Monitoring Well Installation Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area
Everett, Washington

for
Washington State Department of Ecology

May 15, 2013

GeoEngineers
Earth Science + Technology

Monitoring Well Installation
Technical Memorandum

Everett Smelter Cleanup Site
FSID 2744, ISIS Cleanup Site ID 4298

Lowland Area
Everett, Washington

Project No. 0504-068-00

May 15, 2013

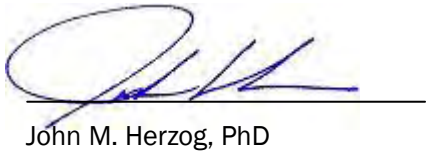
Prepared for:

Washington State Department of Ecology
Toxics Cleanup Program
3190 160th Avenue SE
Bellevue, Washington 98008-5452

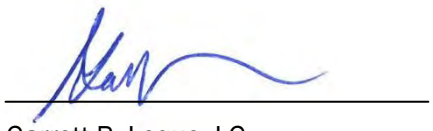
Attention: Sandra Matthews and David South

Prepared by:

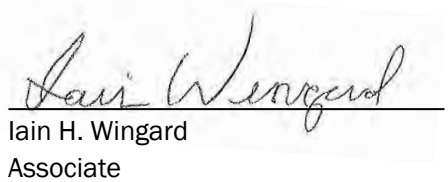
GeoEngineers, Inc.
Plaza 600 Building
600 Stewart Street, Suite 1700
Seattle, Washington 98101
206.728.2674



John M. Herzog, PhD
Principal



Garrett R. Leque, LG
Geologist



Iain H. Wingard
Associate

GRL:IHW:JMH:cn

Table of Contents

LIST OF FIGURES

LIST OF TABLES

APPENDICES

1.0 INTRODUCTION

This memorandum summarizes field investigation activities completed at the Everett Smelter Lowland Area. The Lowland Area is a part of the Everett Smelter Cleanup Site and generally located in northeast Everett, Washington (Figure 1). The Lowland Area includes multiple parcels and the rights-of-way adjacent to the parcels as shown in Figure 2.

The purpose of the Lowland Area study is to characterize metals concentrations in soil and groundwater within and near the Lowland Area in order to evaluate potential environmental impacts from the historical smelter activities. Soil boring, soil sampling and analysis and monitoring well installation were performed in December 2012 and January 2013. A total of 54 monitoring wells and three soil borings were installed to characterize metals concentrations in soil throughout the Lowland Area. The activities were completed in general accordance with the Washington State Department of Ecology (Ecology)-approved Final Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) for the project dated August 31, 2012.

The purpose of this technical memorandum is to describe field activities completed as part of the investigation of the Lowland Area and summarize the resulting data. The results of this and future field activities will be used to develop a preliminary Feasibility Study so that a Cleanup Action Plan can be developed for the Lowland Area that is protective of human health and the environment.

1.1. Site History and Background

The Everett Smelter Lowland Area is part of the Everett Smelter Cleanup Site. The Everett Smelter Cleanup Site has been divided into an Upland Area and Lowland Area. Historically, a smelter was located in the Upland Area, west of the Lowland Area. Beginning in the 1890s, the smelter produced lead, copper, gold and silver from ore. An arsenic extraction plant was added in 1901. The entire smelter was shut down by 1912 and dismantled by 1915.

The historic smelting activities resulted in the release of metals including arsenic and lead to the soil, groundwater and air. The arsenic extraction plant where arsenic trioxide was produced was demolished. However, arsenic trioxide remained on site in the former plant area. This portion of the Everett Smelter Cleanup Site has been referred to as the former arsenic trioxide processing area and as the fenced area.[1] This area underwent environmental cleanup in approximately 2004 through 2006 to remove and consolidate soil that had been contaminated by smelter operations.

Historically, slag waste from former smelter activities was poured down the bluff located on the east side of the Upland portion of the Everett Smelter Site and onto an adjacent property, currently known as the Benson Property. Slag present on the Benson Property was historically used for the manufacture of “rock wool”. Additionally, slag was excavated from the Benson Property and

[1] The former arsenic trioxide processing area has sufficiently high contamination that it was purchased by Asarco soon after the Site was rediscovered, the homes vacated, and the area fenced off.

transported for use on and off site. Although slag was historically reused, not all of it was removed. Slag still remains on the Benson Property and potentially in other parts of the Lowland Area.

Air emissions from the former smelter stacks are likely to have deposited of particulates containing metals onto the historic land surface surrounding the Smelter Site. The extent of contamination from the smelter has been characterized in the Upland portion of the Everett Smelter Cleanup Site and is currently under remedial action. The extent of contamination in the Lowland portion of the Site is being investigated to evaluate potential environmental impacts from historical smelter activities.

Multiple soil and groundwater investigations have been performed in the Lowland Area since the 1990s related to the Everett Smelter contamination. Groundwater monitoring in the late 1990s identified metals-contaminated groundwater east of the former smelter in the Lowland Area. In 2011 and 2012, GeoEngineers installed 20 wells (in ten well pairs - "shallow" and "deep" wells BP-01S/D through BP-10S/D) along the eastern portion of the Benson Property and collected soil and groundwater samples from the borings/wells. Additionally, GeoEngineers collected groundwater samples from three existing wells (EV-20B and EV-22A/B). Soil and groundwater samples were analyzed for arsenic, lead, cadmium, mercury, antimony and thallium. Results indicated soil and groundwater contain elevated metals concentrations (predominantly arsenic and lead). Of note, the metals concentrations in groundwater identified in the late 1990s were similar to the metals concentrations detected in 2012.

2.0 FIELD INVESTIGATION

2.1. Monitoring Well and Soil Boring Installation

Investigation activities included installation of 54 groundwater monitoring wells (23 "shallow" wells, 30 "deep" wells and one "deeper deep" well) throughout the Lowland Area using hollow-stem auger (HSA) drill rigs. Forty six of the monitoring wells were installed in shallow/deep well pairs at twenty three locations as shown on Figure 3. Seven of the wells were installed as deep wells, either adjacent to existing shallow wells or where shallow groundwater was not encountered. One deeper, deep well (BP-05D2) was installed adjacent to an existing shallow/deep well pair (BP-05S/D) on the Benson Property to further characterize the vertical extent of metals in soil and groundwater. The shallow and deep wells in each pair are spaced approximately 4 to 5 feet apart. Soil samples were collected from each deep well boring completed during the monitoring well installation activities.

The investigation locations were selected to characterize metals concentrations in soil and groundwater throughout the Lowland Area. The monitoring well installations were completed between December 4, 2012 and January 24, 2013. The horizontal coordinates and vertical elevations of each well were surveyed after well installation was completed.

In general accordance with the objectives of the SAP, shallow wells were installed in what previous investigations of the Everett Smelter Area characterize as the "shallow aquifer." The top of the well screens were installed at depths ranging from 3.5 feet to 8 feet below ground surface (bgs) and the bottom of the well screens were installed at depths ranging from 6 to 18 feet bgs. The only exception to this is well LLMW-23S, which was installed on top of a dike along the Snohomish River

at a higher surface elevation than the surrounding Lowland Area and was screened from 14 to 24 feet bgs. The bottom of the shallow well screens within the Lowland Area were installed approximately 1 foot above the historic native surface of the silt/channel deposits, where encountered. Shallow wells installed within the Upland Area along Marine View Drive were typically installed at or just above the top of the Vashon Till unit (described below in Section 3.0) with the exception of LLMW-27S, which was installed between 31 and 36 feet bgs at a potential water bearing zone within the Vashon Till unit. Shallow wells were installed with screen lengths ranging from 2.5 to 10 feet.

Deep wells were installed in what previous investigations of the Everett Smelter Area characterize as the "deep aquifer." The top of the well screens within the Lowland Area were installed at depths ranging from 11 to 30 feet bgs and the bottom of the well screens were installed at depths ranging from 21 feet to 40 feet bgs. The deep wells installed in the Upland Area had top of screen depths ranging from 35 to 63.5 feet bgs and the bottom of the screens were installed between approximately 45 to 73.5 feet bgs. All of the deep well screens were ten feet in length. The deep well screens were installed with a minimum 1-foot separation between the bottom of the silt/channel deposits or Vashon Till unit and the top of the well screens.

The deeper deep well BP-05D2 was installed with a 5-foot-long screen set from 67 feet to 72 feet bgs.

Three soil borings were completed using direct-push technologies at the locations shown on Figure 3. These borings were each completed to 20 feet bgs on January 7, 2013.

All borings were logged by qualified geologists and the wells were installed by licensed drillers in general accordance with Washington Administrative Code (WAC) 173-160. Wells were constructed of 2-inch-diameter PVC with either flush mount or stick-up monuments. Wells with stick-up monuments have steel bollards set in concrete around the wells for protection. Boring and monitoring well construction logs are provided in Appendix A. Each monitoring well and boring location was surveyed by a certified land survey company, David Evans and Associates. A summary of monitoring well and soil boring construction information is provided in Table 1. The survey data and surveyor's field notes are provided in Appendix B.

Continuous soil samples were collected from each boring advanced to install the deep wells using a split-spoon sampler (i.e., Standard Penetration Test sampler or "California spoon" sampler). Soil samples were only collected from the deep well borings at locations where the deep well borings were co-located with a shallow well boring. Well construction details for the shallow wells were based on observations of soil in the adjacent deep well. Field screening was completed as described in the Ecology-approved SAP (GeoEngineers, 2012), and at least one soil sample was collected from each deep well in each of the following four soil horizons:

- Fill comprising the shallow aquifer;
- Historic native surface (i.e., the top of the native silt deposits or till);
- From deeper within the native deposits; and

- Soil from within the deep aquifer (alluvium or advance outwash) that was within the elevation where the well screen was installed.

Soil samples were collected, logged on a chain-of-custody form in general accordance with the QAPP, placed in laboratory-supplied jars and stored in coolers on ice for transport and delivery to the analytical laboratory. A total of 151 samples were analyzed for metals including antimony, arsenic, cadmium, lead, mercury, and thallium by Environmental Protection Agency (EPA) Methods 6010/200.8/7470.

Chemical analysis of the soil samples was completed by Analytical Resources, Inc. (ARI) in Tukwila, Washington.

2.2. Monitoring Well Development

The monitoring wells were developed in December 2012 and January 2013. Well development was completed to remove water that may have been introduced into the well during drilling, stabilize the filter pack and formation materials surrounding the well screen and restore the hydraulic connection between the well screen and the surrounding soil. Each well screen interval was gently surged with a decontaminated stainless steel bailer and groundwater in the well was removed using a decontaminated, submersible pump and tubing. Approximately 20 to 50 gallons of water was removed from each well at a rate of approximately 20 gallons per hour. The initial turbidity readings of water removed from the wells during development were greater than 1,000 Nephelometric turbidity units (NTUs) and final turbidity readings were less than 500 NTUs in all but six wells. The soil within the well screen intervals of the six wells with higher turbidities generally included a higher fines content and/or organics/wood which may have contributed to the higher turbidities.

2.3. Decontamination

Drilling and non-disposable sampling equipment was decontaminated using the procedures specified in the QAPP.

2.4. Disposal of Investigation-Derived Materials

Soil cuttings from borings advanced for soil sampling and monitoring well installation were placed in labeled and sealed 55-gallon drums pending characterization for disposal. Approximately 3,500 gallons of development and purge water removed from the monitoring wells and decontamination water generated during all Lowland activities was placed in one 6,500 gallon upright aboveground polyethylene storage tank pending characterization for disposal. Both the soil drums and aboveground storage tank were stored within a fenced staging area on a property owned by the Port of Everett and made available for the investigation. The soil was disposed of at Republic Services Landfill in Roosevelt, Washington and water was disposed of at Emerald Services Airport Way Facility in Seattle, Washington based on the results of the characterization for disposal and approval by the disposal facilities. Incidental waste (i.e., gloves, paper towels, etc.) were disposed of off site as solid waste.

2.5. Deviations From the SAP

Field activities were performed in general accordance with the SAP, QAPP and HASP created for this project, with the exceptions listed below. All deviations were discussed with and approved by a representative of Ecology prior to implementation. Deviations included the following:

- Monitoring wells LLMW-24D, LLMW-25D, LLMW-31D were installed as deep wells only due to the absence of shallow groundwater at those locations.
- The actual location for monitoring well pair LLMW-17S/D was moved approximately 100 feet east-northeast from the planned location based on a request by Ecology. Pentachlorophenol (PCP) was previously observed at an investigation location west of the actual location of LLMW-17S/D. These wells were sampled for PCP in groundwater independent of the original scope of the Lowland (i.e., metals) investigation. The groundwater samples for PCP analysis were collected as "splits" and provided to Weyerhaeuser and Ecology.
- The actual location for monitoring well pair LLMW-21S/D is approximately 150 feet northeast of the planned location due to a request by the property owner for access reasons.
- The actual location for monitoring well LLMW-31D was on the east side of East Marine View Drive due to underground and overhead utility conflicts at the planned location.
- The actual locations for monitoring well pairs LLMW-12S/D, LLMW-14S/D and LLMW-15S/D were adjusted slightly (each less than approximately 100 feet from the planned locations) based on a request by the property owner for access reasons.

3.0 RESULTS

3.1. Observed Stratigraphy and Subsurface Conditions

In general, soils encountered during this investigation were similar to what has been described in previous investigations of the Lowland Area. The following is a description of four soil units observed in the Lowland Area:

- Fill: In general, approximately 7 feet of fill was observed at the surface of the Lowland Area. However, up to 19 feet of fill was observed in LLMW-13D and LLMW-23D. Fill predominantly consisted of soft/loose silty sands to silts with occasional wood and debris such as glass, metal and concrete. Groundwater within the fill unit was measured at depths ranging from approximately 3 to approximately 12 feet bgs during groundwater investigation activities. Results of groundwater investigation activities will be provided in a separate groundwater monitoring technical memorandum.
- Silt: Silt deposits were identified beneath the fill, typically as a layer of silt, silt with organics, and/or peat. The top of the silt is likely the historic native surface present during the time of smelter operations. The silt deposits have been described as forming a somewhat leaky confining layer between the shallow, unconfined aquifer and underlying deep aquifer. Where present, the silt deposits were generally observed to be between approximately 1.5 and 13 feet thick. The silt deposits were generally observed to be thicker in monitoring wells in the western portion of the Lowland Area, and thinner toward the east (i.e., towards the Snohomish River). A silt layer was not observed to be present at wells LLMW-01 or LLMW-02 at an

elevation consistent with the elevation of the silt layer in other Lowland Area investigation locations. However, a thin silt layer was observed at LLMW-01 and LLMW-02 at an elevation substantially lower than observed in the remainder of the Lowland Area. It is likely the silt observed in LLMW-01 and LLMW-02 may represent a thin interbed within the alluvium unit (described below).

- Alluvium: Wet, loose to medium dense sand was observed beneath the silt confining layer. The sand present beneath the confining layer is interpreted to be comprised of alluvium that has been described in previous investigations (ASARCO Incorporated, 2000).
- Lower Silt: A lower silt unit with sand interbeds was observed beneath the deep aquifer sand unit at the deeper deep location of BP-05D2. This silt was observed from approximately 46 feet to the total depth of the boring at 72 feet bgs. A five-foot well screen was set across the thickest sand interbed observed in the boring. The sand was observed at a depth of 68 to 71 feet bgs and the well screen was set at a depth of 67 to 72 feet bgs.

Soils encountered along the boundary between the Upland and Lowland Areas (LLMW-24D, LLMW-25D, LLMW-27D, LLMW-29D, LLMW-31D, LLMW-33D, and LLMW-34D) consisted of four principal geologic units:

- Fill/colluvium deposits: Approximately 1.5 to 6 feet of fill/colluvium deposits were observed at the surface in the borings performed along the boundary between the Upland and Lowland Areas. The soil was generally comprised of silt to cobble size material and occasionally contained organic matter, charred wood and other debris typically associated with fill.
- Weathered glacial till: Approximately 1.5 to 10 feet of weathered glacial till was observed underlying the surface fill/colluviums. The soil was generally comprised of silt to cobble size material. The soil was similar in appearance to the glacial till described below. However, the color of the weathered glacial till was generally brown and the density was lower than glacial till.
- Glacial till: Approximately 15 to 30 feet of glacial till was observed underlying the weathered glacial till. The soil was generally comprised of a dense mixture of silt to cobble sized material. Our interpretation of this soil is that it is Vashon till.
- Advance outwash sand: Advance outwash sand was observed underlying the glacial till to the full depth of the explorations. Soil consisted of fine to medium sand with trace amounts of silt. Our interpretation of this soil is that it is Vashon Advance Outwash Sand.

3.2. Data Validation

A data quality assessment was performed on all data in general conformance with an EPA "Stage-2B" validation. The data quality assessment report is provided in Appendix C. The laboratory analytical reports are provided in Appendix D. The data were deemed acceptable for use as qualified.

3.3. Soil Analytical Results

One hundred and fifty one soil samples from 31 deep borings were analyzed. Soil samples were only collected as part of the deep well installation and not from the co-located shallow monitoring well installations due to the close proximity (i.e., within 4 or 5 feet) of the well pairs. The soil

samples collected were submitted for metals analysis including antimony, arsenic, cadmium, lead, mercury and thallium. Selected soil samples were also submitted for analysis of grain size and total organic carbon (TOC).

The results for metals in soil are presented in Table 2 and Figures 4 and 5 present the arsenic and lead soil results, respectively.

The following summarizes the results for soil samples:

- Antimony was detected in one soil sample collected from the fill layer at LLMW-17 at a concentration of 19 milligrams per kilogram (mg/kg). Antimony was not detected in any other soil samples.
- Arsenic was detected in all samples at concentrations ranging from 1.7 mg/kg up to 1,330 mg/kg (LLMW-27 from 3.5 to 4.5 feet bgs). In general, the highest soil arsenic concentrations were observed in samples collected from the historic native surface of the silt deposits, followed by samples collected from the fill layer above the silt deposits.
- Cadmium was detected in all but 12 of the soil samples at concentrations ranging from 0.2 mg/kg to 4.5 mg/kg. Cadmium concentrations were higher in samples collected from the fill as well as the historic native surface of the silt. Cadmium concentrations also tended to be higher in samples with higher lead and/or arsenic concentrations.
- Lead was detected in the majority of samples at concentrations ranging from 2 mg/kg to 395 mg/kg. Lead concentrations tended to be higher in samples collected from the fill as well as the historic native surface of the silt.
- Mercury was detected in approximately half the samples at concentrations ranging from 0.02 mg/kg to 0.81 mg/kg.
- Thallium was not detected in any of the soil samples analyzed.

Soil total organic carbon results are presented in Table 3. The samples selected for grain size analysis are shown in Table 4 and the results are contained in Appendix E.

4.0 LIMITATIONS

We have prepared this report for the exclusive use of Washington State Department of Ecology and their authorized agents.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of environmental investigation in this area at the time this report was prepared. No warranty or other conditions express or implied should be understood.

Please refer to Appendix F titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

5.0 REFERENCES

ASARCO Incorporated, 2000. Draft Comprehensive Lowland Area Remedial Investigation Report for the Everett Smelter Site, Everett, Washington. January 2000.

Table 1

Summary of Monitoring Well and Soil Boring Construction Information

Everett Lowland

Everett, Washington

Location ID	Ecology Well Tag	Location Coordinates[1]		Elevations[2]		Flush / Stickup	Screened Interval Depth (feet bgs)
		Northing (Y)	Easting (X)	Ground Surface Elevation (feet)	Top of Casing Elevation (feet)		
Monitoring Well							
BP-05D2	BHR-977	371472.5693	1308791.7070	15.83	19.26	Stickup	67-72
LLMW-01D	BHU-093	373911.1708	1307952.9290	16.08	15.74	Flush	27.5-37.5
LLMW-02D	BHU-027	372887.0090	1307921.3900	15.38	15.15	Flush	22-32
LLMW-03S	BHU-088	372968.4709	1308355.5780	14.52	17.45	Stickup	3.5-8.5
LLMW-03D	BHU-087	372965.5718	1308351.5110	14.43	17.45	Stickup	21-31
LLMW-04S	BHU-090	372644.2517	1308249.7640	18.61	21.91	Stickup	4-14
LLMW-04D	BHU-089	372642.8382	1308246.2520	18.89	21.98	Stickup	22-32
LLMW-05S	BHU-011	372938.3312	1309085.1330	14.42	14.05	Flush	4-9
LLMW-05D	BHU-010	372934.1281	1309088.2700	14.39	13.92	Flush	15-25
LLMW-06S	BHU-091	372477.6634	1309132.4260	12.73	12.49	Flush	4-7
LLMW-06D	BHU-092	372472.7325	1309133.8720	12.71	12.29	Flush	18-28
LLMW-07S	BHU-008	372578.2673	1309467.0870	14.06	13.82	Flush	4-9
LLMW-07D	BHU-009	372580.8285	1309464.7630	14.09	13.81	Flush	15-25
LLMW-08S	BHU-013	372213.2542	1309788.2490	13.21	16.21	Stickup	5-10
LLMW-08D	BHU-012	372209.3701	1309788.5690	13.45	16.26	Stickup	15-25
LLMW-09S	BHU-007	371929.4722	1309290.9450	13.15	12.57	Flush	3.5-6
LLMW-09D	BHU-006	371933.0232	1309291.5300	13.18	12.79	Flush	17-27
LLMW-10S	BHU-015	371722.2934	1309357.7910	13.18	15.91	Stickup	4-6.5
LLMW-10D	BHU-014	371725.4255	1309359.4070	13.14	15.97	Stickup	21-31
LLMW-11S	BHU-041	371826.1136	1310349.2310	16.00	19.76	Stickup	3.5-9.5
LLMW-11D	BHU-040	371822.9079	1310350.2610	16.03	19.71	Stickup	12-22
LLMW-12S	BHU-017	371520.5241	1309412.4360	13.84	15.61	Stickup	3-7
LLMW-12D	BHU-016	371523.5091	1309414.2800	13.63	15.71	Stickup	17-27
LLMW-13S	BHU-044	371682.6131	1309796.9300	18.43	21.49	Stickup	8-18
LLMW-13D	BHU-045	371682.4624	1309793.1490	18.48	21.24	Stickup	25-35
LLMW-14S	BHU-019	371374.1753	1309446.9460	12.49	14.74	Stickup	3.5-6
LLMW-14D	BHU-018	371375.9911	1309449.1600	12.49	14.80	Stickup	20-30
LLMW-15S	BHU-021	371051.1506	1309535.4190	13.21	15.94	Stickup	3.5-9.5
LLMW-15D	BHU-020	371053.2175	1309536.6120	13.10	16.07	Stickup	24-34
LLMW-16S	BHU-043	371159.2967	1310164.4520	17.19	20.02	Stickup	4-12
LLMW-16D	BHU-042	371158.1660	1310160.4370	17.14	20.14	Stickup	24-34
LLMW-17S	BHU-039	371320.3207	1310602.2830	15.32	18.27	Stickup	4-11
LLMW-17D	BHU-038	371317.6575	1310603.0720	15.27	18.29	Stickup	15-25
LLMW-18S	BHU-023	370389.0772	1309715.2920	13.27	15.70	Stickup	3.5-7.5
LLMW-18D	BHU-022	370391.7580	1309718.7140	13.11	15.91	Stickup	20-30
LLMW-19D	BHU-005	370189.3895	1310224.8460	11.64	14.22	Stickup	17-27
LLMW-20D	BHU-037	370542.4429	1310748.1780	11.32	14.92	Stickup	11-21
LLMW-21S	BHU-026	370010.9467	1309885.4530	13.62	16.04	Stickup	3.5-7
LLMW-21D	BHU-025	370011.1759	1309881.2800	13.29	16.03	Stickup	23-33
LLMW-22S	BHU-004	369173.0090	1310445.6340	13.18	12.87	Flush	3.5-7
LLMW-22D	BHU-003	369167.8357	1310446.0910	13.14	12.80	Flush	17-27
LLMW-23S	BHU-002	368222.1107	1310277.4480	25.95	25.54	Flush	14-24
LLMW-23D	BHU-001	368226.9076	1310278.8900	25.91	25.30	Flush	30-40
LLMW-24D	BHU-030	371665.5506	1308321.7200	54.66	54.28	Flush	43.5-53.5
LLMW-25D	BHU-024	371489.9394	1308367.7590	61.98	61.76	Flush	55-65
LLMW-27S	BHU-032	371254.3715	1308467.3450	61.87	61.46	Flush	31-36
LLMW-27D	BHU-031	371259.2652	1308465.4350	61.93	61.71	Flush	50-60
LLMW-29S	BHU-029	370978.6854	1308557.0080	55.91	55.66	Flush	5-15
LLMW-29D	BHU-028	370982.4647	1308556.2150	56.04	55.62	Flush	50-60
LLMW-31D	BHR-886	370452.8170	1308669.7760	59.00	58.41	Flush	54-64
LLMW-33S	BHU-095	369957.8312	1308912.9560	37.73	37.42	Flush	3.5-10.5
LLMW-33D	BHU-094	369961.9490	1308914.5250	37.57	37.24	Flush	35-45
LLMW-34S	BHU-047	368693.8425	1308931.7710	53.22	52.71	Flush	4-12
LLMW-34D	BHU-046	368696.1556	1308930.6690	53.30	53.03	Flush	63.5-73.5
Soil Boring							
LLSB-1	Not Applicable	373990.7175	1306949.75	12.6436	Not Applicable	Not Applicable	Not Applicable
LLSB-2	Not Applicable	373634.9832	1307691.419	14.7497	Not Applicable	Not Applicable	Not Applicable
LLSB-3	Not Applicable	373543.2766	1308050.649	15.0686	Not Applicable	Not Applicable	Not Applicable

Notes

BP = Benson Property

LLMW = Lowland Monitoring Well

[1] Northing (Y) and Easting(X) are in Wasington State Plane North Coordinate System, 83/91 grid values

[2] Vertical datum is NAVD88, US survey feet

Survey performed by David Evans and Associates, Everett, Washington

Table 2

Chemical Analtyical Result - Soil[1]

Everett Lowland

Everett, Washington

Location ID	Sample ID	Analyte	Antimony	Arsenic	Cadmium	Lead	Mercury	Thallium
		Units	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*
		Stratigraphic Unit						
LLMW01	LLMW01-3-4	Fill	5 U	**5.6**	**0.2**	**2**	0.02 U	0.2 U
	LLMW01-25-25.2	Native Surface	8 U	**16.4**	**0.6**	**14**	**0.18**	0.3 U
	LLMW01-26-26.5	Silt Deposits	8 U	**13.3**	**0.6**	**12**	**0.16**	0.3 U
	LLMW01-32.5-33.5	Alluvium	6 U	**2.7**	0.2 U	2 U	0.03 U	0.2 U
LLMW02	LLMW02-6-7	Fill	6 U	**5.3**	**0.3**	**3**	0.02 U	0.2 U
	LLMW02-17.4-17.6	Native Surface	8 U	**64.6**	**1.9**	**50**	**0.21**	0.3 U
	LLMW02-20-21	Silt Deposits	6 U	**7.5**	**0.3**	**3**	0.03 U	0.2 U
	LLMW02-27-28	Alluvium	6 U	**5.3**	**0.3**	**3**	0.02 U	0.2 U
LLMW03	LLMW03-9-10	Fill	6 U	**6.4**	**0.3**	**5**	0.02 U	0.2 U
	LLMW03-10.5-10.6	Native Surface	8 U	**20.9**	**0.6**	**21**	**0.09 J**	0.3 U
	LLMW03-13.5-14.5	Silt Deposits	8 U	**12.6**	**0.7**	**7**	**0.09 J**	0.3 U
	LLMW03-28-29	Alluvium	6 U	**3.2**	**0.3**	2 U	0.03 U	0.2 U
LLMW04	LLMW04-2-3	Fill	5 U	**7.3**	**0.5**	**11**	**0.05**	0.2 U
	LLMW04-2-3D	Duplicate	5 U	**6.7**	**0.5**	**10**	**0.05**	0.2 U
	LLMW04-14.3-14.5	Native Surface	7 U	**24.9**	**0.6**	**11**	**0.08**	0.3 U
	LLMW04-18-19	Silt Deposits	8 U	**15.7**	**0.7**	**6**	**0.09**	0.3 U
	LLMW04-30-31	Alluvium	5 U	**4.4**	**0.3**	2 U	0.02 U	0.2 U
LLMW05	LLMW05-6-7	Fill	6 U	**9.8**	**0.3**	**4**	0.02 U	0.2 U
	LLMW05-10-10.2	Native Surface	8 U	**49.8**	**0.8**	**53**	**0.1**	0.3 U
	LLMW05-12-13	Silt Deposits	7 U	**9.8**	**0.5**	**6**	**0.06**	0.3 U
	LLMW05-12-13-D	Duplicate	7 U	**9.8**	**0.5**	**5**	**0.06**	0.3 U
	LLMW05-20-21	Alluvium	6 U	**4.4**	**0.3**	**3**	0.03 U	0.2 U
LLMW06	LLMW06-6.5-7.5	Fill	6 U	**59.5**	**0.3**	**3**	0.02 U	0.2 U
	LLMW06-8-8.2	Native Surface	9 U	**28**	**0.8**	**15**	**0.08**	0.3 U
	LLMW06-11-12	Silt Deposits	7 U	**13.7**	**0.6**	**6**	**0.09**	0.3 U
	LLMW06-23-24	Alluvium	6 U	**5.3**	**0.3**	2 U	**0.03**	0.3 U
LLMW07	LLMW07-3-4	Fill	6 U	**5.7**	**0.5**	**16**	0.02 U	0.2 U
	LLMW07-10-10.2	Native Surface	8 U	**12.9**	**0.3**	**4**	**0.05**	0.3 U
	LLMW07-10.5-11	Silt Deposits	7 U	**13.5**	**0.4**	**5**	**0.06**	0.3 U
	LLMW07-18-19	Alluvium	6 U	**2.6**	0.2 U	2 U	0.02 U	0.2 U
LLMW08	LLMW08-3-4	Fill	10 U	**26.8**	**0.8**	**81**	**0.06**	0.2 U
	LLMW08-12-13	Native Surface	20 U	**29.2**	**1.1**	**386**	**0.07**	0.3 U
	LLMW08-20-21	Alluvium	6 U	**5.4**	**0.3**	4	0.02 U	0.2 U
LLMW09	LLMW09-4.5-5.5	Fill	6 U	**15.1**	**0.3**	**4**	0.02 U	0.2 U
	LLMW09-8.3-8.5	Native Surface	10 U	**103**	**1.7**	**169**	**0.26**	0.4 U
	LLMW09-10.5-11	Silt Deposits	8 U	**16.5**	**0.5**	8	**0.08**	0.3 U
	LLMW09-18-19	Alluvium	6 U	**5.9**	0.2 U	2 U	0.02 U	0.2 U
LLMW10	LLMW10-6-7	Fill	6 U	**2.8**	**0.3**	**3**	0.03 U	0.2 U
	LLMW10-7.5-7.7	Native Surface	7 U	**22.3**	**2.5**	**37**	**0.1**	0.3 U
	LLMW10-12-13	Silt Deposits	8 U	**15.4**	**0.6**	**8**	**0.09**	0.3 U
	LLMW10-27-28	Alluvium	6 U	**3.4**	**0.2**	2 U	0.03 U	0.2 U
LLMW11	LLMW11-5-6	Fill	10 U	**26**	0.6 U	**15**	**0.05**	0.2 U
	LLMW11-10.5-10.7	Native Surface	7 U	**13.9**	**0.4**	**12**	**0.05**	0.3 U
	LLMW11-11-11.5	Silt Deposits	6 U	**10.8**	**0.5**	**6**	**0.06**	0.3 U
	LLMW11-19.5-20.5	Alluvium	6 U	**28.9**	**0.3**	**3**	0.03 U	0.3 U
LLMW12	LLMW12-5-5.5	Fill	6 U	**3.8**	**0.3**	**3**	0.02 U	0.2 U
	LLMW12-8.5-8.7	Native Surface	8 U	**32.1**	**0.8**	**12**	**0.07**	0.3 U
	LLMW12-10-10.5	Silt Deposits	8 U	**12.6**	**0.5**	**8**	**0.09**	0.3 U
	LLMW12-21-22	Alluvium	6 U	**9.4**	**0.3**	**3**	0.02 U	0.2 U
LLMW13	LLMW13-10.5-11.5	Fill	7 U	**47.2**	**0.3**	**49**	0.03 U	0.3 U
	LLMW13-18.7-19	Native Surface	7 U	**15.7**	**0.5**	**12**	**0.09**	0.3 U
	LLMW13-23-24	Silt Deposits	6 U	**6.7**	**0.4**	**5**	0.02 U	0.2 U
	LLMW13-32-33	Alluvium	6 U	**4.2**	**0.3**	**3**	0.02 U	0.2 U
LLMW14	LLMW14-5.5-6	Fill	6 U	**8.4**	**0.4**	**16**	**0.03**	0.2 U
	LLMW14-7-7.2	Native Surface	10 U	**203**	**4.5**	**395**	**0.23**	0.4 U
	LLMW14-13.5-14.5	Silt Deposits	7 U	**12.9**	**0.6**	**7**	**0.07**	0.3 U
	LLMW14-29-30	Alluvium	6 U	**2.8**	**0.3**	2 U	0.03 U	0.2 U
LLMW15	LLMW15-2-3	Fill	6 U	**2.6**	**0.3**	**4**	**0.02**	0.2 U
	LLMW15-2-3 DUP	Duplicate	6 U	**2.5**	**0.3**	**3**	0.03 U	0.2 U
	LLMW15-11.5-11.7	Native Surface	10 U	**63.8**	**1.5**	**105**	**0.2**	0.4 U
	LLMW15-14-15	Silt Deposits	8 U	**12.9**	**0.6**	**7**	**0.1**	0.3 U
	LLMW15-30.5-31.5	Alluvium	6 U	**5.1**	**0.2**	2 U	0.03 U	0.2 U
LLMW16	LLMW16-13-13.5	Fill	6 U	**15**	**0.3**	**6**	**0.03**	0.2 U
	LLMW16-13.5-13.7	Native Surface	7 U	**21**	**0.5**	**8**	**0.06**	0.3 U
	LLMW16-15-16	Silt Deposits	7 U	**10.5**	**0.5**	**6**	**0.07**	0.3 U
	LLMW16-29.5-30.5	Alluvium	5 U	**4**	**0.3**	**3**	0.02 U	0.2 U
LLMW17	LLMW17-5-6	Fill	**19**	**43.7**	**0.4**	**47**	**0.04**	0.2 U
	LLMW17-12-12.2	Native Surface	6 U	**10.8**	**0.4**	**5**	**0.05**	0.3 U
	LLMW17-12.5-13	Silt Deposits	6 U	**12.2**	**0.4**	**5**	**0.05**	0.3 U
	LLMW17-21-22	Alluvium	6 U	**3.7**	**0.3**	**2**	0.03 U	0.2 U
LLMW18	LLMW18-6-7	Fill	6 U	**3.9**	**0.2**	**3**	0.03 U	0.2 U
	LLMW18-8.5-8.7	Native Surface	10 U	**313**	**3.1**	**212**	**0.54**	0.4 U
	LLMW18-11-12	Silt Deposits	9 U	**18.8**	**0.5**	**9**	**0.08**	0.4 U
	LLMW18-21-22	Alluvium	6 U	**3.4**	0.3 U	3 U	0.03 U	0.3 U
LLMW19	LLMW19-3-4	Fill	6 U	**142**	**0.4**	**86**	**0.04**	0.2 U
	LLMW19-7.8-8	Native Surface	8 U	**31.2**	**0.5**	**131**	**0.09**	0.3 U
	LLMW19-9-10	Silt Deposits	8 U	**19.8**	**0.5**	13	**0.08**	0.3 U
	LLMW19-25-26	Alluvium	6 U	**2.7**	0.2 U	2 U	0.03 U	0.2 U

