January, February, and March • 2nd Quarter = April, May, and June • 3rd Quarter = July, August, and September • 4th Quarter = October, November, and December* *Permittees shall sample stormwater discharge within the first 12 hours from the **first** fall storm event each year. “First fall storm event” means the first time on or after September 1st of each year that precipitation occurs and results in a stormwater discharge from a facility.
S9.B	DMR Submittal	Submit to Ecology by the DMR due date for the quarter.
S8	Corrective Actions	Implement: • Level 1 Corrective Actions within 14 days of receipt of sampling results, or the end of quarter, whichever is later; sign/certify and fully implement the revised SWPPP no later than the DMR due date for quarter the benchmark was exceeded • Level 2 Corrective Actions by August 31 of the following year • Level 3 Corrective Actions by September 30 of the following year.
S9.C	Submit Annual Report	Submit to Ecology by May 15 of each year starting.

APPENDIX J – BEST MANAGEMENT PRACTICES BY INDUSTRIAL ACTIVITY

Stormwater Pollution Prevention Plan (SWPPP)
Boeing Space Center (BSC) Kent
Washington Department of Ecology
(WDOE) Permit # WAR-000481

July 2021

Prepared by:
The Boeing Company
Boeing Defense, Space and Security (BDS) Puget Sound (PS)
Environment, Health and Safety (EHS)

Printed copies, other than the signed and stamped original, are for reference only. The Boeing BDS Puget Sound EHS Manager is responsible for maintaining the official signed and stamped original plan.

SWPPP CERTIFICATION FORM

The Permitee shall use this form to sign and certify that the Stormwater Pollution Prevention Plan (SWPPP) is complete, accurate and in compliance with Conditions S3 and S8 of the Industrial Stormwater General Permit.

- A SWPPP certification form needs to be completed and attached to all SWPPPs.
- Each time a Level 1, 2, or 3 Corrective Action is required, this form needs to be re-signed and re-certified by the Permitee, and attached to the SWPPP.

Is this SWPPP certification in response to a Level 1, 2 or 3 Corrective Action? ☐ **Yes** ☒ **No**
If Yes:

- Type of Corrective Action?: Level 1 ☐ Level 2 ☐ Level 3 ☐
- Date SWPPP update/revision completed:

"I certify under penalty of law that this SWPPP and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate information to determine compliance with the Industrial Stormwater General Permit. Based on my inquiry of the person or persons who are responsible for stormwater management at my facility, this SWPPP is, to the best of my knowledge and belief, true, accurate, and complete, and in full compliance with Permit Conditions S3 and S8, including the correct Best Management Practices from the applicable Stormwater Management Manual. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

John Sherman	Puget Sound Senior Manager, Environment
Operator's Printed Name *	Title
	7-26-21
Operator's Signature *	Date

* Federal regulations require this document to be signed as follows:

For a corporation, by a principal executive officer of at least the level of vice president; for a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or for a municipality, state, federal, or other public facility, by either a principal executive officer or ranking elected official.

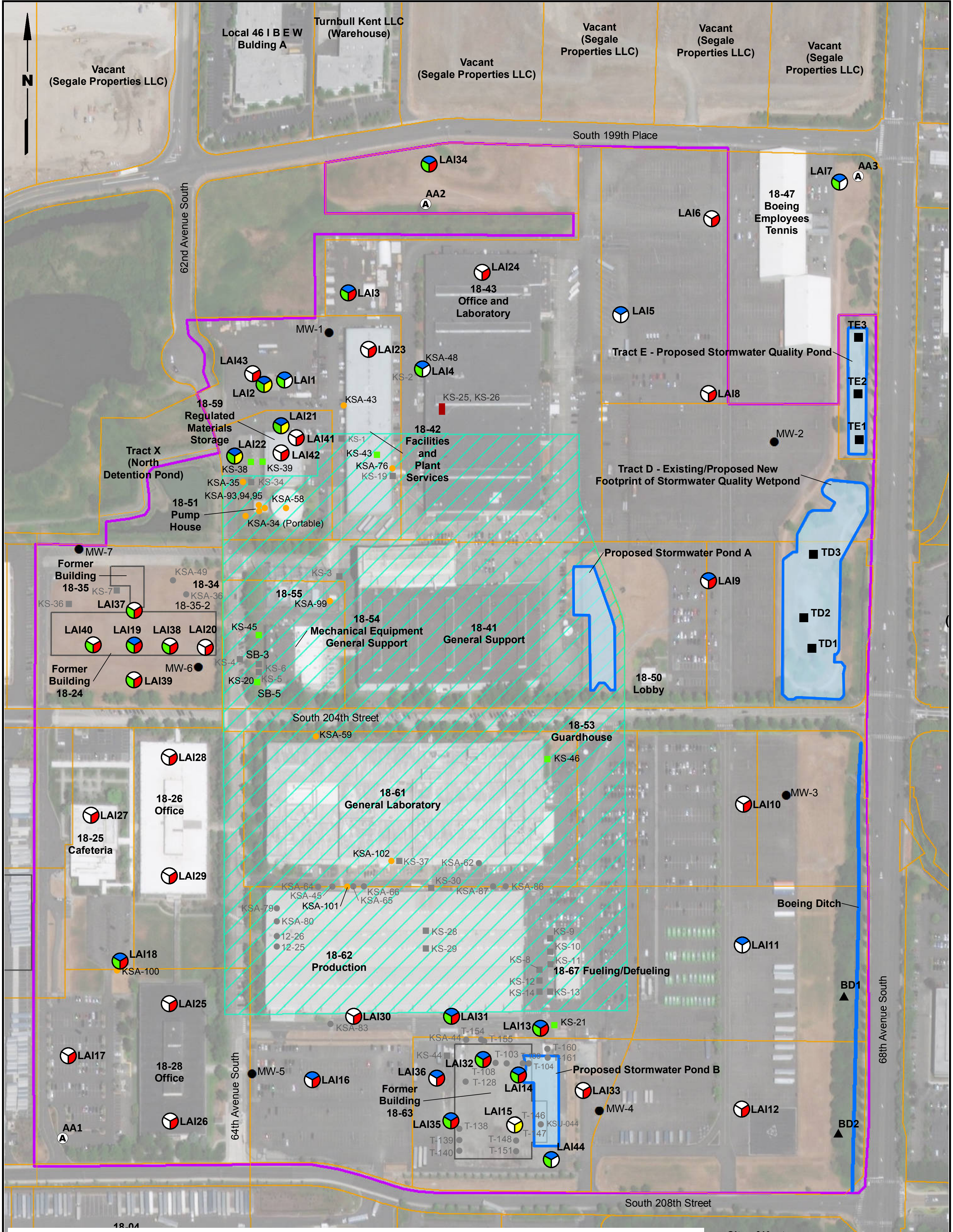
This document shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if: 1) The authorization is made in writing by a person described above and submitted to Ecology, and 2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

Changes to authorization: If an authorization under number 2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of number 2 above shall be submitted to Ecology prior to, or together with, any reports, information, or applications to be signed by an authorized representative.

Appendix F

Due Diligence Investigation Maps

G:\Projects\025\213\210\213\Phase II ESA\F02SitePlan.mxd 1/18/2019



Legend

Ⓐ Ambient Air Sample

● Existing Monitoring Well

◕ Groundwater Sample

◕ Soil Sample

◕ Soil Gas Sample

◕ Soil Gas Well Installed - No Sample Collected

▲ Boeing Ditch Sample

■ Stormwater Feature Sample

● Current Aboveground Storage Tank

● Removed Aboveground Storage Tank

■ Current Underground Storage Tank/Vault/Sump

■ Decommissioned in Place Underground Storage Tank

■ Removed Underground Storage Tank/Vault/Sump

▭ Current Boeing Kent Space Center Boundary

▭ Historical Buildings

▨ Area Excluded from Phase II

▭ Stormwater Ponds

Notes

1. Only Phase II ESA locations and data are shown on this figure.
2. Tank locations are approximations. Please refer to Boeing internal documents for precise locations.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Sources: Boeing; King County GIS; Esri World Imagery.

0 250 500

Scale in Feet

LANDAU ASSOCIATES

Boeing Kent Space Center
Kent, Washington

Site Plan and Sampling Locations

Figure
2

Appendix G

Previous Arsenic Evaluations

The Boeing Company
P.O. Box 3707
Seattle, WA 98124-2207

October 11, 2011
9L-22-N410-JLF-172

Washington State Department of Ecology
Northwest Regional Office
Hazardous Waste and Toxics Reduction Program
3190 160th Avenue SE
Bellevue, Washington 98008-5452

Attn: Byung Maeng, P.E.

RE: EVALUATION OF ARSENIC IN GROUNDWATER
STRIKER PROPERTY SOUTH
BOEING SPACE CENTER
KENT, WASHINGTON

Dear Mr. Maeng:

The Boeing Company (Boeing) recently submitted a request to the Washington State Department of Ecology (Ecology) for removal of the Striker South Property (subject property) from the Boeing Space Center (BSC) Resource Conservation and Recovery Act (RCRA) Interim Status Facility (WAD 061670766; Boeing 2011). As part of its review, Ecology requested additional information regarding the arsenic concentrations detected in groundwater at the BSC. This letter provides a summary of the available data for arsenic in groundwater at the BSC and our evaluation of the nature and occurrence of the detected concentrations.

BACKGROUND

Groundwater sampling was conducted at the subject property in 2010 and 2011 as part of due diligence prior to potential sale of a portion of the BSC known as the Striker Property, which includes the subject property. Dissolved arsenic was detected in groundwater samples collected throughout the subject property at concentrations ranging from 0.3 micrograms per liter (µg/L) to 114 µg/L, and the concentrations detected at many locations were greater than the screening level of 5 µg/L, which was developed based on the Model Toxics Control Act (MTCA) Method B cleanup level for protection of groundwater as drinking water (Landau Associates 2010). The investigations conducted to date, which included assessment to evaluate the nature and extent of the arsenic concentrations detected in groundwater, have not identified a potential source of arsenic at the subject property or at the BSC. Based on available data, and as discussed below, the elevated concentrations of arsenic in groundwater are isolated, reflect area-wide conditions, are not attributable to sources at the BSC, and do not pose a risk to human health or the environment.

ARSENIC DATA FROM PREVIOUS INVESTIGATIONS AT BOEING SPACE CENTER

Boeing gathered and reviewed available arsenic groundwater data collected during previous investigations at the BSC, including the subject property. The available arsenic data for the BSC are summarized in Table 1. Available arsenic data for the Striker Property are presented on Figure 1.

Building 18-03

Between 1992 and 1994, groundwater samples were collected for laboratory analysis from five monitoring wells installed on the east side of Building 18-03, in the area of a former chrome waste underground storage tank (UST) system. Dissolved arsenic was detected in the samples at concentrations ranging from 16 µg/L to 25 µg/L (Figure 1; Weston 1994). In a letter dated February 27, 1995, Ecology accepted certification for clean closure of the tank system (Ecology 1995).

Former Gun Club

In October 1998, groundwater samples were collected from four direct-push borings during site characterization activities at the BSC Gun Club, which was formerly located directly north of the Striker Property (in the current location of the stormwater detention pond). The detected concentrations of dissolved arsenic ranged from 13 µg/L to 42 µg/L (Landau Associates 1999). In October 1999, following soil remediation activities in the summer of 1999, groundwater samples were collected and analyzed from three monitoring wells installed in the former source area. The dissolved arsenic concentrations detected in the groundwater samples ranged from 6.7 µg/L to 12.4 µg/L. The wells were re-sampled in March 2000 and the samples were analyzed for total and dissolved arsenic. The detected concentrations of total arsenic ranged from 4 µg/L to 23 µg/L; the dissolved arsenic concentrations were only slightly lower than the total concentrations and ranged from 3 µg/L to 19 µg/L. The results of the 1999 groundwater monitoring were included in the final cleanup report submitted to Ecology in April 2000 (AGI 2000). The results of the 2000 groundwater monitoring were included in an addendum to the final cleanup report (discussed below).

In April 2000, AGI Technologies prepared an addendum to the final cleanup report for the Gun Club at the request of Ecology. The addendum presented an evaluation of the source of metals detected in groundwater and concluded that the arsenic detected in groundwater at the BSC comes from natural sources. A copy of the addendum is attached. In August 2000, based on the data presented in the addendum, Ecology issued a No Further Action (NFA) determination for the Gun Club facility under the Voluntary Cleanup Program (VCP). The NFA letter acknowledged that "arsenic concentrations in groundwater that exceed MTCA Method A limits are likely the result of nature, and not the result of a known release at the Gun Club site." A copy of the NFA letter is attached.

Building 18-54

In April 2009, three monitoring wells were installed in the area of Building 18-54 (located east of the Striker Property) to document groundwater conditions prior to upgrades to an existing substation by Puget Sound Energy. Dissolved arsenic was detected in the groundwater samples collected from each of the wells at concentrations ranging from 24 µg/L to 51 µg/L (Boeing 2001; GeoEngineers 2009).

DISSOLVED ARSENIC AT STRIKER SOUTH PROPERTY

The dissolved arsenic concentrations detected in the groundwater samples collected at the Striker South Property are shown on Figure 1. The highest concentrations of arsenic were detected in the groundwater samples collected from an undeveloped portion of the Striker South Property, between Building 18-20 to the north and Building 18-03 to the south. Arsenic was detected at concentrations about 20 times greater than the screening level in this area (114 µg/L at DP-5 and 111 µg/L at DP-27). There has been no handling, use, or storage of any arsenic-containing material in this area. Waste profile records for the contents of the former chrome waste UST system at Building 18-03, which is located about 600 feet to the southeast of this area, indicate that the waste stream included arsenic. Analytical results for a sample of the tank contents indicate that total arsenic was detected at a concentration of 34.9 milligrams per liter (34,900 µg/L) (Weston 1994). As noted above, during the closure of the UST system, arsenic was detected at concentrations ranging from 16 µg/L to 25 µg/L in samples collected from monitoring wells in the immediate vicinity of the UST system. The detected concentrations of dissolved arsenic in groundwater samples collected from direct-push borings DP-28 through DP-30 (located between the former UST system and direct-push borings DP-5 and DP-27) ranged from 1.1 µg/L to 31.9 µg/L. Based on the investigations conducted in the area and the associated groundwater data, the elevated concentrations of arsenic detected in groundwater at DP-5 and DP-27 appear to be isolated and are not associated with the former UST system, which is the only known potential source of arsenic on the Striker South Property.

Elevated concentrations of arsenic (65.4 µg/L at DP-31 and 43.8 µg/L at DP-11) were also detected in groundwater samples collected from locations in the southwest, undeveloped portion of the Striker South Property. There has been no development in this area and no handling, use, or storage of any arsenic-containing material. Arsenic was detected at concentrations below the screening level in two samples collected from the immediate vicinity of DP-31 and DP-11 (2.8 µg/L at DP-32 and 0.3 µg/L at DP-33); therefore, the elevated concentrations of arsenic appear to be isolated and not associated with a release. As with the other locations at the subject property, the investigations conducted and the associated groundwater data indicate that the elevated concentrations of arsenic detected in groundwater at DP-31 and DP-11 appear to be isolated and are not associated with known or potential sources of arsenic on the Striker South Property.

CONCLUSIONS

Dissolved arsenic is present in groundwater at the Striker South Property at concentrations greater than the screening level. Based on the investigations conducted to date and the available analytical and historical data, the elevated concentrations of arsenic detected in groundwater are isolated, are the result of regional conditions, and are not the result of sources associated with Boeing operations.

Groundwater at the BSC is not used for drinking water. Boeing's purchase and sale agreement with the prospective buyer of the Striker Property includes a restriction on the use of groundwater. As an added level of protection, Boeing is willing to pursue a formal environmental covenant to restrict the use of groundwater. The arsenic present in groundwater at the Striker Property does not pose a potential threat to human health or the environment; therefore, Boeing requests that the site not be listed on the Confirmed and Suspected Contaminated Sites List.

We would appreciate the opportunity to discuss the information presented in this letter with you and to answer questions that you may have regarding the detected concentrations of arsenic in groundwater at the Striker South Property. Please e-mail or call me to schedule a time to discuss this request.

Sincerely,

Joe Flaherty
Project Manager
EHS Remediation Group
(206) 769-5987
joseph.l.flaherty@boeing.com

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ATTACHMENTS

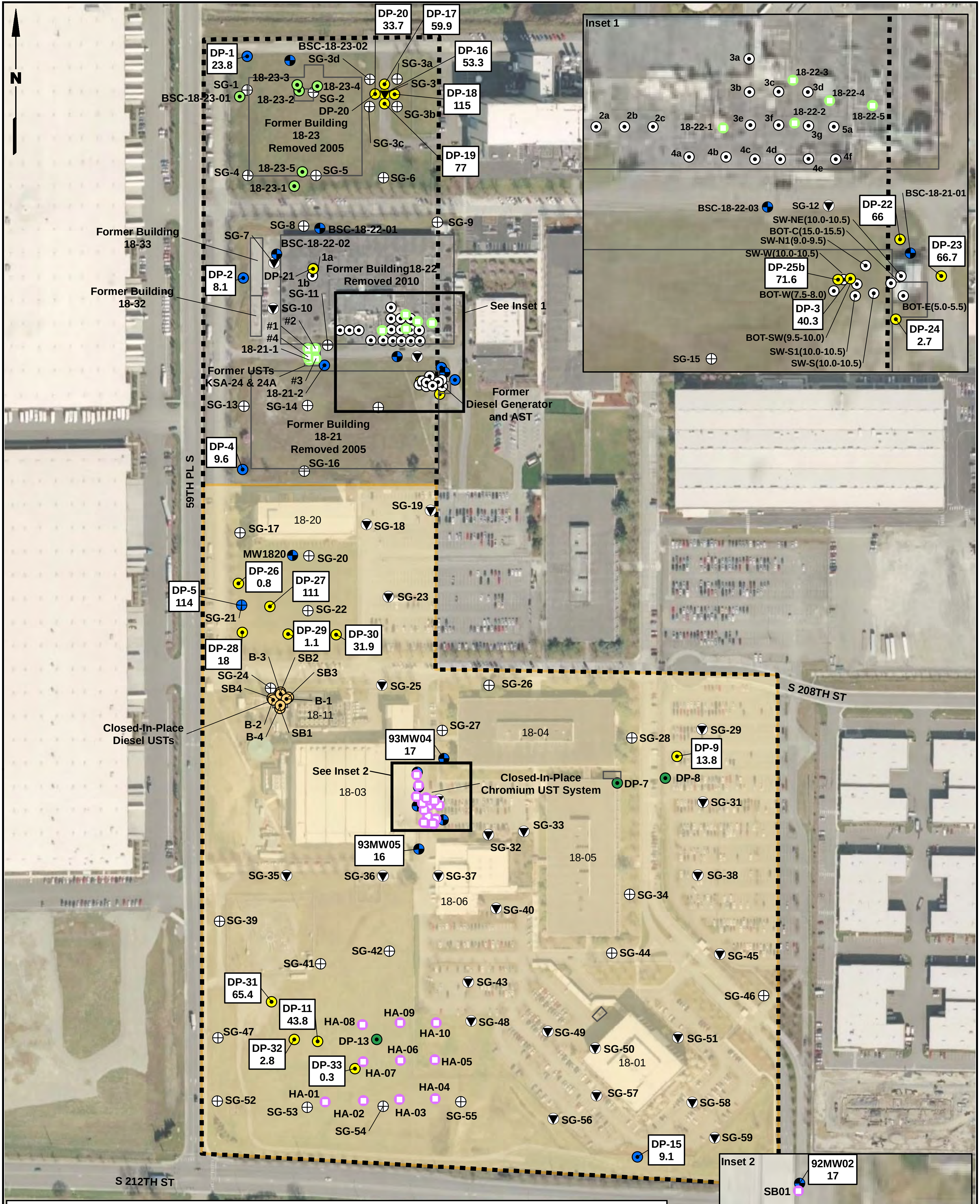
Figure 1: Detected Concentrations of Dissolved Arsenic in Groundwater

Table 1: Detected Concentrations of Dissolved Arsenic in Groundwater

AGI Letter Report: *Groundwater Monitoring and Evaluation Addendum, Boeing Space Center Gun Club Soil Cleanup, Kent Washington*. April 28, 2000.

Washington State Department of Ecology Letter: *No Further Action Determinatio*n, Boeing Space Center Gun Club, Kent, Washington. August 22, 2000.

Y:\Projects\025195\Mapdocs\Revised\Fig1-DetectedArsenic.mxd 10/11/2011 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Legend

- ● Direct-Push Soil and Groundwater Samples (2010-2011)
- ● Direct-Push Groundwater Sample (2010-2011)
- ● Direct-Push Soil Sample (2010)
- ▼ Sub-slab Vapor Samples Using Hand Tools (2010)
- ▼ Sub-slab Vapor Samples Using Hand Tools, Direct-Push Soil and Groundwater Samples (2010)
- ⊕ Soil Gas Samples from Direct-Push Boring (2010)
- ⊕ Soil Gas and Groundwater from Direct-Push Boring (2010)
- ◐ Groundwater Sample - Monitoring Well (Abandoned)
- ⊙ Soil Grab Samples (2010)
- ● Direct-Push Soil and Groundwater Samples (1996-1998)
- ● Direct-Push Soil and Groundwater Samples (2002-2003)
- ○ Soil Sample - Hand Auger (2002-2005)
- ○ Soil Sample - Hand Auger (1987-1994)
- ▭ Project Boundary
- ▭ Striker South

0 250 500

Scale in Feet

Data Source: Google Earth Image; King County GIS

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.
2. All Arsenic results shown are in µg/L.

LANDAU ASSOCIATES

Project Striker
Kent, Washington

Detected Concentrations of Dissolved Arsenic in Groundwater

Figure
1

TABLE 1
DETECTED CONCENTRATIONS OF DISSOLVED ARSENIC IN GROUNDWATER
BOEING STRIKER PROPERTY
KENT, WASHINGTON

Sample ID	**Date**	**Dissolved Arsenic (µg/L)**
KSC-DP-1	7/28/2010	**23.8**
KSC-DP-2	7/30/2010	**8.1**
KSC-DP-3	7/30/2010	**40.3**
KSC-DP-4	7/29/2010	**9.6**
KSC-DP-5	7/30/2010	**114**
KSC-DP-9	7/29/2010	**13.8**
KSC-DP-11	7/30/2010	**43.8**
KSC-DP-15	7/30/2010	**9.1**
KSC-DP-16	7/30/2010	**53.3**
KSC-DP-17	1/27/2011	**59.9**
KSC-DP-18	1/27/2011	**115**
KSC-DP-19	1/27/2011	**77**
KSC-DP-20	1/27/2011	**33.7**
KSC-DP-22	1/26/2011	**66**
KSC-DP-23	1/26/2011	**66.7**
KSC-DP-24	1/26/2011	**2.7**
KSC-DP-25b	1/26/2011	**71.6**
KSC-DP-26	1/25/2011	**0.8**
KSC-DP-27	1/25/2011	**111**
KSC-DP-28	1/25/2011	**18**
KSC-DP-29	1/25/2011	**1.1**
KSC-DP-30	1/25/2011	**31.9**
KSC-DP-31	1/26/2011	**65.4**
KSC-DP-32	1/26/2011	**2.8**
KSC-DP-33	1/26/2011	**0.3**
Building 18-03		
92MW-01	11/21/1994	**19**
92MW-02	11/21/1994	**17**
92MW-03	11/21/1994	**25**
93MW-04	11/21/1994	**17**
93MW-05	11/21/1994	**16**
Building 18-54		
MW-1	4/27/2009	**27**
MW-2	4/27/2009	**24**
MW-3	4/27/2009	**51**
Gun Club		
P-1	10/26/1998	**42**
P-2	10/26/1998	**13**
P-3	10/26/1998	**18**
P-4	10/26/1998	**21**
KGC-MW-1	3/6/2000	**19**
KGC-MW-2	3/6/2000	**3**
KGC-MW-3	3/6/2000	**12**

Bold = Detected compound.

Box = indicates detected concentration exceeds screening level (5 µg/L).

AGI
TECHNOLOGIES
A **CDM** COMPANY

April 28, 2000

14,327.321

Mr. Brian Anderson
The Boeing Company
Shared Services Group
Post Office Box 3707, MC7A-WW
Seattle, Washington 98124-2207

Dear Brian:

Addendum
Groundwater Monitoring and Evaluation
Boeing Space Center Gun Club Soil Cleanup
Kent, Washington

This letter report provides additional groundwater information collected subsequent to completion of soil cleanup and reporting for a gun club operated by Boeing employees at the Kent Space Center. Low levels of lead and arsenic have been detected in shallow site groundwater. As requested by the Washington Department of Ecology (Ecology) after review of the draft soil cleanup report, this addendum further evaluates the source of metals in groundwater.