Location ID	Sample ID	Analyte	Antimony	Arsenic	Cadmium	Lead	Mercury	Thallium
		Units	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*	*mg/Kg*
		Stratigraphic Unit						
LLMW20	LLMW20-4.5-5.5	Fill	5 U	**30.2**	**0.3**	**12**	**0.03**	0.2 U
	LLMW20-7.2-7.4	Native Surface	7 U	**64.6**	**0.5**	**9**	**0.06**	0.3 U
	LLMW20-9-9.5	Silt Deposits	6 U	**19.4**	**0.4**	**5**	**0.03**	0.2 U
	LLMW20-13.5-14.5	Alluvium	6 U	**22.9**	**0.3**	**19**	0.03 U	0.3 U
LLMW21	LLMW21-6-7	Fill	6 U	**15.4**	**0.3**	**5**	0.02 U	0.2 U
	LLMW21-7.7-7.9*	Native Surface	10 U	**121**	**2**	**96**	**0.22**	0.4 U
	LLMW21-12-13	Silt Deposits	8 U	**21.3**	**0.6**	**9**	**0.07**	0.3 U
	LLMW21-15-16	Silt Deposits	10 U	**17**	**0.6**	**10**	**0.07**	0.4 U
	LLMW21-24-25	Alluvium	6 U	**5.1**	**0.3**	3 U	0.02 U	0.2 U
LLMW22	LLMW22-3-4	Fill	6 U	**6.1**	0.2 U	2 U	0.02 U	0.2 U
	LLMW22-8-8.2	Native Surface	9 U	**24.6**	**0.4**	**8**	**0.1**	0.3 U
	LLMW22-10.5-11.5	Silt Deposits	8 U	**16.9**	**0.4**	**9**	**0.09**	0.3 U
	LLMW22-20-21	Alluvium	6 U	**2.6**	**0.2**	2 U	0.03 U	0.2 U
LLMW23	LLMW23-17-18	Fill	6 U	**5.6**	0.2 U	**4**	0.02 U	0.2 U
	LLMW23-20-21	Fill	6 U	**5.7**	0.2 U	**5**	0.03 U	0.2 U
	LLMW23-22.9-23.1	Native Surface	7 U	**11.2**	**0.3**	**7**	**0.04**	0.3 U
	LLMW23-26-26.5	Silt Deposits	8 U	**16.3**	**0.4**	**6**	**0.1**	0.3 U
	LLMW23-35-36	Alluvium	6 U	**2.3**	0.2 U	2 U	0.02 U	0.2 U
LLMW24	LLMW24-1.3-1.5	Native Surface	6 U	**14.6 J**	**1.1**	**69**	**0.07**	0.2 U
	LLMW24-6-6.5	Till	6 U	**3.2 J**	**0.5**	**4**	**0.04**	0.2 U
	LLMW24-30-31	Outwash	5 U	**2.1 J**	**0.4**	**2**	0.03 U	0.2 U
	LLMW24-45-46	Outwash	5 U	**2.5 J**	**0.3**	2 U	**0.02**	0.2 U
LLMW25	LLMW25-3-4	Fill	5 U	**2.7**	**0.6**	**5**	**0.04**	0.2 U
	LLMW25-8-8.2	Native Surface	5 U	**2.1**	**0.3**	2 U	0.02 U	0.2 U
	LLMW25-10.5-11	Till	5 U	**2**	**0.3**	**2**	0.03 U	0.2 U
	LLMW25-55-56	Outwash	6 U	**2.2**	**0.3**	2 U	0.03 U	0.2 U
LLMW27	LLMW27-3.5-4.5	Fill	6 U	**1,330**	0.2 U	2 U	**0.08**	0.2 U
	LLMW27-4.5-5.5	Native Surface	5 U	**274**	**0.7**	2 U	0.02 U	0.2 U
	LLMW27-8-9	Weathered Till	6 U	**84.2**	**0.8**	2 U	0.02 U	0.2 U
	LLMW27-15.5-16	Weathered Till	6 U	**2.4**	**0.3**	2 U	0.02 U	0.2 U
	LLMW27-25-26	Till	5 U	**3.1**	**0.4**	**2**	0.02 U	0.2 U
	LLMW27-30-31	Outwash	5 U	**2.3**	**0.4**	2 U	0.02 U	0.2 U
	LLMW27-37-37.5	Outwash	6 U	**58.7**	**0.7**	**19**	**0.08**	0.2 U
	LLMW27-40-41	Outwash	5 U	**2.3**	**0.3**	2 U	0.02 U	0.2 U
	LLMW27-50-51	Outwash	6 U	**28.8**	**0.4**	2 U	0.03 U	0.2 U
	LLMW27-60-61	Outwash	5 U	**38.9**	**0.3**	2 U	0.03 U	0.2 U
LLMW29	LLMW29-6-7	Fill	10 U	**6.9**	0.5 U	5 U	0.05	0.2 U
	LLMW29-12.5-13.5	Native Surface	5 U	**85.7**	**0.4**	**2**	**0.02**	0.2 U
	LLMW29-20-21	Till	5 U	**52.6**	**0.3**	**2**	**0.02**	0.2 U
	LLMW29-30-31	Outwash	5 U	**30.1**	**0.3**	2 U	0.02 U	0.2 U
	LLMW29-55-56	Outwash	6 U	**6.7**	**0.3**	2 U	0.03 U	0.2 U
LLMW31	LLMW31-3-4	Fill	5 U	**58.8**	**0.8**	**271**	**0.13**	0.2 U
	LLMW31-9.1-9.3	Native Surface	5 U	**12.7**	**0.4**	**34**	**0.07**	0.2 U
	LLMW31-25-25.5	Till	5 U	**4.3**	**0.4**	**3**	0.02 U	0.2 U
	LLMW31-45-46	Outwash	5 U	**2.2**	**0.4**	**3**	**0.03**	0.2 U
	LLMW31-55-56	Outwash	6 U	**2.1**	**0.4**	2 U	0.02 U	0.2 U
LLMW33	LLMW33-3-4	Fill	6 U	**121**	**1**	**301**	**0.81**	0.2 U
	LLMW33-4.5-4.7	Native Surface	6 U	**10.9**	**0.5**	**18**	**0.17**	0.2 U
	LLMW33-10.5-11.5	Weathered Till	6 U	**2.6**	**0.3**	2 U	0.03 U	0.2 U
	LLMW33-39-40	Outwash	6 U	**1.7**	**0.3**	2 U	0.02 U	0.2 U
LLMW34	LLMW34-4.5-5.5	Fill	6 U	**5.7 J**	**0.4**	**7**	**0.05**	0.2 U
	LLMW34-6-6.2	Native Surface	6 U	**4.6 J**	**0.3**	**6**	**0.06**	0.2 U
	LLMW34-11.5-11.7	Weathered Till	6 U	**2.7 J**	**0.3**	2 U	0.02 U	0.2 U
	LLMW34-70-70.5	Outwash	5 U	**2.2 J**	**0.4**	2 U	0.02 U	0.2 U
LLSB01	LLSB01-6-7	Fill	8 U	**11.3**	**0.5**	**26 J**	**0.06**	0.3 U
	LLSB01-10.8-11	Native Surface	9 U	**13.4**	**1.2**	**50 J**	**0.4**	0.4 U
	LLSB01-13-14	Silt Deposits	8 U	**14.9**	**0.6**	**12 J**	**0.15**	0.3 U
	LLSB01-19-20	Alluvium	6 U	**3.9**	**0.3**	**3 J**	0.03 U	0.2 U
LLSB02	LLSB02-3-4	Fill	5 U	**9.8**	**0.4**	**37**	**0.02**	0.2 U
	LLSB02-10-10.2	Native Surface	9 U	**36.4**	**1**	**133**	**0.1**	0.3 U
	LLSB02-10.6-10.8	Silt Deposits	8 U	**14.7**	**0.6**	**7**	**0.07**	0.3 U
	LLSB02-12-13	Silt Deposits	7 U	**15**	**0.7**	**7**	**0.09**	0.3 U
	LLSB02-15-16	Alluvium	6 U	**9.4**	**0.4**	**4**	**0.04**	0.2 U
LLSB03	LLSB03-3-4	Fill	5 U	**6.9**	**0.3**	**3**	0.02 U	0.2 U
	LLSB03-11-11.2	Native Surface	8 U	**31.1**	**0.7**	**14**	**0.12**	0.3 U
	LLSB03-13-14	Silt Deposits	7 U	**18.3**	**0.6**	**7**	**0.07**	0.3 U
	LLSB03-19-20	Alluvium	6 U	**6.9**	**0.3**	**3**	0.03 U	0.2 U
	LLSB-DUP	Duplicate	5 U	**5.4**	**0.3**	**3 J**	0.02 U	0.2 U
BP05D2	BP05D2-40-41	Alluvium	6 U	**10.7**	**0.3**	**6**	0.03 U	0.2 U
	BP05D2-50-51	Silt Deposits	6 U	**8.2**	**0.5**	**4**	**0.03**	0.2 U
	BP05D2-62-62.5	Silt Deposits	7 U	**11.9**	**0.7**	**5**	**0.04**	0.3 U
	BP05D2-65-66	Silt Deposits	6 U	**12.3**	**0.6**	**3**	0.03 U	0.3 U
	BP05D2-70.5-71	Alluvium	6 U	**6.4**	**0.3**	2 U	0.02 U	0.2 U

Notes

[1] Chemical analysis performed by Analytical Resources, Inc., of Tukwila, Washington.

mg/Kg = milligram per Kilogram

U = Analyte was not detected at or greater than the listed reporting limit.

J = The indicated result is an estimate.

A "D" or "Dup" at the end of the sample ID indicates a field duplicate sample.

Bold type indicates the analyte was detected.

* = Sample LLMW21-7.7-7.9 was mislabeled in the field and reported as LLMW21-7.7-9. The correct sample ID (LLMW21-7.7-7.9) is displayed in this table.

Table 3

Soil Total Organic Carbon

Everett Lowland

Everett, Washington

Sample ID	Analyte	Total Solids	Total Organic Carbon
	Units	Percent	Percent
	Stratigraphic Unit		
LLMW03-5-5.2	Native Surface	67.3	2.93
LLMW04-30-31	Alluvium	88.3	0.264
LLMW05-6-7	Fill	84.2	0.247
LLMW06-6.5-7.5	Fill	87.8	0.368
LLMW07-18-19	Alluvium	82.2	0.222
LLMW08-20-21	Alluvium	82.6	0.741
LLMW10-6-7	Fill	83	0.296
LLMW11-19.5-20.5	Alluvium	84.6	3.06
LLMW12-21-22	Alluvium	83.8	0.765
LLMW13-10.5-11.5	Fill	65.7	28.2
LLMW14-5.5-6	Fill	82.8	3.36
LLMW16-29.5-30.5	Alluvium	87.5	0.549
LLMW17-5-6	Fill	88	11.6
LLMW18-6-7	Fill	83.2	0.433
LLMW18-21-22	Alluvium	78.30	1.29
LLMW20-4.5-5.5	Fill	88.6	3.42
LLMW27-50-51	Outwash	79.8	0.129
LLMW29-55-56	Outwash	78.9	0.538

Table 4

Samples Submitted for Grain Size Analysis

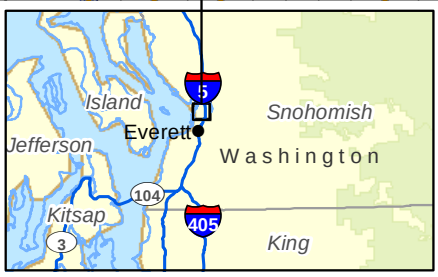
Everett Lowland

Everett, Washington

Sample ID
LLMW03-5-5.2
LLMW03-28-29
LLMW06-6.5-7.5
LLMW06-23-24
LLMW07-18-19
LLMW08-20-21
LLMW11-3.5-4.5
LLMW11-19.5-20.5
LLMW12-5-5.5
LLMW12-21-22
LLMW13-10.5-11.5
LLMW13-32-33
LLMW18-6-7
LLMW18-21-22

Note:

See Appendix E for results of grain size analyses.



N
W
E
S

2,000 0 2,000

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

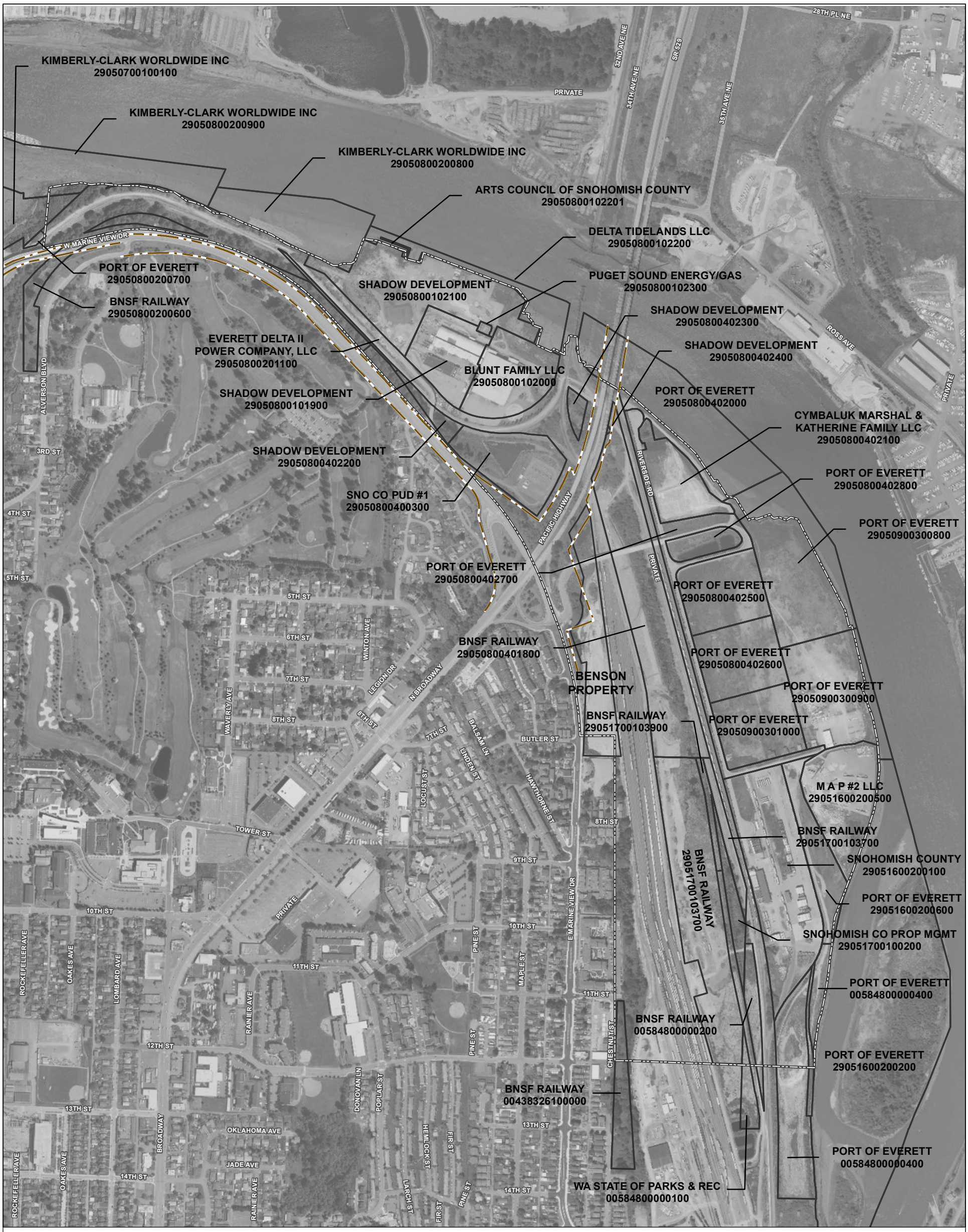
Everett Smelter - Lowland Area

GeoEngineers

Figure 1

Path: \\seal\projects\0105040681GIS\0504068_VicinityMap_Lowland.mxd Map Revised: 07 February 2013 amanza

Path: \\sea\projects\0\0504068\GIS\050406800_T700_LowlandStudyArea_ed.mxd Map Revised: 11 June 2013 bmagdasy



Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Approximate WSDOT Right of Way

N
W E
S

700 0 700

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

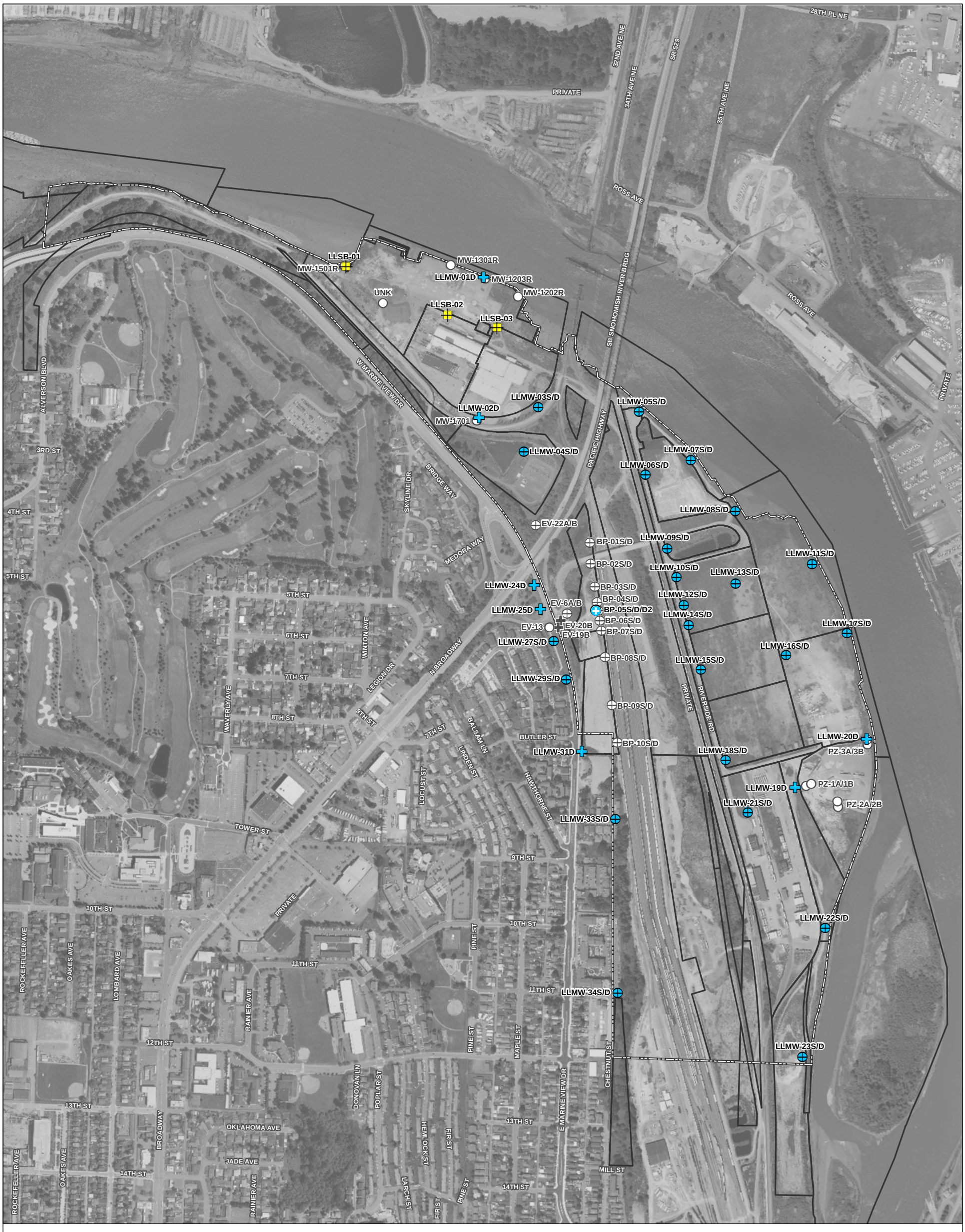
Lowland Area

Everett Smelter - Lowland Area

GeoEngineers

Figure 2

Path: W:\Seattle\Projects\0\0504068\GIS\050406800_T700_LowlandInvestigations_2012_2013.mxd Map Revised: 01 May 2013 bmagdasy



Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Existing Shallow Aquifer Monitoring Well
- Existing Deep Aquifer Monitoring Well
- Existing Shallow and Deep Aquifer Monitoring Well Pair

Investigation Locations (2012-2013)

- Shallow and Deep Aquifer Monitoring Well Pair
- Deep Aquifer Monitoring Well
- Deeper Deep Aquifer Monitoring Well (to determine vertical extent)
- Soil Boring

N W E S

700 0 700

Feet

Lowland Area Investigation Locations

Everett Smelter - Lowland Area

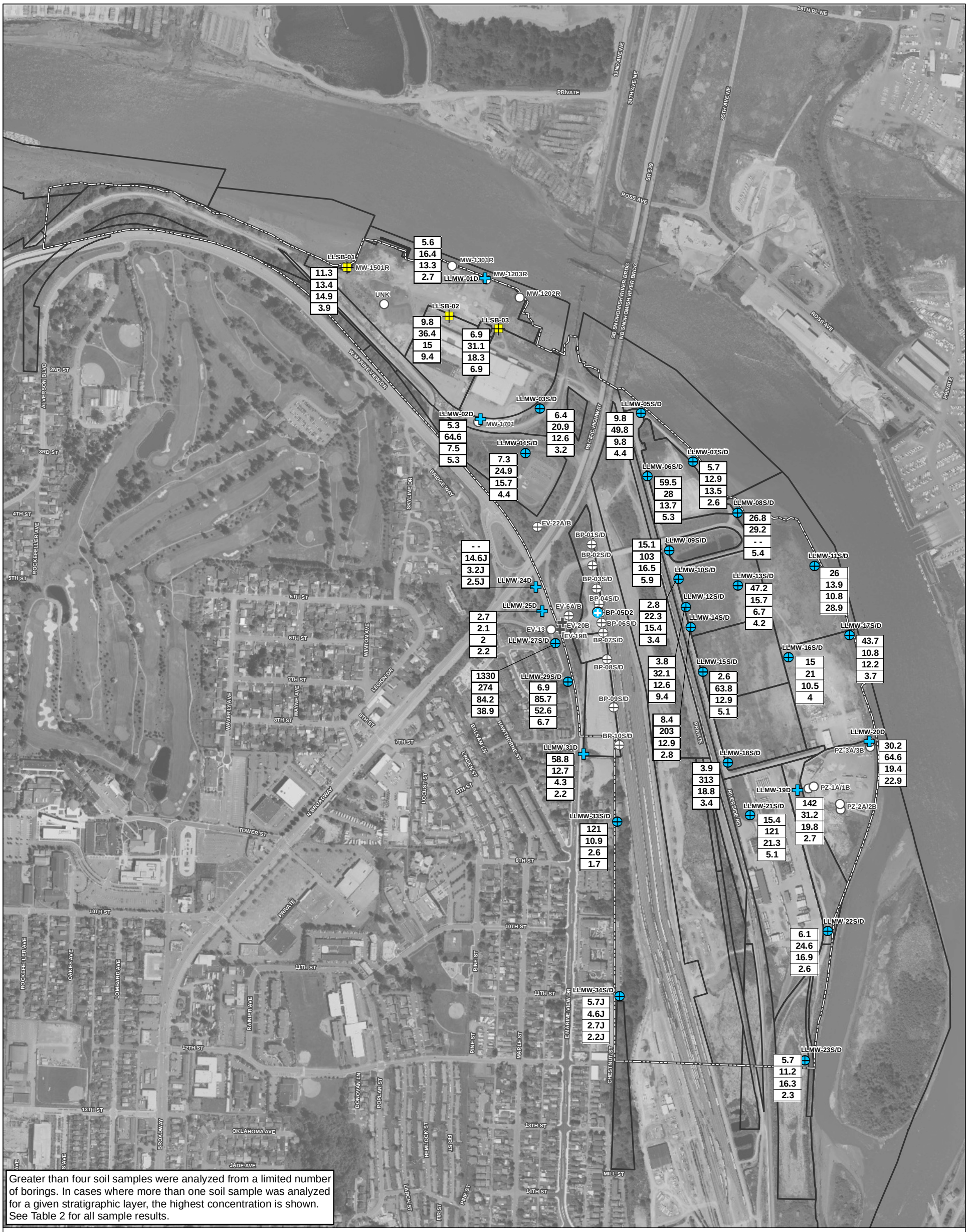
GeoEngineers

Figure 3

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

Path: W:\Seattle\Projects\0\0504068\GIS\050406800_T700_Soil_Arsenic.mxd Map Revised: 01 May 2013 bmagdasy



Greater than four soil samples were analyzed from a limited number of borings. In cases where more than one soil sample was analyzed for a given stratigraphic layer, the highest concentration is shown. See Table 2 for all sample results.

Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Existing Shallow Aquifer Monitoring Well
- Existing Deep Aquifer Monitoring Well
- Existing Shallow and Deep Aquifer Monitoring Well Pair

Investigation Locations (2012-2013)

- Shallow and Deep Aquifer Monitoring Well Pair
- Deep Aquifer Monitoring Well
- Deeper Deep Aquifer Monitoring Well (to determine vertical extent)
- Soil Boring

Key to Soil Results

- Fill (Shallow Aquifer)
- Native Surface
- Silt/Till
- Alluvium/Outwash (Deep Aquifer)
- 5.7J — Arsenic Concentration in mg/kg ("J" indicates estimate)
- - - — Sample Not Obtained

N W E S

700 0 700

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

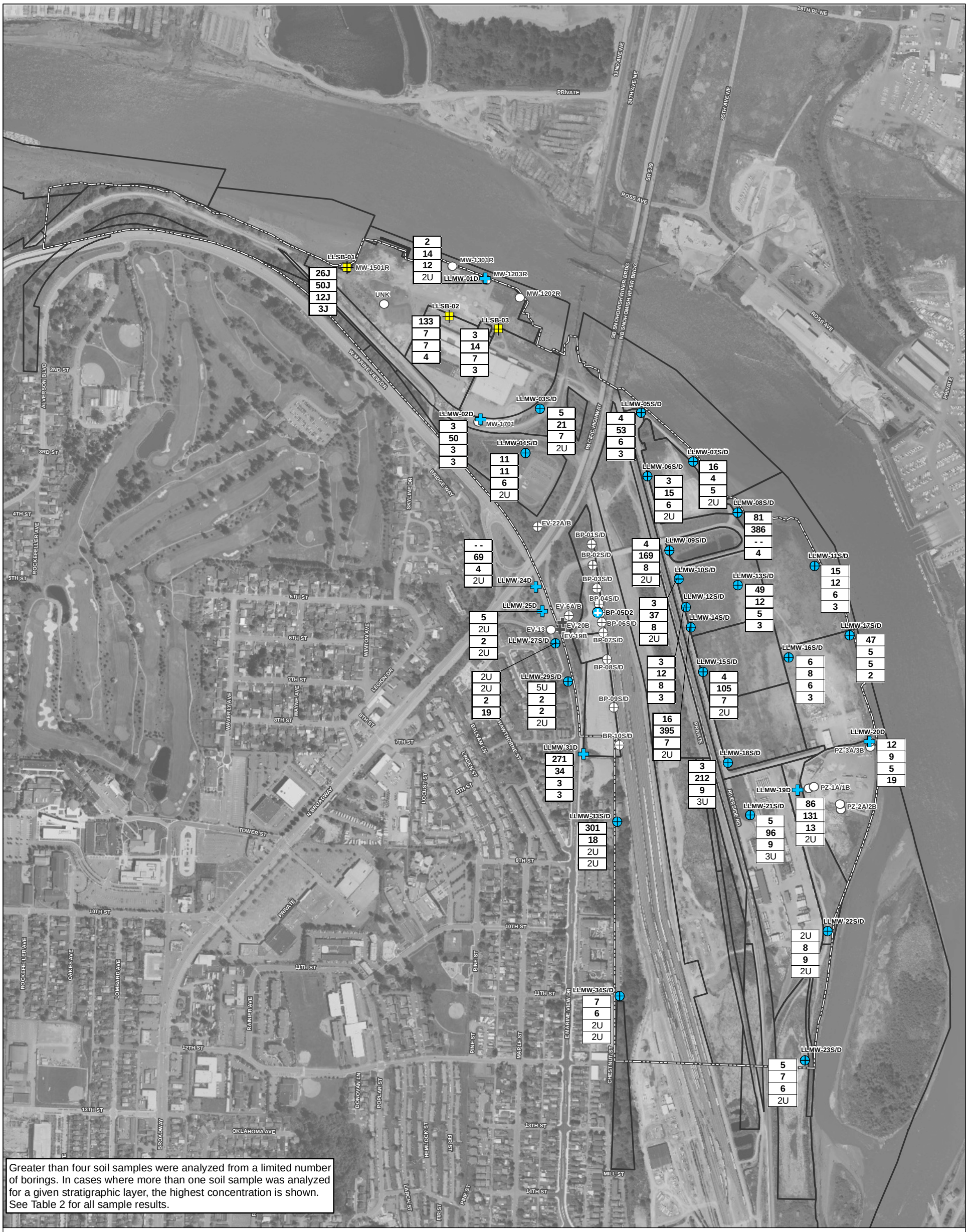
Boring/Monitoring Well Locations: Soil Results - Arsenic

Everett Smelter - Lowland Area

GeoEngineers

Figure 4

Path: W:\Seattle\Projects\0\0504068\GIS\050406800_T700_Soil_Lead.mxd Map Revised: 03 May 2013 bmagdasy



Legend

- Lowland Area
- Snohomish County Parcel Boundary
- Existing Shallow Aquifer Monitoring Well
- Existing Deep Aquifer Monitoring Well
- Existing Shallow and Deep Aquifer Monitoring Well Pair

Investigation Locations (2012-2013)

- Shallow and Deep Aquifer Monitoring Well Pair
- Deep Aquifer Monitoring Well
- Deeper Deep Aquifer Monitoring Well (to determine vertical extent)
- Soil Boring

Key to Soil Results

- Fill (Shallow Aquifer)
- Native Surface
- Silt/Till
- Alluvium/Outwash (Deep Aquifer)

5.7J — Arsenic Concentration in mg/kg ("U" indicates not detected, "J" indicates estimate)

- - — Sample Not Obtained

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Aerials Express Seattle, 2009. Snohomish County GIS, 2012.

N W E S

700 0 700

Feet

Boring/Monitoring Well Locations: Soil Results - Lead

Everett Smelter - Lowland Area

GeoEngineers

Figure 5

APPENDIX A
Boring and Monitoring Well Construction Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

- **Measured groundwater level in exploration, well, or piezometer**
- **Groundwater observed at time of exploration**
- **Perched water observed at time of exploration**
- **Measured free product in well or piezometer**

Graphic Log Contact

- **Distinct contact between soil strata or geologic units**
- **Approximate location of soil strata change within a geologic soil unit**

Material Description Contact

- **Distinct contact between soil strata or geologic units**
- **Approximate location of soil strata change within a geologic soil unit**

Sampler Symbol Descriptions

- **2.4-inch I.D. split barrel**
- **Standard Penetration Test (SPT)**
- **Shelby tube**
- **Piston**
- **Direct-Push**
- **Bulk or grab**

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/8/2013	1/8/2013	72	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) Vertical Datum	16.46 NAVD88	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)	371367.4523 1308612.59	Horizontal Datum	WA State Plane North 83/91

A 2 (in) well was installed on 1/8/2013 to a depth of 72 (ft).

Groundwater

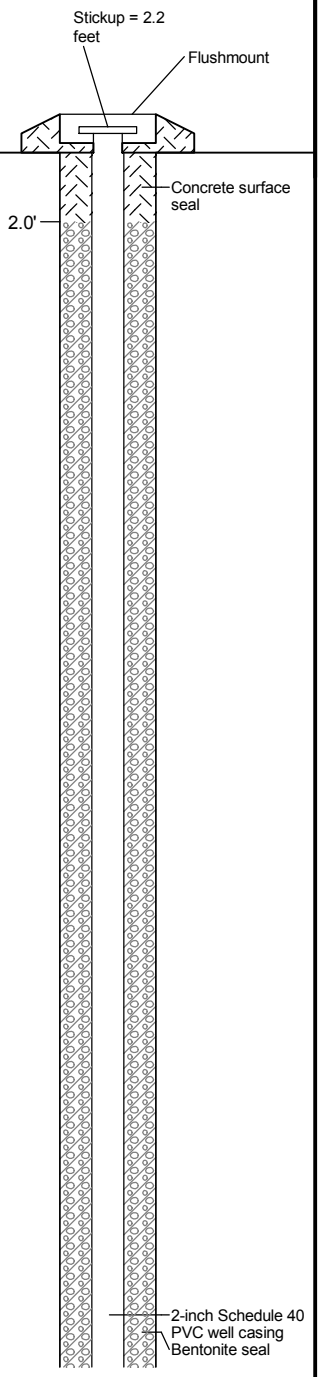
Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0									See boring log BP-05D for sampling and material description from 0 to 33 feet bgs.		
15	5											
	10											
5	15											
0	20											
-5	25											
-10	30											
-15	35											

WELL LOG

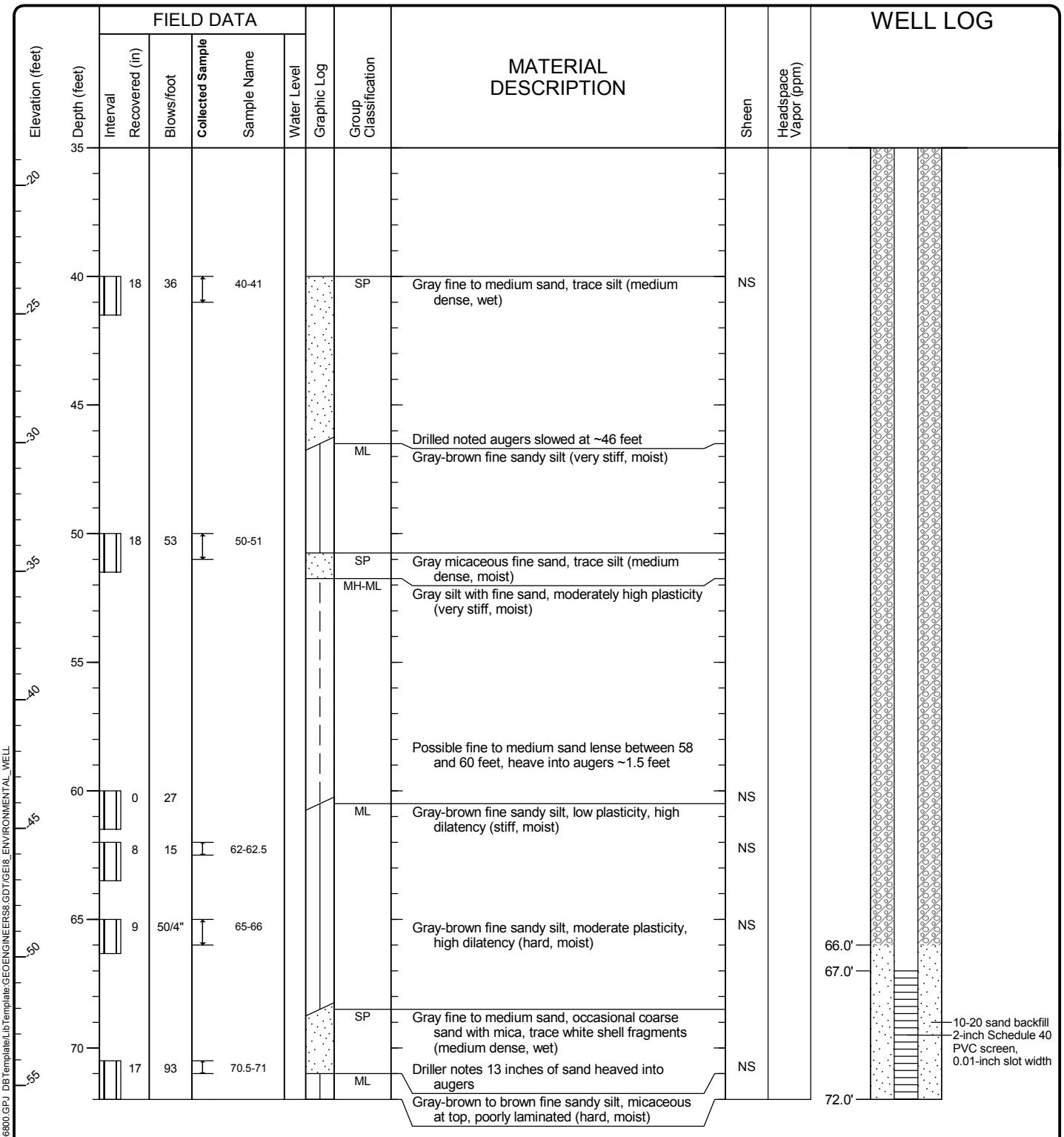


Note: Please see Figure A-1 for explanation of symbols

Log of Boring BP-05D2

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00



Note: Please see Figure A-1 for explanation of symbols

Log of Boring BP-05D2 (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-2
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/2/2013	1/2/2013	38	AMW	Holocene Drilling	Hollow-stem Auger

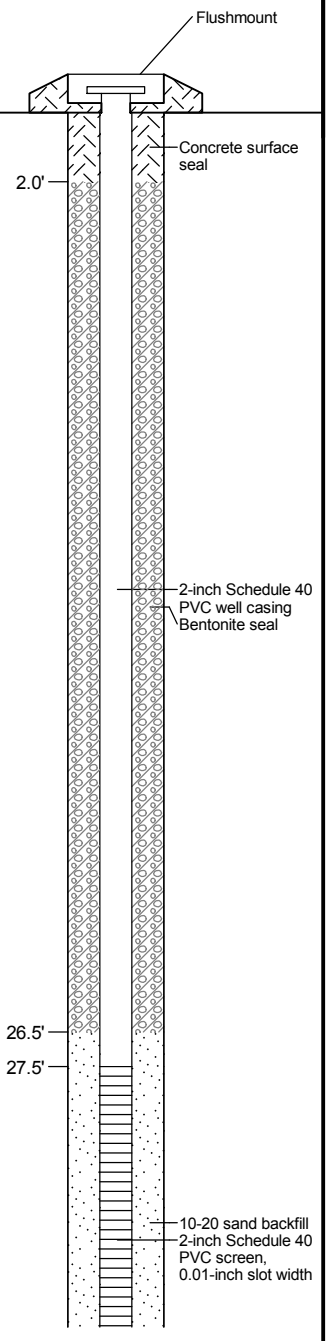
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	16.0827	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	373911.1708	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1307952.929		

DOE Well I.D.: BHU-093
A 2 (in) well was installed on 1/2/2013 to a depth of 38 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/2/2013	7.5	8.6

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								AC	20 inches asphalt		
			15	62					GP-GM	Light brown fine to coarse gravel with sand, with silt (medium dense, moist) (fill)	SS	
			13	38		3-4			SP	Light brown fine to coarse sand, occasional gravel, trace silt (medium dense, moist) (fill)	SS	
	5		17	17							SS	
			10	11						Light brown fine to coarse sand, occasional gravel, trace silt (loose, moist) (fill)	NS	
			11	4						Light brown fine to coarse sand, trace silt, trace wood fragments (very loose, wet) (fill)	NS	
			12	7							NS	
	10									Becomes gray		
			10	14						Gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
			12	8		12.5-13				Gray fine to coarse sand, trace silt (very loose, wet) (fill)	NS	
									Wood	Wood (fill)		
			8	7					SP	Gray fine to medium sand with organic matter, trace silt (very loose, wet) (fill)	NS	
	15		10	3		15-16			Wood	Brown silty sawdust with wood fragments (soft, wet) (fill)		
			4	5						Sawdust with wood fragments (loose, wet) (fill)		
			4	6						Sawdust with bark and wood fragments (very loose, wet) (fill)		
	20		11	50/5"						Wood (log)		
			0	19					SP	Sand in shoe (fill)		
	25		18	6		25-25.2			ML	Dark gray-brown fine sandy silt with organic matter (~1%) (medium stiff, wet) (native)	NS	
						26-26.5						
			15	3					SP	Gray fine to coarse sand, trace silt, with mica (very loose, wet)	NS	
			8	14						Driller noted heaving sands	NS	
	30		13	29						Dark gray fine to coarse sand, occasional gravel, trace silt, with mica, trace organic matter (~1%) (medium dense, wet)	NS	
			12	38		32.5-33.5						
	35											



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-01D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-3
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
-20	35		4	33						Dark gray fine to coarse sand with mica, trace silt, occasional gravel, trace organic matter (~1%) (medium dense, wet)			37.5' 38.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-01D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-3
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/21/2012	12/21/2012	32	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	15.384	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372887.009	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1307921.39		