ADDENDUM BACKGROUND

Soil cleanup at the gun club was completed during late summer, early fall 1999 by stabilization and removal of 4 to 12 inches of soil from a 19.2 acre area. Conservative Model Toxics Control Act (MTCA) residential cleanup levels were met with shallow excavation depths indicating that contaminants of concern (lead and polycyclic aromatic hydrocarbons [cPAH]) had not appreciably migrated. Following soil cleanup, site groundwater in the most highly impacted source areas was evaluated by installation and sampling of three shallow groundwater monitoring wells (approximately 20 feet below ground surface). For reference, monitor well logs are included as an attachment. Well locations were chosen on the basis that source areas had not been altered and had been continuous since the early 1970's. Consequently, if groundwater had been impacted at all by gun club chemicals of concern, we expected to see impacts in the source center areas.

Water samples were collected in October 1999 and were analyzed for lead, arsenic, and carcinogenic (cPAH). The lead and cPAH were the primary chemicals of concern for gun club soils, but arsenic was also included as an analyte since it had been detected in groundwater in a precleanup assessment (Landau, 1999). The post cleanup groundwater sampling results were presented as part of the soil cleanup report (AGI, 2000). These results indicated very low lead concentrations below MTCA Method A (5 parts per billion [ppb]), except one duplicate sample which contained 6 ppb lead. CPAH was not detected in any of the three wells. Arsenic was detected at relatively low ppb levels ranging from 3 to 16 micrograms per liter (µg/L). Based on discussions with Ecology, additional

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actions were requested to address or further define the source of very low lead and arsenic concentrations in shallow groundwater at the site. In summary, the following actions have been completed in support of this groundwater addendum:

- The three onsite groundwater monitoring wells were resampled by Boeing on March 6, 1999 and analyzed for both total and dissolved lead and arsenic.
- Further research was performed to establish typical background arsenic and lead concentrations in soil and shallow groundwater within the Kent area and Green River Valley.

KENT GUN CLUB GROUNDWATER SAMPLING

The three onsite monitoring wells, KGC-MW1 through KGC-MW3, were repurged and sampled in early March 2000 using low-flow techniques and a peristaltic pump. This sampling event would be considered a wet season event, versus the dry season performed in October 1999. Groundwater levels, as measured from top of casing, for each of the sampling events are listed as follows:

Well No.	October 25, 1999	March 6, 2000
KGC-MW1	15.3 feet	9.12 feet
KGC-MW2	14.81 feet	6.13 feet
KGC-MW3	14.17 feet	7.47 feet

Groundwater levels rose 6 to 8 feet during the winter between October and March, with the static water table occurring 5 to 7 feet below ground surface.

During the March 2000 sampling event, dissolved metals samples were collected to further evaluate whether metals concentrations could be affected by soil turbidity within the groundwater samples. The three shallow wells produce very low quantities of slightly silty water, since the first water-bearing zone encountered is fine-grained silts and silty sands. Dissolved metal samples were field-filtered with a 45 micron filter to remove suspended solids.

Results of the October 1999 and March 2000 sampling event are summarized in **Table 1.** The original lab reports and Quality Assurance/Quality Control review are included as an attachment. In summary, March 2000 arsenic concentrations range from 4 to 23 μg/L with dissolved arsenic concentrations being slightly lower than totals. These results are consistent with the October 1999 sampling event. Total lead concentrations from the three wells were 2 to 3 μg/L in March 2000 and dissolved concentrations were not detectable.

Total lead concentrations are below the MTCA Method A cleanup level of 5 μg/L and sampling data also indicates that lead detected may be associated with slight to moderate soil turbidity present in the water samples collected. The lead results are typical of background in the Kent Valley and likely have no relationship to lead from gun club cleanup operations. Based on this, these levels do not require further action for the site. Arsenic concentrations slightly exceed the MTCA Method A cleanup levels for groundwater, but the arsenic appears to be associated with regional background conditions, as described in following paragraphs. Both the lead and arsenic are below current drinking water standards (Maximum Contaminant Levels [MCL]) which are 15 μg/L for lead and 50 μg/L for arsenic.

REGIONAL AND LOCAL OCCURRENCES OF ARSENIC AND LEAD IN GROUNDWATER AND SOIL

Groundwater

Arsenic is a naturally occurring source of regional groundwater contamination in Washington State (Ecology, 1999). Turney and others (1995) identified arsenic concentrations ranging from less than 1 to 77μg/L in 64 percent of wells sampled in East King County. Elevated concentrations of arsenic have been documented in other areas of Western Washington, including Snohomish County, which had listed groundwater concentrations as high as 15,000 μg/L. Information obtained from the Washington State Department of Health (WSDH) database showed significant arsenic in many area wells. Specifically, the WSDH database notes nine water supply wells in the vicinity of the Gun Club (Township 22, Range 4E and Range 5E) with 2 to 25 μg/L arsenic (see **Table 2**).

The source of the arsenic in the groundwater comes from natural sources. The highest concentrations of arsenic are associated with igneous or volcanic "bedrock" or with sedimentary deposits containing igneous material (Turney, 1995). Although bedrock does not outcrop near the Kent Space Center and is buried beneath 800 to 1,000 feet of sediment in the area (Hill & Othberg, 1974), the uppermost sedimentary deposits in the Kent Valley are derived from the Cascade Mountains and have a high proportion of volcanic fragments. In fact, the uppermost sediments are colloquially termed the "Duwamish Sand" based on a characteristic black color speckled with red. The black particulates originate from basalts and other volcanic materials and the red particles are derived from andesite.

Significant regional lead comparison data were not available, since most testing observed had detection levels of 5 μg/L and site lead levels are below this level. Also, since the drinking water standard for lead is 15 μg/L, lead has not been a significant regional concern. However, the WSDH database did have several wells in the Kent area with lead, as shown in **Table 3**.

Soil

Based on review of gun club assessment data, site soil background levels for lead and arsenic can be generally determined. Site soil samples that did not appear to be impacted by gun club contaminants contained about 5 mg/kg arsenic and 10 mg/kg lead. These values are consistent with Ecology publication, *Natural Background Soil Metals Concentrations in Washington*. In this document, the Puget Sound 90th percentile value for arsenic and lead are 7.8 and 16.8, respectively. Consequently, the natural soil background concentrations of lead and arsenic in soil can contribute to groundwater detections; particularly if groundwater samples contain soil turbidity introduced by sampling procedures.

DATA FROM SHALLOW KENT VALLEY GROUNDWATER MONITORING WELLS

In order to further verify that arsenic levels and lead levels are the result of a regional condition and not onsite contamination, we also obtained locally available shallow groundwater monitoring well data. Specifically, groundwater data were available from another area of the Boeing Kent Space Center facility and the Boeing Auburn Facility, which is also located in the Green River Valley.

Kent Space Center

During the early 1990's, Boeing closed a micromation tank at the Kent Space Center. The site is approximately 3,000 feet southeast and likely upgradient of the gun club. Arsenic and lead results are shown in **Table 4**. Three shallow wells were installed and groundwater was tested for metals during two sampling events (December 1992 and January 1993). Arsenic concentrations (3 to 21 µg/L) have not been linked to any contamination source at the site and can only be explained by the regional occurrence of arsenic in groundwater. Lead levels ranging from 1 to 30 µg/L were detected. The samples with 1 to 6 µg/L of lead are consistent with a background condition. Several higher detections in the first round could have been related to site impacts.

Boeing Auburn

The Boeing Auburn facility is also located to the south and upgradient in the Green River Valley. Due to various environmental actions, groundwater monitoring in the shallow water zone has been ongoing for many years and a similar arsenic and lead background condition has been noted. August 1999 groundwater data from the Boeing Auburn facility showed eight out of 27 samples collected exhibited concentrations of arsenic and lead in the groundwater. The arsenic concentrations ranged from 5 to 20 µg/L; lead ranged from 2 to 9 µg/L and was detected in most wells where arsenic exceeded 5 µg/L. These arsenic and lead concentrations have not been linked to any contamination source at the site, and can best be explained by the regional occurrence of arsenic and lead in groundwater. This data is very similar to that observed at the gun club.

SUMMARY AND CONCLUSIONS

Based on additional sampling performed at the gun club, further research of regional information and data sources; and obtaining other site-specific shallow groundwater data from two Boeing sites upgradient and within the Green River Valley; we believe that conclusive statements can be made regarding metals concentration and shallow groundwater at the gun club site as follows:

- **Lead**

  The October 1999 and March 2000 sampling results indicate that lead is below MTCA Method A cleanup levels and drinking water standards during both the dry and wet seasons, and that low levels detected are associated with sample turbidity and natural soil background conditions. The lead detected is associated with soil turbidity since dissolved lead concentrations were not detectable.

- **Arsenic**

  Low levels of arsenic in site groundwater occur in the dissolved phase and exceed the MTCA Method A cleanup level of 5 µg/L, but are below current drinking water quality standards of 50 µg/L. Further research performed for this addendum indicates that arsenic concentrations in the ranges detected are commonly found as natural background conditions throughout the area and region and specifically within the Green River Valley. Background arsenic concentrations at two upgradient Boeing sites in the Green River Valley were similar to those of the gun club.

In summary, this addendum supports the statement that Boeing Gun Club activities did not adversely impact site groundwater.

Sincerely,

AGI Technologies, a CDM Company

Jessica R Garofalo

Jessica R. Garofalo
Staff Geologist

Martin E. Carlson, P.E.
Principal Engineer

cc: Mr. Ron Timm, Ecology

enclosures

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REFERENCES

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TABLES

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Table 1
Arsenic, Lead and CPAHs in Site Groundwater Quantified by EPA Method 7060,7421, and 8270

Boeing/Kent Gun Club
Kent, Washington

		Total Metals			Dissolved Metals		
	Sample	Arsenic	Lead	Turbidity	Arsenic	Lead	Turbidity
Sample I.D.	Date	µg/L		NTU	µg/L		NTU
KGC-MW1-10/99	10/26/99	10	2	--	--	--	--
KGC-MW1-000306	03/06/00	23.0	2.0	40	19.0	ND	1.5
KGC-MW2-10/99	10/26/99	6	ND	--	--	--	--
KGC-MW2-000306	03/06/00	4.0	2.0	68	3.0	ND	0.5
KGC-MW3-10/99	10/26/99	12	1	--	--	--	
KGC-MW4-10/99 (Duplicate)**	10/26/99	14	6	--	--	--	--
KGC-MW3-000306	03/06/00	15.0	3.0	57	12.0	ND	0.5
Method A Cleanup Level ^{a}		5	5		5	5	

	Sample I.D.		
	KGC-MW1 10/99	KGC-MW2 10/99	KGC-MW3 10/99
Compound	µg/L		
Naphthalene	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Fluorene	ND	ND	ND
Phenanthrene	ND	ND	ND
Anthracene	ND	ND	ND
Fluoranthene	ND	ND	ND
Pyrene	ND	ND	ND
Benzo[a]anthracene*	ND	ND	ND
Chrysene*	ND	ND	ND
Benzo[b]fluoranthene*	ND	ND	ND
Benzo[k]fluoranthene*	ND	ND	ND
Benzo[a]pyrene*	ND	ND	ND
Indeno[1,2,3-cd]pyrene*	ND	ND	ND
Dibenz[a,h]anthracene*	ND	ND	ND
Benzo{g,h,I]perylene*	ND	ND	ND
Total CPAHs	ND	ND	ND
Method A Cleanup Level ^{a} (total cPAHs)	0.1	0.1	0.1

Notes:

*Carcinogenic PAH (cPAH).

**Sample is a duplicate of MW-3.

Detection limit for lead and PAH is 1µg/L and 0.1 µg/L, respectively.

Shaded value exceeds cleanup level.

a) Washington Administrative Code Chapter 173-340 Model Toxics Control Act Cleanup Regulation Method A suggested cleanup level for groundwater.

µg/L - microgram per liter.

ND - not detected.

-- not analyzed.

Table 2

Arsenic Concentrations in Groundwater, Public Water Systems in T22N, R4E and R5E, King County

Washington State Department of Health Data Base

Boeing/Kent Gun Club
Kent, Washington

Township	Range	Section	QTR	Name	Sample Number	Result (mg/L)
22	04E	8	NENE	HIGHLINE WATER DISTRICT	12015	0.023
22	04E	8	NWSE	KING COUNTY WATER DISTRICT #54	9819	0.0034
22	04E	9	NENE	HIGHLINE WATER DISTRICT	12015	0.023
22	05E	14	NESW	REICHEL/SCANLON SYSTEM	15394	0.028
22	05E	21	SWSW	KING COUNTY WATER DISTRICT 111	14784	0.01
22	05E	21	SWSW	KING COUNTY WATER DISTRICT 111	15401	0.009
22	05E	21	SWSW	KING COUNTY WATER DISTRICT 111	15402	0.006
22	05E	21	SWSW	KING COUNTY WATER DISTRICT 111	15403	0.006
22	05E	21	SWSW	KING COUNTY WATER DISTRICT 111	15404	0.005
22	05E	21	SWSW	KING COUNTY WATER DISTRICT 111	15405	0.007
22	05E	27	NWNW	LAKE MERIDIAN ESTATES (MHP)	28012	0.025
22	05E	27	NWNW	SUNSET PARK WATER CO	14734	0.012
22	05E	27	NWNW	SUNSET PARK WATER CO	15568	0.011
22	05E	32	SWSE	CRESTVIEW WEST WATER SYSTEM	15268	0.005
22	05E	32	SWSE	CRESTVIEW WEST WATER SYSTEM	15269	0.005
22	05E	32	SWSE	CRESTVIEW WEST WATER SYSTEM	15269	0.0101
22	05E	33	SWSW	CRESTVIEW TRACTS #3	34528	0.012

Note:

mg/L - milligram per liter.

Table 3

Lead Concentrations in Groundwater, Public Water Systems in T22N, R4E and R5E, King County

Washington State Department of Health Data Base

Boeing/Kent Gun Club
Kent, Washington

Township	Range	Section	QTR	Pws-Id	Pws-Name	Sample Number	Results (mg/L)
22	04E	6	NWNW	64816	OLSON, M	6855	0.002
22	04E	6	NWNW	64816	OLSON, M	6855	0.005
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	535	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	536	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6006	0.002
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6008	0.007
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6009	0.006
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6012	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6013	0.008
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6016	0.007
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6017	0.002
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6018	0.0036
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6019	0.0009
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6020	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6024	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6028	0.002
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	6170	0.002
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	8579	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	12015	0.005
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28272	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28273	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28274	0.002
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28275	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28276	0.014
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28278	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28280	0.005
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28281	0.011
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28282	0.011
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28283	0.01
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28284	0.014
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28286	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28288	0.005

Table 3
Lead Concentrations in Groundwater, Public Water Systems in T22N, R4E and R5E, King County
Washington State Department of Health Data Base

Boeing/Kent Gun Club
Kent, Washington

Township	Range	Section	QTR	Pws-Id	Pws-Name	Sample Number	Results (mg/L)
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28289	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28290	0.008
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28291	0.005
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28292	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28294	0.007
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28295	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28296	0.005
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28297	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28298	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28299	0.057
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28300	0.01
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28301	0.002
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28302	0.005
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28303	0.005
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28306	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28308	0.017
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28309	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28313	0.014
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28314	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28730	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28830	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	28836	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	29210	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	29212	0.003
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	29216	0.004
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	29219	0.006
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	29573	0.012
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	29574	0.005
22	04E	8	NENE	40650	HIGHLINE WATER DISTRICT	29575	0.006
22	04E	17	SWSE	51930	MASONIC RETIREMENT CENTER	70807	0.003
22	04E	17	SWSE	51930	MASONIC RETIREMENT CENTER	70808	0.004
22	04E	17	SWSE	51930	MASONIC RETIREMENT CENTER	70810	0.005

Table 3
Lead Concentrations in Groundwater, Public Water Systems in T22N, R4E and R5E, King County
Washington State Department of Health Data Base

Boeing/Kent Gun Club
Kent, Washington

Township	Range	Section	QTR	Pws-Id	Pws-Name	Sample Number	Results (mg/L)
22	04E	17	SWSE	51930	MASONIC RETIREMENT CENTER	70812	0.002
22	04E	17	SWSE	51930	MASONIC RETIREMENT CENTER	70813	0.004
22	04E	17	SWSE	51930	MASONIC RETIREMENT CENTER	70814	0.004
22	04E	17	SWSE	51930	MASONIC RETIREMENT CENTER	70815	0.018
22	04E	17	SWSE	51930	MASONIC RETIREMENT CENTER	70816	0.002
22	05E	27	NWNW	23341	LAKE MERIDIAN ESTATES (MHP)	5440	0.002
22	05E	27	NWNW	23341	LAKE MERIDIAN ESTATES (MHP)	5445	0.003
22	05E	27	NWNW	23341	LAKE MERIDIAN ESTATES (MHP)	6031	0.004
22	05E	27	NWNW	23341	LAKE MERIDIAN ESTATES (MHP)	7410	0.001
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	4186	0.002
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	22735	0.002
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	22739	0.002
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	22740	0.002
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	24317	0.008
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	24318	0.002
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	24319	0.002
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	24320	0.004
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	24321	0.016
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	24322	0.007
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	24323	0.002
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	24325	0.003
22	05E	28	NWSE	53800	MERIDIAN MEADOWS	24326	0.007
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	11341	0.015
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	24838	0.004
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	24839	0.002
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	26255	0.004
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	33389	0.004
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	33920	0.001
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	33921	0.002
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	33922	0.002
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	33923	0.002
22	04E	32	NENE	57396	MINTER VIEW WATER SYSTEM	33924	0.002

Table 3
Lead Concentrations in Groundwater, Public Water Systems in T22N, R4E and R5E, King County
Washington State Department of Health Data Base

Boeing/Kent Gun Club
Kent, Washington

Township	Range	Section	QTR	Pws-Id	Pws-Name	Sample Number	Results (mg/L)
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	17	0.001
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	17	0.003
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	17	0.0059
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	18	0.0017
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	18	0.002
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	19	0.007
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	21	0.001
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	22	0.002
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	23	0.001
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	23	0.002
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	24	0.154
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	25	0.009
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	25	0.011
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	26	0.015
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	26	0.016
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	9984	0.001
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	9986	0.005
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	9988	0.001
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	9989	0.002
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	9990	0.002
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	9992	0.005
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	9993	0.001
22	05E	33	NWSW	19000	DERBYSHIRE SCENIC ACRES	9994	0.003
22	05E	35	SESW	94170	WELCHS WATER ASSOCIATION	22435	0.006
22	05E	35	SESW	94170	WELCHS WATER ASSOCIATION	22436	0.006
22	05E	35	SESW	94170	WELCHS WATER ASSOCIATION	22437	0.007
22	05E	35	SESW	94170	WELCHS WATER ASSOCIATION	22438	0.003
22	05E	35	SESW	94170	WELCHS WATER ASSOCIATION	22919	0.003
22	05E	35	SESW	94170	WELCHS WATER ASSOCIATION	22920	0.004
22	05E	35	SESW	94170	WELCHS WATER ASSOCIATION	22922	0.002
22	05E	35	SESW	94170	WELCHS WATER ASSOCIATION	22923	0.005

Note:

mg/L - milligram per liter.

Table 4
Total Arsenic and Lead in Offsite Groundwater
Quantified by EPA Method 600/4-79-020 206.2

Boeing/Kent Gun Club
Kent, Washington

18-03 Building, Kent Space Center

Sample I.D.	Sample Date	Arsenic	Lead
		µg/L	
92MW-01	12/15/92	10.0	1.0
92MW-02	12/15/92	13.0	30.0
92MW-03	12/15/92	12.0	18.0
92MW-1-02	01/29/93	21.0	5.0
92MW-2-02	01/29/93	3.0	6.0
92MW-3-02	01/29/93	14.0	1.0
Method A Cleanup Level [a]		5.0	5.0

Boeing Auburn Facility

Sample I.D.	Sample Date	Arsenic	Lead
		µg/L	
AGW032-990830	08/30/99	20.0	ND
AGW049-990831	08/31/99	13.0	7.0
AGW068-990831	08/31/99	12.0	9.0
AGW038-990831	08/31/99	11.0	ND
AGW065-990831	08/31/99	11.0	ND
AGW081-990830	08/30/99	7.0	4.0
AGW082-990830	08/30/99	3.0	3.0
AGW083-990830	08/30/99	6.0	2.0
AGW080-990830	08/30/99	5.0	ND
Method A Cleanup Level [a]		5.0	5.0

Notes:

Boeing Auburn facility data provide only the most recent available sampling round arsenic and lead detections. These detections are consistent over the last 5 years of monitoring.

Detection limit for arsenic and lead is 1.0 µg/L.

Shaded value exceeds cleanup level.

a) Washington Administrative Code Chapter 173-340 Model Toxics Control Act Cleanup Regulation Method A suggested cleanup level for groundwater.

µg/L - microgram per liter.

ND - not detected.

-- not analyzed.

AGI
TECHNOLOGIES
A CDM COMPANY

MONITOR WELL LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS					TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 Sieve	**GRAVELS** More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	**GW**		Well graded gravels, gravel-sand mixtures
			GP		Poorly graded gravels, gravel-sand mixtures
		Gravels with over 12% fines	**GM**		Silty gravels, poorly graded gravel-sand-silt mixtures
			GC		Clayey gravels, poorly graded gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	**SW**		Well graded sands, gravelly sands
			SP		Poorly graded sands, gravelly sands
		Sands with over 12% fines	**SM**		Silty sand, poorly graded sand-silt mixtures
			SC		Clayey sands, poorly graded sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 Sieve	**SILTS AND CLAYS** Liquid limit less than 50		**ML**		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL		Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		**MH**		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH		Inorganic clays of high plasticity, fat clays
			OH		Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			**PT**		Peat and other highly organic soils

SAMPLE

- ■ "Undisturbed"
- ▨ Bulk/Grab
- ◫ Not Recovered
- ▥ Recovered, Not Retained

CONTACT BETWEEN UNITS

——	Well Defined Change
⁄	Gradational Change
- - -	Obscure Change
▬	End of Exploration

BLOWS PER FOOT

Hammer is 140 pounds with 30-inch drop, unless otherwise noted

S - SPT Sampler (2.0-Inch O.D.)
T - Thin Wall Sampler (2.8-Inch Sample)
H - Split Barrel Sampler (2.4-Inch Sample)

MOISTURE DESCRIPTION

Dry - Considerably less than optimum for compaction
Moist - Near optimum moisture content
Wet - Over optimum moisture content
Saturated - Below water table, in capillary zone, or in perched groundwater

PHYSICAL PROPERTY TESTS

Consol - Consolidation
LL - Liquid Limit
PL - Plastic Limit
Gs - Specific Gravity
SA - Size Analysis
TxS - Triaxial Shear
TxP - Triaxial Permeability
Perm - Permeability
Po - Porosity
MC - Moisture Content
MD - Moisture/Density
DS - Direct Shear
VS - Vane Shear
Comp - Compaction

UU - Unconsolidated, Undrained
CU - Consolidated, Undrained
CD - Consolidated, Drained

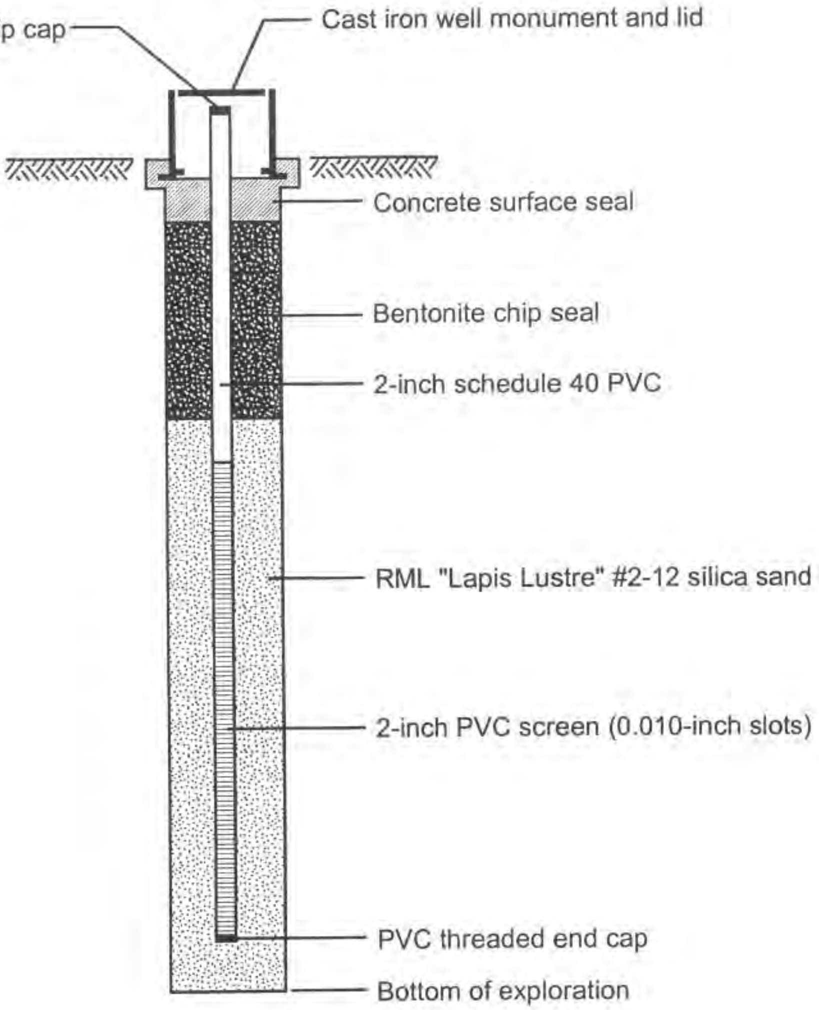
AGI
TECHNOLOGIES

Soil Classification/Legend

Boeing/Kent Gun Club
Kent, Washington

PLATE
D1

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
soilcleg.cdr	14,327.317	PJS	1/19/00			