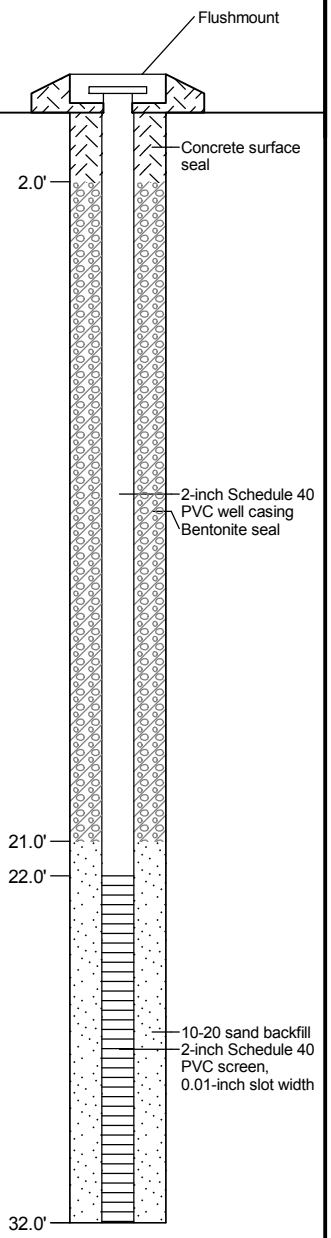
DOE Well I.D.: BHU-027
A 2 (in) well was installed on 12/21/2012 to a depth of 32 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/21/2012	3.3	12.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
15	0		18	29					SP	Gray fine to coarse sand with gravel, trace silt, occasional cobbles (medium dense, moist) (fill)		
			16	15		2-3			SP	Brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)		
			11	14						Brown fine to coarse sand, trace silt (loose, wet) (fill)		
10	5		16	8						2mm silt layer at 3.5 feet Grades to gray and becomes very loose		
			12	9		6-7						
			18	14						Becomes loose		
5	10		24	14						Grades with gravel		
			17	10								
0			16	4		12-13				Brown fine to coarse sand (very loose, wet) (fill)		
			18	8								
-5	15		18	24						Becomes loose		
			18	11								
						17.4-17.6			ML	Gray silt with organics (native)		
			18	14					SP	Grades to black, trace wood material (loose, wet) Gray fine to coarse sand, trace wood (loose, wet)		
-10	20		16	17		20-21				Gray fine to coarse sand with 3 silt/wood layers from 19.8 to 21 feet (stiff, wet)		
			14	13						Gray fine to coarse sand, trace wood at 22.5 feet (loose, wet)		
			16	13						Gray fine to coarse sand, trace wood and silt (medium dense, wet)		
-15	25		17	8						(loose, wet)		
			18	12						Grading coarser (loose, wet)		
			18	14		27-28				One wood piece (3") at 28 feet (loose, wet)		
	30											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-02D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-4
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/26/2012	12/26/2012	31	GRL	Holocene Drilling	Hollow-stem Auger

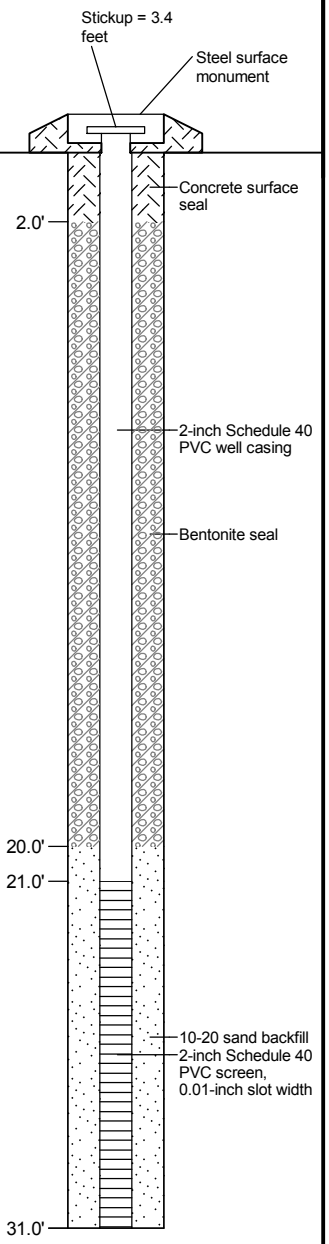
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.4339	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372965.5718	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308351.511		

DOE Well I.D.: BHU-087
A 2 (in) well was installed on 12/26/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/26/2012	3.0	11.4

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	18					ML	Dark brown sandy silt with abundant organic matter (fill)	SS	
									SP-SM	Gray-brown to brown fine to coarse sand with silt and gravel, trace organic matter (~1% rootlets) (loose, moist) (fill)	SS	
			16	12		1.75-2			SP			
			10	6					SP	Light brown fine to coarse sand, occasional gravel, trace silt (black band from 1.75 to 2 feet) (very loose, moist) (fill)	SS	
10	5		10	6		5-5.2			SM-ML	Light brown fine to coarse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
			13	26					SP	Light brown fine to coarse sand , trace silt, occasional gravel, trace wood (~5%) (fill)	NS	
			14	21						Gray silty fine sand to fine sandy silt, with mica (medium stiff, wet) (fill)	NS	
5			13	13		9-10				Gray fine to coarse sand, trace silt (very loose, wet) (fill)	NS	
	10		1	12		10.5-10.6			ML	Gray-brown medium to coarse sand, trace fine sand, trace silt, trace fine gravel, trace mica (medium dense, wet) (fill)	NS	
			3	5						Gray fine to coarse sand, trace silt, occasional gravel (loose, wet) (fill)	NS	
			11	2		13.5-14				Gray-brown fine to coarse sand, trace silt, trace organics (~1% wood fragments) (loose, wet) (fill)	NS	
0	15		14	5						Brown fine sandy silt with organic matter (soft, wet) (native)	NS	
			9	2						Gray-brown fine sandy silt with organic matter (fibrous reeds/wood) (very soft, wet)	NS	
										Gray-brown fine sandy silt with organci matter (very soft, wet)		
			18	6						Gray brown fine sandy silt with organic matter (soft, wet)	NS	
-5	20		17	24		20-21			SM	Gray silty fine sand with mica, trace organic matter (~1%) (very loose, wet)	NS	
									SP to SP-SM	Gray silty fine sand grading to fine sand with silt, moderately laminated (loose, wet)	NS	
			13	27					SP	Gray fine sand, trace silt (loose, wet)		
			13	23						Gray fine to medium sand, trace silt (medium dense, wet)	NS	
-10	25		10	32						Gray fine to medium sand, trace silt, trace organics with mica (~1%) (loose, wet)	NS	
										Gray fine to coarse sand, trace silt with mica (medium dense, wet)		
			18	41		28-29				Gray fine to coarse sand, trace silt with mica (medium dense, wet)	NS	
-15	30											



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-03D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-5
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/26/2012	12/26/2012	8.5	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	14.5247 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372968.4709 1308355.578	Horizontal Datum	WA State Plane North 83/91

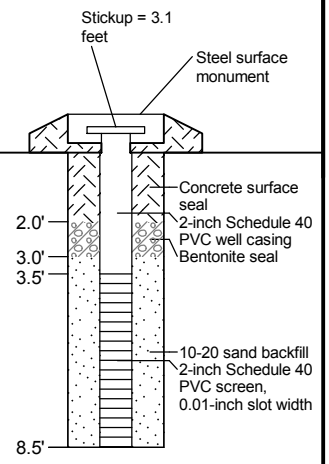
DOE Well I.D.: BHU-088
A 2 (in) well was installed on 12/26/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-03D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-03S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-6
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/28/2012	12/28/2012	33	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	18.8925 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372642.8382 / 1308246.252	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-089
A 2 (in) well was installed on 12/28/2012 to a depth of 33 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	12					SP-SM	Brown fine to coarse sand with silt, with gravel, rootlets (loose, moist) (fill)	NS	
			18	23		2-3			SP	Brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)	NS	
			2	20					SM	Orange-brown silty fine to coarse sand with gravel, trace organics (loose, moist) (fill)	NS	
	5		1	15							NS	
			8	4					ML	Brown to gray-brown sandy silt with gravel (soft, moist) (fill)	NS	
			12	2					SM	Gray silty fine to coarse sand with gravel, trace wood (~5%) (very loose, wet) (fill)	NS	
			18	5						Gray silty fine to coarse sand with gravel, trace wood (~1%) (loose, wet) (fill)	NS	
	10		13	13							NS	
			12	22					SP	Black to dark gray fine to coarse sand, trace organic matter (loose, wet) (fill)	NS	
			13	9						Gray fine to medium sand, occasional coarse sand, trace silt (loose, wet) (fill) Gray fine to medium sand, trace silt (loose, wet) (fill)	NS	
						14.3-14.5			SM			
	15		17	5					ML	Becomes dark gray to black with wood fragments (very loose, wet) (fill)		
			5	8						Black silty sand, trace wood fragments (very loose, wet) (native)		
			15	7		18-19				Gray-brown fine sandy silt with organic matter (~1%) (soft, moist) Becomes ~5% to 30% organic matter at shoe		
	20		11	5					ML to SM	Gray-brown fine sandy silt with organic matter (medium dense, wet)	NS	
										Gray fine sandy silt iwth interbeds of silty fine sand (soft, wet)		
			11	20					SP	Gray fine to coarse sand, trace silt with mica (loose, wet)	NS	
			13	16						Gray fine to coarse sand, trace silt with wood fragments with mica (loose, wet)	NS	
	25		12	33						Gray fine to coarse sand, trace silt with mica (medium dense, wet)	NS	
	30		15	57		30-31				Gray fine to coarse sand, trace silt with mica (medium dense, wet)	NS	
			5	35					Wood	Wood	NS	
									SP	Gray fine to coarse sand, trace silt with mica (medium dense, wet)		

WELL LOG

Stickup = 3.7 feet
Steel surface monument
Concrete surface seal
2.0'
2-inch Schedule 40 PVC well casing
Bentonite seal
21.0'
22.0'
10-20 sand backfill
2-inch Schedule 40 PVC screen, 0.01-inch slot width
32.0'
33.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-04D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-7
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/28/2012	12/28/2012	14	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	18.6052	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372644.2517	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308249.764		

DOE Well I.D.: BHU-090
A 2 (in) well was installed on 12/28/2012 to a depth of 33 (ft).

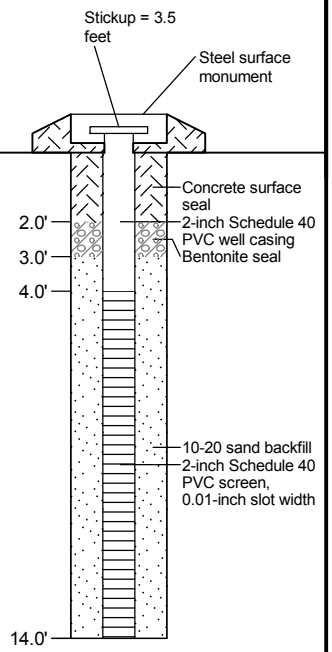
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-04D for sampling and material description		
15											
	5										
10											
	10										
5											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-04S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-8
Sheet 1 of 1

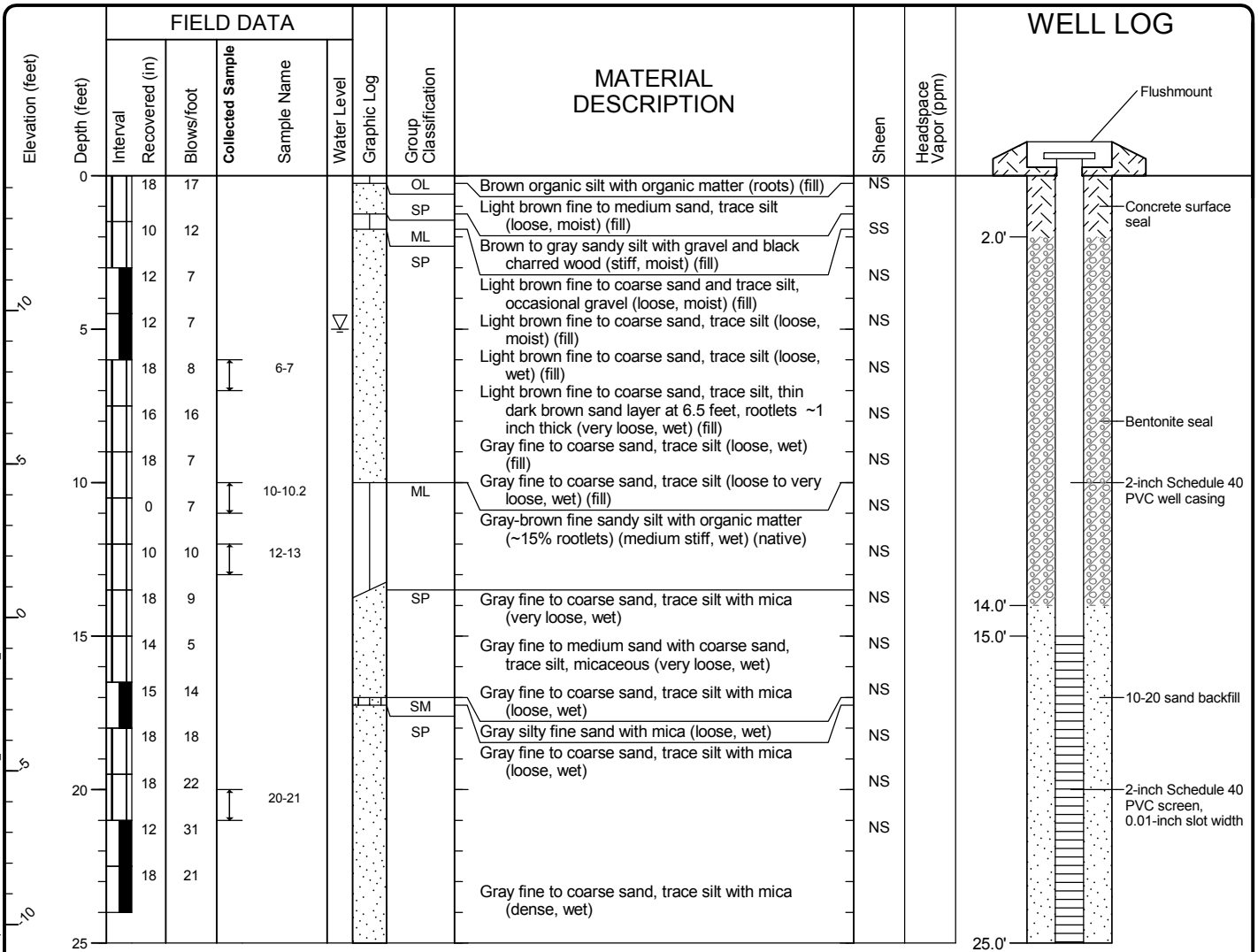
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/10/2012	25	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.3948	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372934.1281	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309088.27		

DOE Well I.D.: BHU-010
A 2 (in) well was installed on 12/10/2012 to a depth of 25 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/10/2012	5.0	9.4

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-05D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-9
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/10/2012	9	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.4241	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372938.3312	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309085.133		

DOE Well I.D.: BHU-011
A 2 (in) well was installed on 12/10/2012 to a depth of 25 (ft).

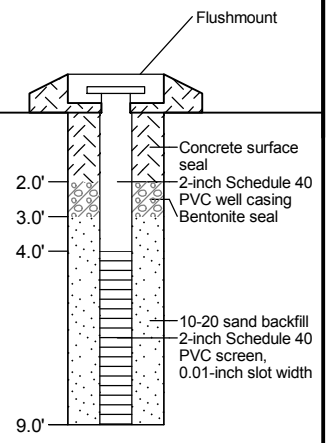
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-05D for sampling and material description		
10	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-05S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-10
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/27/2012	12/27/2012	28.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	12.7123	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372472.7325	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309133.872		

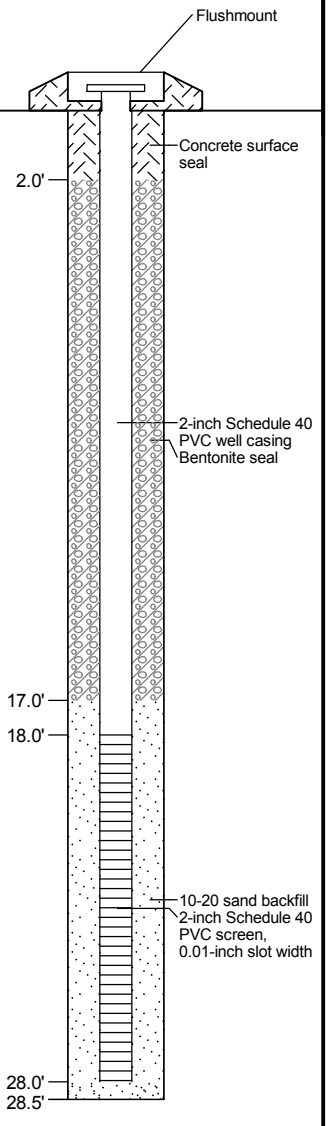
DOE Well I.D.: BHU-092
A 2 (in) well was installed on 12/27/2012 to a depth of 28.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								CC	Concrete		
									Unknown	Unknown: cleared with vactor truck due to potential utilities		
	5		15	2							NS	
			15	3		6.5-7.5			SP	Gray-brown fine to coarse sand, with gravel, trace silt (very loose, wet) (fill)	NS	
			6	2		8-8.2			ML	Gray-brown fine sandy silt with organic matter (~15 to 20%) (very soft, wet) (native)	NS	
	10		13	0							NS	
			12	2		11-12				Gray-brown fine sandy silt with organic matter (~15%) (very soft, wet)	NS	
			6	11					Wood	Wood	NS	
	15		12	9					ML	Gray-brown fine sandy silt, trace organic matter (~5%) (medium stiff, wet)	NS	
			18	9					SP/ML	Gray fine to medium sand, trace silt with mica (very loose, wet)	NS	
			7	15						Gray fine to medium sand, trace silt (very loose, wet) Interbedded with gray-brown fine sandy silt with mica (medium stiff, wet)	NS	
	20		18	14					SP	Gray fine to coarse sand, trace silt with mica (loose, wet)	NS	
			9	2					SP-SM			
									SP	Becomes fine sand with silt and wood with mica (loose, wet)		
			12	1		23-24				Gray fine to medium sand, trace silt, trace wood (~1%) (very loose, wet) Gray fine to medium sand, trace silt (very loose, wet)		
	25		12	16						Gray fine to medium sand, trace silt (loose, wet)		
									Wood	Brown wood zone		
									SP	Gray fine to coarse sand, trace silt (loose, wet)		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-06D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-11
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/27/2012	12/27/2012	7	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	12.7338 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372477.6634 / 1309132.426	Horizontal Datum	WA State Plane North 83/91

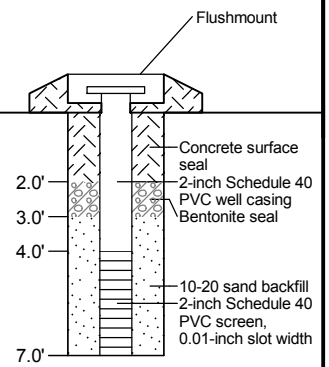
DOE Well I.D.: BHU-091
A 2 (in) well was installed on 12/27/2012 to a depth of 28.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-06D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-06S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-12
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/7/2012	12/7/2012	25	AMW	Holocene Drilling	Hollow-stem Auger

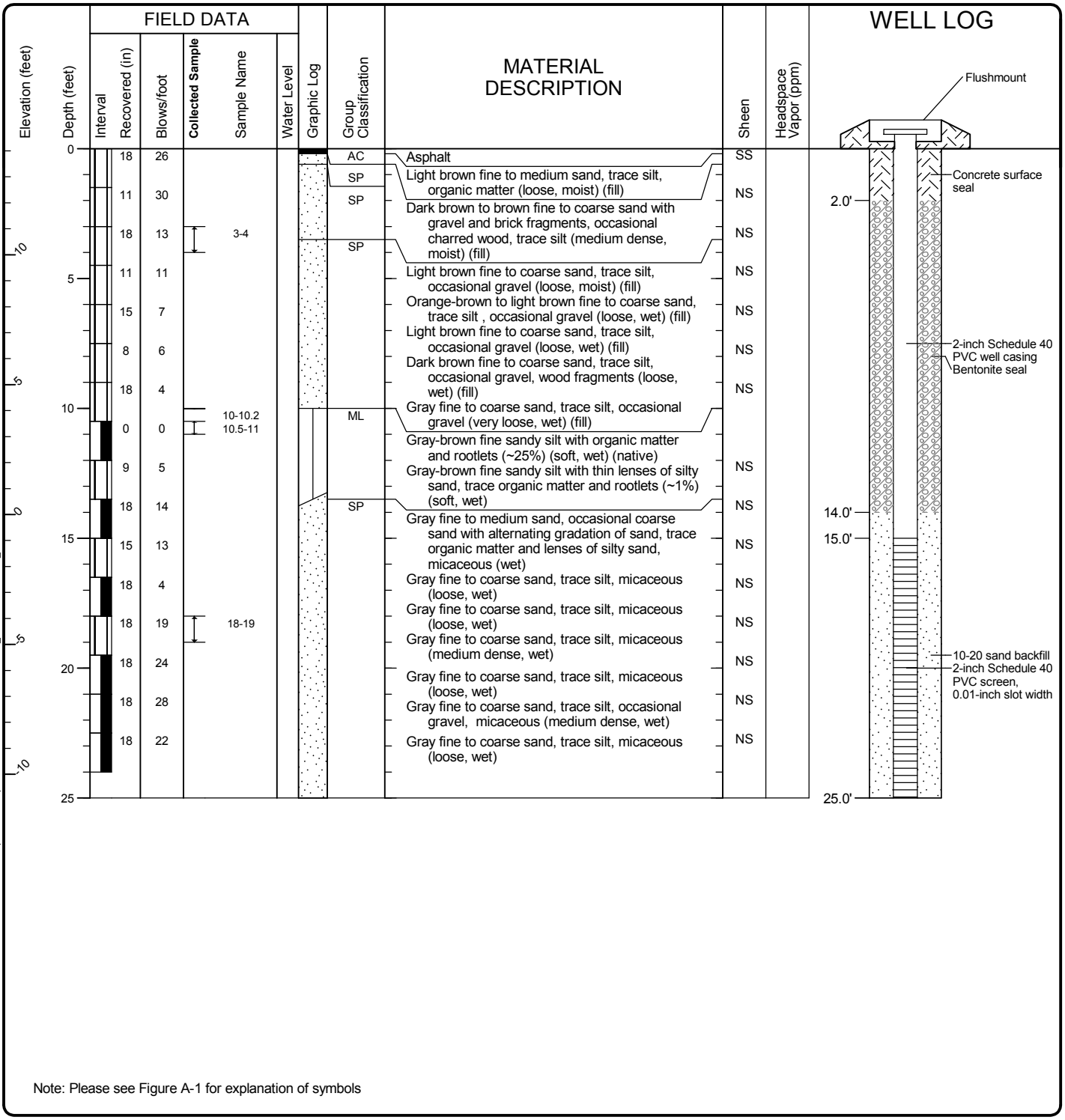
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft) / Vertical Datum	14.088 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	372580.8285 1309464.763	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-009
A 2 (in) well was installed on 12/7/2012 to a depth of 25 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-07D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-13
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/7/2012	12/7/2012	9	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Turbo Track Rig
Surface Elevation (ft)	14.057	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372578.2673	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309467.087		

DOE Well I.D.: BHU-008
A 2 (in) well was installed on 12/7/2012 to a depth of 25 (ft).

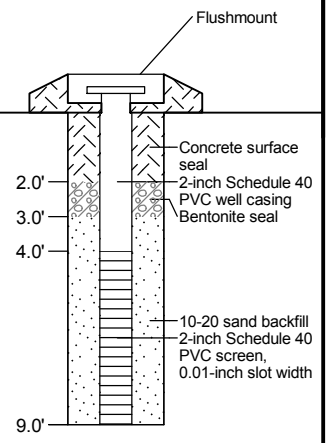
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-07D for sampling and material description		
10											
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-07S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-14
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/11/2012	25.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.4459	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372209.3701	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309788.569		

DOE Well I.D.: BHU-012
A 2 (in) well was installed on 12/10/2012 to a depth of 25.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/10/2012	5.5	7.9

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		12	25					SP	Brown fine to medium sand with coarse sand, occasional gravel, trace silt (loose, moist) (fill)	NS	
									GP	Brown coarse gravel, trace silt (loose, moist) (fill)		
			18	15					SP	Brown coarse gravel with sand, with silt (loose, moist) (fill)	NS	
									ML	Light brown fine to medium sand, trace silt, trace organic matter (~5%) (loose, moist) (fill)	NS	
10			12	6		3-4			SP-SM	Brown fine sandy silt with brick fragments and charred wood, occasional gravel (medium stiff, moist) (fill)	NS	
	5		15	0						Brown to gray to orange fine to coarse sand with gravel, with silt (loose, moist) (fill)	NS	
			8	4						Dark brown to light brown fine to coarse sand with silt, occasional gravel (very loose, wet) (fill)	NS	
5			6	0					SP	Brown fine to coarse sand with silt, occasional gravel, trace rootlets (~1%) (loose, wet) (native)	NS	
			12	0						Gray brown to gray fine to coarse sand, trace silt (very loose, wet)	NS	
	10		4	0						Dark gray to black fine to coarse sand, trace silt (very loose, wet)	NS	
			12	0		12-13			ML	Gray fine to coarse sand, occasional gravel, trace silt (very loose, wet)	NS	
0			12	10					SP-SM	Dark gray-brown fine sandy silt with wood fragments (very soft, wet)	SS	
	15		14	21					SP	Dark gray-brown fine to coarse sand with silt, occasional gravel, trace wood (~5%) (very loose, wet)	NS	
			6	3					Wood	Dark gray-brown fine to coarse sand, occasional gravel, trace silt (loose, wet)	NS	
-5			4	0					SP	Wood	NS	
			18	3		20-21				Gray fine to coarse sand, trace silt, wood fragments (~25%) (very loose, wet)	NS	
	20		18	25						Gray fine to coarse sand, trace silt with mica (very loose, wet)	NS	
-10			18	28						Gray fine to coarse sand, trace silt, trace wood with mica (~5%) (very loose, wet)	NS	
			0							Gray fine to coarse sand, trace silt, micaceous (loose, wet)		
	25									Gray fine to coarse sand, trace silt, occasional fine gravel, micaceous (loose, wet)		

WELL LOG

Stickup = 3.2 feet
Steel surface monument
Concrete surface seal
2.0'
2-inch Schedule 40 PVC well casing
Bentonite seal
14.0'
15.0'
10-20 sand backfill
2-inch Schedule 40 PVC screen, 0.01-inch slot width
25.0'
25.5'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-08D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-15
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

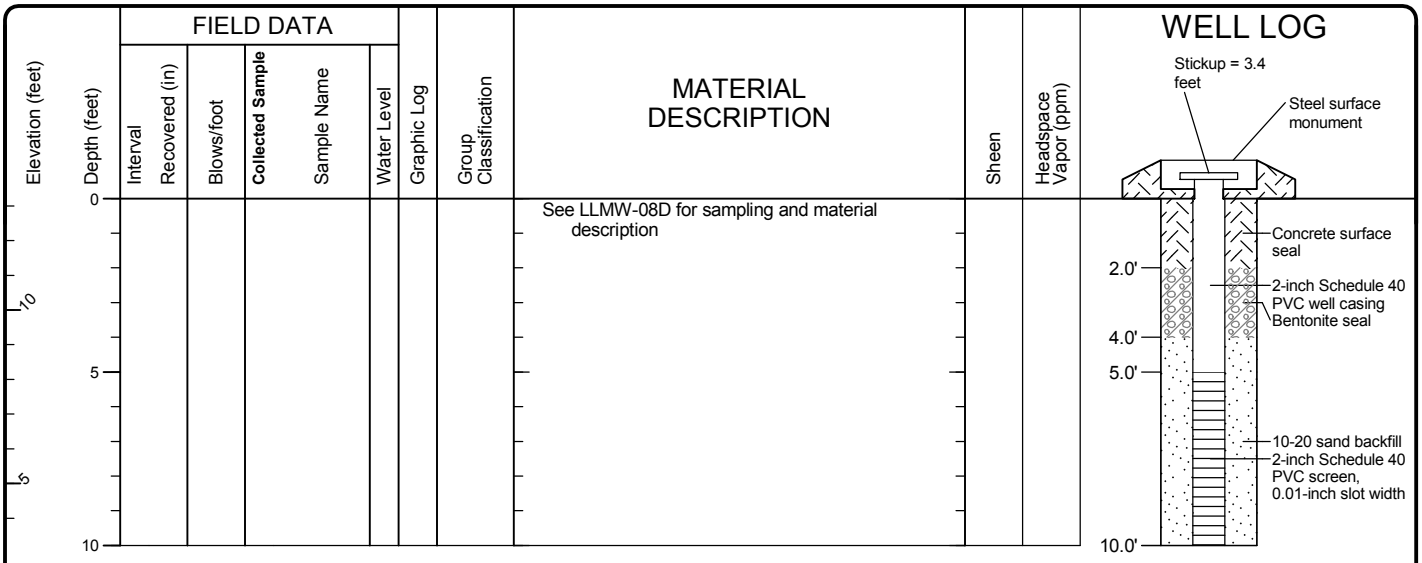
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/10/2012	12/11/2012	10	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.2146	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	372213.2542	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309788.249		

DOE Well I.D.: BHU-013
A 2 (in) well was installed on 12/10/2012 to a depth of 25.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-08S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-16
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/6/2012	12/6/2012	27	AMW	Holocene Drilling	Hollow-stem Auger

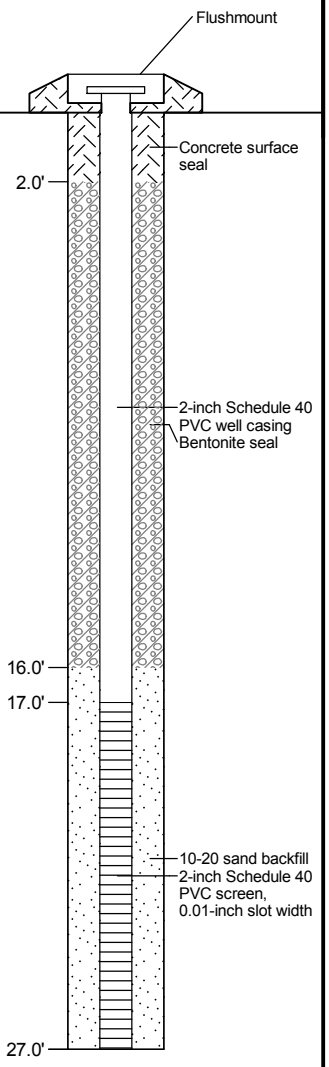
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1786 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371933.0232 / 1309291.53	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-006
A 2 (in) well was installed on 12/6/2012 to a depth of 27 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0								GP	3 inch minus crushed rock (fill)		
		15	22					SP-SM	Brown fine to coarse sand with silt, occasional gravel (loose, moist) (fill)	NS	
		14	22					SP	Gray-brown fine to coarse sand, trace silt (loose, wet) (fill)	NS	
5		18	20	✓	4.5-5				Gray-brown fine to coarse sand, trace silt (loose, wet) (fill)	SS/MS	
		18	3						Gray-brown fine to coarse sand, trace silt (loose, wet) (fill)	NS	
		12	3	✓	7.3-7.5			ML	Gray-brown fine sandy silt with trace organic matter (~1%) (soft, moist) (native)	NS	
		12	3						Gray-brown fine sandy silt with trace organic matter (~1%) (soft, moist)	NS	
10		6	0	✓	10.5-11				Gray-brown fine sandy silt with trace organic matter (~1%) (soft, moist)	NS	
		12	4						Gray-brown fine sandy silt with organic matter and rootlets (~15%) (very soft, moist)	NS	
		8	2						Gray-brown fine sandy silt with organic matter and rootlets (>15%) (soft, moist)	NS	
		18	6					SM	Gray-brown fine sandy silt with organic matter and rootlets (~15%) (very soft, wet)	NS	
15		6	14					ML	Gray silty fine sand (loose, wet)	NS	
		12	16	✓	18-19				Gray-brown fine sandy silt, trace organic matter	NS	
		6	16					SP	Gray-brown fine sandy silt with silty fine sand interbeds, trace organic matter (~1%)	NS	
20		6	15						Gray fine to coarse sand, trace silt (very loose, wet)	NS	
		18	26						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
		18	24						Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
25									Occasional silt ripup clasts	NS	
									Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
									Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
									Occasional brown silt ripup clasts	NS	



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-09D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-17
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/6/2012	12/6/2012	6	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1484 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371929.4722 / 1309290.945	Horizontal Datum	WA State Plane North 83/91

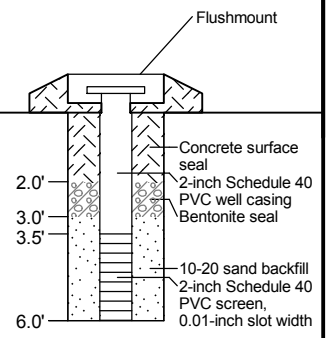
DOE Well I.D.: BHU-007
A 2 (in) well was installed on 12/6/2012 to a depth of 27 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0	0								See LLMW-09D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-09S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-18
Sheet 1 of 1

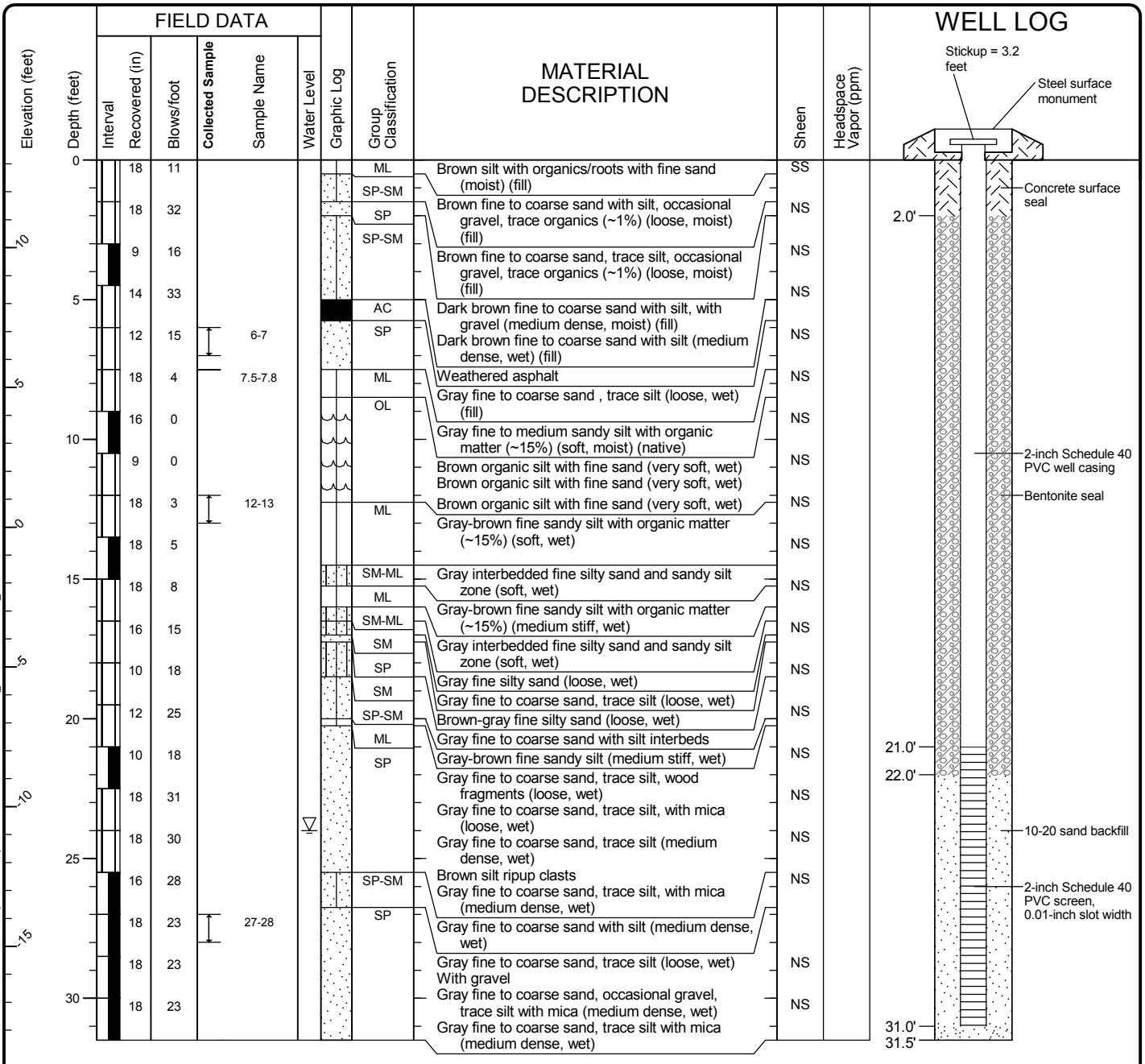
Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/11/2012	12/11/2012	31.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.1425	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371725.4255	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309359.407		

DOE Well I.D.: BHU-014
A 2 (in) well was installed on 12/11/2012 to a depth of 31.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/11/2012	24.0	-10.9

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-10D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-19
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/11/2012	12/11/2012	6.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.183	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371722.2934	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309357.791		

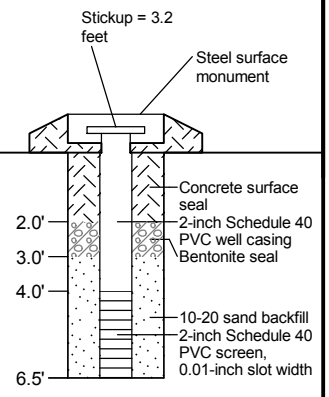
DOE Well I.D.: BHU-015
A 2 (in) well was installed on 12/11/2012 to a depth of 31.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0									See LLMW-10D for sampling and material description		
	5											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-10S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-20
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/13/2012	12/13/2012	22.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	16.0257	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371822.9079	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310350.261		

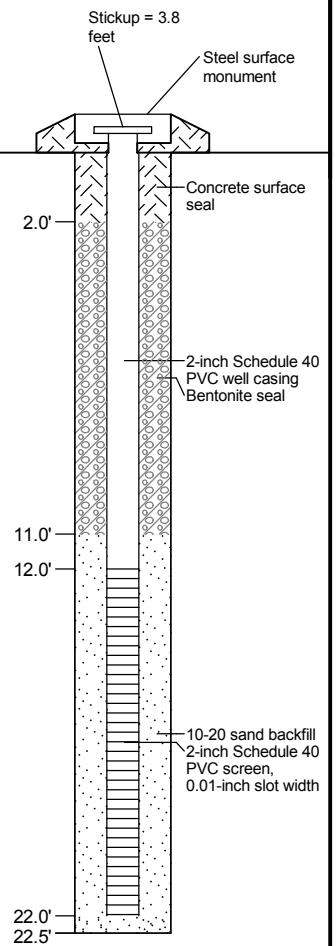
DOE Well I.D.: BHU-040
A 2 (in) well was installed on 12/13/2012 to a depth of 22.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/2/2013	4.5	11.5