AGI TECHNOLOGIES

Monitoring Well Construction

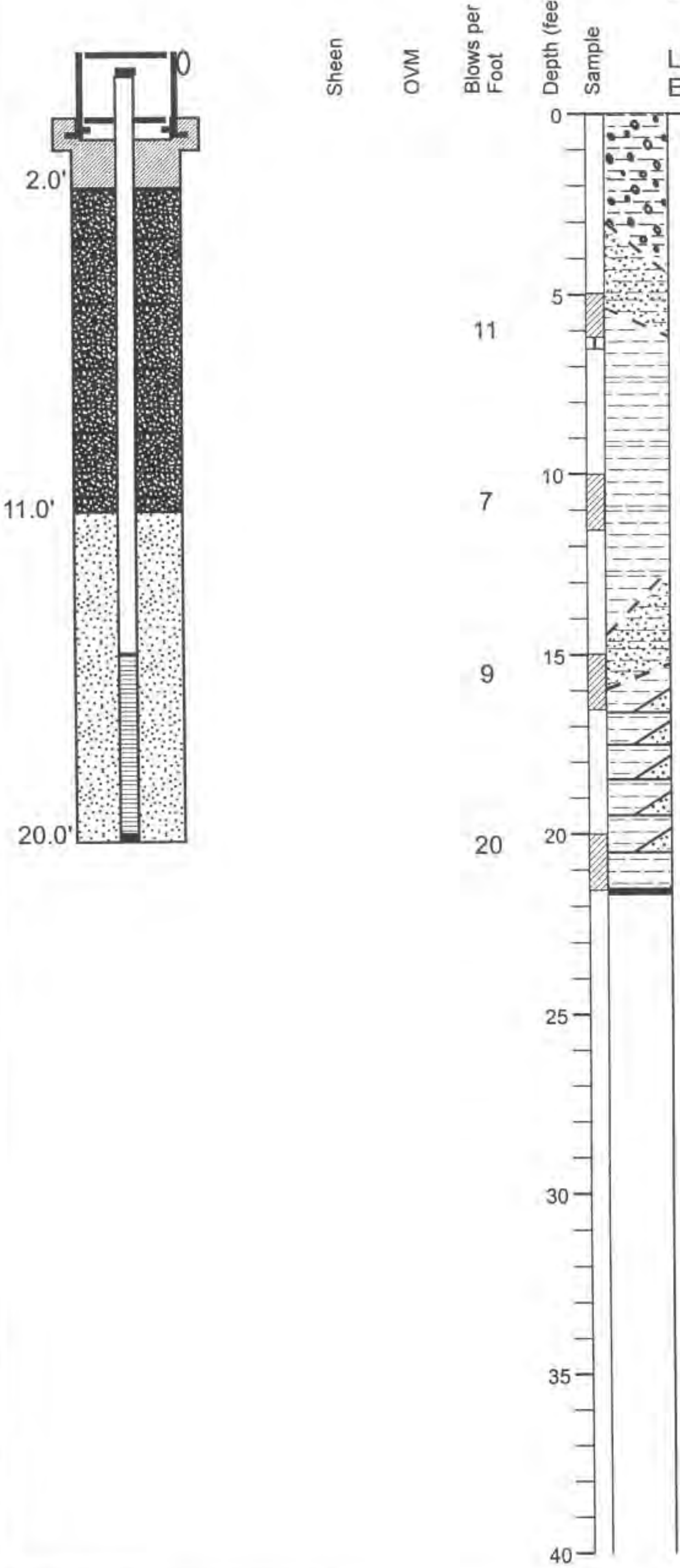
Boeing/Kent Gun Club
Kent, Washington

PLATE
D2

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
Wellcons.cdr	14,327.317	PJS	1/19/00	MEC		

Equipment CME 55 Limited Access

Land Surface Elevation ____________ Date 10/21/99



BROWN SILTY GRAVEL (GM) (logged from auger return).

Becomes dark gray and 4 feet.

DARK GRAY SILTY SAND (SM) medium dense, moist; fine grained.

DARK GRAY SANDY SILT (ML) stiff, moist.

Becomes greenish gray, wet.

DARK GRAY SILTY SAND (SM) loose, saturated; fine grained.

GRAY SANDY SILT (ML) stiff, wet; with thin interlayers of saturated fine DARK GRAY SAND (SP-SM).

Boring terminated at 21.5 feet bgs.
Groundwater encountered at 13 feet bgs.

AGI
TECHNOLOGIES

Log of Monitoring Well MW1

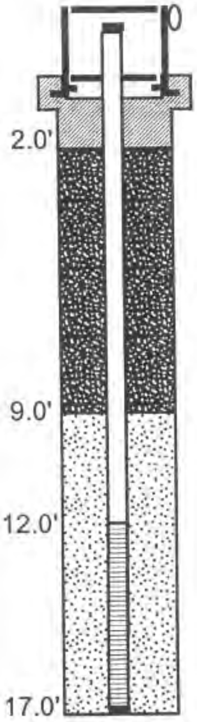
Boeing/Kent Gun Club
Kent, Washington

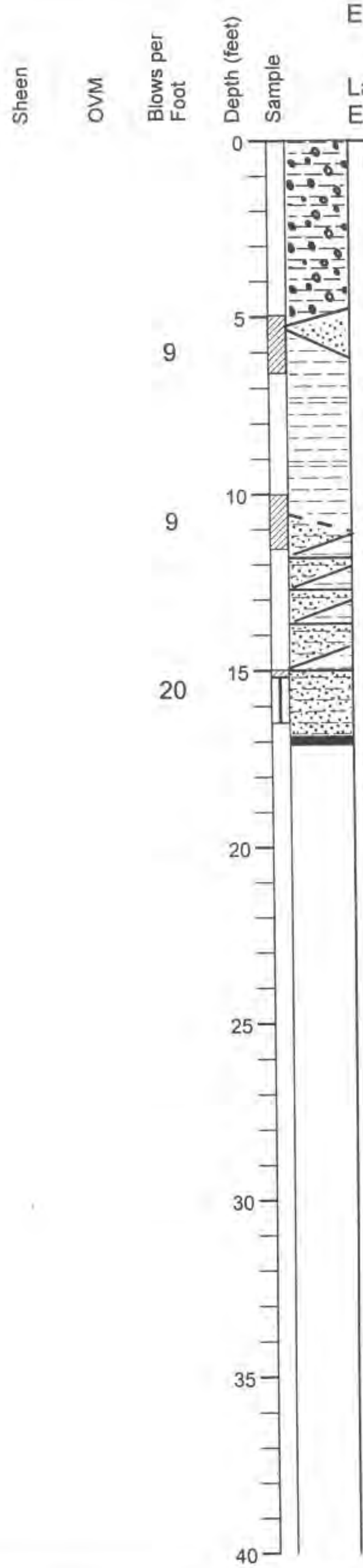
PLATE
D3

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
4327317wl.cdr	14,327.317	PJS	1/19/00	MSC		

Equipment CME 55 Limited Access

Land Surface Elevation ______ Date 10/21/99





BROWN SILTY GRAVEL (GM).

RED-BROWN SANDY SILT (ML) stiff, moist.

Becomes gray.

GRAY SILTY SAND (SM) loose, saturated; fine grained, with SANDY SILT (ML) interlayers.

Boring terminated at 17 feet bgs.
Groundwater encountered at 11 feet bgs.

AGI
TECHNOLOGIES

Log of Monitoring Well MW1

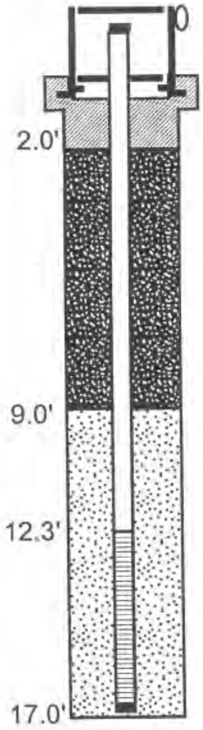
Boeing/Kent Gun Club
Kent, Washington

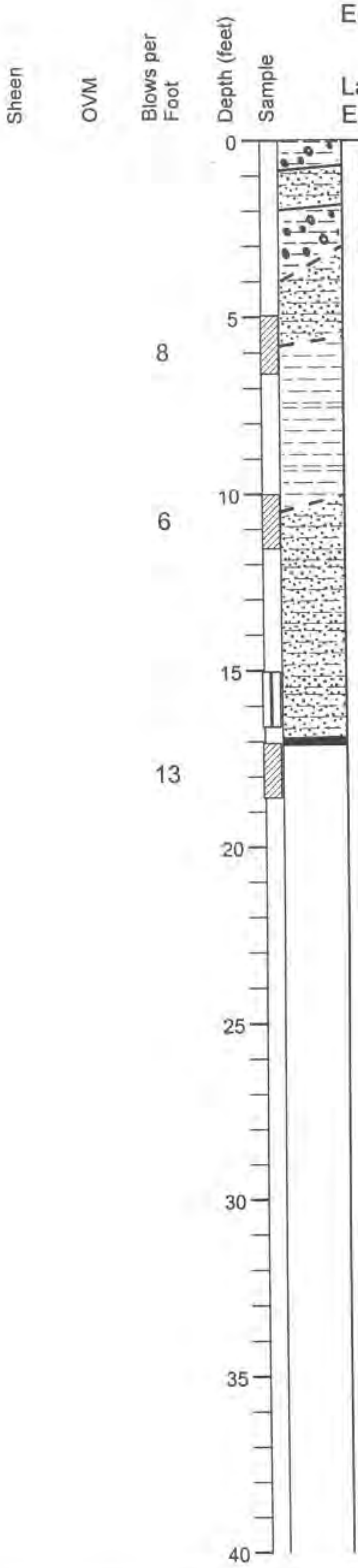
PLATE
D4

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
4327317wl.cdr	14,327.317	PJS	1/19/00	MSC		

Equipment CME 55 Limited Access

Land Surface Elevation ______ Date 10/21/99





BROWN SILTY GRAVEL (GM).
BROWN SILTY SAND (SM).
DARK GRAY SILTY GRAVEL (GM).
BROWN SAND (SP-SM) loose, moist.

GRAY SILT (ML) stiff, moist; slightly plastic, trace organics.

GRAY SILTY SAND (SM) loose, saturated; fine grained.

No recovery.

Boring terminated at 17 feet bgs.
Groundwater encountered at 10 feet bgs.

AGI TECHNOLOGIES

Log of Monitoring Well MW1

Boeing/Kent Gun Club
Kent, Washington

PLATE
D5

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
4327317wl.cdr	14,327.317	PJS	1/19/00	MSC		

CHEMISTRY DATA

QUALITY ASSURANCE/QUALITY CONTROL

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	Kent Gun Club
Project No.:	14,327.321
Lab Name:	Analytical Resources, Incorporated
Lab Number:	BJ29
Sample No.:	KGC MW1-000306, KGC MW2-000306, KGC MW3-000306
Matrix:	Water

QUALITY ASSURANCE SUMMARY

All data were of known quality and acceptable for use.

ANALYTICAL METHODS

Parameters	Technique	Method
Arsenic	AA/GF	EPA 7060
Lead	AA/GF	EPA 7421

TIMELINESS

All samples were extracted and analyzed within recommended holding times.

Parameters	Date Sampled	Date Extracted	Date Analyzed	Time Until Extraction	Time Until Analysis
Dissolved Arsenic	3/06/00	3/07/00	3/07/00	1	1(180)
Dissolved Lead	3/06/00	3/07/00	3/07/00	1	1(180)
Total Arsenic	3/06/00	3/07/00	3/09/00	1	3(180)
Total Lead	3/06/00	3/07/00	3/09/00	1	3(180)

NR - not reported.
NA - not applicable.
( ) - numbers in parenthesis indicate recommended holding time in days.