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
15	0		14	5					SP	Brown fine to coarse sand, trace silt with rootlets, occasional gravel (moist) (fill)	NS	
			16	31						Brown fine to coarse sand, trace silt with roots (fill)	NS	
			18	23					SM	Brown silty sand with gravel, with rootlets (loose, moist) (fill)	SS	
						3.5-4.5			SP			
10	5		15	47		5-6			SP-SM	Light brown fine to medium sand, trace silt (loose, moist) (fill)	SS	
			10	23					SP	Dark brown fine to coarse sand, with silt, occasional gravel (medium dense, moist) (fill)	SS	
			12	31						Orange-brown fine to coarse sand, trace silt, occasional gravel (loose, moist) (fill)	SS	
			11	10						Orange-brown fine to coarse sand, trace silt (loose, moist to wet) (fill)	NS	
5	10		12	9		10.5-10.7			ML	Becomes gray-brown (medium dense) (fill) Gray-brown with orange mottling fine to coarse sand, trace silt (very loose, wet) (fill) Becomes gray with rotten wood (fill)	NS	
						11-11.5			SP	Gray fine sandy silt (stiff, wet) (native)		
			12	27						Gray-brown fine to medium sand, trace silt, micaceous (medium dense, wet)	NS	
			9	27						Gray fine to coarse sand, trace silt, occasional gravel, trace organic layer with mica (<1%) (medium dense, wet)	NS	
0	15		6	25						Gray fine to coarse sand, trace silt, occasional gravel, trace organic layer with mica (~5%) (loose, wet)	NS	
			13	41							NS	
			12	30						Gray fine to coarse sand, trace silt, occasional gravel, with mica (medium dense, wet)	NS	
-5	20		12	32		19.5-20.5				Gray fine to coarse sand, trace silt, occasional gravel, trace wood fragments with mica (twigs and bark) (medium dense, wet)	NS	
				36								

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-11D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-21
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	9.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	15.999 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371826.1136 1310349.231	Horizontal Datum	WA State Plane North 83/91

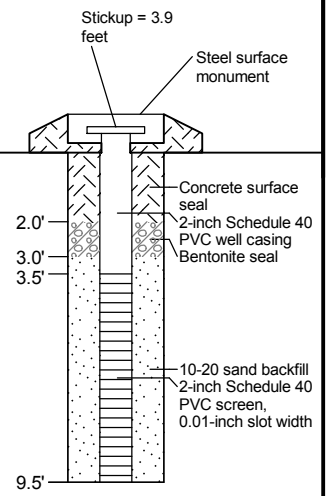
DOE Well I.D.: BHU-041
A 2 (in) well was installed on 12/13/2012 to a depth of 22.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
15	0								See LLMW-11D for sampling and material description		
10	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-11S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-22
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/12/2012	12/12/2012	27.5	PDR	Holocene Drilling	Hollow-stem Auger

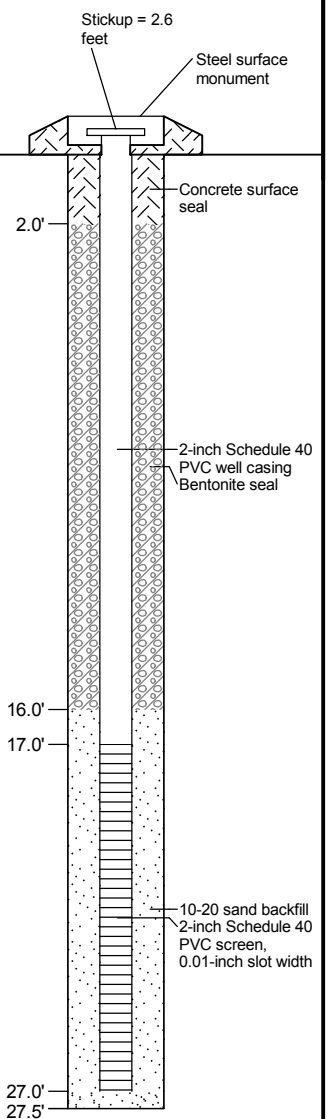
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.6305	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371523.5091	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309414.28		

DOE Well I.D.: BHU-016
A 2 (in) well was installed on 12/12/2012 to a depth of 27.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/12/2012	4.5	9.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		17	6					SM	Brown silty fine to medium sand, trace organics (fill)	NS	
			18	8						Brown silty fine sand, occasional wood debris (loose, moist)	NS	
			15	14					SP-SM	Gray fine to medium sand, trace silt	NS	
	5		16	11		5-5.5				Gray fine to medium sand, trace silt, occasional fine gravel	NS	
			15	17						Grades to coarse sand	NS	
			18	3						Gray fine to coarse sand with trace silt, occasional fine gravel (medium dense, wet)	NS	
			8	0/18"		8.5-8.7			ML	Brown silt with organics	NS	
	10		18	0/18"		10-10.5				Gray silt with organics (soft, moist)	NS	
			18	2						Gray/brown silt with increasing organics and occasional 1 cm layer of fine sandy silt (soft, moist)	NS	
			14	3					SP	Gray silt	NS	
									ML	Gray fine to medium sand interbed		
									SP	Gray silt, occasional organics (soft, moist)		
	15		14	7					ML	Gray fine sand interbed	NS	
			18	6					SM	Gray silt, occasional organics (soft, moist)	NS	
			18	13					SP	Gray silty fine to medium sand with occasional wood debris	NS	
	20		18	16						Gray fine to coarse sand, trace silt (dense, wet)	NS	
			11	25		21-22					NS	
			18	23							NS	
			18	25							NS	
	25		16	24							NS	
										Gray fine to coarse sand, trace silt, occasional fine gravel (dense, wet)		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-12D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-23
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/12/2012	7	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.8405 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371520.5241 / 1309412.436	Horizontal Datum	WA State Plane North 83/91

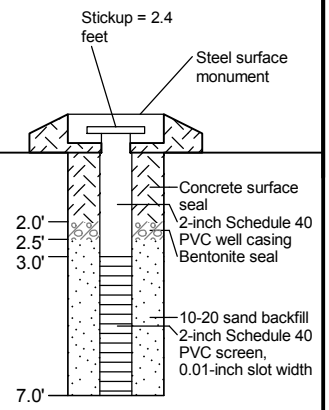
DOE Well I.D.: BHU-017
A 2 (in) well was installed on 12/12/2012 to a depth of 27.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-12D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-12S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-24
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/17/2012	12/17/2012	37	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	18.4782 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371682.4624 1309793.149	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-045
A 2 (in) well was installed on 12/17/2012 to a depth of 37 (ft).

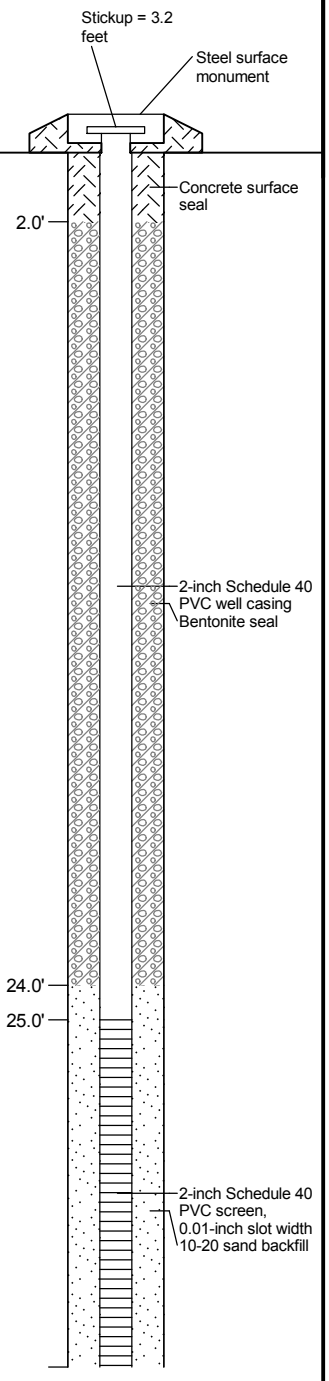
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0								SP-SM	Light brown fine to coarse sand with gravel/cobbles, with silt (wet at surface, then moist below 6 inches) (fill)		
5		8	50/5"					SM	Brown fine to coarse silty sand with gravel (very dense, moist) (fill)	NS	
		0	50/2"							NS	
		11	50/5"					SP	Gray fine to coarse sand, trace silt (very dense, moist) (fill)		
10		8	21							NS	
		14	15		10.5-11.5			SP-SM	Gray fine to coarse sand, trace silt, with gravel (very dense, moist) (fill)	NS	
		12	17					SP	Black fine to coarse sand with silt, with charred wood (loose, moist) (fill)	NS	
		10	40					SM	Black fine to coarse sand with silt, with gravel, with charred wood (loose, moist to wet) (fill)	NS	
15		8	9					SP	Gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
		8	10						Dark gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
		12	9		18.7-19				Gray fine silty sand, laminated (loose, wet) (fill)	NS	
20		14	8					ML	Gray fine to coarse sand, trace silt, wood in shoe (medium dense, wet) (fill)	NS	
		14	18					SM	Gray fine to coarse sand, trace silt, with mica (very loose, wet) (fill)	NS	
		18	10		23-24			SM	Gray fine to coarse sand, with gravel, trace silt (very loose, wet) (fill)	NS	
25		18	15						Gray fine sandy silt, trace organic matter, low plasticity (~1%) (medium stiff, wet) (native)	NS	
		7	16					SP-SM	Gray fine to coarse silty sand (very loose, wet)	NS	
		13	45					SP	Gray-brown fine to coarse sand, trace organic matter (~1%) (loose, wet)	NS	
		5	25						Gray-brown silty fine to coarse sand, trace wood (loose, wet)	NS	
30		12	46						Gray-brown silty fine to coarse sand with wood, occasional gravel (loose, wet)	NS	
		15	51		32-33			SP-SM	Gray-brown fine to coarse sand with gravel, with silty, trace wood (loose, wet)	NS	
		12	50/6"					SP	Gray-brown fine to coarse sand, trace wood (<1%) (medium dense, wet)	NS	
35									Gray fine sand with silt lense	NS	
									Gray fine to coarse sand, trace silt (wet)	NS	
								SP-SM	Gray fine to coarse sand with silt (wet)	NS	
								SP	Gray fine to coarse sand, occasional fien gravel, trace silt (medium dense, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-13D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-25
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
	35		17	61							NS		35.0'
													37.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-13D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-25
Sheet 2 of 2

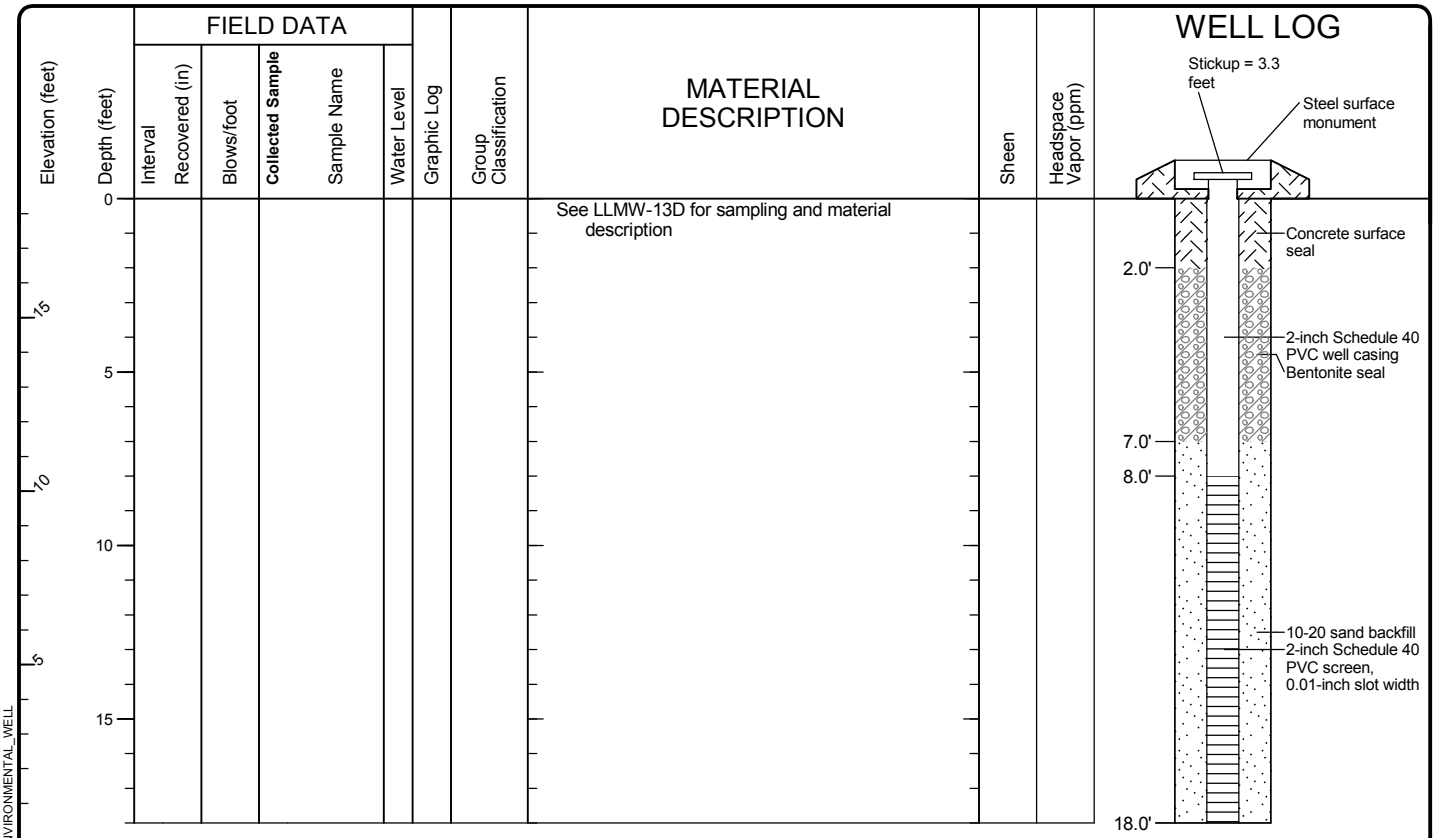
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/17/2012	12/17/2012	18	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	18.4337 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371682.6131 / 1309796.93	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-044
A 2 (in) well was installed on 12/17/2012 to a depth of 37 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-13S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-26
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/12/2012	31	PDR	Holocene Drilling	Hollow-stem Auger

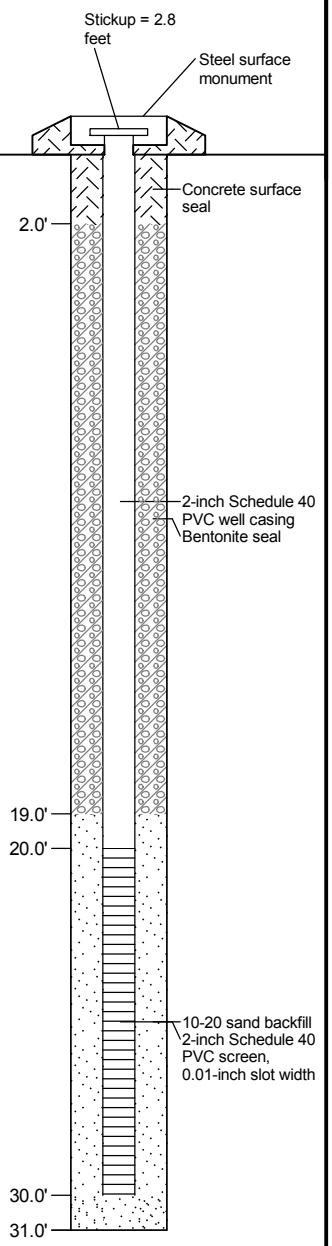
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	12.4895 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371375.9911 1309449.16	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-018
A 2 (in) well was installed on 12/12/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/12/2012	4.5	8.0

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	5					TS	2 inches topsoil (fill)	NS	
									SM	Brown silty fine to medium sand with organics ((loose, moist) (fill)		
			16	7							NS	
10			7	5					SP	Brown fine to medium sand with trace silt (loose, moist) (fill)	NS	
	5		10	5			▽			Brown fine to coarse sand with trace silt (loose, moist) (fill)	NS	
			10	3		5.5-6				Gray fine to coarse sand with trace silt (loose, wet) (fill)	NS	
5			18	0		7-7.2			ML	Brown silt with organics (soft, wet) (native)	NS	
						8-9				Brown silt (soft, wet)		
			16	0							NS	
	10		8	0							NS	
0			18	0/18"					ML	Gray silt with trace organics and some fine sand (soft, moist)	NS	
										With organics		
			18	5		13.5-14				Wood debris	NS	
									SM	Gray fine to medium silty sand (loose, wet)		
	15		15	4					SP-SM	Gray fine to coarse sand with silt (loose, wet)	NS	
			15	14							NS	
-5									ML	Brown silty interbed		
			18	6					SP	Gray fine to coarse sand with trace silt (dense, wet)		
									ML	Gray silt with fine sand (soft, wet)		
	20		16	24					Wood	Wood debris	NS	
			18	24					SP	Gray fine to coarse sand with trace silt (medium dense, wet)	NS	
-10			18	10						Gray fine to coarse sand with trace silt (dense, wet)	NS	
									Wood	Wood debris		
			18	21					SP	Gray fine to coarse sand with trace silt (dense, wet)	NS	
	25		18	17						Gray fine to coarse sand with trace silt (medium dense, wet)	NS	
-15			18	25						Gray fine to coarse sand with trace silt (medium dense, wet)	NS	
			18	22		29-30				Gray fine to coarse sand with trace silt (dense, wet)	NS	
	30											



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-14D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-27
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/12/2012	12/12/2012	6	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	12.4877 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371374.1753 1309446.946	Horizontal Datum	WA State Plane North 83/91

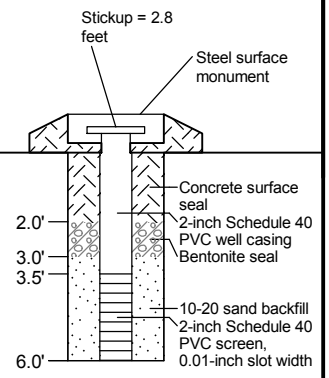
DOE Well I.D.: BHU-019
A 2 (in) well was installed on 12/12/2012 to a depth of 31 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-14D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-14S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-28
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	34	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.0987 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371053.2175 / 1309536.612	Horizontal Datum	WA State Plane North 83/91

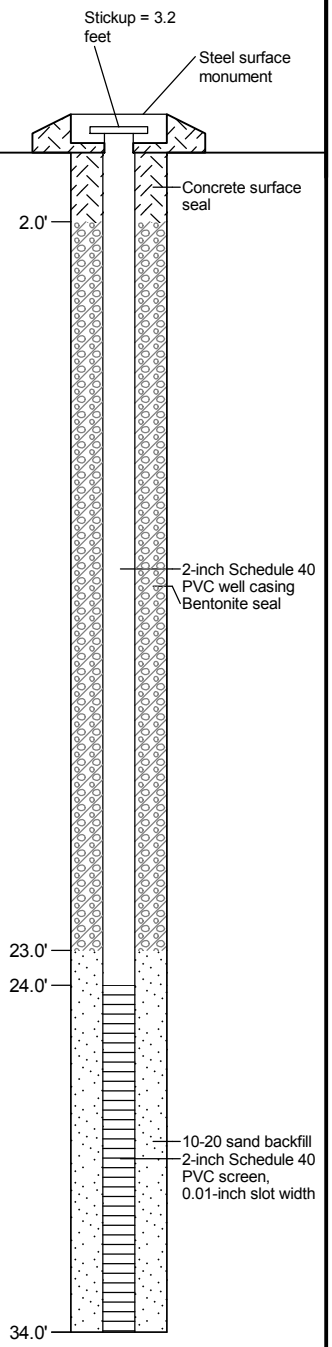
DOE Well I.D.: BHU-020
A 2 (in) well was installed on 12/13/2012 to a depth of 34 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/13/2012	6.0	7.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	10					TS	3 inches topsoil (fill)	NS	
			18	39		2-3			SP-SM	Brown fine to medium sand with silt (medium dense, moist) (fill)	NS	
			10	22					GP-GM	Brown fine to coarse sand with silt (medium dense, moist) (fill)	NS	
			10	15		4-4.5			SP	Brown fine to coarse gravel with fine sand and silt (dense, moist) (fill)	NS	
	5		18	15					ML	Dark gray fine to coarse sand with trace silt; black staining (dense, moist) (fill)	NS	
			7	14					SP	Black silt with fine sand and organics (medium dense, moist) (fill)	NS	
			9	10						Brown fine to coarse sand with trace silt (loose, wet) (fill)	NS	
	10		12	1					Wood	Gray fine to coarse sand with trace silt (loose, wet) (fill)		
			7	4		11.5-12			SP	Wood (fill)		
			18	1		14-15			ML	Brown silt with occasional fine sand and organics (medium dense, moist) (native)		
	15		15	4								
			14	3								
			17	8								
	20		15	6					Wood	Wood/gravel		
			18	6					ML	Gray silt with trace fine sand (soft, wet)	NS	
			16	23					SM	Gray silty fine sand (loose, wet)	NS	
	25		14	62					SP	Gray fine to coarse sand with trace silt (dense, wet)	NS	
			17	20							NS	
			6	8					Wood	Wood in shoe	NS	
			5	26					Wood/SM	Brown wood with fine sand, trace silt		
	30		12	33		30.5-31.5			SP-SM	Gray fine to coarse sand with silt (dense, wet)	NS	
			6	14					SP	Gray fine to coarse sand with trace silt (dense, wet)	NS	
									Unknown	No sample this interval		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-15D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-29
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	9.5	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.2143 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371051.1506 1309535.419	Horizontal Datum	WA State Plane North 83/91

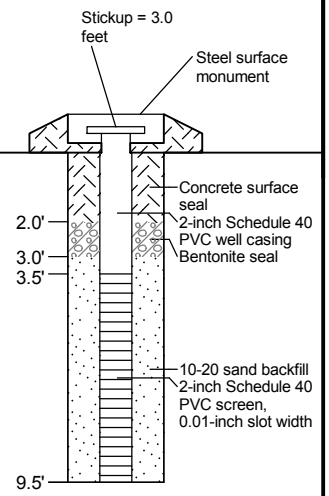
DOE Well I.D.: BHU-021
A 2 (in) well was installed on 12/13/2012 to a depth of 34 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-15D for sampling and material description		
5	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-15S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-30
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/14/2012	12/14/2012	34	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	17.1441 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371158.166 / 1310160.437	Horizontal Datum	WA State Plane North 83/91

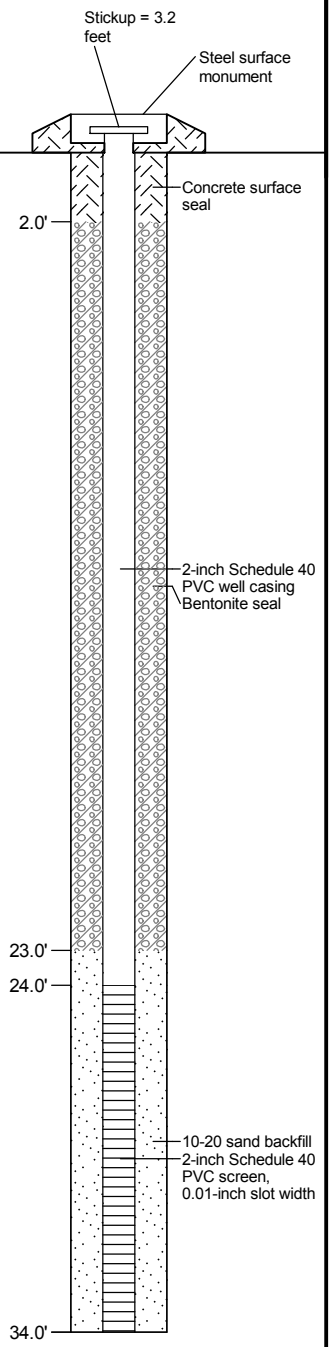
DOE Well I.D.: BHU-042
A 2 (in) well was installed on 12/14/2012 to a depth of 34 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
15	0		13	21					SM	Light brown silty sand with gravel, with organic matter (charred wood) (loose, wet) (fill)	NS	
			12	17							NS	
			18	32							NS	
			8	50/2"					SP	Light brown fine to medium sand, occasional coarse sand and gravel, trace silt (very dense, moist) (fill)	NS	
10	5		6	50/3"					SM	Becomes moist Light brown silty sand with gravel (very dense, moist) (fill)	NS	
5	10		6	4					SP-SM	Black and brown fine to coarse sand with silt, with gravel and brick fragments (very loose, moist) (fill)	NS	
			0	0								
			12	2		12.5-12.7 13-13.5					NS	
0	15		18	0					ML/OL	Gray-brown fine sandy silty to organic silt (very soft, wet) (native)	NS	
			12	0		15-16			ML	Gray-brown fine sandy silt with organic matter (~15%) (very soft, wet) Becomes very stiff	NS	
-5			15	4						Becomes soft	NS	
	20		18	5						Gray-brown fine sandy silt with wood/organic matter (~12%) (soft, wet) moderate dilatency, moderate plasticity	NS	
-10			18	5						Gray-brown fine sandy silt with wood/organic matter (soft, wet) high dilatency, high plasticity	NS	
			18	13							NS	
-15	25		9	14					SP	Gray fine to coarse sand with trace silt (loose, wet)	NS	
			8	11						Gray fine to coarse sand with wood, trace silt, with mica (loose, wet)	NS	
			10	15						Gray fine to coarse sand with wood, trace silt, with mica (loose, wet)	NS	
			9	21					SP-SM	Gray fine to coarse sand with wood, with silt (loose, wet)	NS	
-20	30		14	61		29.5-30.5			SP	Gray fine to coarse sand, trace silt, with mica (loose, wet)	NS	
			18	56						Gray fine to coarse sand, occasional fine gravel, trace silt, with mica (loose, wet) occasional brown silt ripup clasts	NS	
			8	54						Gray fine to coarse sand with gravel, trace silt, with mica (medium dense, wet)		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-16D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-31
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/14/2012	12/14/2012	12	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	17.1917 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371159.2967 1310164.452	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-043
A 2 (in) well was installed on 12/14/2012 to a depth of 34 (ft).

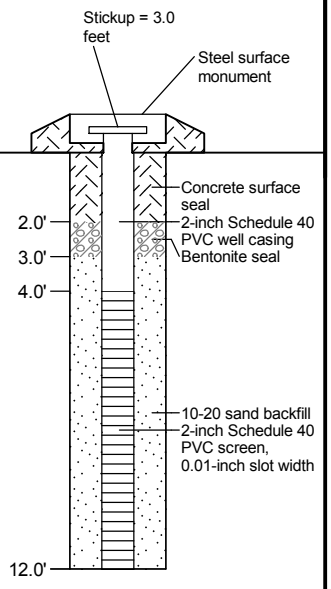
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
5	0								See LLMW-16D for sampling and material description		
0	5										
	10										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-16S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-32
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/13/2012	25.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	15.2671	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371317.6575	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310603.072		

DOE Well I.D.: BHU-038
A 2 (in) well was installed on 12/12/2012 to a depth of 25.5 (ft).

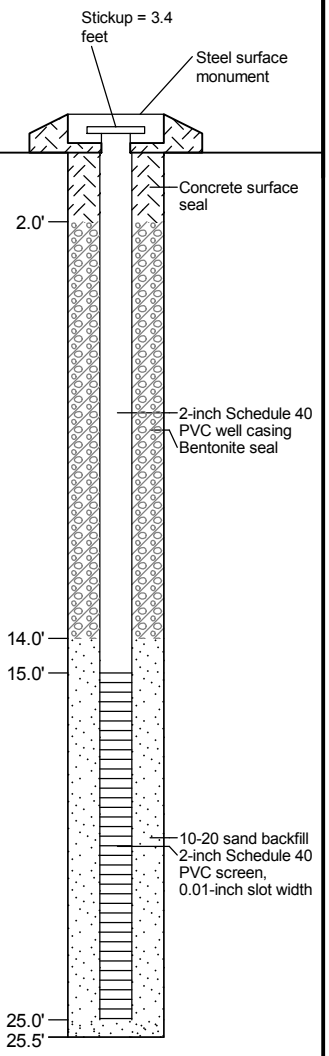
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
5	0		12	6					SP	Brown fine to medium sand, occasional coarse sand and gravel, trace silt, wood fragments and rootlets (loose, moist) (fill)	NS	
			12	17						Brown fine to coarse sand, occasional gravel, trace silt, occasional rootlets (loose, moist) (fill)	NS	
			16	20						Brown fine to coarse sand with gravel, trace silt, occasional rootlets (~1%) (loose, moist) (fill)	SS	
0			18	10		5-6				Dark brown fine to coarse sand, occasional gravel, trace silt (very loose, moist) (fill)	SS	
	5		14	12						Light brown fine to coarse sand, trace silt (loose, moist)	SS	
			13	14							NS	
-5			15	19						Gray-brown fine to coarse sand, occasional fine gravel, trace silt (loose, wet)	NS	
	10		12	11							NS	
			10	8		12-12.2 12.5-13			ML	Gray-brown fine to coarse sand, occasional fine gravel, trace silt (loose, wet) Gray fine to medium sand, trace organic matter, with mica (~5%) (very loose, wet) (fill)	NS	
-10			8	12					SP	Gray fine sandy silt , trace organics, 1 inch piece of wood, with mica (medium stiff, wet) (native)	NS	
	15		12	16						Gray fine to medium sand with coarse sand, trace silt, occasional wood (~1%), with mica (loose, wet)	NS	
			14	29						Gray fine to coarse sand, trace silt, with wood (loose, wet)	NS	
-15			0	25						Gray fine to coarse sand, trace silt, occasional wood (medium dense, wet) (native)		
	20		9	40						Gray fine to coarse sand with gravel, trace silt, with mica (medium dense, wet)	NS	
			12	40		21-22				Gray fine to coarse sand with gravel, trace silt (medium dense, wet)	NS	
-20			12	49						Gray fine to coarse sand with gravel, trace silt (medium dense, wet)	NS	
	25		9	41						Gray fine to coarse sand with gravel, trace silt (medium dense, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-17D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-33
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/12/2012	12/13/2012	11	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	15.3209 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371320.3207 / 1310602.283	Horizontal Datum	WA State Plane North 83/91

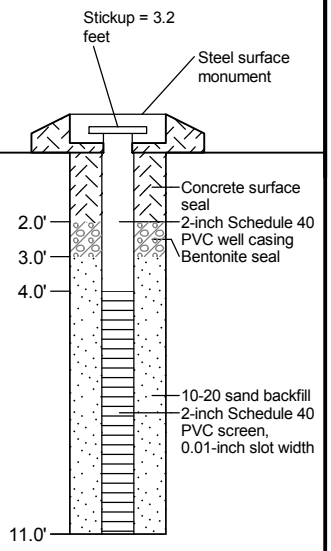
DOE Well I.D.: BHU-039
A 2 (in) well was installed on 12/12/2012 to a depth of 25.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
5	0									See LLMW-17D for sampling and material description		
10	5											
5	10											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-17S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-34
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	30	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1053 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370391.758 1309718.714	Horizontal Datum	WA State Plane North 83/91

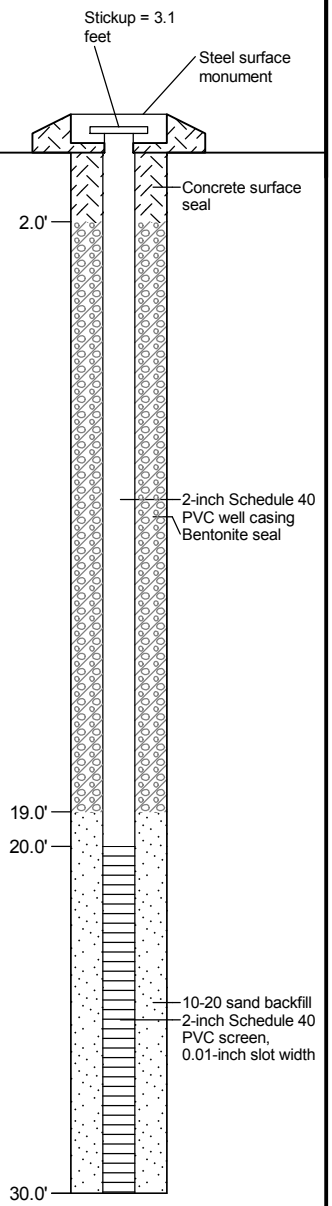
DOE Well I.D.: BHU-022
A 2 (in) well was installed on 12/13/2012 to a depth of 30 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/13/2012	4.0	9.1

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	13					SOD	2 inched grass/topsoil (fill)	NS	
									GM	Brown silty fine to coarse gravel with fine to medium sand (dense, moist) (fill)	NS	
			8	50/3"						Becomes gray		
									CC	Rock in shoe	NS	
			3	42						Concrete debris (fill)		
									SP-SM	Brown fine to coarse sand with silt (dense, wet) (fill)	NS	
	5		18	28					SP	Gray fine to coarse sand with occasional fine to coarse gravel (dense, wet) (fill)	NS	
			18	10		6-7			Wood	Wood in shoe (fill)		
									SP	Gray fine to coare sand (dense, wet) (fill)	NS	
			14			8.5-8.7			ML	Dark gray silt with fine sand and organics (stiff, wet) (fill)	NS	
			16	18					SP-SM	Gray fine to coarse sand with silt (very loose, wet) (fill)	NS	
	10		18	0		11-12			ML	Dark gray silt with fine sand and organics (soft, wet) (native)	NS	
			16	0						Grades to brown	NS	
										Brown silt with organics, occasional fine sand (soft, wet)	NS	
			18	0						Brown silt with organics (soft, wet)	NS	
	15		12	0						Increasing organics	NS	
			18	2						Grades to gray		
			18	9					ML	Gray silt with fine to medium sand interbeds		
	20		18	22					SP	Gray fine to medium sand with trace silt, with trace organics		
			18	17		21-22				Gray fine to medium sand with trace silt (dense, wet)		
										Gray fine to medium sand, trace wood debris		
			10	22						Gray fine to coarse sand with occasional gravel, trace silt (medium dense, wet)	NS	
			18	25							NS	
	25		18	28						Gray fine to coarse sand, trace silt (dense, wet)	NS	
			13	32							NS	
	30		13	28							NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-18D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-35
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/13/2012	12/13/2012	7.5	PDR	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.2735 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370389.0772 1309715.292	Horizontal Datum	WA State Plane North 83/91

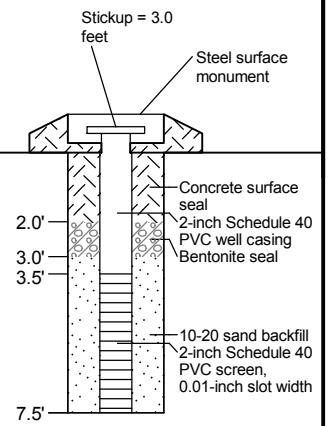
DOE Well I.D.: BHU-023
A 2 (in) well was installed on 12/13/2012 to a depth of 30 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-18D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-18S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-36
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/6/2012	12/6/2012	27	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	11.642 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370189.3895 / 1310224.846	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-005
A 2 (in) well was installed on 12/6/2012 to a depth of 27 (ft).