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	Kent Gun Club
Project No.:	14,937.073
Lab Name:	Analytical Resources, Incorporated
Lab Number:	BJ29

FIELD QUALITY CONTROL SAMPLES

Field Duplicates:	None
Rinsate:	None.
Trip Blank:	None.

LAB QUALITY CONTROL SAMPLES

Method Blanks:	No analytes were detected at or above ARI reporting limits.
Blank Spikes:	Blank Spike recoveries were within ARI control limit criteria.
Duplicates:	None.
Surrogates:	None.
Laboratory Control Sample:	None.

SIGNATURES

Prepared by ______ Date 4/07/00

Checked by Gary Sadowski Date 4/7/00

Analytical Resources, Incorporated
Analytical Chemists and Consultants

RECEIVED
[illegible]
AGI/A CDM COMPANY

March 10, 2000

Brian Anderson
The Boeing Company
P.O. Box 3707, M/S 7A-XA
Seattle, WA 98124-2207

RE: Project: Kent Gun Club
ARI Job: BJ29

Dear Brian:

Please find enclosed sample custody records and analytical results for the above referenced project. Analytical Resources, Inc. accepted three water samples in good condition on March 6, 2000.

The samples were analyzed for total and dissolved metals (arsenic and lead) referencing EPA methods 7060 and 7421. No analytical complications were noted.

Copies of the reports and all raw data will remain on file at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Jeff Reitan
Client Services Manager
jeff@arilabs.com

JJR/sl
Enclosure

cc: Martin Carlson, AGI Technologies Inc. (Bellevue, WA)

333 Ninth Avenue North • Seattle WA 98109-5187 • **206-621-6490** • **206-621-7523** fax

Chain of Custody Record & Laboratory Analysis Request

321-327

Date: 3-6-00
Page 1 of 1
Number of coolers: 1
Cooler Temp: 3.5

Analytical Resources, Incorporated
Analytical Chemist and Consultants
400 Ninth Avenue North
Seattle, WA 98109-4708
(206) 621-6490
(206) 621-7523 (Fax)

ARI Client: BOEING
Phone#:
Client Contact: BRIAN ANDERSON
Client Project ID: KENT GUN CLUB
Samplers: CH. HARDY, KG. CHAPUT

	Sample ID	Date	Time	Matx	No Cont	Lab ID	Analysis Required									Notes/Comments
							Total Pb & As	Dissolved Pb & As								00-2962 to 00-2967 BJ29
1	KGC MW1-000306	3-6-00	14:45	A	2		✓	✓								Dissolved Metals were Field Filtered
2	KGC MW3-000306	3-6-00	15:35	A	2		✓	✓								
3	KGC MM2-000306	3-6-00	16:20	A	2		✓	✓								
4																
5																
6																
7																

ARI Project No:
T.A.T. Requested: RUSH ASAP
Comments/Special Instructions: Report Results to Brian Anderson

Relinquished by: (Signature) Ken Chaput	Relinquished by: (Signature)	Relinquished by: (Signature)
Printed Name: Ken Chaput	Printed Name:	Printed Name:
Company: Boeing	Company:	Company:
Date: 3-6-00 Time: 1720	Date: Time:	Date: Time:
Received by: (Signature)	Received by: (Signature)	Received by: (Signature)
Printed Name: Carrie McDougal	Printed Name:	Printed Name:
Company: ARI	Company:	Company:
Date: 3/6/00 Time: 1720	Date: Time:	Date: Time:

Limits of Liability: ARI will perform all requested services in accordance with appropriate methodology following Standard Operating Procedures and our Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services 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 client.

INORGANICS ANALYSIS DATA SHEET **Sample No: KGCMW1-000306**
TOTAL METALS

Lab Sample ID: BJ29A
LIMS ID: 00-2962
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Date Sampled: 03/06/00
Date Received: 03/06/00

Data Release Authorized:
Reported: 03/10/00

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
7060	03/07/00	7060	03/09/00	**7440-38-2**	**Arsenic**	0.001	**0.023**
3020	03/07/00	7421	03/09/00	**7439-92-1**	**Lead**	0.001	**0.002**

U Analyte undetected at given RL

RL Reporting Limit

INORGANICS ANALYSIS DATA SHEET **Sample No: KGCMW3-000306**
TOTAL METALS

Lab Sample ID: BJ29B
LIMS ID: 00-2963
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Date Sampled: 03/06/00
Date Received: 03/06/00

Data Release Authorized:
Reported: 03/10/00

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
7060	03/07/00	7060	03/09/00	**7440-38-2**	**Arsenic**	0.001	**0.015**
3020	03/07/00	7421	03/09/00	**7439-92-1**	**Lead**	0.001	**0.003**

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample No: KGCMW2-000306

Lab Sample ID: BJ29C
LIMS ID: 00-2964
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Date Sampled: 03/06/00
Date Received: 03/06/00

Data Release Authorized:
Reported: 03/10/00

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
7060	03/07/00	7060	03/09/00	**7440-38-2**	**Arsenic**	0.001	**0.004**
3020	03/07/00	7421	03/09/00	**7439-92-1**	**Lead**	0.001	**0.002**

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

INORGANICS ANALYSIS DATA SHEET **Sample No: Method Blank**
TOTAL METALS

Lab Sample ID: BJ29MB
LIMS ID: 00-2962
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Date Sampled: NA
Date Received: NA

Data Release Authorized:
Reported: 03/10/00

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
7060	03/07/00	7060	03/09/00	7440-38-2	Arsenic	0.001	0.001 U
3020	03/07/00	7421	03/09/00	7439-92-1	Lead	0.001	0.001 U

U Analyte undetected at given RL

RL Reporting Limit

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BJ29LCS
LIMS ID: 00-2962
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Data Release Authorized:
Reported: 03/10/00

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Spike mg/L	Spike Added	% Recovery	Q
Arsenic	0.107	0.100	107%	
Lead	0.112	0.100	112%	

'Q' codes: N = control limit not met

Control Limits: 80-120%

FORM-VII

INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: KGCMW1-000306

Lab Sample ID: BJ29D
LIMS ID: 00-2965
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Date Sampled: 03/06/00
Date Received: 03/06/00

Data Release Authorized:
Reported: 03/10/00

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
7000	03/07/00	7060	03/07/00	**7440-38-2**	**Arsenic**	0.001	**0.019**
7000	03/07/00	7421	03/07/00	7439-92-1	Lead	0.001	0.001 U

U Analyte undetected at given RL

RL Reporting Limit

INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: KGCMW3-000306

Lab Sample ID: BJ29E
LIMS ID: 00-2966
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Date Sampled: 03/06/00
Date Received: 03/06/00

Data Release Authorized
Reported: 03/10/00

Prep Meth	**Prep Date**	**Analysis Method**	**Analysis Date**	**CAS Number**	**Analyte**	**RL**	**mg/L**
7000	03/07/00	7060	03/07/00	**7440-38-2**	**Arsenic**	0.001	**0.012**
7000	03/07/00	7421	03/07/00	7439-92-1	Lead	0.001	0.001 U

U Analyte undetected at given RL

RL Reporting Limit

INORGANIC ANALYSIS DATA SHEET **Sample No: KGCMW2-000306**
DISSOLVED METALS

Lab Sample ID: BJ29F
LIMS ID: 00-2967
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Date Sampled: 03/06/00
Date Received: 03/06/00

Data Release Authorized:
Reported: 03/10/00

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
7000	03/07/00	7060	03/07/00	**7440-38-2**	**Arsenic**	0.001	**0.003**
7000	03/07/00	7421	03/07/00	7439-92-1	Lead	0.001	0.001 U

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

INORGANIC ANALYSIS DATA SHEET
DISSOLVED METALS

Sample No: **Method Blank**

Lab Sample ID: BJ29MB
LIMS ID: 00-2965
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Date Sampled: NA
Date Received: NA

Data Release Authorized:
Reported: 03/10/00

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
7000	03/07/00	7060	03/09/00	7440-38-2	Arsenic	0.001	0.001 U
7000	03/07/00	7421	03/07/00	7439-92-1	Lead	0.001	0.001 U

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

Lab Sample ID: BJ29LCS
LIMS ID: 00-2965
Matrix: Water

QC Report No: BJ29-Boeing Corporate SHEA
Project: Kent Gun Club

Data Release Authorized:
Reported: 03/10/00

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Spike mg/L	Spike Added	% Recovery	Q
Arsenic	0.020	0.020	100%	
Lead	0.020	0.020	100%	

'Q' codes:
N = control limit not met
NA = Not applicable - analyte not spiked

Control Limits: 80-120%

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Northwest Regional Office, 3190 - 160th Ave S.E. • Bellevue, Washington 98008-5452 • (425) 649-7000

August 22, 2000

Mr. Brian Anderson
The Boeing Company
Shared Services Group
P.O. Box 3707, M/C 7A-WW
Seattle, WA. 98124-2207

Dear Mr. Anderson.

Re: Voluntary Cleanup Program Review
Boeing Space Center Gun Club, 20403 68th Ave. S., Kent, WA.

Thank you for submitting the results of your voluntary cleanup for review by the State of Washington's Department of Ecology (Ecology). Ecology appreciates your initiative in pursuing this administrative option under the Model Toxics Control Act (MTCA).

Ecology's Toxics Cleanup Program has reviewed the following information regarding the former Boeing Space Center Gun Club facility, located at 20403 68th Ave. S., Kent, WA.:

1. Report titled "Final Report: Site Characterization Study, Kent Gun Club, Kent, Washington", prepared for Boeing Environmental Affairs, Bellevue, WA., by Landau Associates, Inc., Edmonds, WA., and dated February 22, 1999.

2. Report titled "Work Plan, Soil Remediation, Boeing Kent Space Center Gun Club, 20403 68th Avenue South, Kent, Washington: Contract No. ENV-G-99KSC-417", prepared for The Boeing Company, Seattle, WA., by AGI Technologies, Bellevue, WA., and dated July 14, 1999.

3. Report titled "Final Report. Soil Cleanup, Boeing Kent Space Center Gun Club, 20403 68th Avenue South. Kent, Washington: Volumes 1 & 2: Contract No. ENV-G-99KSC-417", prepared for The Boeing Company. Seattle, WA.. by AGI Technologies. Bellevue, WA., and dated April 17, 2000.

4. Report titled "Addendum: Groundwater Monitoring and Evaluation, Boeing Space Center Gun Club Soil Cleanup, Kent, Washington", prepared for The Boeing Company, Seattle, WA., by AGI Technologies, Bellevue, WA., and dated April 28, 2000.

The report listed above will be kept in the Central Files of the Northwest Regional Office (NWRO) of Ecology for review by appointment only. Appointments can be made by calling Sally Perkins at the NWRO at (425) 649-7190.

Based on the information in the reports listed above, Ecology has determined that, at this time, the releases of lead and carcinogenic polynuclear aromatic hydrocarbons (cPAH) into soil and groundwater no longer poses a threat to human health or the environment. Furthermore, it has been determined that arsenic concentrations in groundwater that exceed MTCA Method A limits are likely the result of nature, and not the result of a known release at the Gun Club site.

Therefore, Ecology is issuing this determination that no further remedial action is necessary at this site under MTCA, chapter 70.105D RCW. Please note that because your actions were not, or will not be conducted under a consent decree with Ecology, this letter is not a settlement by the state under RCW 70.105D.040(4) and is not binding on the agency.

Ecology's no further action determination is made only with respect to the releases identified in the independent remedial action reports listed above. This no further action determination applies only to the areas of the property affected by the releases identified in the reports listed above for the property at 20403 68th Ave. S., Kent, WA. It does not apply to any other releases at the property, any other areas on the property, nor any other properties owned or operated by The Boeing Company.

Ecology will update its database to reflect this "No Further Action" determination. Your site will not appear in future publications of the Confirmed and Suspected Contaminated Sites Report (previously known as the Affected Media and Contaminants Report). Ecology does not assume any liability for any release, threatened release or other conditions at the site, or for any actions taken or omitted by any person or his/her agents or employees with regard to the release, threatened release, or other conditions at the site.

Again, thank you for taking the initiative to voluntarily address the contamination at your site. Your efforts are recognized by Ecology as a positive step in our work to protect human health and the environment in the State of Washington.

If you have any questions regarding this letter, please contact me at 425-649-7185.

Sincerely,

Ronald W. Timm

Ronald W. Timm
Hydrogeologist III
Toxics Cleanup Program

RWT

The Boeing Company
P.O. Box 3707
Seattle, WA 98124-2207

March 16, 2012
9L-22-N410-JLF-049

Washington State Department of Ecology
Northwest Regional Office
Hazardous Waste and Toxics Reduction Program
3190 160th Avenue SE
Bellevue, Washington 98008-5452

Attn: Byung Maeng, P.E.

RE: ADDITIONAL EVALUATION OF ARSENIC IN GROUNDWATER
BOEING SPACE CENTER AREA
KENT, WASHINGTON

Dear Mr. Maeng:

The Boeing Company (Boeing) has submitted a request to the Washington State Department of Ecology (Ecology) for removal of the Striker Property (subject property) from the Boeing Space Center (BSC) Resource Conservation and Recovery Act (RCRA) Interim Status Facility (WAD 061670766; Boeing 2011). As part of its review, Ecology requested additional information regarding the dissolved arsenic concentrations detected in groundwater at the BSC. Boeing responded with our October 11, 2011 letter that presents a summary of the available data regarding arsenic in groundwater at the subject property and the BSC.

During our meeting at Ecology's Northwest Regional Office on December 13, 2011, Ecology requested that additional data be collected to evaluate the concentrations of dissolved arsenic in groundwater including any existing data from other properties in the area around the BSC, and/or the collection and analysis of additional groundwater samples from around the subject property on the BSC or on nearby properties. We were unable to find additional existing arsenic in groundwater data for the BSC beyond what was provided in our October 11, 2011 letter. There are currently no monitoring wells located at the BSC and no offsite monitoring wells (except wells associated with the Western Processing site discussed below) were identified in the proximity of the BSC. Additional groundwater samples were collected using direct-push drilling and sampling techniques from locations at the BSC and on City of Kent Property in the area around the BSC. Samples were also collected from existing monitoring wells associated with the nearby Western Processing site.

The sampling locations were provided for Ecology's review and concurrence in advance of sample collection, and our correspondence with Ecology regarding the locations is documented in e-mails dated January 5 and 18, 2012, and February 6, 2012. The groundwater sampling was conducted between January 25 and February 9, 2012. This letter provides a summary of the additional data for dissolved arsenic in groundwater.

BACKGROUND

Direct-push drilling and soil and groundwater sampling were conducted at the subject property in 2010 and 2011 as part of due diligence prior to the potential sale of the Striker Property. The results of the subsurface investigations indicate that the BSC and subject property are underlain by approximately 10 feet (ft) of fill material underlain by alluvium. The fill generally consists of brown, fine to medium sand to a maximum depth of 8 ft below ground surface (BGS). Beneath the fill, the native soil consists of gray sands and silts. Groundwater was encountered during drilling at depths ranging from 3 to 8 ft BGS (Landau Associates 2010). Based on topography, the groundwater gradient within the Kent Valley and the BSC area is locally very flat, with the overall direction of groundwater flow to the west-northwest toward the Green River. Elevation measurements from monitoring wells at the BSC in 2001 indicate local variability in groundwater elevations and direction of flow (Landau Associates 2002).

The dissolved arsenic concentrations detected in groundwater samples collected throughout the subject property during the 2010 and 2011 investigations range from 0.3 micrograms per liter (µg/L) to 115 µg/L, and the concentrations detected at many locations were greater than the screening level of 5 µg/L, which was developed based on the Model Toxics Control Act (MTCA) Method B cleanup level for protection of groundwater as drinking water (Landau Associates 2010). The investigations conducted to date, which included assessment of the nature and extent of the dissolved arsenic concentrations detected in groundwater, have not identified a potential source of arsenic at the subject property or at the BSC. Based on the available data, and as discussed below, the elevated concentrations of arsenic in groundwater are isolated/localized, reflect area-wide conditions, are not attributable to sources at the BSC, and do not pose a risk to human health or the environment.

ADDITIONAL ARSENIC GROUNDWATER DATA

As noted above, in January and February 2012 Boeing collected groundwater samples to document dissolved arsenic concentrations in shallow groundwater at locations on and around the BSC, including locations that are hydraulically upgradient and downgradient based on overall shallow groundwater flow to the west-northwest toward the Green River. The groundwater samples were collected on the BSC, on the Western Processing site (located to the northeast of the BSC), and on City of Kent property. As requested in the e-mail correspondence with Ecology noted above, the selected City of Kent locations include the closest, upgradient, accessible locations that appeared to be the least affected by development/human activities. The selected Western Processing wells consist of a background/upgradient well, and a shallow downgradient well that are part of the Western Processing monitoring network, but that have not been affected by site activities.

Eighteen groundwater samples were collected from fifteen locations, as shown on Figure 1. The groundwater samples were submitted to Lancaster Laboratories for analysis of dissolved arsenic by U.S. Environmental Protection Agency (EPA) Method 6020. The arsenic analytical data are summarized in Table 1. Field screening conducted during direct push drilling and groundwater sample collection did not identify evidence of potential soil or groundwater contamination at any of the sampling locations. A summary of the information regarding the groundwater sampling and analysis is presented below:

BSC Property

- Nine groundwater samples were collected at six direct-push sampling locations (including DP-40 and -41, which are just outside the northern BSC property boundary).
- Co-located samples were collected at three locations.
- Depths to groundwater ranged from about 5 to 8 ft BGS.
- Dissolved arsenic was detected above the laboratory reporting limit in all nine samples, at concentrations ranging from 3.3 to 58.4 µg/L.

Western Processing Site

- Groundwater samples were collected from two shallow monitoring wells that have not been affected by activities at the Western Processing site.
- Depth to groundwater was about 5 ft BGS.
- Dissolved arsenic was detected above the laboratory reporting limit in one of the two samples at a concentration of 10.8 µg/L.

City of Kent Property

- Groundwater samples were collected at seven direct-push sampling locations.
- Depths to groundwater ranged from about 16 to 18 ft BGS at locations near the Green River (Kent-1 through -4) and from about 7 to 9 ft BGS at locations farther away from the river.
- Dissolved arsenic was detected above the laboratory reporting limit at four of the seven locations at concentrations ranging from 3.9 to 115 µg/L.
- Sampling was planned for one additional location (Kent-5), but a sample could not be collected due to the presence of utilities that prevented drilling.

DISSOLVED ARSENIC CONCENTRATIONS

The dissolved arsenic concentrations detected in the additional groundwater samples are shown on Figure 1. The analytical results for dissolved arsenic are summarized as follows:

- Dissolved arsenic was detected at concentrations above the laboratory reporting limit in 14 of the 18 groundwater samples, and at concentrations ranging from 3.3 to 115 µg/L. Of the detected dissolved arsenic concentrations, 11 concentrations were greater than the screening level of 5 µg/L.
- The highest concentration of dissolved arsenic (115 µg/L) was detected in the groundwater sample collected from southeast of the BSC at location Kent-7. The

nearest sample (Kent-8 collected approximately1,300 ft to the east of Kent-7) indicated a concentration of 14.5 µg/L.

- The next highest concentrations were detected southwest of the BSC near the Green River (Kent-1; 59.6 µg/L), from the north portion of the BSC (DP-39; 58.4 µg/L), and near the east boundary of the BSC (DP-36; 47.1 µg/L).
- The co-located samples indicated concentrations with relative percent differences (RPDs) of 0 percent (DP-40 and -41; both 3.3 µg/L), 4.35 percent (DP-34 and -35; 12.6 and 15.0 µg/L), and 34 percent (DP-37 and -38; 5.2 and 27.9 µg/L). Concentrations with RPD's less than 20 are considered similar and concentrations with RPDs greater than 20 are considered different.
- The sample from Western Processing shallow monitoring well 13M30A indicated a concentration of 10.8 µg/L.
- The samples collected from east-southeast of the BSC, and hydraulically upgradient based on a west-northwest direction of groundwater flow, indicated dissolved arsenic concentrations ranging from 3.9 to 115 µg/L.
- The samples collected along the Green River to the west-northwest of the BSC, and hydraulically downgradient based on a west-northwest direction of groundwater flow, did not indicate dissolved arsenic concentrations above the laboratory reporting limit.

CONCLUSIONS

Dissolved arsenic was detected in 11 of the 18 groundwater samples collected at and around the BSC at concentrations greater than the screening level. The concentrations above the screening level were detected in samples collected upgradient and cross gradient of the subject property. As noted above, the detected concentrations varied locally, including in one pair of the co-located samples. Based on the investigations conducted to date, the available analytical data, and the historical data presented in our October 11, 2011 letter, the elevated concentrations of dissolved arsenic detected in groundwater are isolated/localized, are the result of regional conditions, and are not the result of sources associated with Boeing operations. Groundwater downgradient of the subject property does not indicate concentrations of dissolved arsenic greater than the laboratory reporting limit.

As we have discussed, groundwater at the BSC or in the surrounding area is not used for drinking water. Boeing's purchase and sale agreement with the prospective buyer of the Striker Property includes a restriction on the use of groundwater. The City of Kent does not allow the installation of private wells in areas serviced by a municipal water purveyor, which includes the BSC area. As an added level of protection, Boeing is willing to pursue a formal environmental covenant to restrict the use of groundwater. The dissolved arsenic concentrations present in groundwater at the Striker Property are similar to those detected at other locations in the Kent Valley near the BSC and do not pose a potential threat to human health or the environment; therefore, Boeing requests that the site not be listed on the Confirmed and Suspected Contaminated Sites List.

We would appreciate the opportunity to discuss the information presented in this letter with you and to answer questions that you may have regarding the detected concentrations of dissolved arsenic in groundwater in the BSC area, and at the Striker Property. Please e-mail or call me to schedule a time to discuss this request.

Sincerely,

Joe Flaherty
Project Manager
EHS Remediation Group
(206) 769-5987
joseph.l.flaherty@boeing.com

REFERENCES

Landau Associates. 2010. Report: *Phase II Environmental Site Assessment, Striker Property South, Boeing Space Center, 20403 68th Avenue South, Kent, Washington*. November 30.

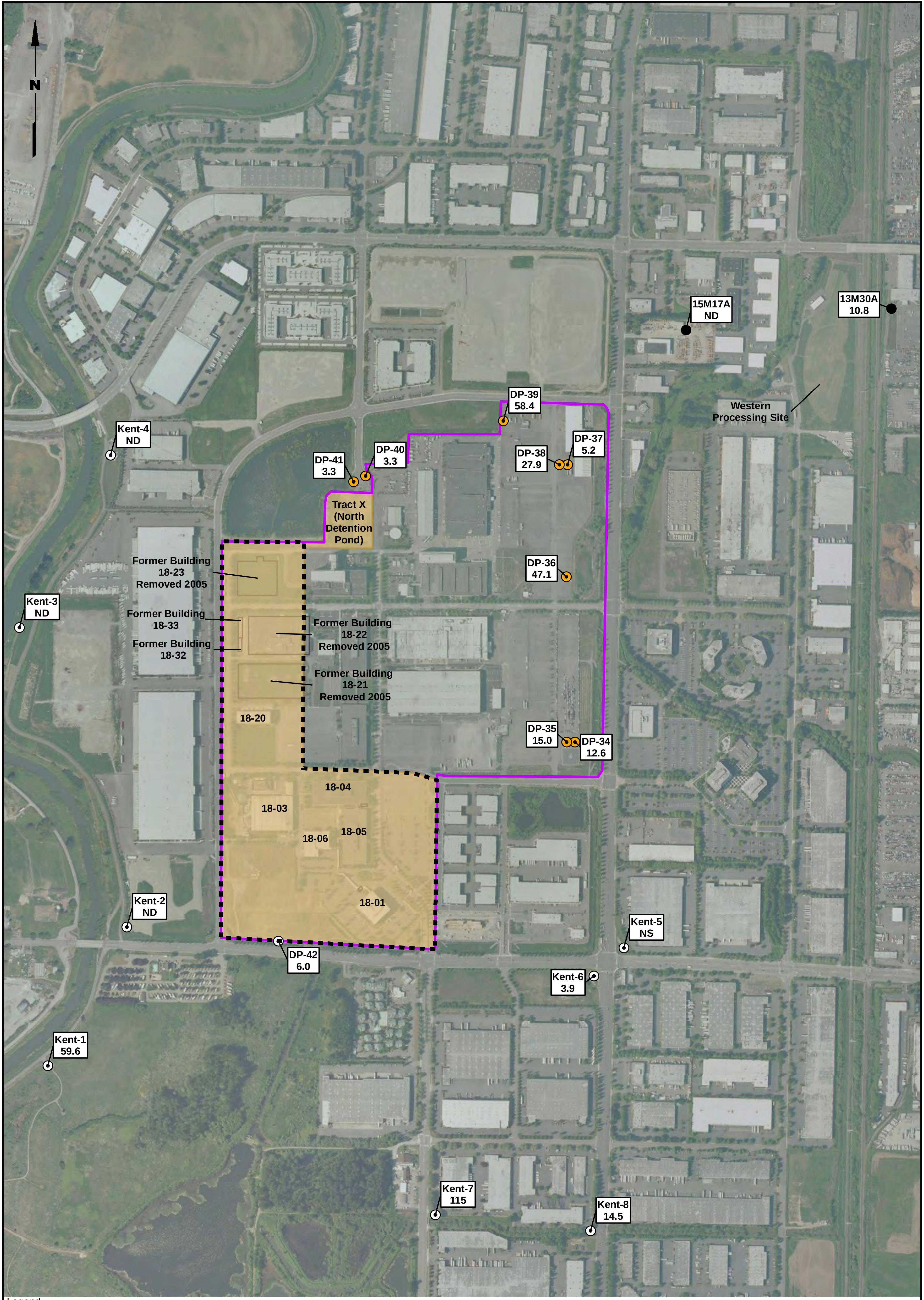
Landau Associates. 2002b. Report: *Phase II Environmental Site Assessment, Boeing Clearwater, Kent, Washington*. June 4.