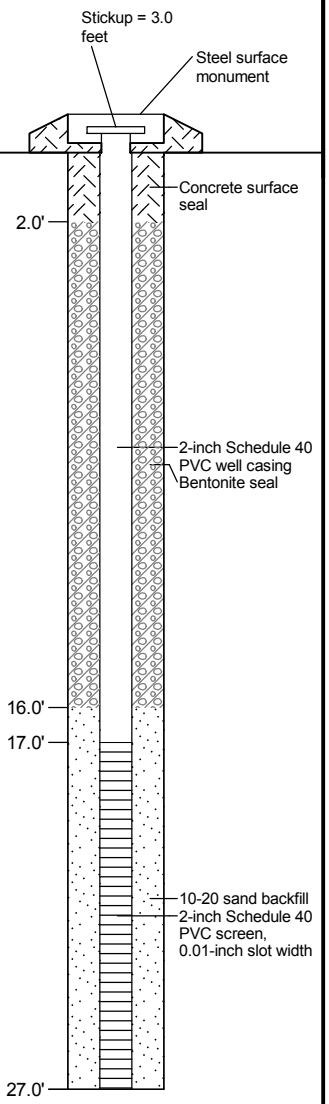
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0		15	50/4"					SP-SM	Brown fine to coarse sand, concrete rubble (very dense, moist) (fill)	SS	
			18	80					Rock	Rock (fill)	NS	
			13	54		3-4			SP	Orange-brown fine to coarse sand with gravel (moist) (fill)	NS	
5									ML			
			18	24					SP	Olive brown fine sandy silt with gravel and brick fragments (hard, moist) (fill)	NS	
			10	7						Dark gray fine to coarse sand, occasional gravel, trace silt (medium dense, wet) (fill)	NS	
5										Brown silt lense at 3.75 feet		
			14	4		7.8-8			ML	Dark gray fine to coarse sand, trace silt (loose, wet) (fill)	NS	
			9	4		9-10				Gray fine to coarse sand, occasional fine gravel, trace silt (very loose, wet) (fill)	NS	
0	10		10	3						Dark gray grades to gray-brown fine sandy silt with organic matter and rootlets (~15%) (soft, moist) (native)	NS	
			17	5						Gray-brown fine sandy silt with organic matter and rootlets (soft, moist)	NS	
			18	5						1 inch lense of gray silty sand, occasional carbonized wood, micaceous (very loose, moist)	NS	
5	15		18	11					SP-SM	1 inch lense of gray silty sand, occasional carbonized wood, micaceous (very loose, moist)	NS	
			18	17					ML	Gray fine to coarse sand with silt (very loose, wet)		
									SP-SM	Gray-brown fine sandy silt (very soft, wet)		
			18	21					SP	Gray fine to coarse sand with silt (very loose, wet)		
10	20		18	11						Gray fine to coarse sand, trace silt, occasional brown silt ripup clasts (loose, wet)	NS	
			0	44								
15	25		14	22		25-26				Gray fine to coarse sand, trace silt, with mica (loose, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-19D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-37
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/12/2012	12/12/2012	21	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	11.3205	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370542.4429	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1310748.178		

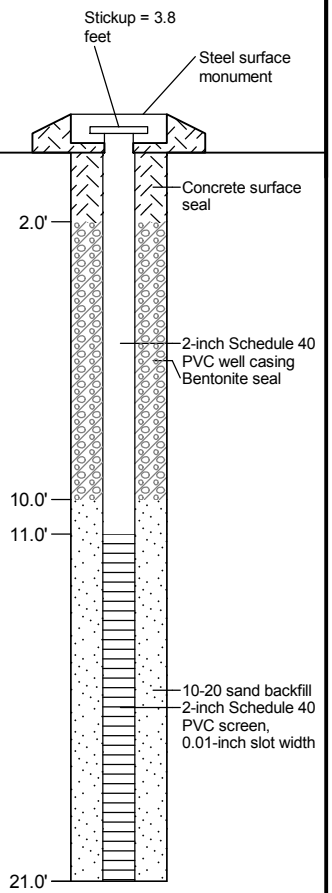
DOE Well I.D.: BHU-037
A 2 (in) well was installed on 12/12/2012 to a depth of 21 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/12/2012	3.0	8.3

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	25					AC	Asphalt	SS	
									SP	Brown fine to coarse sand with gravel, trace silt, trace wood fragments/bark (loose, moist) (fill)	SS	
			16	30						Brown fine to coarse sand, occasional gravel, trace silt, rusty scrap metal at 2.5 feet (medium dense, moist) (fill)	NS	
			9	8						Brown fine to coarse sand, occasional gravel, trace silt with thin silt layer (1 inch thick) at 3.5 feet in the sand (very loose, wet) (fill)	SS	
	5		10	5		4.5-5.5				Brown fine to caorse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
			16	2						Brown fine to coarse sand, occasional grvel, trace silt (wet) (fill)		
			0			7.2-7.4			ML	Gray-brown fine sandy silt, trace organic matter (~1%) (very soft, wet) (native)		
			2	11		9-9.5				Gray-brown fine sandy silt, trace organic matter (<1%) (medium stiff, wet)	SS	
	10		12	13					SP	Orange-brown fine to coarse sand, trace silt, with mica (loose, wet)	SS	
			12	13						Gray fine to coarse sand, trace silt, with mica, wood fragments at 12.5 feet (loose, wet)	SS	
			10	15		13.5-14.5				Gray fine to coarse sand, trace silt, occaional wood/bark, with mica (loose, wet)	NS	
	15		10	26							NS	
			6	25						Gray fine to coarse sand, trace silt, with mica (medium dense, wet)	NS	
			12	16						Gray fine to coarse sand with fine subrounded gravel, trace silt, with mica (loose, wet)	NS	
	20		8	23						Gray fine to coarse sand with gravel, trace silt, with mica, trace wood (loose, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-20D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-38
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	33	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.2943	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370011.1759	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309881.28		

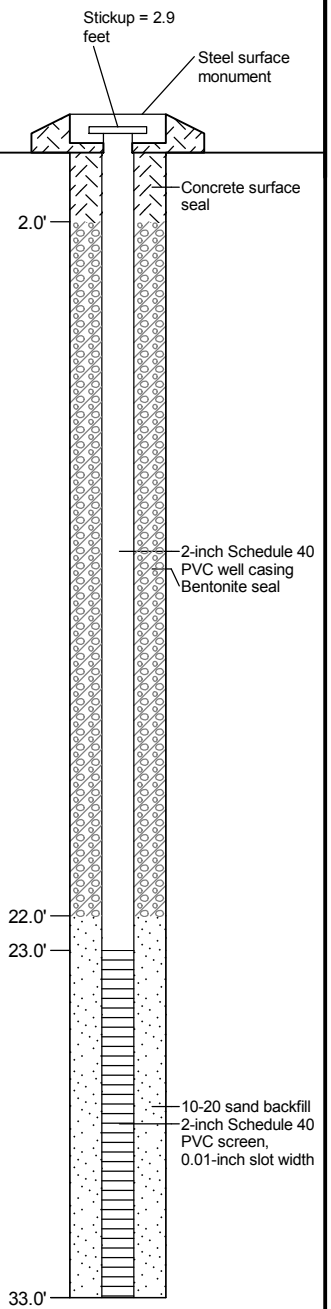
DOE Well I.D.: BHU-025
A 2 (in) well was installed on 12/20/2012 to a depth of 33 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/20/2012	5.0	8.3

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	16					SOD	1/2 inch sod		
									SP-SM	Brown fine to coarse sand with silt and gravel (loose, moist) (fill)		
			14	8					AC	Black bituminous material (degraded asphalt) (fill)		
			14	17					SP-SM	Brown fine to coarse sand with silt and gravel (loose, moist) (fill)		
	5		15	17			▽			Trace wood and bark from 2.5 to 3 feet Becomes moist to wet Grades with occasional cobbles		
			13	12		6-7			SP	Grades to wet Gray fine to medium sand, trace silt (medium dense, wet) (fill)		
			15	2		7.7-7.9			Peat	Black organic matter (peat) (native)		
			15	6					ML	Gray silt with organics (moist)		
	10		18	0						Grades to trace organics 3 inch layer silt with fine to medium sand 1 inch layer silt with fine to medium sand, occasional gravel		
			18	6		12-13				Increasing organics		
			18	0						Grades brown, further increasing organics, trace fibrous woody material		
	15		12	0								
			12	0								
			18	25					SP-SM	Gray fine sand with silt (moist)		
	20		18	28					SP	Gray fine to medium sand, trace silt (moist)		
			16	23						1 cm silt at 20.8 feet		
			18	20						Grades fine to coarse		
			18	21								
	25		18	22		24-25				3 inches fine sand and one piece of wood at 23.7 feet Trace wood at 25.5 feet		
			17	25								
			17	19						2 mm thick brown silt materials		
	30											
			18	21								

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-21D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-39
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	7	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft)	13.6214	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370010.9467	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1309885.453		

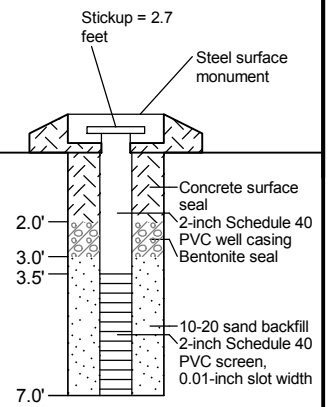
A 2 (in) well was installed on 12/20/2012 to a depth of 33 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-21D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-21S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-40
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/5/2012	12/5/2012	27	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1426 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	369167.8357 / 1310446.091	Horizontal Datum	WA State Plane North 83/91

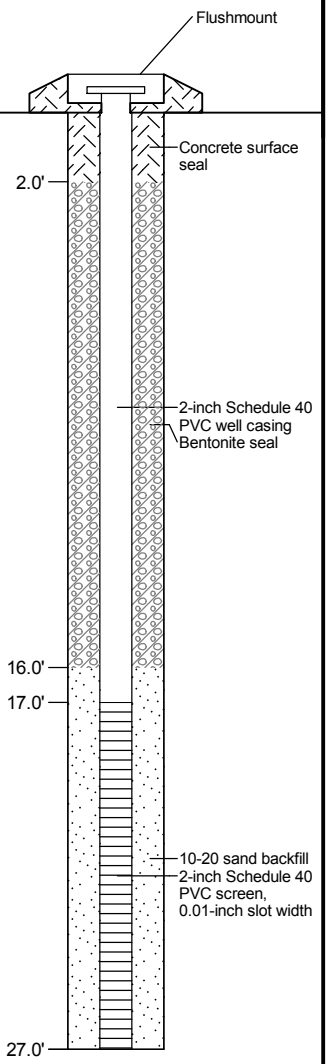
DOE Well I.D.: BHU-003
A 2 (in) well was installed on 12/5/2012 to a depth of 27 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		14	50/4"					SP	Brown fine to coarse sand with gravel (fill)	NS	
									CC	Concrete (fill)		
			8	50/2"					SP	Brown fine to coarse sand with gravel, trace silt (very dense, moist) (fill)	SS	
									CC	Concrete with brick fragments (fill)		
			18	31		3-4			SM	Brown silty sand with wood, brick fragments (fill)	NS	
	5		15	26					SP	Gray-brown with orange mottling fine to coarse sand, trace silt (medium dense, moist) (fill)	NS	
			12	9						Gray-brown fine to coarse sand, trace silt (medium dense, wet) (fill)	NS	
			12	6		8-8.2				Gray fine to coarse sand, occasional gravel, trace silt (very loose, wet) (fill)	NS	
									ML	Dark gray fine to coarse sand, occasional gravel, trace silt (very loose, wet) (fill)		
			17	5						Brown fine sandy silt, trace rootlets (~1%) (medium stiff, moist) (native)	NS	
	10		14	3		10.5-11.5				Gray-brown fine sandy silt with organic matter and rootlets (~5%) (soft, moist)	NS	
			18	6						Gray-brown fine sandy silt with organic matter and wood fragments (soft, moist)	NS	
									Wood	Gray-brown fine sandy silt with organic matter and wood fragments (soft, moist)		
			16	5					ML	Piece of wood undergraded	NS	
	15		12	12					SM/ML	Gray-brown fine sandy silt with organic matter (medium stiff, moist)	NS	
									SM	Gray-brown fine interbedded silty sand and sandy silt, trace organic matter (soft, wet)		
			7	32					SP	Gray fine silt sand with organic matter and rootlets (~15%) (loose, wet)	NS	
			18	32						Gray fine to coarse sand with gravel, trace silt, trace mica (medium dense, wet)		
	20		18	42		20-21				Gray fine to coarse sand, trace silt (medium dense, wet)	NS	
			18	34						Gray fine to coarse sand, occasional rounded gravel, trace silt, trace mica (medium dense, wet)	NS	
			18	47						Gray fine to coarse sand, occasional fine gravel, trace silt, micaceous (medium dense, wet)	NS	
			18	46						Gray fine to coarse sand with fine gravel, trace silt, micaceous (medium dense, wet)	NS	
	25		12	41						Gray fine to coarse sand with fine gravel, trace silt, micaceous (medium dense, wet)	NS	
										Gray fine to coarse sand, trace silt, micaceous (medium dense, wet)	NS	



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-22D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-41
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\050406800.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/5/2012	12/5/2012	7	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	13.1787 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	369173.009 / 1310445.634	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-004
A 2 (in) well was installed on 12/5/2012 to a depth of 27 (ft).

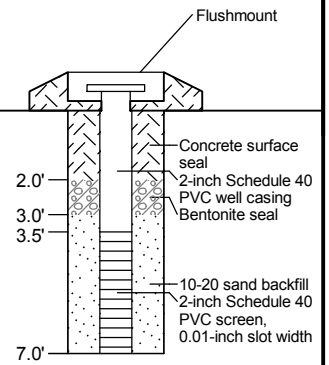
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
10	0								See LLMW-22D for sampling and material description		
	5										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-22S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-42
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/4/2012	12/5/2012	40	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	25.9105 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	368226.9076 1310278.89	Horizontal Datum	WA State Plane North 83/91

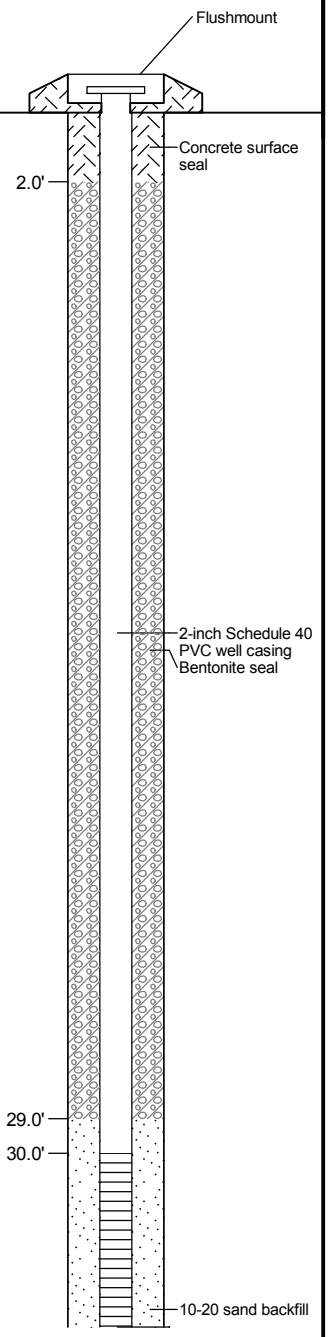
DOE Well I.D.: BHU-001
A 2 (in) well was installed on 12/4/2012 to a depth of 40 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
25	0								SP	Gray-brown fine to medium sand, trace silt (medium dense, moist) (fill)		
20	5		15	11							NS	
			15	31		8-9				Gray-brown fine to medium sand, trace silt (medium dense, moist) (fill)		
15	10		15	18						Gray-brown fine to coarse sand, occasional gravel, trace silt (medium dense, moist) (fill)	NS	
10	15		5	5						Gray-brown fine to coarse sand, occasional gravel, trace silt (medium dense, moist) (fill)	NS	
			15	19		17-18				Gray-brown fine to medium sand, trace wood fragments (~1%), yellow brick fragments at 16.5 feet (medium dense, moist) (fill)	NS	
			13	0						Gray-brown fine to medium sand, trace wood chips (~1%) (medium dense, moist) (fill)		
5	20		11	15		20-21				Gray-brown fine to coarse sandl, trace silt (medium dense, wet) (fill)	NS	
			10	14					Wood			
			7	4		22.9-23.1			SP	Dark brown wood fibers/bark (bogfuel) (wet) (fill)	NS	
0	25		9						SM	Gray-brown fine to coarse sand, occasional gravel, trace silt, trace wood (~1%) (medium dense, wet) (fill)	NS	
			5	4		26-26.5			SP	Gray-brown fine to medium sand, trace silt (loose, wet) (fill)		
			12	6					ML	Gray-brown silty fine to medium sand, trace wood (~5%) (loose, wet) (native)	NS	
-5	30		18	20					SP	Gray-brown fine to coarse sand, trace silt, occasional rootlets (loose, wet)	NS	
			15	18						Gray-brown sandy silt with rootlets (~15%) (medium stiff, wet)	NS	
			18	19						Gray-brown sandy silt with rootlets (~5%) (medium stiff, moist)	NS	
			18	38						Gray fine to medium sand, trace to no silt, trace rootlets (~1%), micaceous (loose, wet)	NS	
	35		18	37						Gray fine to medium sand, trace silt, trace rootlets (~1%), micaceous	NS	
										Gray fine to medium sand, occasional coarse sand, occasional fine gravel, trace silt, micaceous, small silt ripups in matrix (medium dense, wet)	NS	

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well LLMW-23D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-43
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
10	35					35-36				Gray fine to medium sand, occasional coarse sand, trace silt, micaceous (medium dense, wet) (native)	NS		2-inch Schedule 40 PVC screen, 0.01-inch slot width
			18	31						Gray fine to medium sand, occasional coarse sand, trace silt, micaceous (medium dense, wet)	NS		
			12	37						Gray fine to coarse sand, trace silt, micaceous (medium dense, wet)			
	40												40.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-23D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-43
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/4/2012	12/5/2012	24	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-120
Surface Elevation (ft) / Vertical Datum	25.9515 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	368222.1107 1310277.448	Horizontal Datum	WA State Plane North 83/91

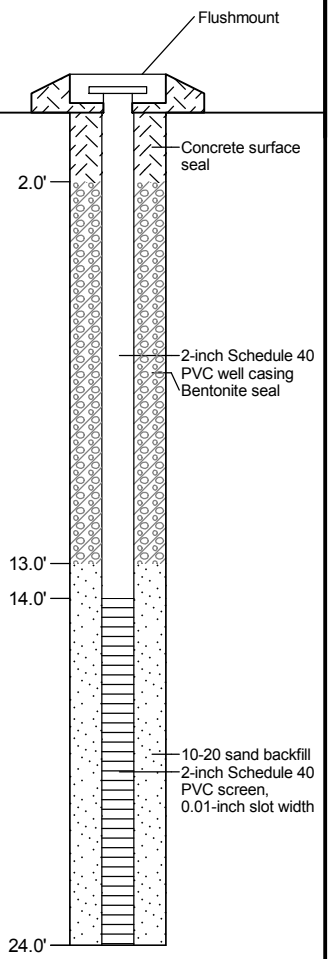
DOE Well I.D.: BHU-002
A 2 (in) well was installed on 12/4/2012 to a depth of 40 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
25	0								See LLMW-23D for sampling and material description		
20	5										
15	10										
10	15										
5	20										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-23S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-44
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

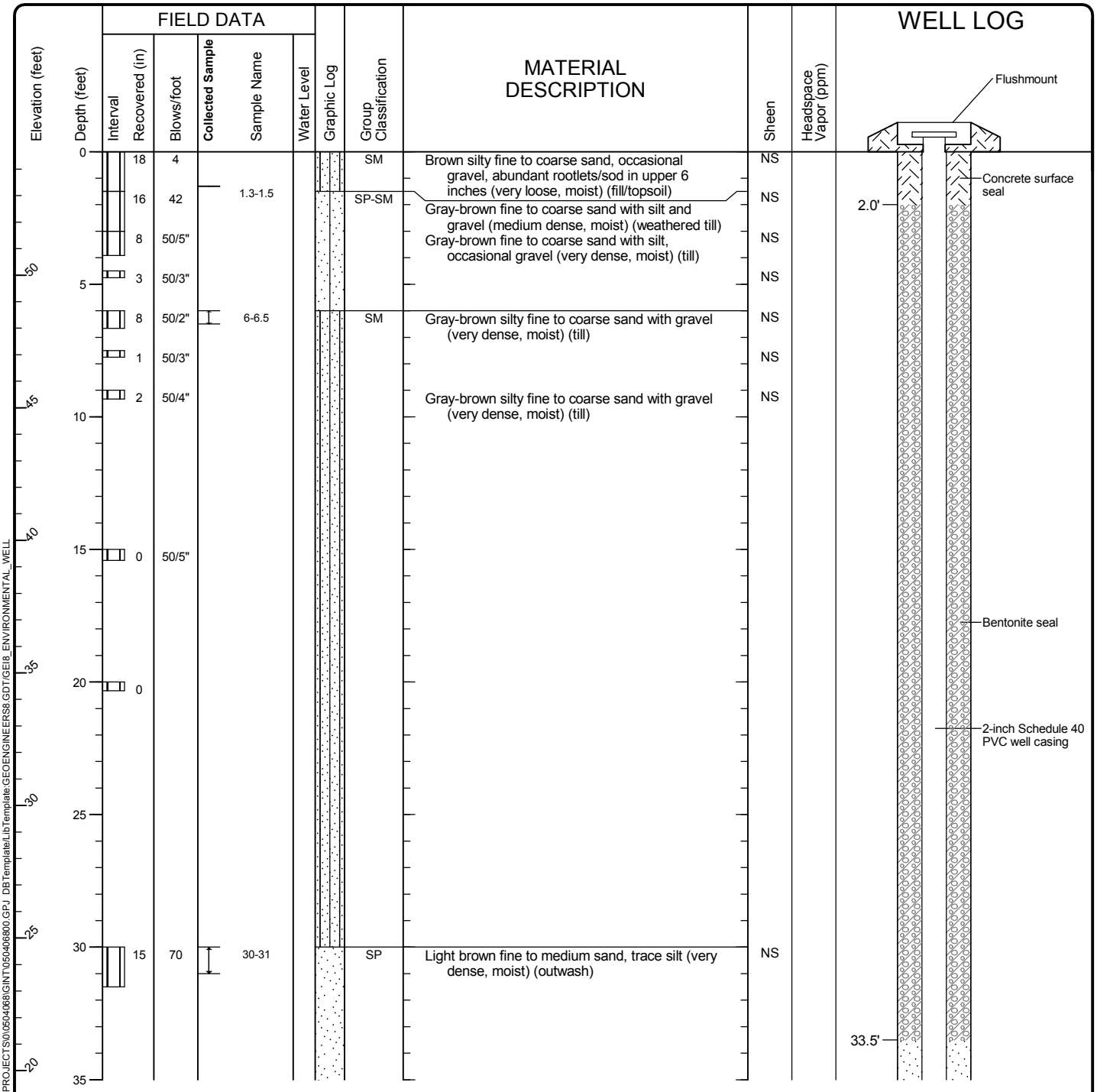
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/20/2012	12/20/2012	56.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	54.6587 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371665.5506 1308321.72	Horizontal Datum	WA State Plane North 83/91

A 2 (in) well was installed on 12/21/2012 to a depth of 56.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/20/2012	45.0	9.7

Notes:



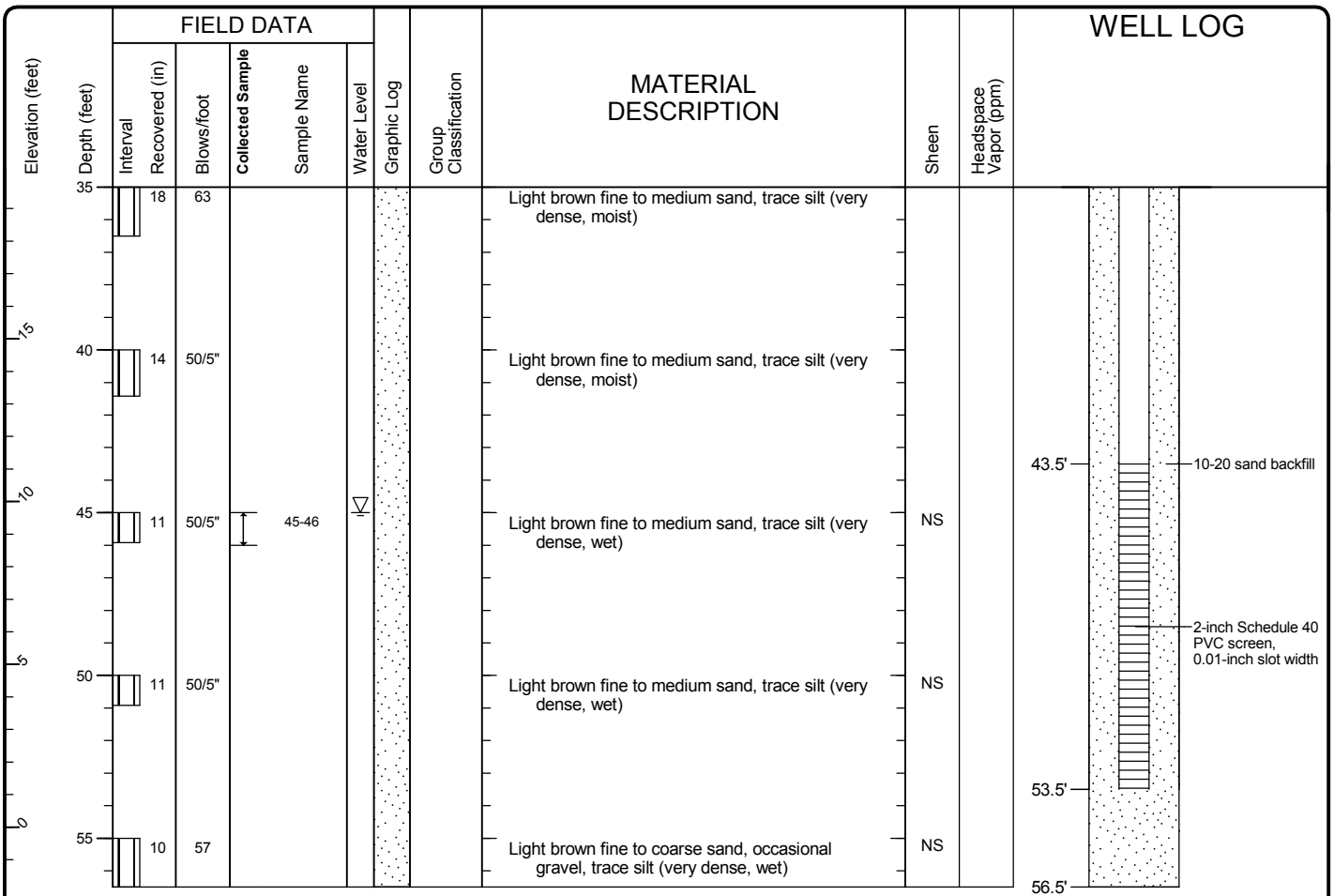
Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLMW-24D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-45
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLMW-24D (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-45
Sheet 2 of 2

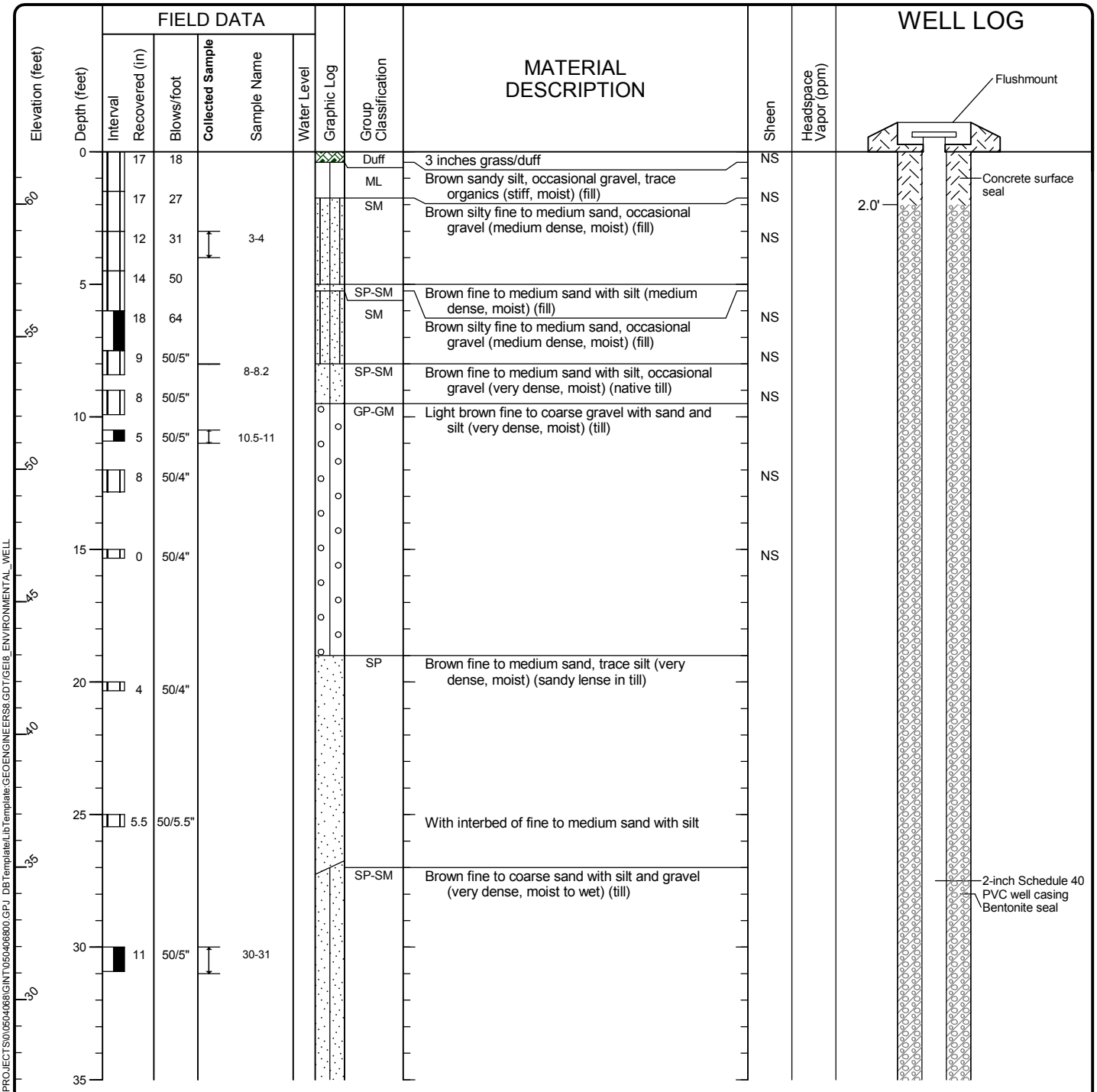
Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	12/19/2012	12/19/2012	65	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	61.9771 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	371489.9394 1308367.759	Horizontal Datum	WA State Plane North 83/91

A 2 (in) well was installed on 12/19/2012 to a depth of 65 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/19/2012	55.0	7.0

Notes:



Note: Please see Figure A-1 for explanation of symbols

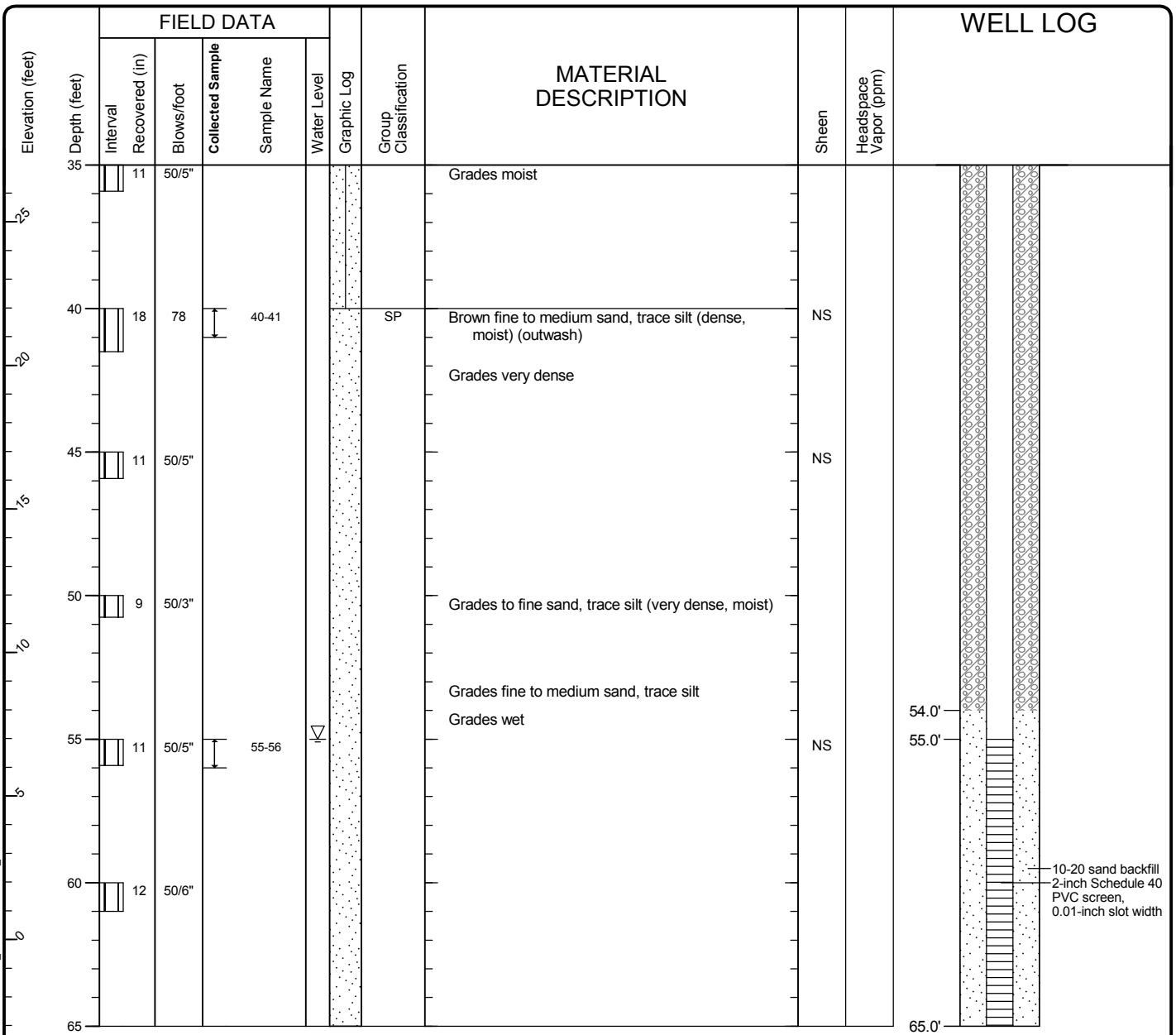
Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Boring LLMW-25D

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-46
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLMW-25D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-46
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/9/2013	1/9/2013	61.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	61.9264	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371259.2652	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308465.435		

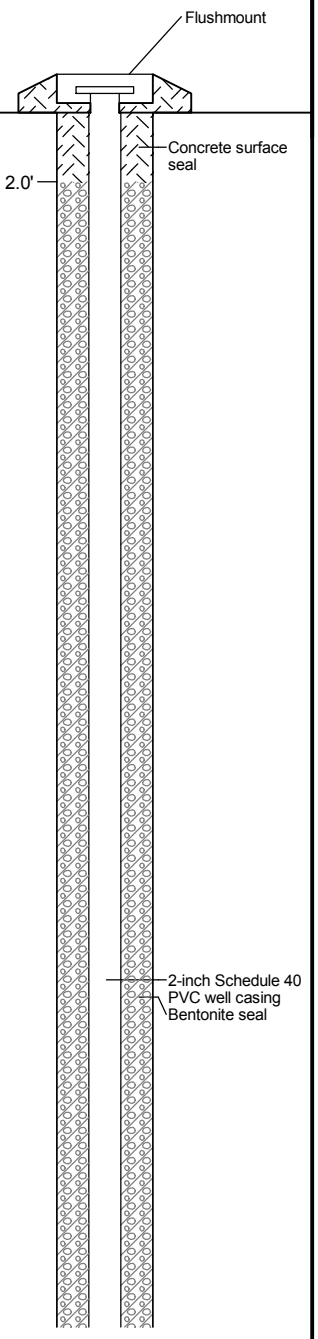
DOE Well I.D.: BHU-031
A 2 (in) well was installed on 1/10/2013 to a depth of 61.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
60	0		18	20					CC	4 inches concrete sidewalk	NS	
									GP-GM	Brown fine gravel with sand and silt (loose, moist) (base course, fill)		
			18	14					SM	Brown silty fine to medium sand, occasional gravel (loose, moist) (fill)	NS	
			16	25						Grades reddish-brown	NS	
55	5								SP-SM	Reddish-brown fine to medium sand with silt, occasional gravel (loose, moist) (fill)		
			15	20					SP	Brown fine to medium sand, trace silt (loose, moist) (fill)	NS	
									SM	Brown silty fine to coarse sand with gravel (loose, moist)		
			18	51						Grades with no gravel, orange-brown mottling		
			14	63						Grades brown, occasional gravel (medium dense, moist)		
50	10		15	93					SP-SM	Brown fine to coarse sand with silt, occasional gravel (very dense, moist) (native)		
			3	50/3"								
			9	50/3"								
45	15		3.5	50/3.5"								
			9	50/5"		15.5-16						
			3.5	50/3.5"								
40	20		5.5	50/5.5"						Grades with gravel		
35	25		18	45		25-26				Light brown fine to medium sand with silt (medium dense, moist)	NS	
									SP	Light brown fine to medium sand, trace silt (dense, moist)		
30	30		18	81		30-31					NS	
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

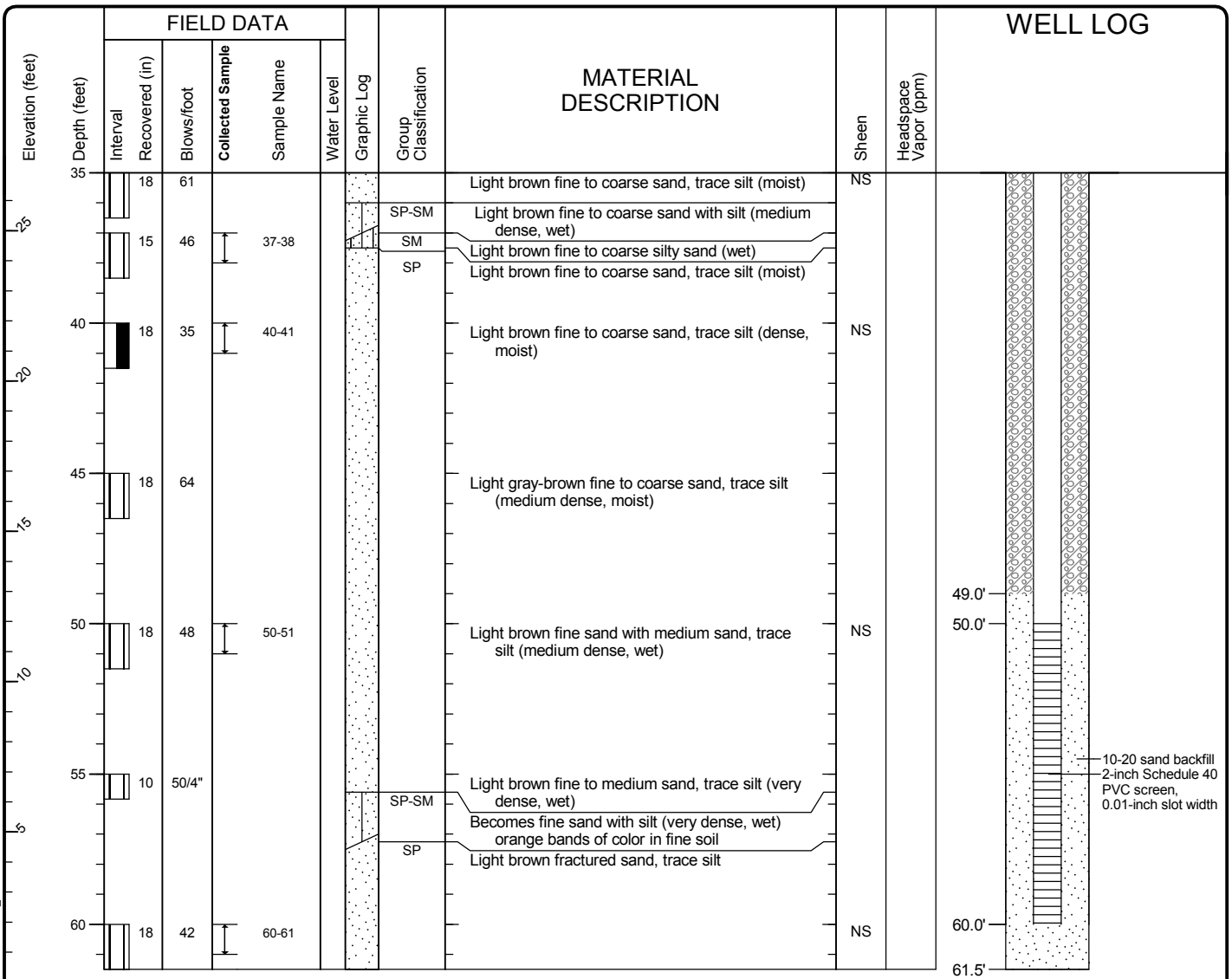
Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well LLMW-27D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-47
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-27D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-47
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/9/2013	1/9/2013	36	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	61.8712	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	371254.3715	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308467.345		

DOE Well I.D.: BHU-032
A 2 (in) well was installed on 1/9/2013 to a depth of 61.5 (ft).

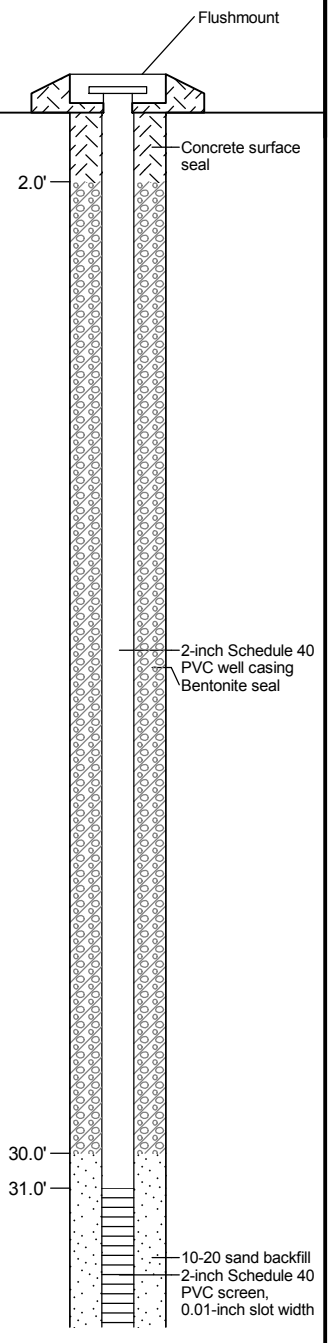
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
60	0								See LLMW-27D for sampling and material description		
55	5										
50	10										
45	15										
40	20										
35	25										
30	30										
	35										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-27S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-48
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
	35											36.0'

Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-27S (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-48
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/8/2013	1/8/2013	61.5	GRL	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	56.0371	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	370982.4647	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308556.215		

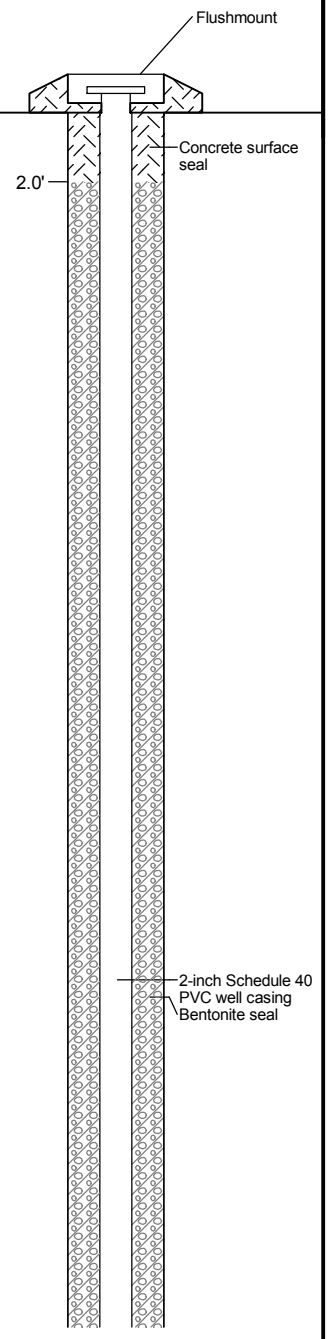
DOE Well I.D.: BHU-028
A 2 (in) well was installed on 1/8/2013 to a depth of 61.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/8/2013	44.1	11.9

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
55	0		15	41					AC	Asphalt concrete	NS	
									SM	Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)		
			16	35		2-3				Grades dense	NS	
										Grades very dense		
			4	50/6"							NS	
50	5		1	50/5"							NS	
			15	22		6-7				Increased gravel content, grades medium dense	NS	
			12	36							NS	
			15	17							NS	
45	10									Grades loose		
			15	16						Grades medium dense	NS	
			16.5	56		12.5-13.5					NS	
									SP-SM	Brown fine to coarse sand with silt, occasional gravel (medium dense, moist) (native)		
			18	69						Grades very dense	NS	
40	15		12	76							NS	
										Grades dense		
			10	78/11"							NS	
										Grades very dense		
			18	48							NS	
										Grades to dense, lacks gravel		
35	20		15	65		20-21			SM	Brown silty fine to coarse sand, occasional gravel (medium dense, moist) (till)	NS	
			18	49							NS	
30	25		12	76/9"						Grades to very dense	NS	
									SP-SM	Brown fine to coarse sand with silt (very dense, moist) (outwash)		
25	30		15	78/9"		30-31					NS	
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

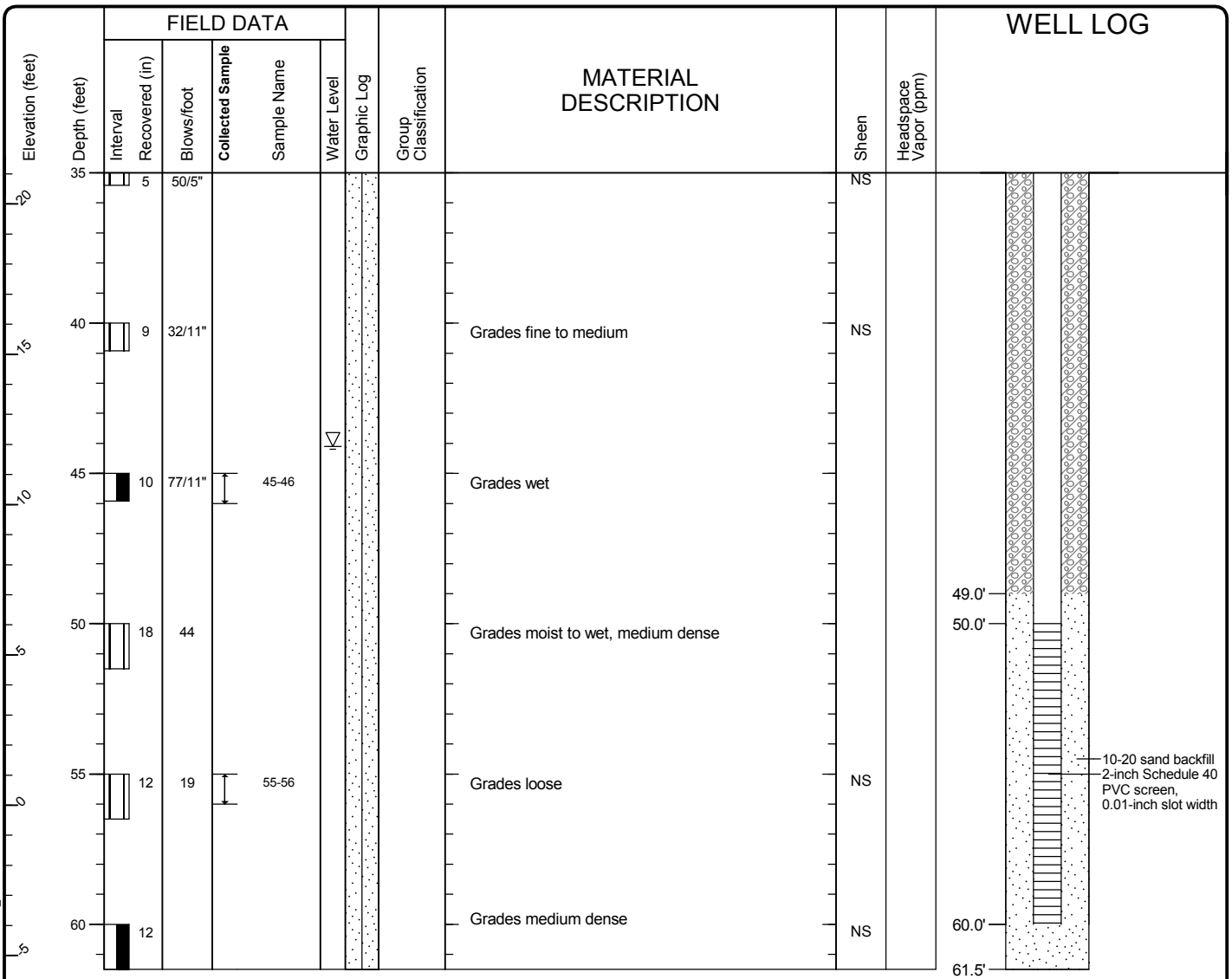
Log of Monitoring Well LLMW-29D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-49
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-29D (continued)

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-49
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/8/2013	1/8/2013	10	GRL	Holocene Drilling	Hollow-stem Auger

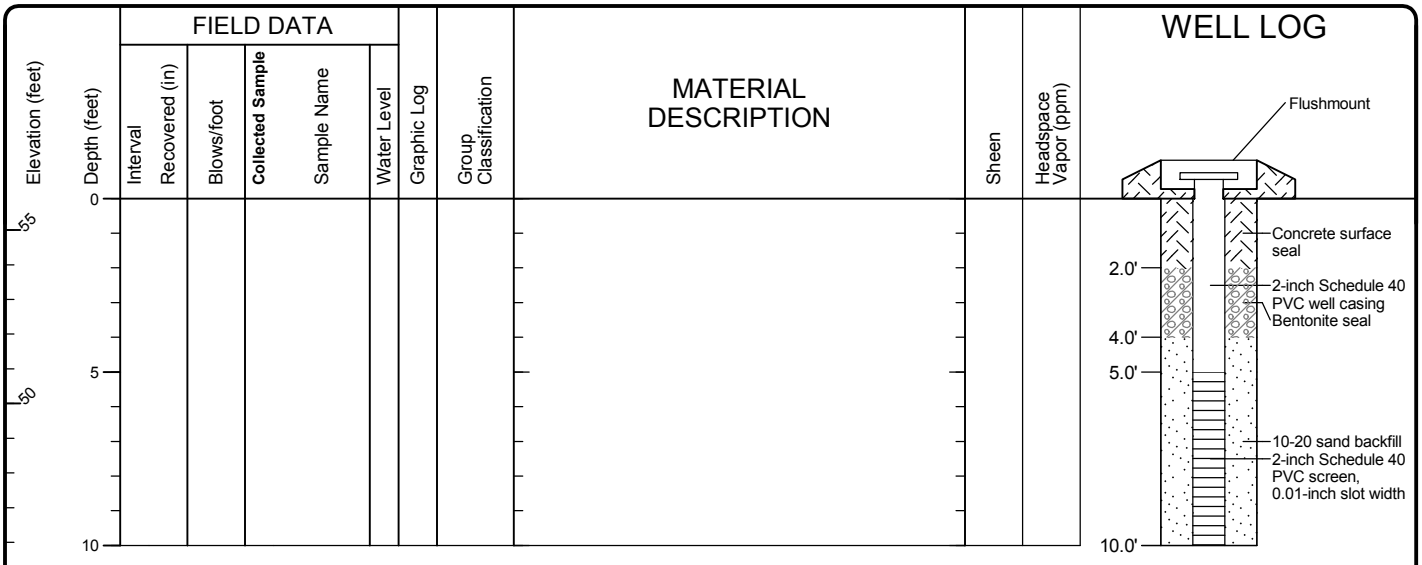
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft) / Vertical Datum	55.9093 NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	370978.6854 1308557.008	Horizontal Datum	WA State Plane North 83/91

DOE Well I.D.: BHU-029
A 2 (in) well was installed on 1/8/2013 to a depth of 61.5 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-29S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-50
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	1/23/2013	1/23/2013	64	GRL	Holocene	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850
Surface Elevation (ft) Vertical Datum	59	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)		Horizontal Datum	

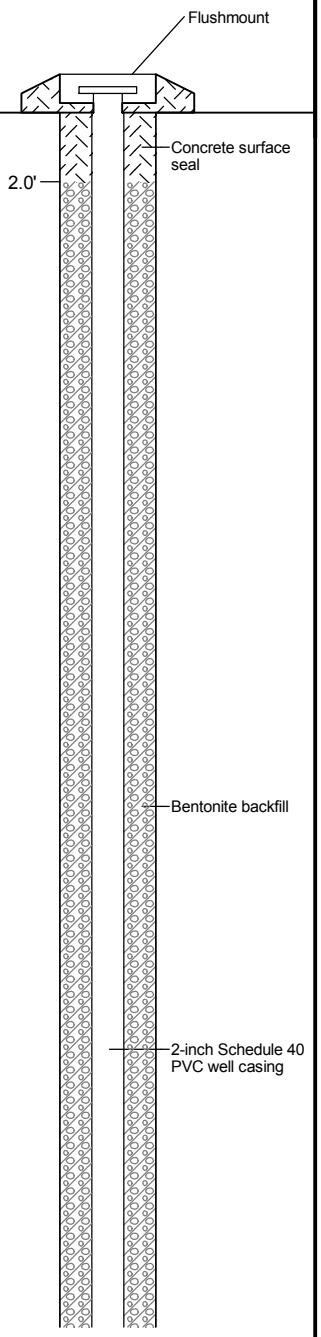
A 2 (in) well was installed on 1/23/2013 to a depth of 64 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/23/2013	46.0	13.0

Notes:

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0		12	30					SP-SM	Brown fine to coarse sand with silt, occasional gravel, and trace organic matter (medium dense, moist) (fill)	NS	
		18	44					SM	Grades to darker brown with gravel		
		13	14		3-4				Brown silty fine sand with gravel (medium dense, moist) (fill)		
5		15	4						Grades fine to coarse, occasional gravel		
		1	3						Grades gray-brown, fine, loose		
		12	7						Grades to very loose		
		17	50		9.1-9.3			SM	2 inch oxidized iron stained layer, contains ~5% black pieces of decomposing wood		
10		18	41						Light brown silty fine to coarse sand with occasional gravel (medium dense, moist) (native) (weathered till)		
		11	50/5"		12-13				Grades very dense		
		18	32						Rig chatter at 12 feet Grades to no gravel (till)		
15		16	50/4"						Grades fine, dense		
		11	50/5"						Grades occasional gravel, very dense		
		9	50/3"						Grades brown, fine to coarse		
20		5	50/5"		20-20.5						
									Less chatter		
25		5	50/5"		25-25.5			SP-SM	Brown fine to coarse sand with silt and occasional gravel (very dense, moist) (till)		
								SM	Brown silty fine to coarse sand with occasional gravel (very dense, moist) (till)		
30		5	50/5"								
35											

WELL LOG



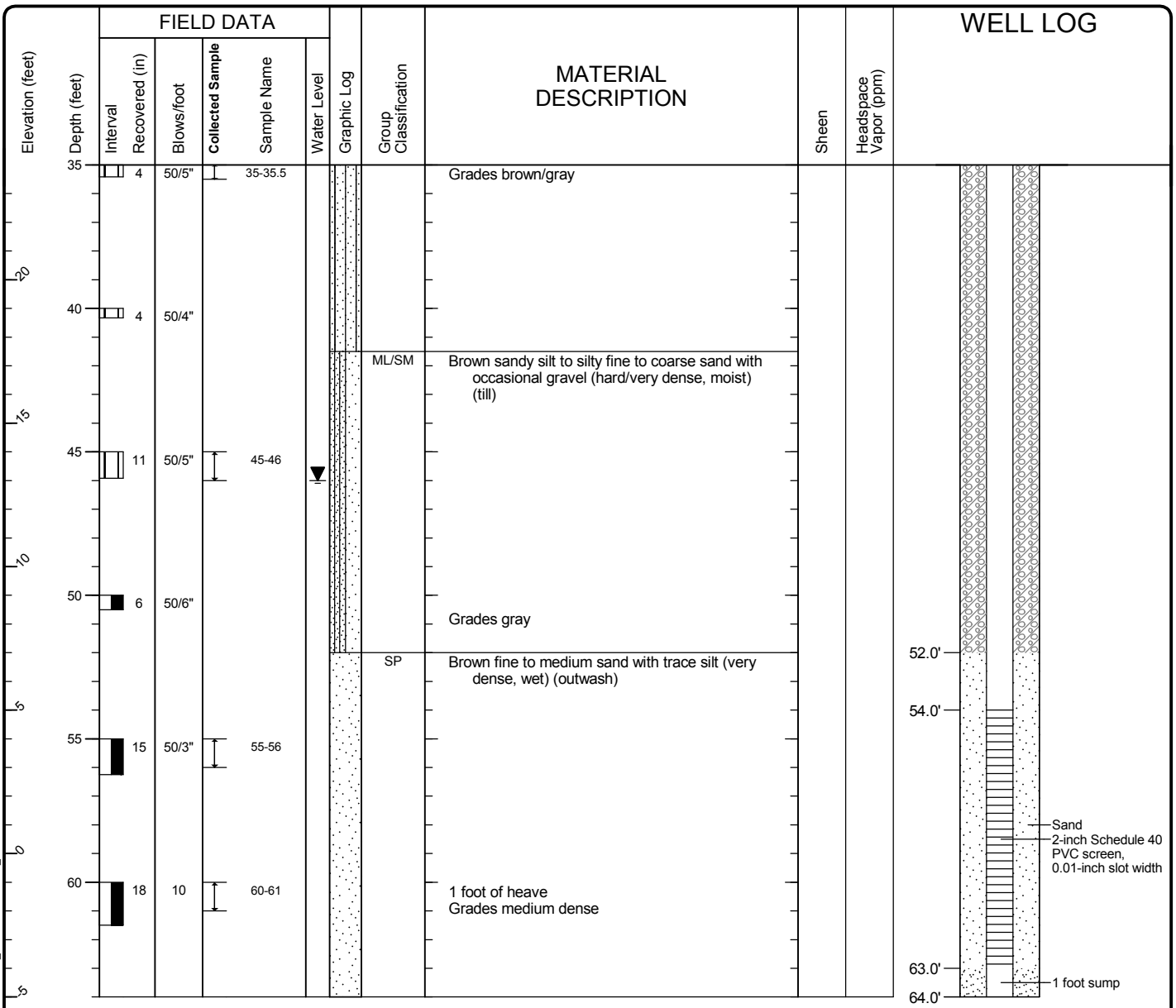
Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-31D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-51
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-31D (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-51
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Driller	Drilling Method
	1/3/2013	1/7/2013	45.5	AMW	Holocene Drilling	Hollow-stem Auger

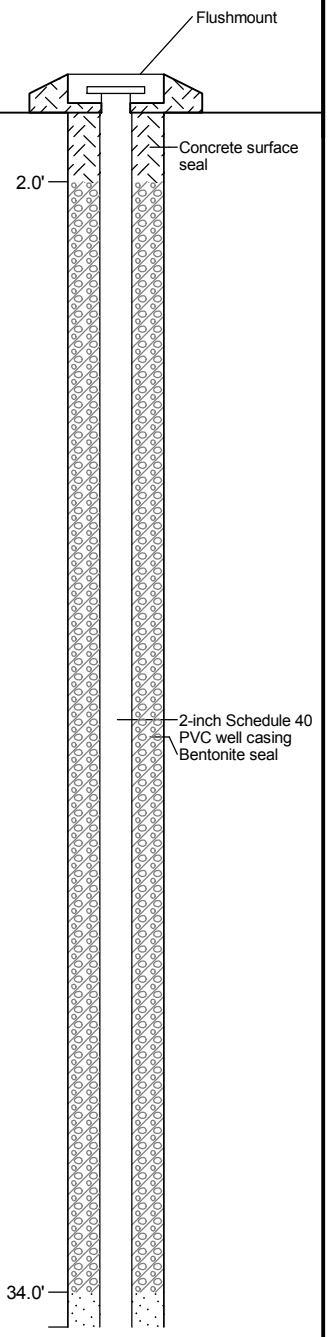
Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft)	37.5673	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	369961.949	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308914.525		

DOE Well I.D.: BHU-094
A 2 (in) well was installed on 1/7/2013 to a depth of 45.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		18	49					AC	7 inches asphalt concrete	NS	
			18	34					SP-SM	Light brown fine to coarse sand with gravel, with silt (medium dense, moist) (fill)	NS	
35			14	14		3-4					NS	
	5		14	10		4.5-4.7			SM	Brown to orange-brown fine to coarse silty sand with gravel, occasional brick fragments (loose, moist) (fill)	NS	
			11	50/6"					GM	Light orange-brown silty fine to coarse sand with gravel (very loose, moist) (fill/colluvium)	NS	
30			17	40					SM	Gray-brown silty fine to coarse gravel with sand (very dense, moist) (weathered till)	NS	
			18	28						Orange-brown mottled to gray-brown silty fine to coarse sand with gravel (medium dense, wet) (weathered till)	NS	
	10		11	23		10.5-11.5				Gray-light brown mottled orange silty fine to coarse sand with gravel (medium dense, wet) (till)	NS	
25			7	50/3"					SM	Light brown silty fine to coarse sand with gravel (loose, wet) (till)	NS	
			10	50/4"						Gray-brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
			11	50/4"						Gray silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
	15		9	50/3"						Gray silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
20										Becomes light brown Light brown silty fine to coarse sand with gravel (<3") (very dense, moist) (till)		
	20		11	50/5"						Light brown silty fine to coarse sand with gravel (very dense, moist) (till)	NS	
15												
	25		6	50/6"		24-24.5				Gray silty fine to coarse sand, occasional gravel (very dense, moist) (till)	NS	
									SP-SM	Light brown fine sand with silt (very dense, moist)		
10			12	50/5"							NS	
	30		18	100					SP	Light brown fine sand, trace silt (very dense, moist) moderately laminated	NS	
									SM	Light brown fine silty sand with a clay filled verticle fracture 4" long		
5									ML	Light tan poorly laminated silt with sand (hard, moist)		
									ML	Light brown fine sandy silt (very stiff, moist) moderately laminated		
	35		14	50/4"					SP	Light brown fine to medium sand, trace silt (very	NS	



Note: Please see Figure A-1 for explanation of symbols

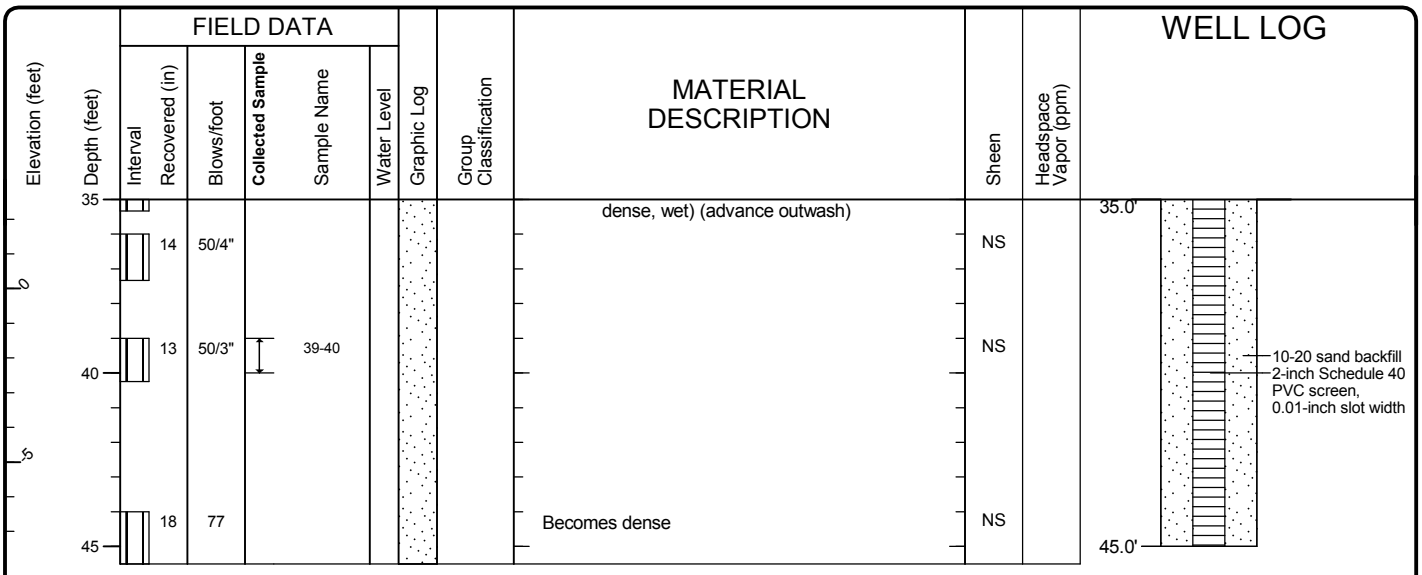
Log of Monitoring Well LLMW-33D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-52
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-33D (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-52
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/3/2013	1/7/2013	10.5	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-59 Track Rig
Surface Elevation (ft) / Vertical Datum	37.7314 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	369957.8312 / 1308912.956	Horizontal Datum	WA State Plane North 83/91

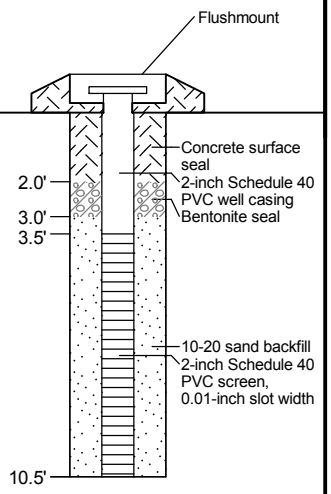
DOE Well I.D.: BHU-095
A 2 (in) well was installed on 1/7/2013 to a depth of 45.5 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0							See LLMW-33D for sampling and material description		
-5										
	5									
-10										
	10									

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-33S

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-53
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	75.3	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft)	53.2995	Top of Casing Elevation (ft)	
Vertical Datum	NAVD88		
Easting (X)	368696.1556	Horizontal Datum	WA State Plane North 83/91
Northing (Y)	1308930.669		

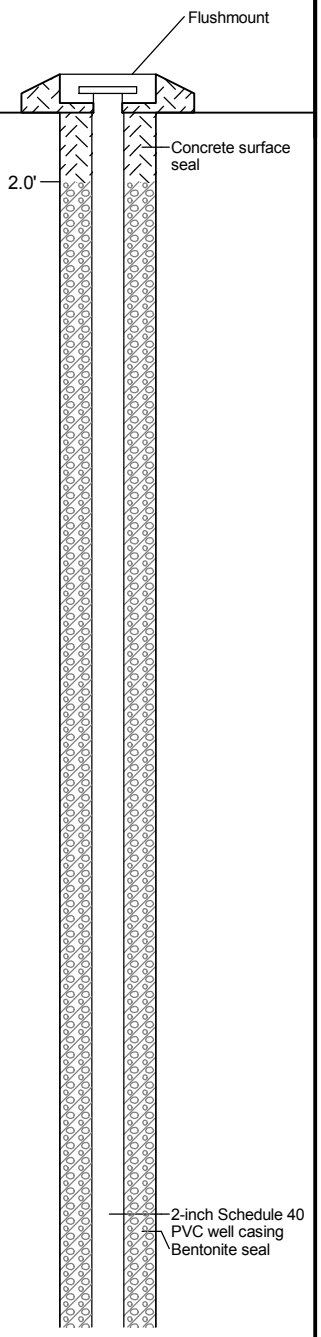
DOE Well I.D.: BHU-046
A 2 (in) well was installed on 12/19/2012 to a depth of 75.3 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/19/2012	70.0	-16.7

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
50	0								AC	Asphalt concrete		
									SM	Brown silty fine to coarse sand with gravel (moist)		
			8	20						Light brown silty fine sand with medium to coarse sand, occasional gravel (loose, moist)	NS	
			2	23							NS	
45	5		14	10		4.5-5.5				Light brown silty fine sand with medium to coarse sand, with gravel (very loose, moist)	NS	
			13	5		6-6.2				Becomes orange-brown Orange-brown silty fine to coarse sand with gravel, trace carbonized wood (very loose, moist to wet)	NS	
			18	26							NS	
40	10		14	16					SP-SM	Orange-brown to light brown mottled silty fine to coarse sand, occasional gravel (medium dense, moist to wet)	NS	
			15	14						Gray-light brown with orange mottling fine to coarse sand with silt (loose, moist)	NS	
			17	50/5"		11.5-11.7			SP	Light gray-brown slight orange mottling fine to coarse sand with silt, occasional gravel (loose, wet)	NS	
			10	50/4"					SM	Light brown fine to medium sand, trace silt (loose, wet)	NS	
35	15		2	50/2"						Light brown silty fine sand, occasional medium to coarse sand, occasional gravel (very dense, wet) (native)	NS	
										Light brown silty fine to medium sand, with gravel (very dense, moist to wet)		
										Light brown silty fine to medium sand, with gravel and coarse sand (very dense, wet)		
30	20		0	50/5"						3 inch rock in shoe	NS	
25	25		10	50/5"						Light brown silty fine to coarse sand, occasional gravel (very dense, moist)	NS	
25									SP-SM	Light brown fine to coarse sand with silt, with gravel (very dense, moist)		
20	30		5	50/5"							NS	
									SM	Gray silty fine to medium sand, occasional coarse sand and gravel (very dense, moist)		
	35											

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

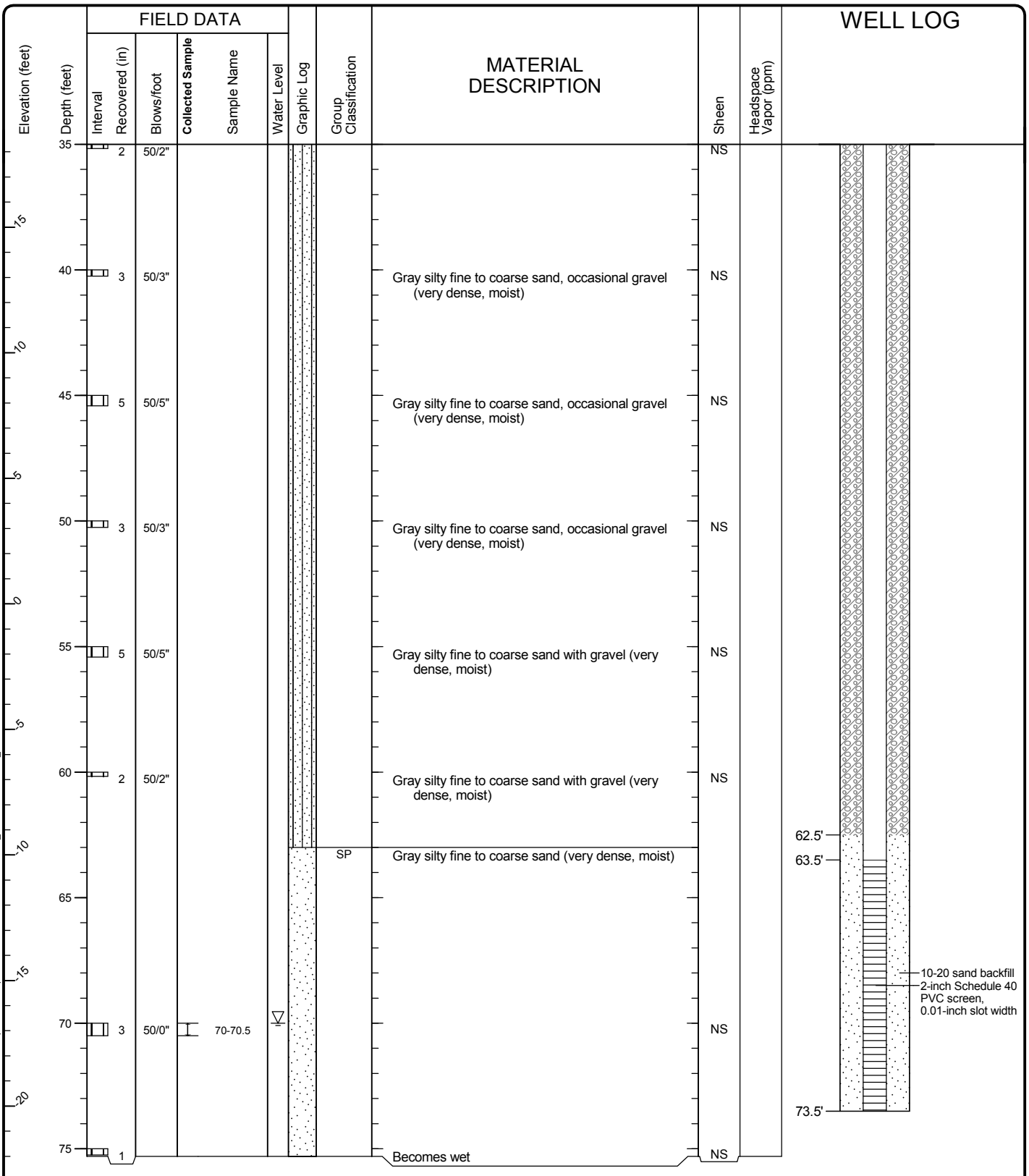
Log of Monitoring Well LLMW-34D

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-54
Sheet 1 of 2

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate/GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-34D (continued)

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-54
Sheet 2 of 2

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
12/20/2012	12/20/2012	12	AMW	Holocene Drilling	Hollow-stem Auger

Hammer Data	140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 850 Track Rig
Surface Elevation (ft) / Vertical Datum	53.2239 / NAVD88	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)	368693.8425 / 1308931.771	Horizontal Datum	WA State Plane North 83/91

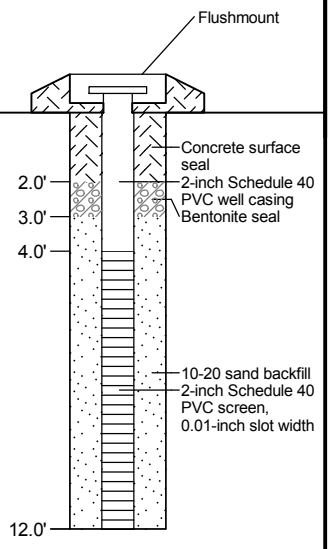
DOE Well I.D.: BHU-047
A 2 (in) well was installed on 12/20/2012 to a depth of 75.3 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								See LLMW-34D for sampling and material description		
50											
	5										
45											
	10										

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well LLMW-34S

GeoEngineers

Project:	Everett Lowland
Project Location:	Everett, Washington
Project Number:	0504-068-00

Figure A-55
Sheet 1 of 1

Seattle: Date:5/16/13 Path:W:\SEATTLE\PROJECTS\0\0504068\GINT\0504068.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/7/2013	1/7/2013	20	GRL	Holocene Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
12.6436 NAVD88	Pneumatic	AMS Powerprobe 9500 D

Easting (X) / Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)
373990.7175 / 1306949.75	WA State Plane North 83/91			

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
10	0		36						GP	Gray fine to coarse gravel with sand, trace silt (moist) (fill)	NS		
									Wood	Brown wood debris			
			40			4-5			SP-SM	Brown fine to coarse sand with silt and gravel, trace wood debris (moist) (fill)	NS		
	5									Grades to wet at 5 feet			
5						6-7			Wood	Brown wood debris with brown fine to medium sand with silt, occasional gravel (wet) (fill)	NS		
			40								NS		
									SP-SM	Brown fine to coarse sand with silt and gravel, trace wood debris (wet) (fill)			
	10					10.8-11			ML	Brown silt, trace organics (wet) (native)	NS		
											NS		
						13-14				Grades with 1 inch sand interbeds	NS		
	15									Grades with wood, trace sand			
0			48						SP	Gray fine to medium sand, trace silt, trace wood (wet)	NS		
						19-20					NS		
	20												

Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLSB-01

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-56
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/7/2013	1/7/2013	20	GRL	Holocene Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
14.7497 NAVD88	Pneumatic	AMS Powerprobe 9500 D

Easting (X) / Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)
373634.9832 / 1307691.419	WA State Plane North 83/91			

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
10	0		30					SP	Dark brown fine to coarse sand, trace silt, occasional gravel (moist) (fill)			
								SP	Brown-orange fine to medium sand (moist) (fill)			
	5		48		3-4				Gravel Grades to brown Grades to wet Grades to medium to coarse sand			
5			48									
	10				10-10.2			ML	Gray silt, trace organics (wet) (native)			
					10.6-10.8			Wood	Wood (wet)			
			0		12-13			ML	Gray silt, trace organics, trace sand (wet) Grades sandy silt			
0	15				15-16			SP	Gray fine sand, trace silt, trace wood (wet)			
			40						Grades fine to medium Lacks wood Grades <1cm layers of wood			
-5	20				19-20							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLSB-02

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-57
Sheet 1 of 1

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
1/7/2013	1/7/2013	20	GRL	Holocene Drilling	Direct Push

Surface Elevation (ft) / Vertical Datum	Hammer Data	Drilling Equipment
15.0686 NAVD88	Pneumatic	AMS Powerprobe 9500 D

Easting (X) / Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)
373543.2766 / 1308050.649	WA State Plane North 83/91			

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
10	0		44						SP	Brown fine to medium sand (moist) (fill)			
						2-3					NS		
						3-4					NS		
			46							Grades to brown-orange			
	5										NS		
			48						Wood	Wood debris (wet) (fill)			
5	10					9.5-10.5			SP	Gray fine to coarse sand trace silt (wet) (fill)	NS		
						11-11.2			ML	Gray silt, trace organics (wet) (native)	NS		
			40										
						13-14					NS		
0	15								SP	Gray fine to medium sand, trace silt (wet)	NS		
			44										
											NS		
						19-20					NS		
	20									Refusal due to heaving sands (wet)			

Note: Please see Figure A-1 for explanation of symbols

Log of Boring LLSB-03

GeoEngineers

Project: Everett Lowland
Project Location: Everett, Washington
Project Number: 0504-068-00

Figure A-58
Sheet 1 of 1

APPENDIX B
Survey Data

Garrett R. Leque

From: Garrett R. Leque
Sent: Monday, February 11, 2013 9:05 AM
To: Aaron M. Waggoner
Subject: FW: Monitor Wells-Everett Smelter
Attachments: GEOE0020-FIELD NOTES.pdf

From: Gil Laas [mailto:GJLA@deainc.com]
Sent: Wednesday, January 23, 2013 12:34 PM
To: Garrett R. Leque
Subject: Monitor Wells-Everett Smelter

Garrett,

Attached is a spread sheet with all the wells we located over the last few days. The format is as such: Point number, Northing, Easting, Elevation, and description. The descriptions are as follows: TOP CASE= top of metal lid to well. PVC NORTH=north edge of pvc pipe inside the well. GROUND= a ground shot elevation adjacent to well in areas in which the well case is NOT flush with the ground. In areas in which the lid was flush with the ground we did not measure a separate ground elevation.

Wells LLMW-31S and LLMW-31D were not set at the time of this survey.

I also included a copy of the surveyor's field notes for your reference.

The coordinate system is Washington State Plane North coordinate system 83/91 in grid values. Vertical datum is NAVD88. US survey feet.

Please call with any comments or questions.