ATTACHMENTS

Figure 1: Striker Property Sampling Locations and Arsenic Concentrations

Table 1: Groundwater Analytical Results for Dissolved Arsenic

Y:\Projects\025195\Mapdocs\040\044\Figure 1 Sampling Locations and Arsenic Results.mxd 3/15/2012 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Legend

- ● Direct Push Sample - Boeing Property
- ⊙ Direct Push Sample - City of Kent Property
- ● Monitoring Well - Western Processing
- ▪▪▪ Striker Project Boundary
- ▭ Property to Be Sold and Removed From RCRA Interim Status Facility
- ▭ Current Boeing Kent Space Center Boundary
- ▭ Historic Buildings

Notes

1. All Arsenic results shown in µg/L.
2. ND = Not Detected, NS = Not Sampled
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 650 1,300

Scale in Feet

Data Source: ESRI World Imagery

Landau Associates

Project Striker Kent, Washington	**Striker Property Sampling Locations & Arsenic Concentrations**	Figure 1

TABLE 1
GROUNDWATER ANALYTICAL RESULTS FOR DISSOLVED ARSENIC
BOEING STRIKER
KENT, WASHINGTON

Location	LLI SDG	Lab ID	Date Collected	Arsenic (Dissolved) EPA Method 6020 µg/L
KSC-DP-34	1286934	6533689	1/25/2012	**12.6**
KSC-DP-35	1286934	6533690	1/25/2012	**15.0**
KSC-DP-36	1286934	6533691	1/25/2012	**47.1**
KSC-DP-37	1286934	6533692	1/25/2012	**5.2**
KSC-DP-38	1286934	6533693	1/25/2012	**27.9**
KSC-DP-39	1286934	6533694	1/25/2012	**58.4**
KSC-DP-40	1286934	6533695	1/25/2012	**3.3**
KSC-DP-41	1286934	6533696	1/25/2012	**3.3**
KSC-DP-42	1289491	6546694	2/9/2012	**6.0**
Kent-1	1289491	6546687	2/9/2012	**59.6**
Kent-2	1289491	6546688	2/9/2012	2.0 U
Kent-3	1289491	6546689	2/8/2012	2.0 U
Kent-4	1289491	6546690	2/8/2012	2.0 U
Kent-6	1289491	6546691	2/8/2012	**3.9**
Kent-7	1289491	6546692	2/9/2012	**115.0**
Kent-8	1289491	6546693	2/9/2012	**14.5**
15M17S	1289491	6546695	2/9/2012	2.0 U
15M30A	1289491	6546696	2/9/2012	**10.8**

U = Indicates the compound was not detected at the reported concentration.
Bold = Detected compound.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

December 19, 2012

Mr. Joe Flaherty
Boeing EHS Remediation Group
M/C 6Y-94
P.O.Box 3707
Seattle, WA 98124-2207

Re: Removal of Striker Property from Boeing Kent Space Center RCRA Interim Status (WAD 061670766)

Dear Mr. Flaherty:

The letter is in response to your July 21, 2011 letter in which you, on behalf of The Boeing Company (Boeing), requested the Washington State Department of Ecology (Ecology) to remove the Striker Property (see Figure 1 attached) from the Boeing Kent Space Center RCRA interim status facility located at 20402 68th Ave South, Kent, Washington (WAD 061670766). The removal of the Striker Property from the Boeing Kent Space Center RCRA interim status facility would result in a termination of interim status for the Striker Property.

In support of its request to remove the Striker Property from the facility, Boeing submitted the following documents for Ecology review:

1. Report, Phase I Environmental Site Assessment, Boeing Striker Property, Kent, Washington, dated November 30, 2010, prepared by Landau Associates.
2. Technical Memorandum, Phase II Environmental Site Assessment Findings, Boeing Striker Property, Kent, Washington, dated December 6, 2010, prepared by Landau Associates.
3. Technical Memorandum, Supplemental Phase II Environmental Site Assessment Findings, Boeing Striker Property, Kent, Washington, dated April 29, 2011, prepared by Landau Associates.
4. Report, Phase II Environmental Site Assessment, Striker Property South, Boeing Space Center, 20403 68th Avenue South, Kent, Washington, dated July 15, 2011, prepared by Landau Associates.
5. Report, Independent Remedial Action Report, Former Diesel Generator/Aboveground Storage Tank KSA-46 Area, Boeing Space Center, Kent, Washington, dated September 2, 2011, prepared by Landau Associates.
6. Letter Report from J. Flaherty, Boeing to B. Maeng, Ecology, dated October 11, 2011(9L-22-410-JLF-172) received on October 12, 2011 via email – Evaluation of Arsenic in Groundwater, Striker Property South, Boeing Space Center, Kent, Washington.
7. Technical Memorandum, North Detention Pond Sampling Results, Boeing Striker Property, Kent, Washington, dated December 12, 2011, prepared by Landau Associates.
8. Letter from J. Flaherty, Boeing to B. Maeng, Ecology, dated March 16, 2012 received on March 16, 2012 via email – Additional Evaluation of Arsenic in Groundwater, Boeing Space Center Area, Kent, Washington.

Based on Ecology's review of the information in the documents listed above, Ecology determined that arsenic in groundwater was the only constituent of concern with concentrations that exceed the cleanup level established under the Model Toxics Control Act (MTCA – Chapter 70.105D RCW and

Chapter 173-340 WAC). However, Ecology believes that this arsenic contaminated groundwater at the Striker Property does not pose a threat to human health or environment for the following reasons:

1. Arsenic contaminated groundwater at the Striker Property is localized in several isolated areas;
2. Groundwater at the facility does not serve as a current source of drinking water;
3. This site is currently zoned for industrial and any change in zoning of this property is not anticipated in the near future; and
4. A restrictive covenant will be recorded with King County to prevent any removal and use of groundwater at the Striker Property. Ecology has reviewed the draft restrictive covenant Boeing will be recording with King County.

After Ecology's review of Boeing's request of removal and documentation supporting that request, Ecology conducted a 45-day public notice for termination of interim status for the Striker Property from July 27 through September 10, 2012. Ecology received no comments from the public.

Once Boeing records the restrictive covenant with King County, Ecology will approve of Boeing's request to remove the Striker Property from the Boeing Kent Space Center facility and will terminate the RCRA interim status for the Striker Property. After the recording of the covenant, Boeing must submit a copy of the recorded covenant to Ecology, attention to Byung Maeng.

Any other contamination issues which were not revealed during this review or any future release of dangerous waste constituents to the media at the Striker Property will be addressed under the MTCA regulations.

If you have any questions on this letter, please contact me at 425-649-7253 or at bmae461@ecy.wa.gov.

Sincerely,

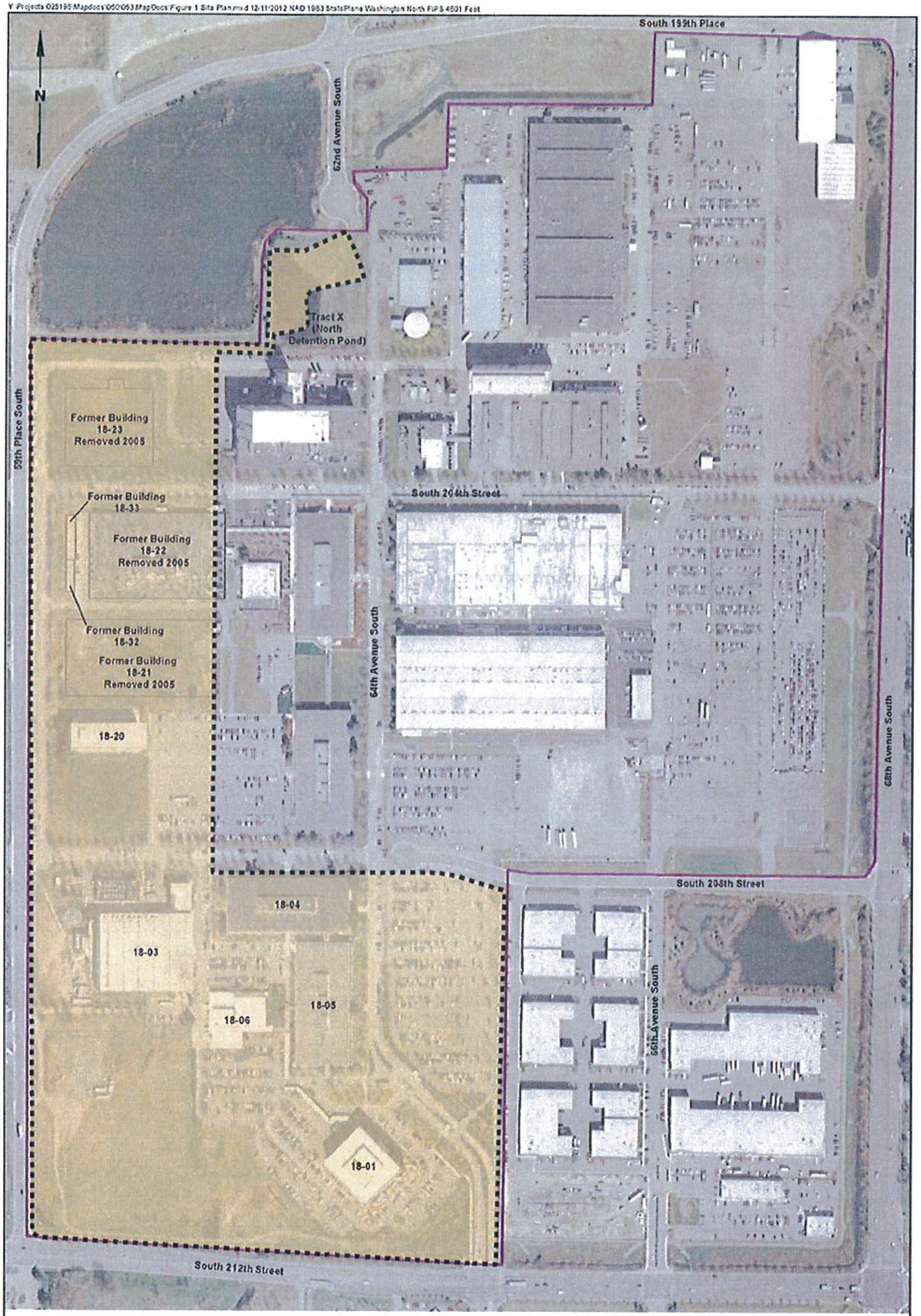
Byung Maeng, PE
Hazardous Waste and Toxics Reduction Program

BM/SA
Enclosure: Figure 1 Striker Property Site Plan

By certified mail: 7011 2970 0000 0455 2696

cc: Dennis Johnson, Ecology-NWRO
John Level, AAG
Roger Nye, Ecology-TCP
Tim Syverson, Landau Associates (tsyverson@landauinc.com)

Y:\Projects\025195\Mapdocs\050\053\MapDocs\Figure 1 Site Plan.mxd 12/11/2012 NAD 1983 StatePlane Washington North FIPS 4601 Feet



Legend

- ▪▪ Striker Property to be Removed From RCRA Interim Status Facility
- ☐ Current Boeing Kent Space Center Boundary
- ☐ Historic Buildings

0 300 600

Scale in Feet

Data Source: Google Earth Pro; King County GIS.

LANDAU ASSOCIATES

Note

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

Striker Property Kent, Washington	**Striker Property Site Plan**	Figure 1