Thanks

LLMW-31D was surveyed January 28, 2013 and has been included in the table below. LLMW-31S was not installed.

Gil Laas, P.L.S., C.Fed.S,
Project Surveyor | Associate
David Evans and Associates, Inc. | Surveying and Geomatics
1620 W. Marine View Dr. Suite 200 | Everett, WA 98201 | www.deainc.com
d: 425.405.1513 | c: 360.739.9853 | gjla@deainc.com

Carly Nadasky

From: Garrett R. Leque
Sent: Monday, February 11, 2013 9:04 AM
To: Aaron M. Waggoner
Subject: FW: Monitor Wells-Everett Smelter
Attachments: GRID-GEOE0118-0121CAG-WITH DESCRIPTION.csv

From: Gil Laas [mailto:GJLA@deainc.com]
Sent: Monday, January 28, 2013 10:43 AM
To: Garrett R. Leque
Subject: RE: Monitor Wells-Everett Smelter

Garrett,

Here is the updated spreadsheet with the last well.

Stop by anytime for the keys.

Gil

From: Garrett R. Leque [mailto:gleque@geoengineers.com]
Sent: Monday, January 28, 2013 9:35 AM
To: Gil Laas
Subject: RE: Monitor Wells-Everett Smelter

ok sounds good. There is one well; LLMW31D, and it is located across the street (east of) from the location shown on the Figure I sent you. It is located just north of the little City park that overlooks the industrial area. It is a flush well with one stickup bollard...

Thanks,
G

From: Gil Laas [mailto:GJLA@deainc.com]
Sent: Monday, January 28, 2013 9:33 AM
To: Garrett R. Leque
Subject: RE: Monitor Wells-Everett Smelter

Garrett,

We will shoot the two new wells this morning. I will send you the updated info by the end of the day. No worries about budget.

You can have someone pick up the keys this afternoon or tomorrow.

Thanks

Gil

From: Garrett R. Leque [mailto:gleque@geoengineers.com]
Sent: Monday, January 28, 2013 9:12 AM
To: Gil Laas
Subject: RE: Monitor Wells-Everett Smelter

Thanks!
After DEA did the work we installed one more well; LLMW31. Do you think it would be possible to get that included within the budget?

Thanks,
G

From: Gil Laas [mailto:GJLA@deainc.com]
Sent: Wednesday, January 23, 2013 12:34 PM
To: Garrett R. Leque
Subject: Monitor Wells-Everett Smelter

Garrett,

Attached is a spread sheet with all the wells we located over the last few days. The format is as such: Point number, Northing, Easting, Elevation, and description. The descriptions are as follows: TOP CASE= top of metal lid to well. PVC NORTH=north edge of pvc pipe inside the well. GROUND= a ground shot elevation adjacent to well in areas in which the well case is NOT flush with the ground. In areas in which the lid was flush with the ground we did not measure a separate ground elevation.

Wells LLMW-31S and LLMW-31D were not set at the time of this survey.

I also included a copy of the surveyor's field notes for your reference.

The coordinate system is Washington State Plane North coordinate system 83/91 in grid values. Vertical datum is NAVD88. US survey feet.

Please call with any comments or questions.

Thanks

Gil Laas, P.L.S., C.Fed.S,
Project Surveyor | Associate
David Evans and Associates, Inc. | Surveying and Geomatics
1620 W. Marine View Dr. Suite 200 | Everett, WA 98201 | www.deainc.com
d: 425.405.1513 | c: 360.739.9853 | gjla@deainc.com

Appendix B

Survey Data

Point Number	Northing	Easting	Elevation	Description
10000	373999.5776	1306940.8470	12.46	1501R-TOP CASE
10001	373999.2866	1306940.8230	11.94	1501R PVC NORTH
10002	373990.7175	1306949.7500	12.64	LLSB-1
10003	373634.9832	1307691.4190	14.75	LLSB-2
10004	373543.2766	1308050.6490	15.07	LLSB-3
10005	373911.1708	1307952.9290	16.08	01D-TOP CASE
10006	373910.9344	1307952.7240	15.74	01D-PVC NORTH
10007	373726.9180	1307221.6340	20.54	MW-UNK-TOP CASE
10008	373726.7456	1307221.4940	20.05	MW-UNK-PVC NORTH
10009	373729.7908	1307217.3640	15.98	MW-UNK-GROUND
10010	373617.7071	1307454.3610	17.19	MW-UNK-2-TOP BASE AT GROUND-BENT
10011	372887.0090	1307921.3900	15.38	02D-TOP CASE
10012	372886.6753	1307921.1850	15.15	02D PVC NORTH
10013	372968.6297	1308356.2020	17.64	03S-TOP CASE
10014	372968.3797	1308356.3800	17.45	03S-PVC NORTH
10015	372968.4709	1308355.5780	14.52	03S-GROUND
10016	372965.2847	1308351.9080	17.79	03D-TOP CASE
10017	372965.2972	1308351.7320	17.45	03D-PVC NORTH
10018	372965.5718	1308351.5110	14.43	03D-GROUND
10019	372938.3312	1309085.1330	14.42	05S-TOP CASE
10020	372938.0230	1309084.8030	14.05	05S-PVC NORTH
10021	372934.1281	1309088.2700	14.39	05D-TOP CASE
10022	372933.9143	1309087.9300	13.92	05D-PVC NORTH
10023	372578.2673	1309467.0870	14.06	07S-TOP CASE
10024	372578.1202	1309467.2720	13.82	07S-PVC NORTH
10025	372580.8285	1309464.7630	14.09	07D-TOP CASE
10026	372580.6617	1309464.9380	13.81	07D-PVC NORTH
10027	372477.6634	1309132.4260	12.73	06S-TOP CASE
10028	372477.2658	1309132.4950	12.49	06S-PVC NORTH
10029	372472.7325	1309133.8720	12.71	06D-TOP CASE
10030	372472.4759	1309133.8230	12.29	06D-PVC NORTH
10031	371929.4722	1309290.9450	13.15	09S-TOP CASE
10032	371929.1754	1309290.9440	12.57	09S-PVC NORTH
10033	371933.0232	1309291.5300	13.18	09D-TOP CASE
10034	371932.7400	1309291.5290	12.79	09D-PVC NORTH
10035	372212.5643	1309788.4460	16.65	08S-TOP CASE
10036	372212.3650	1309788.4670	16.21	08S-PVC NORTH
10037	372213.2542	1309788.2490	13.21	08S-GROUND
10038	372208.8338	1309788.8870	16.62	08D-TOP CASE
10039	372208.7778	1309789.0540	16.26	08D-PVC NORTH
10040	372209.3701	1309788.5690	13.45	08D-GROUND
10041	371825.3721	1310349.5720	19.88	11S-TOP CASE
10042	371825.3634	1310349.5860	19.76	11S-PVC NORTH
10043	371826.1136	1310349.2310	16.00	11S-GROUND
10044	371822.0995	1310350.8190	19.86	11D-TOP CASE
10045	371821.8957	1310350.7800	19.71	11D-PVC NORTH
10046	371822.9079	1310350.2610	16.03	11D-GROUND
10050	371319.7638	1310602.2140	18.53	17S-TOP CASE
10051	371319.6439	1310602.2280	18.27	17S-PVC NORTH
10052	371320.3207	1310602.2830	15.32	17S-GROUND
10053	371317.1396	1310602.9420	18.63	17D-TOP CASE
10054	371317.0587	1310602.9620	18.29	17D-PVC NORTH
10055	371317.6575	1310603.0720	15.27	17D-GROUND
10056	370542.1375	1310748.1650	15.11	20D-TOP CASE
10057	370541.8637	1310748.3440	14.92	20D-PVC NORTH
10058	370542.4429	1310748.1780	11.32	20D-GROUND

Point Number	Northing	Easting	Elevation	Description
10059	370543.0710	1310753.2670	11.23	PZ-3B-PVC NORTH
10060	370542.7696	1310753.2970	11.75	PZ-3B-TOP CASE
10061	370504.9847	1310755.1880	14.16	PZ-3A-PVC NORTH
10062	370504.7144	1310755.0800	14.74	PZ-3A-TOP CASE
10063	370188.7720	1310224.8770	14.60	19D-TOP CASE
10064	370188.5613	1310224.9320	14.22	19D-PVC NORTH
10065	370189.3895	1310224.8460	11.64	19D-GROUND
10066	370205.8714	1310306.7650	11.34	PZ-1B-PVC NORTH
10067	370205.6506	1310306.9870	13.74	PZ-1B-TOP CASE
10068	370216.1134	1310344.1870	13.33	PZ-1A-PVC NORTH
10069	370089.9137	1310537.2860	12.99	PZ-2A-PVC NORTH
10070	370089.9303	1310537.3100	13.50	PZ-2A-TOP CASE
10071	370050.4818	1310539.9430	12.02	PZ-2B-PVC NORTH
10072	370050.6105	1310539.6630	12.87	PZ-2B-TOP CASE
10073	370215.8348	1310344.3790	14.47	PZ-1A-TOP CASE
10074	369172.9406	1310445.5870	12.87	22S-PVC NORTH
10075	369173.0090	1310445.6340	13.18	22S-TOP CASE
10076	369167.8989	1310446.1630	12.80	22D-PVC NORTH
10077	369167.8357	1310446.0910	13.14	22D-TOP CASE
10078	368222.2067	1310277.6010	25.54	23S-PVC NORTH
10079	368222.1107	1310277.4480	25.95	23S-TOP CASE
10080	368226.9611	1310279.1070	25.30	23D-PVC NORTH
10081	368226.9076	1310278.8900	25.91	23D-TOP CASE
10082	370010.9723	1309884.8390	16.36	21S-TOP CASE
10083	370010.7034	1309884.8900	16.04	21S-PVC NORTH
10084	370010.9467	1309885.4530	13.62	21S-GROUND
10085	370011.2226	1309881.9670	16.15	21D-TOP CASE
10086	370011.1111	1309881.9240	16.03	21D-PVC NORTH
10087	370011.1759	1309881.2800	13.29	21D-GROUND
10088	370388.7121	1309715.0820	16.26	18S-TOP CASE
10089	370388.7626	1309715.2030	15.70	18S-PVC NORTH
10090	370389.0772	1309715.2920	13.27	18S-GROUND
10091	370391.6628	1309718.2390	16.22	18D-TOP CASE
10092	370391.6398	1309718.1620	15.91	18D-PVC NORTH
10093	370391.7580	1309718.7140	13.11	18D-GROUND
10094	371050.7465	1309535.3570	16.22	15S-TOP CASE
10095	371050.5776	1309535.3370	15.94	15S-PVC NORTH
10096	371051.1506	1309535.4190	13.21	15S-GROUND
10097	371052.7439	1309536.7510	16.25	15D-TOP CASE
10098	371052.5926	1309536.6760	16.07	15D-PVC NORTH
10099	371053.2175	1309536.6120	13.10	15D-GROUND
10100	371373.4417	1309447.0550	15.31	14S-TOP CASE
10101	371373.4769	1309447.0670	14.74	14S-PVC NORTH
10102	371374.1753	1309446.9460	12.49	14S-GROUND
10103	371375.7095	1309449.0750	15.29	14D-TOP CASE
10104	371375.6023	1309449.1470	14.80	14D-PVC TOP
10105	371375.9911	1309449.1600	12.49	14D-GROUND
10106	371520.1755	1309412.6120	16.19	12S-TOP CASE
10107	371520.0860	1309412.6630	15.61	12S-PVC NORTH
10108	371520.5241	1309412.4360	13.84	12S-GROUND
10109	371522.9645	1309414.2950	16.23	12D-TOP CASE
10110	371523.0150	1309414.2620	15.71	12D-PVC NORTH
10111	371523.5091	1309414.2800	13.63	12D-GROUND
10112	371721.7620	1309357.6080	16.40	10S-TOP CASE
10113	371721.7809	1309357.9690	15.91	10S-PVC NORTH
10114	371722.2934	1309357.7910	13.18	10S-GROUND
10115	371725.0606	1309359.3290	16.34	10D-TOP CASE
10116	371724.8375	1309359.5870	15.97	10D-PVC NORTH
10117	371725.4255	1309359.4070	13.14	10D-GROUND
10118	371682.0940	1309796.8330	21.74	13S-TOP CASE

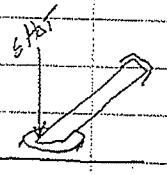
Point Number	Northing	Easting	Elevation	Description
10119	371682.0263	1309796.7690	21.49	13S-PVC NORTH
10120	371682.6131	1309796.9300	18.43	13S-GROUND
10121	371682.0029	1309793.1160	21.67	13D-TOP CASE
10122	371681.8513	1309793.0410	21.24	13D-PVC NORTH
10123	371682.4624	1309793.1490	18.48	13D-GROUND
10124	371159.1791	1310165.4720	20.23	16S-TOP CASE
10125	371158.9693	1310165.5270	20.02	16S-PVC NORTH
10126	371159.2967	1310164.4520	17.19	16S-GROUND
10127	371157.7625	1310161.3970	20.35	16D-TOP CASE
10128	371157.6532	1310161.3680	20.14	16D-PVC NORTH
10129	371158.1660	1310160.4370	17.14	16D-GROUND
10130	372644.2048	1308250.2640	22.14	04S-TOP CASE
10131	372644.1374	1308250.3910	21.91	04S-PVC NORTH
10132	372644.2517	1308249.7640	18.61	04S-GROUND
10133	372642.4795	1308246.2400	22.62	04D-TOP CASE
10134	372642.3485	1308246.3590	21.98	04D-PVC NORTH
10135	372642.8382	1308246.2520	18.89	04D-GROUND
10136	372106.4788	1308333.6660	28.82	EV-22A-TOP CASE
10137	372106.2793	1308333.5780	28.59	EV-22A-PVC NORTH
10138	372106.9332	1308333.6120	26.33	EV-22A-GROUND
10139	372111.6804	1308337.1410	29.41	EV-22B-TOP CASE
10140	372111.4369	1308337.1550	29.02	EV-22B-PVC NORTH
10141	372112.0293	1308337.8310	26.35	EV-22B-GROUND
10142	371460.1320	1308563.1640	60.96	EV-6A-PVC NORTH-SOUTHERLY
10143	371460.1068	1308563.2560	61.56	EV-6A-TOP CASE-SOUTHERLY
10144	371466.2733	1308565.2580	60.91	EV-6B-PVC NORTH-NORTHERLY
10145	371466.2012	1308565.2320	61.44	EV-6B-TOP CASE-NORTHERLY
10146	371451.3097	1308568.5600	61.65	PIEZ-PVC NORTH
10147	371451.1763	1308568.6050	61.76	PIEZ-TOP CASE
10148	371406.8325	1308516.4780	64.67	EV-20-TOP CASE
10149	371406.5816	1308516.5360	64.28	EV-20-PVC NORTH
10150	371407.2479	1308516.1020	62.05	EV-20-GROUND
10151	371355.0783	1308496.2820	61.46	EV-19B-PVC NORTH
10152	371355.0687	1308496.3590	62.02	EV-19B-TOP CASE
10153	371254.5214	1308467.3680	61.46	27S-PVC NORTH
10154	371254.3715	1308467.3450	61.87	27S-TOP CASE
10155	371259.3534	1308465.4100	61.71	27D-PVC NORTH
10156	371259.2652	1308465.4350	61.93	27D-TOP CASE
10157	371490.1217	1308367.6460	61.76	25D-PVC NORTH
10158	371489.9394	1308367.7590	61.98	25D-TOP CASE
10159	371665.5296	1308321.6810	54.28	24D-PVC NORTH
10160	371665.5506	1308321.7200	54.66	24D-TOP CASE
10161	371472.5693	1308791.7070	19.41	BP-05D2-TOP CASE
10162	371472.4120	1308791.7130	19.26	BP-05D2-PVC NORTH
10163	371472.6348	1308791.6740	15.82	BP-05D2-GROUND
10164	368693.8487	1308931.6630	52.71	34S-PVC NORTH
10165	368693.8425	1308931.7710	53.22	34S-TOP CASE
10166	368696.1675	1308930.6570	53.03	34D-PVC NORTH
10167	368696.1556	1308930.6690	53.30	34D-TOP CASE
10168	369957.9657	1308912.9620	37.42	33S-PVC NORTH
10169	369957.8312	1308912.9560	37.73	33S-TOP CASE
10170	369962.0849	1308914.4660	37.24	33D-PVC NORTH
10171	369961.9490	1308914.5250	37.57	33D-TOP CASE
10172	370978.8889	1308556.9360	55.66	29S-PVC NORTH
10173	370978.6854	1308557.0080	55.91	29S-TOP CASE
10174	370982.4785	1308556.1280	55.62	29D-PVC NORTH
10175	370982.4647	1308556.2150	56.04	29D-TOP CASE
10180	370453.0750	1308669.7880	58.41	31D-PVC NORTH
10181	370452.8170	1308669.7760	59.00	31D-TOP CASE

GEOE 118CAG

NR		DESC
10,000	MW-150 IR	NORTH Rim FLUSH
10 001	"	TOP N. Rim PVC - .02 TO PVC
10 002	Soil Log	LLSB-1
10003	"	LLSB-2
10004	"	LLSB-3
8	EOD8 COE	MON W/ SHOT
10,005	LLMW-01D	NORTH Rim LID
10,006	"	" " PVC
10,007	MONITOR WELL	UNK N. Rim LID
10,008	" "	" N. Rim PVC
10,009	" "	Ground
10,010	" "	UNK-2 SHOT @ BASE OF
"	STEEL @ TOP OF CONC. PIPE BENT 45° N.	
10,011	MONITOR WELL	LLMW2D N. Rim LID
10,012	" "	" N. Rim PVC
10,013	" "	LLMW03S N. Rim LID
10014	" "	" N. Rim PVC
100 15	" "	Ground
100 16	" "	LLMW03D N. Rim LID
100 17	" "	" N. Rim PVC
100 18	" "	Ground

1-18-13 CAT JRG

Rod	Code
w/ Grnd	6562 564
	" "
	" 286
	" "
	" "
	" 113
Flush w/ Ground	" 564
	" "
	" "
	" "
	" 270
	" 564
	" "
Flush w/ Ground	" "
	" "
	" "
	" "
	270
	564
	"
	270



Rite in the Rain

GEOE 118 CAG

NIL	DESL.			
10.019	LLMW-55	N. Rim	LID	
16,020	〃	N. Rim	PVC	
10,021	〃 50	N. Rim	LID	
10,022	〃	N. Rim	PVC	
10,023	LLMW-075	N. Rim	LID	
10,024	〃	N. Rim	PVC	
10025	〃 -075	N. Rim	LID	
10026	〃 -075	N. Rim	PVC	
10027	LLMW-065	N. Rim	LID	
10028	〃	N Rim	PVC	
10029	〃 060	N. Rim	LID	
10030	〃	N Rim	PVC	
10031	LLMW-095	N. Rim	LID	(NO LOCK)
10032	〃	N. Rim	PVC	
10033	〃 090	N. Rim	LID	(NO LOCK)
10034	〃	N. Rim	PVC	

1-18-13 CPB JRG

	Rod	Code
FLUSH w/ Grnd	6.562	564
	〃	〃
	〃	〃
	〃	〃
FLUSH w/ Grnd	〃	〃
	〃	〃
	〃	〃
	〃	〃
FLUSH w/ GRND	〃	〃
	〃	〃
	〃	〃
	〃	〃
FLUSH w/ Grnd	〃	〃
	〃	〃
	〃	〃
	〃	〃

10035	LLMW-08S	N. Rim	Casing	6562	564
10036	"	N. Rim	PVC	"	"
10037	"	Ground		"	270
10038	" -08D	N. Rim	Casing	"	564
10039	" "	N. Rim	PVC	"	"
10040	" "	Ground		"	270
10041	LLMW-11S	N. Rim	Casing	"	564
10042	" "	N. Rim	PVC	"	"
10043	" "	Ground		1	270
10044	" 11D	N. Rim	Casing	"	564
10045	" "	N. Rim	PVC	"	"
10046	" "	Ground		"	270

Rite in the Rain

GEDE121CAG — 12° FOG — 1-21-13 — CPA JRG

NR	DESC		Rod	Code
8	CEDE-08		6.562	111
10050	LLMW-17S	Lid N. Rim	6.562	564
10051	"	PVC N. Rim	"	"
10052	"	Ground	"	270
10053	LLMW-17D	Lid N. Rim	"	564
10054	"	PVC N. Rim	"	"
10055	"	Ground	"	270
10056	LLMW-20D	Lid N. Rim	"	564
10057	"	PVC N. Rim	"	"
10058	"	Ground	"	270
10059	PZ3B	N. TOP PVC	"	564
10060	"	℄ 2x2 SQUARE LID	"	"
10061	PZ3A	N. TOP PVC	"	"
10062	"	℄ 2x2 LID	"	"

12/13

10063	LMW19-D	N. LID Rim	6.562	564
10064	"	N. PVC Rim	"	"
10065	"	Ground	"	270
10066	PZ1B	N. Rim PVC	"	564
10067	"	& LID	"	"
10068	PZ1A	N. Rim PVC	"	"
10073	"	& LID	"	"
10069	PZ2A	N. Rim PVC	"	"
10070	"	& LID	"	"
10071	PZ2B	N. Rim PVC	"	"
10072	"	& LID	"	"
10074	LMW22 S	N. Rim PVC	"	"
10075	" "	& LID @ Ground	"	"
10076	" D	N. Rim PVC	"	"
10077	" "	& LID @ Ground	"	"

Rite in the Rain

1-21-13

10078	LLMW-23	S	N. Rim PVC	6.562 564
10079	〃	〃	& Lid @ Ground	〃 〃
10080	〃	〃	D N. Rim PVC	〃 〃
10081	〃	〃	〃 & Lid @ Ground	〃 〃
10082	LLMW-21	S	N. Rim CASE	〃 〃
10083	〃	〃	〃 〃 PVC	〃 〃
10084	〃	〃	〃 Ground	〃 270
10085	LLMW-21	D	N. Rim CASE	〃 564
10086	〃	〃	〃 〃 PVC	〃 〃
10087	〃	〃	〃 Ground	〃 270
10088	LLMW-18	S	N. Rim CASE	〃 564
10089	〃	〃	〃 〃 PVC	〃 〃
10090	〃	〃	〃 Ground	〃 270
10091	LLMW-18	D	N. Rim CASE	〃 564
10092	〃	〃	〃 〃 PVC	〃 〃
10093	〃	〃	〃 Ground	〃 270

Rite in the Rain

1-21-13

10094	LLMW 15 S	N. Rim	Case	6.562 564
10095	" "	" "	PVC	" "
10096	" "	Ground		" 270
10097	LLMW 15 D	N. Rim	Case	" 564
10098	" "	" "	PVC	" "
10099	" "	Ground		" 270
10100	LLMW 14 S	N. Rim	Case	" 564
10101	" "	" "	PVC	" "
10102	" "	Ground		" 270
10103	LLMW 14 D	N. Rim	Case	" 564
10104	" "	" "	PVC	" "
10105	" "	Ground		" 270
10106	LLMW 12 S	N. Rim	Case	" 564
10107	" "	" "	PVC	" "
10108	" "	Ground		" 270
10109	LLMW 12 D	N. Rim	Case	" 564
10110	" "	" "	PVC	" "
10111	" "	Ground		" 270

1-21-13

10112	LLMW	10S	N. Rim	Case	6.562 564
10113	"	"	"	PVC	" "
10114	"	"	Ground		" 270
10115	LLMW	10D	N. Rim	Case	" 564
10116	"	"	"	PVC	" "
10117	"	"	Ground		" 270
10118	LLMW	13S	N. Rim	Case	" 564
10119	"	"	"	PVC	" "
10120	"	"	Ground		" 270
10121	LLMW	13D	N. Rim	Case	" 564
10122	"	"	"	PVC	" "
10123	"	"	Ground		" 270
10124	LLMW	16S	N. Rim	Case	" 564
10125	"	"	"	PVC	" "
10126	"	"	Ground		" 270
10127	LLMW	16D	N. Rim	Case	" 564
10128	"	"	"	PVC	" "
10129	"	"	Ground		" 270

Rite in the Rain

1-21-13

10130	LLMW04S	N. Rim CASE	6:56Z	564
10131	〃 〃	〃 〃 PVC	〃	〃
10132	〃 〃	Ground	〃	270
10133	LLMW04D	N. Rim CASE	〃	564
10134	〃 〃	〃 〃 PVC	〃	〃
10135	〃 〃	Ground	〃	270
10136	EV 22 A	N. Rim CASE	〃	564
10137	〃	〃 〃 PVC	〃	〃
10138	〃	Ground	〃	270
10139	EV 22 B	N. Rim CASE	〃	564
10140	〃	〃 〃 PVC	〃	〃
10141	〃	Ground	〃	270
	1-22-13			
10142	EV 6A	N. Rim PVC	STHELY OF 2	〃 564
10143	〃	℄ CASE TOP FLUSH	6A/6B	〃 〃
10144	EV 6B	N. Rim PVC	NTHELY OF 2	〃 〃
10145	〃	℄ CASE TOP 〃	6A/6B	〃 〃
10146	DIESO	N. Rim PVC	〃	〃
10147	〃	℄ CASE TOP 〃	〃	〃

Rite in the Rain

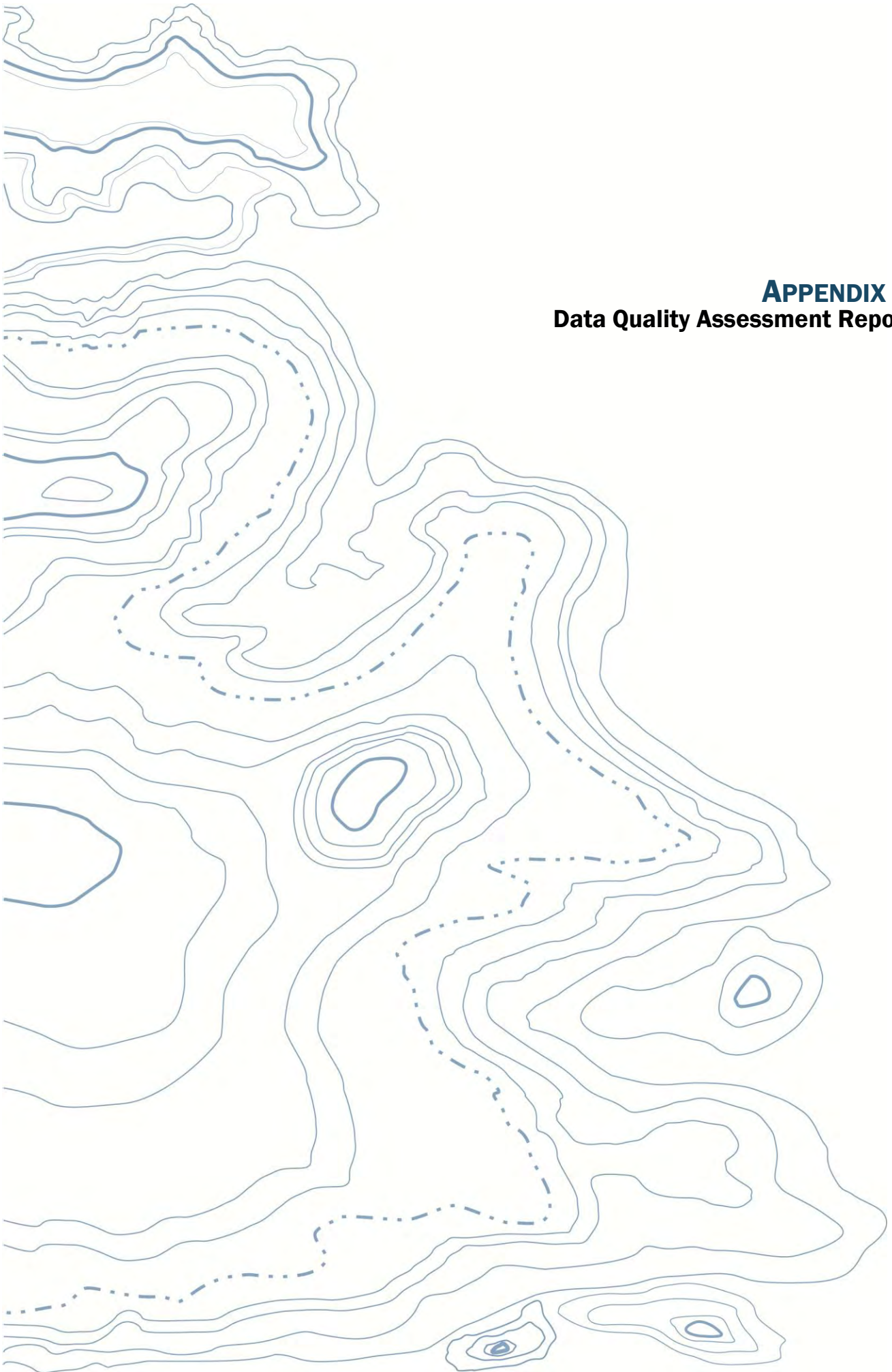
			1-22-13	
10148	EV 20B	N. Rim TOP CASE	6.562	564
10149	〃	N. Rim PVC	〃	〃
10150	〃	Ground	〃	270
10151	EV 19B	N. Rim PVC	〃	564
10152	〃	& LID FLUSH	〃	〃
10153	LMW 27 S	N. Rim PVC	〃	〃
10154	〃 〃	& LID FLUSH	〃	〃
10155	LMW 27 D	N. Rim PVC	〃	〃
10156	〃 〃	& LID FLUSH	〃	〃
10157	LMW 25 D	N. Rim PVC	〃	〃
10158	〃 〃	& LID FLUSH	〃	〃
10159	LMW 24 D	N. Rim PVC	〃	〃
10160	〃 〃	& LID FLUSH	〃	〃
10161	BP05D2	N. Rim CASE	〃	564
10162	〃	N. Rim PVC	〃	〃
10163	〃	Ground	〃	270

Rite in the Rain

1-22-13 UPSTRG

10164	LLMW34S	N. Rim PVC	6.562	564
10165	〃	〃 & LID FLUSH	〃	〃
10166	LLMW34D	N. Rim PVC	〃	〃
10167	〃	〃 & LID FLUSH	〃	〃
10168	LLMW33S	N. Rim PVC	〃	〃
10169	〃	〃 & LID FLUSH	〃	〃
10170	LLMW33D	N. Rim PVC	〃	〃
10171	〃	〃 & LID FLUSH	〃	〃
10172	LLMW29S	N. Rim PVC	〃	〃
10173	〃	〃 & LID FLUSH	〃	〃
10174	LLMW29D	N. Rim PVC	〃	〃
10175	〃	〃 & LID FLUSH	〃	〃
8	CEGE-08	MON	〃	113

Rite in the Rain



APPENDIX C
Data Quality Assessment Report

DATA QUALITY ASSESSMENT REPORT
METALS BY METHODS SW6010C/ SW7471A/SW200.8

ARI Laboratory SDG	Samples Validated (Bold indicates the sample was qualified)
VW17 (VY27 by SW200.8)	LLMW05-6-7, LLMW05-10-10.2, LLMW05-12-13, LLMW05-20-21, LLMW08-3-4, LLMW08-12-13, LLMW08-20-21, LLMW10-6-7, LLMW10-7.5-7.7, LLMW10-12-13, LLMW10-27-28, LLMW12-5-5.5, LLMW12-8.5-8.7, LLMW12-10-10.5, LLMW12-21-22, LLMW20-4.5-5.5, LLMW20-7.2-7.4, LLMW20-9-9.5, LLMW20-13.5-14.5
VV08 (VY30 by SW200.8)	LLMW22-3-4, LLMW22-8-8.2, LLMW22-10.5-11.5, LLMW22-20-21, LLMW23-17-18, LLMW23-20-21, LLMW23-22.9-23.1, LLMW23-26-26.5, LLMW23-35-36
VW18 (VY32 by SW200.8)	LLMW07-3-4, LLMW07-10-10.2, LLMW07-10.5-11, LLMW07-18-19, LLMW09-4.5-5.5, LLMW09-8.3-8.5, LLMW09-10.5-11, LLMW09-18-19, LLMW19-3-4, LLMW19-7.8-8, LLMW19-9-10, LLMW19-25-26
VX00 (VY33 by SW200.8)	LLMW14-5.5-6, LLMW14-7-7.2, LLMW14-13.5-14.5, LLMW14-29-30, LLMW15-2-3, LLMW15-11.5-11.7, LLMW15-14-15, LLMW15-30.5-31.5, LLMW17-5-6, LLMW17-12-12.2, LLMW17-12.5-13, LLMW17-21-22, LLMW18-6-7, LLMW18-8.5-8.7, LLMW18-11-12, LLMW18-21-22
VX01 (VY34 by SW200.8)	**LLMW11-5-6, LLMW11-10.5-10.7, LLMW11-11-11.5, LLMW11-19.5-20.5,** LLMW13-10.5-11.5, LLMW13-18.7-19, LLMW13-23-24, LLMW13-32-33, LLMW16-13-13.5, LLMW16-13.5-13.7, LLMW16-15-16, LLMW16-29.5-30.5
VX78 (VY35 by SW200.8)	LLMW02-6-7, LLMW02-17.4-17.6, LLMW02-20-21, LLMW02-27-28, LLMW21-6-7, LLMW21-7.7-9, LLMW21-12-13, LLMW21-15-16, LLMW21-24-25, LLMW25-3-4, LLMW25-8-8.2, LLMW25-10.5-11, LLMW25-55-56
VX79 (VY36 by SW200.8)	LLMW24-1.3-1.5, LLMW24-6-6.5, LLMW24-30-31, LLMW24-45-46 LLMW34-4.5-5.5, LLMW34-6-6.2, LLMW34-11.5-11.7, LLMW34-70-70.5
VZ01	LLMW29-6-7, LLMW29-12.5-13.5, LLMW29-20-21, LLMW29-30-31, LLMW29-55-56, **LLSB01-6-7, LLSB01-10.8-11, LLSB01-13-14, LLSB01-19-20, LLSB-DUP** LLSB02-3-4, LLSB02-10-10.2, LLSB02-10.6-10.8, LLSB02-12-13, LLSB02-15-16, LLSB03-3-4, LLSB03-11-11.2, LLSB03-13-14, LLSB03-19-20
VZ07	LLMW01-3-4, LLMW01-25-25.2, LLMW03-9-10, **LLMW03-10.5-10.6, LLMW03-13.5-14.5,** LLMW03-28-29, LLMW04-2-3, LLMW04-2-3D, LLMW04-14.3-14.5, LLMW04-18-19, LLMW04-30-31, LLMW06-6.5-7.5, LLMW06-8-8.2, LLMW06-11-12, LLMW06-23-24
VZ08	LLMW01-26-26.5, LLMW01-32.5-33.5, LLMW33-3-4, LLMW33-4.5-4.7, LLMW33-10.5-11.5, LLMW33-39-40 BP05D2-40-41, BP05D2-50-51, BP05D2-62-62.5, BP05D2-65-66, BP05D2-70.5-71
VZ68	LLMW27-3.5-4.5, LLMW27-4.5-5.5, LLMW27-8-9, LLMW27-15.5-16, LLMW27-25-26, LLMW27-30-31, LLMW27-37-37.5, LLMW27-40-41, LLMW27-50-51, LLMW27-60-61
WA93	LLMW31-3-4, LLMW31-9.1-9.3, LLMW31-25-25.5, LLMW31-45-46, LLMW31-55-56

PROJECT: LOWLAND AREA (0504-068-00)

This report documents the results of an Environmental Protection Agency (EPA) level 2b data validation of analytical data from the analyses of soil boring samples and the associated laboratory and field quality control (QC) samples. The review included the following:

- Chain of Custody
- Holding Times and Sample Preservation
- Instrument Calibration
- ICP Interference Check Sample
- Method and Calibration Blanks
- Laboratory Control Samples
- Matrix Spikes
- Laboratory Duplicates
- Field Duplicates
- Internal Standards/Tunes

OBJECTIVE

The objective of the data validation was to review laboratory analytical procedures and quality control (QC) results to evaluate whether:

- The samples were analyzed using well-defined and acceptable methods that provide detection limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

One hundred and fifty-one (151) soil samples were analyzed by one or more of the analytical methods listed in the title of this appendix.

DATA PACKAGE COMPLETENESS

Analytical Resources Incorporated (ARI), located in Tukwila, Washington, analyzed the soil samples evaluated as part of this data quality assessment. The laboratory provided all required deliverables for the assessment according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narrative.

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review* (USEPA, 2010).

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. There were no anomalies noted on the COC forms; proper COC protocols appear to have been followed for this sampling event.

Holding Times and Sample Preservation

The holding time is defined as the time that elapses between sample collection and sample analysis. The maximum holding time criteria of 6 months is prescribed for the two metals analytical methods to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times of 6 months were met for all analyses.

Instrument Calibration

The laboratory followed the method requirements for satisfactory instrument calibration. Instrument calibration is necessary in order to ensure that the instrument is capable of producing acceptable quantitative data for the metals on the target analyte list in the QAPP. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. The Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on any given day that samples are being analyzed.

Each calibration curve was made up of a blank and at least five calibration standards with all measurements being within the working range of the instrument. The calibration curves were fitted using linear regression and each curve had a correlation coefficient of ≥ 0.995.

The ICV/CCV standards were within 90% to 110% of the true value in all cases.

ICP Interference Check Sample

The Interference Check Sample verifies the analytical instrument's ability to overcome isobaric interferences typical of those found in samples. The laboratory analyzed this QC sample at the proper frequency and location of the analytical run. All solution mixtures were within the control limit of 20% of the true value.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is

analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery (%R) is calculated. In the event that a particular element is out of the recovery value control limits in the matrix spiked sample, the laboratory is required to analyze a "post-spiked" sample in order to further isolate any potential quality control issues with the given element.

Matrix spike analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for matrix spikes are 75% to 125% for all of the elements in this report.

The frequency requirements were met for all analyses, with the following exceptions:

All SDGs: In all of the matrix spike samples, the %R value for antimony was less than the control limit of 80%. Appropriately, in each case the laboratory properly conducted a post-spiked sample. These post-spiked samples were spiked with a higher concentration of element solution as the matrix spike, however, they do not interact with acid and are never heated in the digestion process. The %R values for each of the post spike samples were within the 75% to 125% control limits.

In the process of determining the appropriate action for these potential outliers, it was also noted that there were no positive detections for antimony in the associated field samples in this sampling event. The reporting limits for antimony, even though biased low, were consistently three to five times less than the screening level and target reporting limit prescribed in the project QAPP. Based on professional judgment, the antimony reporting limits were not qualified, as there is no effect on the usefulness of the antimony data for this project.

SDG VZ07: The laboratory performed a matrix spike on Sample LLMW03-9-10. The %R value for mercury was greater than the control limit. The positive results for mercury were qualified as estimated (J) in the following samples from this geological boring: LLMW03-10.5-10.6, and LLMW03-13.5-14.5.

SDG VZ68: The laboratory performed a matrix spike on Sample LLMW27-3.5-4.5. The %R value for arsenic was less than the control limit. However, in this case the parent sample concentration was greater than four times the amount spiked into the matrix spike. For this reason, no qualification was necessary.

Laboratory Control Samples (LCS)

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every 20 field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the relative percent difference values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between

the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met in all cases, with the following exceptions:

SDG VX01: The laboratory performed an internal duplicate on Sample LLMW11-5-6. The absolute difference value for antimony was greater than the control limit. There were no positive results for antimony in any of the field samples from the LLMW11 boring. The antimony reporting limits were qualified as estimated (UJ) in all samples from this geological boring: LLMW11-5-6, LLMW11-10.5-10.7, LLMW11-11-11.5, and LLMW11-19.5-20.5.

SDG VZ01: The laboratory performed an internal duplicate on Sample LLSB01-13-14. The absolute difference value for lead was greater than the control limit. The positive results for lead were qualified as estimated (J) in all samples from this geological boring: LLSB01-6-7, LLSB01-10.8-11, LLSB01-13-14, LLSB01-19-20, and LLSB-DUP.

Field Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD.

The RPD control limits for soil samples is 50%, while the RPD control limits for water samples is 35%. The absolute difference control limits for soil samples is twice the PQL value, while the absolute difference control limits for water samples is the same as the PQL value.

SDG VW17: One set of field duplicates, Samples LLMW05-12-13 & LLMW05-12-13D, was submitted to the laboratory. The precision criteria were met for all target analytes.

SDG VX00: One set of field duplicates, Samples LLMW15-2-3 & LLMW15-2-3 DUP, was submitted to the laboratory. The precision criteria were met for all target analytes.

SDG VZ01: One set of field duplicates, Samples LLSB01-19-20 & LLSB-DUP, was submitted to the laboratory. The precision criteria were met for all target analytes.

SDG VZ07: One set of field duplicates, Samples LLMW04-2-3 & LLMW04-2-3DUP, was submitted to the laboratory. The precision criteria were met for all target analytes.

Reporting Limits and Miscellaneous

SDG VW17, VV08, VW18, VX00, VX01, VX78, VX79: The reporting limits of arsenic and thallium in certain samples exceeded the screening levels and/or target reporting limits prescribed in the QAPP when originally analyzed by method SW6010C. The samples in these SDGs were all re-analyzed by method SW200.8 in order to achieve the target reporting limits.

Internal Standards/Tunes

The laboratory appropriately added an internal standard into each sample, with the exception of the instrument tune. The intensity of the internal standard response in each sample was monitored and

compared to the intensity of the response for that internal standard in the calibration blank. The percent relative intensity (%RI) in the samples were within 60-125% of the response in the calibration blank for the appropriate analytical run.

OVERALL ASSESSMENT

As was determined by this data quality assessement, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS %R values, with the exceptions mentioned above. Precision was acceptable, as demonstrated by the laboratory duplicate and field duplicate RPD values, with the exceptions noted above.

Data were qualified as estimated because of laboratory duplicate precision outliers.

The data are acceptable for use.

APPENDIX D
Laboratory Deliverables (on attached CD)

APPENDIX E
Results of Grain Size Analyses

GeoEngineers
0504-068-00
Lowland

Percent Finer (Passing) Than the Indicated Size

Sieve Size (microns)	3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4 (4750)	#10 (2000)	#20 (850)	#40 (425)	#60 (250)	#100 (150)	#200 (75)	32	22	13	9	7	3.2	1 3
LLMW06-23-24	100 0	100.0	100 0	100.0	100.0	100.0	100 0	99 9	99.8	97 3	81 1	57.6	31 4	14 8	9 0	6.0	5 0	4 5	4 0	2 5	1.5
	100 0	100 0	100 0	100.0	100.0	100.0	100.0	100 0	99.6	97 1	80 4	56.9	31 6	14 9	9 0	6.0	5 0	4 5	4 0	2 5	1.5
	100 0	100 0	100 0	100.0	100 0	100 0	100 0	99 6	99.2	96 4	79 2	55.3	29 5	13.5	9 0	6 0	5 0	4.5	4.0	2.5	1 5
LLMW03-5-5 2	100 0	100.0	100 0	100 0	100.0	99.1	99 0	98.3	97 1	94 8	91 3	84.7	73 9	60 7	42.8	32.5	24 0	20 1	14.9	9.1	5 2
LLMW03-28-29	100 0	100 0	100.0	100 0	100 0	100 0	100.0	99 2	92 8	76.5	48.1	29 9	16 6	7 3	5 7	4.1	3.1	2.6	1 6	0.5	0 5
LLMW06-6.5-7.5	100.0	100.0	100 0	100 0	100 0	97.7	93 0	83.0	67.9	38.7	9 1	2 8	1 9	1 5	1 4	1 0	0 7	0.3	0.3	0.0	0 0
LLMW07-18-19	100.0	100.0	100 0	100 0	100.0	100.0	100.0	99.9	98.5	74.8	14 2	6 4	3 4	2.0	1 5	1 5	1 0	0.5	0 0	0.0	0 0
LLMW08-20-21	100 0	100 0	100 0	100 0	100 0	100 0	100.0	98 2	96.2	75.3	23 5	14 7	11 6	7.4	5 3	3 9	2.9	2.4	1 9	0.5	0 5
LLMW11-3 5-4 5	100 0	100.0	100 0	100 0	100 0	100 0	100 0	99 3	98 1	93.0	65 0	26.2	12 0	6 8	5 9	5 0	4 0	3 5	2.5	1 5	0 5
LLMW11-19 5-20 5	100 0	100 0	100 0	100 0	100.0	100 0	99.4	94.9	85 9	73.8	48 0	16 1	9.0	5 4	5 2	3 9	2 6	2 2	1.3	0 4	0.0
LLMW12-5-5 5	100 0	100.0	100 0	100.0	100.0	100 0	98 9	97.1	92.5	68.9	29 4	8 1	3.8	2 6	2 3	1 8	1.4	1 4	0 9	0.5	0.5
LLMW12-21-22	100 0	100 0	100.0	100.0	100 0	100 0	100.0	99 0	89 9	51.4	18 0	12.0	8 6	6 0	4 5	3 6	2.7	2.3	2.3	0 9	0.5
LLMW13-10.5-11 5	100.0	100 0	100 0	100.0	100 0	90.2	85 2	78 5	69 7	54.8	31 5	18 0	13 2	9.8	9.6	7 5	5.9	4 8	3 7	1 6	0.5
LLMW13-32-33	100.0	100 0	100.0	100.0	100.0	100 0	98 5	94 5	84 8	52 4	15 8	7.5	4.5	2 8	2 6	2 1	1.3	0.9	0 4	0 0	0 0
LLMW18-6-7	100.0	100 0	100.0	100.0	100 0	98.2	98 2	97.0	91 4	72.9	34 7	10 8	5.4	3 0	2 8	2 3	1.4	1 4	0 9	0 5	0 5
LLMW18-21-22	100.0	100.0	100.0	100.0	100.0	100 0	100 0	99.2	98.6	87 9	57 0	17 2	8.8	6.0	5 0	4 5	3.0	2 5	1 5	0.5	0.0

Testing performed according to ASTM D421/D422

VZ67

GeoEngineers
0504-068-00
Lowland

Percent Retained in Each Size Fraction

Description	% Coarse Gravel				% Gravel			% Coarse Sand	% Medium Sand		% Fine Sand			% Very Coarse Silt	% Coarse Silt	% Medium Silt	% Fine Silt	% Fine Silt	% Very Fine Silt	% Clay	
Particle Size (microns)	3-2"	2-1 1/2"	1 1/2"-1"	1-3/4"	3/4-1/2"	1/2-3/8"	3/8"-4750	4750-2000	2000-850	850-425	425-250	250-150	150-75	75-32	32-22	22-13	13-9	9-7	7-3 2	3 2-1.3	<1 3
LLMW06-23-24	0 0	0 0	0 0	0 0	0.0	0.0	0 1	0 1	2 4	16.3	23 5	26.2	16 6	5 8	3 0	1 0	0 5	0 5	1 5	1.0	1 5
	0 0	0 0	0.0	0 0	0 0	0 0	0 0	0 4	2 5	16 7	23 4	25.4	16.6	5.9	3 0	1 0	0.5	0.5	1 5	1 0	1.5
	0 0	0 0	0 0	0 0	0.0	0 0	0 4	0 5	2 8	17 2	23 9	25.8	15 9	4 6	3.0	1.0	0.5	0.5	1 5	1.0	1 5
LLMW03-5-5 2	0.0	0 0	0 0	0 0	0 9	0.1	0 7	1 2	2.2	3 5	6 7	10.8	13 1	17.9	10 4	8 4	3.9	5 2	5 8	3 9	5 2
LLMW03-28-29	0 0	0.0	0 0	0 0	0.0	0 0	0 8	6.4	16.3	28.4	18 2	13.3	9 3	1 6	1 6	1.0	0.5	1 0	1 0	0 0	0 5
LLMW06-6 5-7 5	0 0	0.0	0 0	0 0	2.3	4.7	10 0	15 1	29.2	29.6	6 2	0.9	0 4	0 1	0 3	0 3	0 3	0.0	0 3	0 0	0 0
LLMW07-18-19	0.0	0 0	0 0	0 0	0.0	0.0	0 1	1.4	23.7	60.7	7 8	3.0	1 4	0.5	0 0	0.5	0.5	0 5	0.0	0.0	0 0
LLMW08-20-21	0 0	0 0	0 0	0 0	0.0	0 0	1 8	2.0	20.9	51.8	8.9	3.0	4 2	2.1	1.5	1 0	0.5	0 5	1 5	0 0	0 5
LLMW11-3.5-4.5	0.0	0.0	0.0	0 0	0 0	0.0	0 7	1 3	5.0	28 0	38 8	14 2	5 2	0.9	1.0	1.0	0.5	1 0	1.0	1 0	0 5
LLMW11-19 5-20 5	0 0	0.0	0 0	0 0	0 0	0 6	4 6	9.0	12 1	25.8	31 9	7 1	3.6	0.2	1 3	1 3	0.4	0 9	0 9	0.4	0 0
LLMW12-5-5 5	0.0	0 0	0 0	0 0	0 0	1 1	1.9	4.6	23 6	39.5	21 3	4.3	1 3	0 3	0 5	0.5	0 0	0 5	0 5	0 0	0.5
LLMW12-21-22	0.0	0.0	0 0	0 0	0 0	0 0	1.0	9 0	38 5	33.5	6 0	3.4	2 6	1.4	0.9	0.9	0.5	0.0	1 4	0 5	0.5
LLMW13-10.5-11.5	0 0	0.0	0 0	0.0	9.8	5 0	6 8	8 7	14 9	23 4	13.5	4 7	3 4	0 2	2.1	1.6	1 1	1 1	2 1	1 1	0.5
LLMW13-32-33	0 0	0.0	0.0	0 0	0 0	1.5	3 9	9 7	32.4	36 6	8 3	3 0	1.7	0 3	0 4	0 9	0 4	0 4	0 4	0 0	0.0
LLMW18-6-7	0 0	0.0	0 0	0 0	1.8	0.0	1 2	5.6	18 5	38 2	23 9	5 3	2.4	0.2	0 5	0.9	0 0	0 5	0 5	0 0	0 5
LLMW18-21-22	0.0	0.0	0.0	0 0	0 0	0.0	0 8	0 6	10 8	30 9	39 8	8 4	2 8	1 0	0 5	1 5	0 5	1 0	1 0	0.5	0 0

VZ67

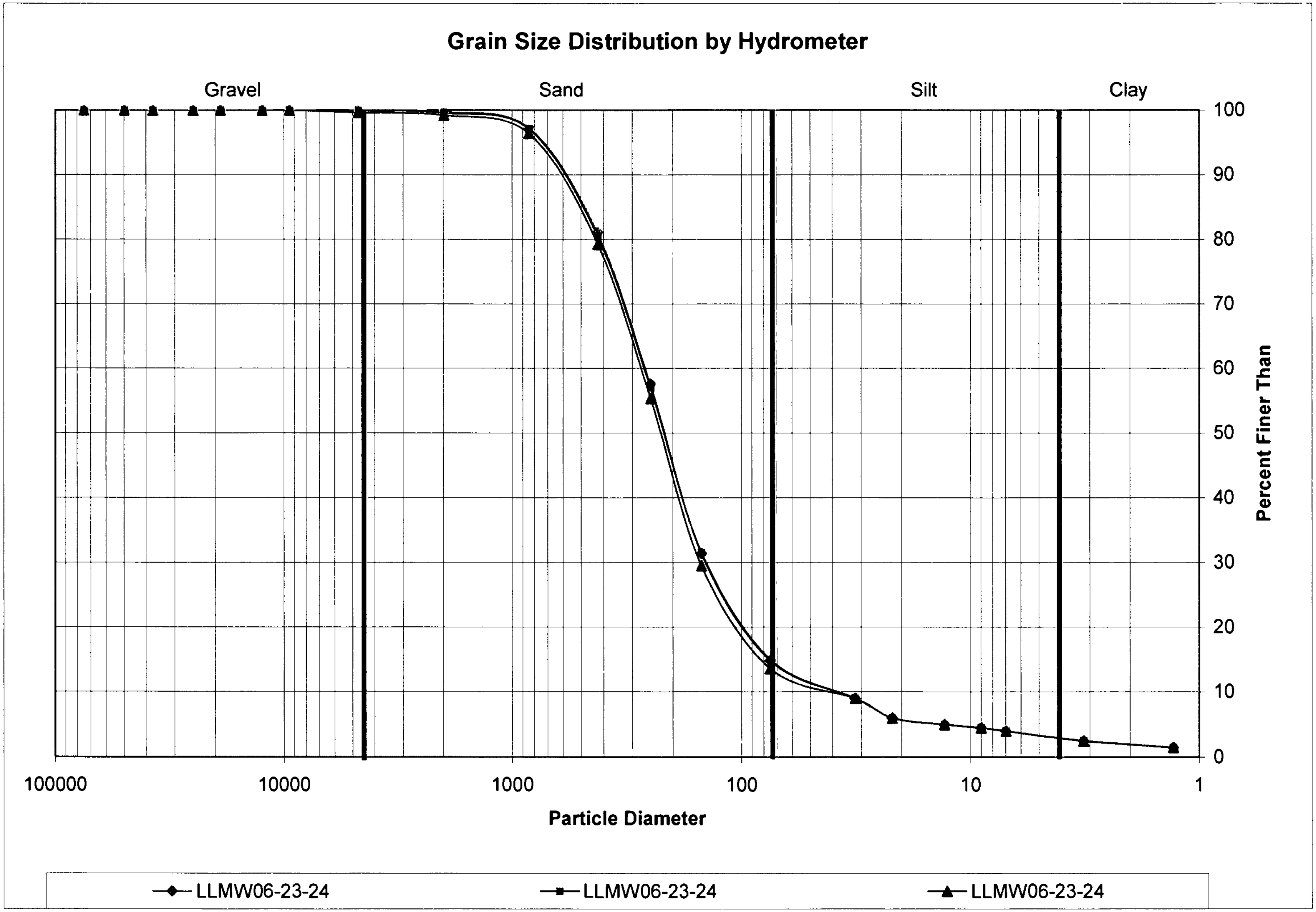
Client	GeoEngineers	Project No	0504-068-00
		Project	Lowland
ARI Triplicate Sample ID	VZ67F	Batch No	VZ67-01
Client Triplicate Sample ID	LLMW06-23-24	Page	1 of 1

Relative Standard Deviation, By Size

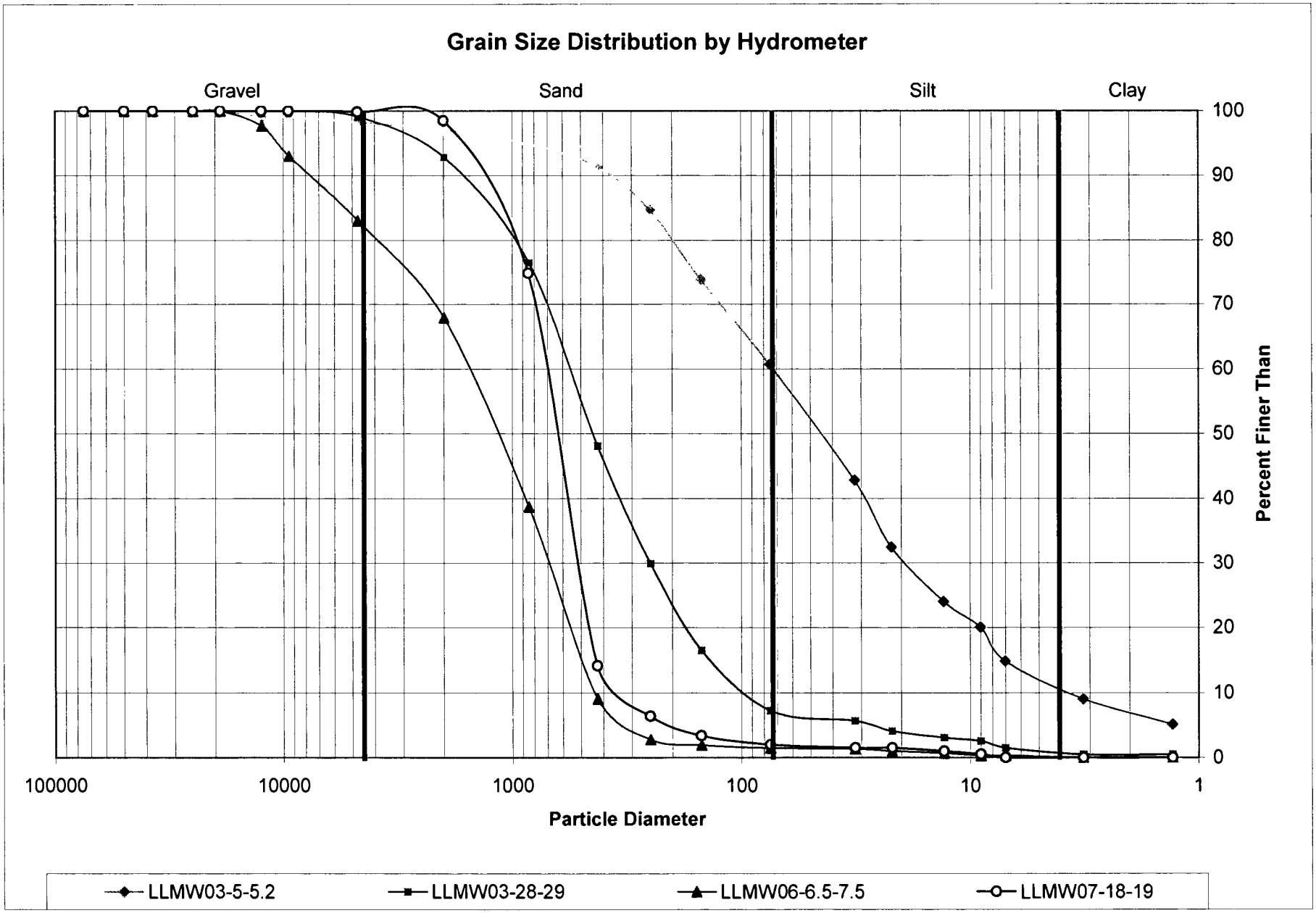
Sample ID	75000	50000	37500	25000	19000	12500	9500	4750	2000	850	425	250	150	75	32	22	13	9	7	3 2	1 3
LLMW06-23-24	100 0	100 0	100 0	100 0	100 0	100 0	100 0	99 9	99 8	97 3	81 1	57 6	31 4	14 8	9 0	6 0	5 0	4 5	4 0	2 5	1 5
LLMW06-23-24	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	99 6	97 1	80 4	56 9	31 6	14 9	9 0	6 0	5 0	4 5	4 0	2 5	1 5
LLMW06-23-24	100 0	100 0	100 0	100 0	100 0	100 0	100 0	99 6	99 2	96 4	79 2	55 3	29 5	13 5	9 0	6 0	5 0	4 5	4 0	2 5	1 5
AVE	100 00	100 00	100 00	100 00	100 00	100 00	100 00	99 85	99 52	96 94	80 23	56 60	30 81	14 43	9 01	6 00	5 00	4 50	4 00	2 50	1 50
STDEV	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 19	0 30	0 50	0 93	1 17	1 15	0 77	0 03	0 02	0 02	0 01	0 01	0 01	0 00
%RSD	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 19	0 30	0 51	1 16	2 07	3 74	5 32	0 32	0 32	0 32	0 32	0 32	0 32	0 32

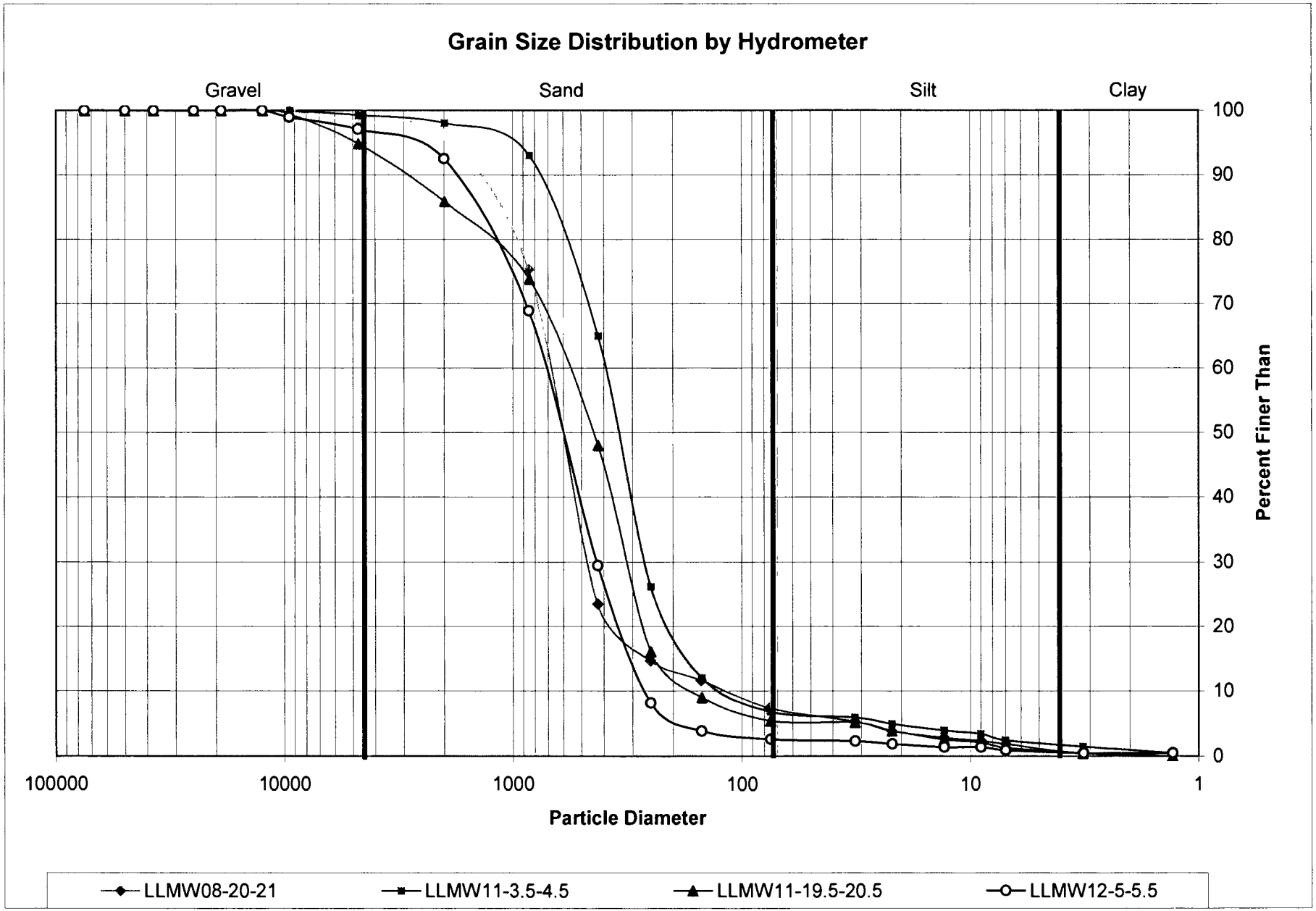
This Triplicate applies to the Batch Containing the Following Samples

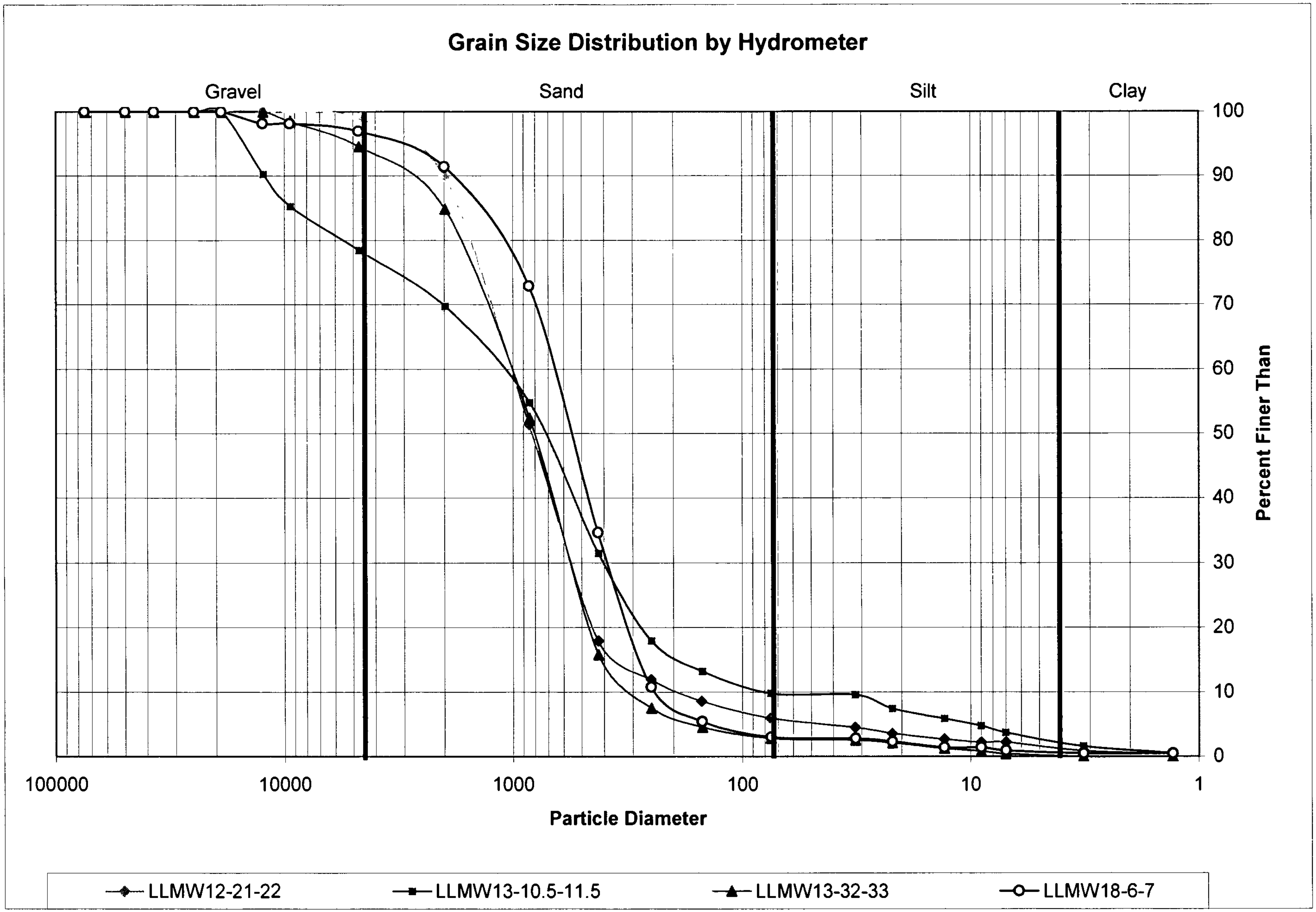
Sample ID	Date Sampled	Date Set up	Date Started	Date Complete	Data Qualifiers
LLMW06-23-24	12/27/2012	1/15/2013	1/21/2013	1/23/2013	
	12/27/2012	1/15/2013	1/21/2013	1/23/2013	
	12/27/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW03-5-5 2	12/26/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW03-28-29	12/26/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW06-6 5-7 5	12/27/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW07-18-19	12/7/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW08-20-21	12/10/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW11-3 5-4 5	12/13/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW11-19 5-20 5	12/13/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW12-5-5 5	12/12/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW12-21-22	12/12/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW13-10 5-11 5	12/17/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW13-32-33	12/17/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW18-6-7	12/13/2012	1/15/2013	1/21/2013	1/23/2013	
LLMW18-21-22	12/13/2012	1/15/2013	1/21/2013	1/23/2013	

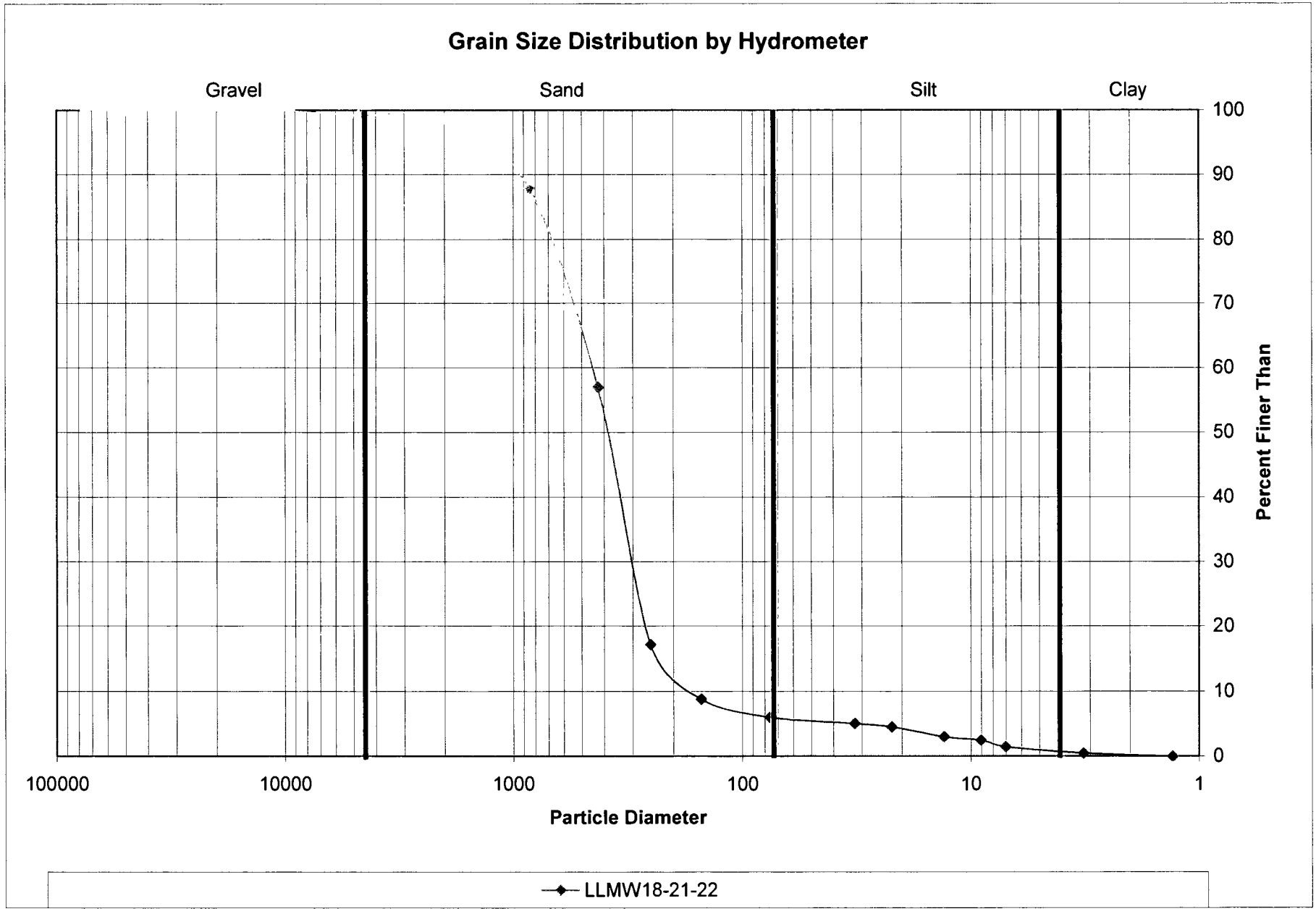


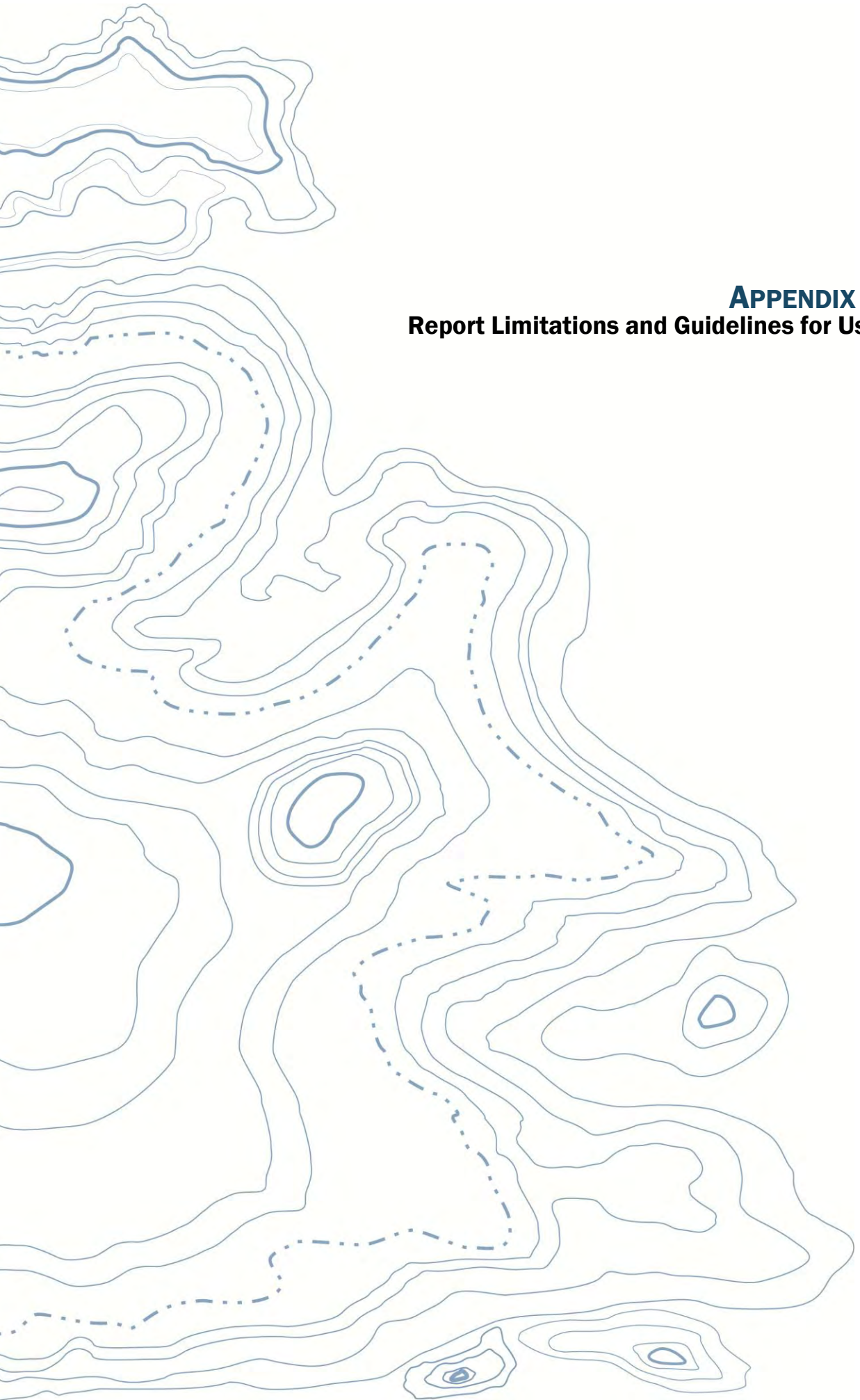
Grain Size Distribution by Hydrometer
Gravel
Sand
Silt
Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer Than
100000
10000
1000
100
10
1
Particle Diameter
LLMW06-23-24
LLMW06-23-24
LLMW06-23-24


Grain Size Distribution by Hydrometer
Gravel
Sand
Silt
Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer Than
100000
10000
1000
100
10
1
Particle Diameter
LLMW03-5-5.2
LLMW03-28-29
LLMW06-6.5-7.5
LLMW07-18-19


Grain Size Distribution by Hydrometer
Gravel
Sand
Silt
Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer Than
100000
10000
1000
100
10
1
Particle Diameter
LLMW08-20-21
LLMW11-3.5-4.5
LLMW11-19.5-20.5
LLMW12-5-5.5


Grain Size Distribution by Hydrometer
Gravel
Sand
Silt
Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer Than
100000
10000
1000
100
10
1
Particle Diameter
LLMW12-21-22
LLMW13-10.5-11.5
LLMW13-32-33
LLMW18-6-7


Grain Size Distribution by Hydrometer
Gravel
Sand
Silt
Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer Than
100000
10000
1000
100
10
1
Particle Diameter
LLMW18-21-22



APPENDIX F
Report Limitations and Guidelines for Use

APPENDIX F
REPORT LIMITATIONS AND GUIDELINES FOR USE[2]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this investigation of the Everett Smelter – Lowland Area in general accordance with the scope and limitations of our proposal, dated July 3, 2012. This report has been prepared for the exclusive use of Washington State Department of Ecology, and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. No one except Washington State Department of Ecology should rely on this environmental report without first conferring with GeoEngineers. Use of this report is not recommended for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Everett Smelter – Lowland Area. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made to the project or property after the date of this report, we recommend that GeoEngineers be given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

2 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Reliance Conditions for Third Parties

Our report was prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations are Always Evolving

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Most Environmental Findings are Professional Opinions

Our interpretations of site conditions are based on field observations and analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. Without this understanding, there may be expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you need to know more about how these “Report Limitations and Guidelines for Use” apply to your project or property.