

PRELIMINARY INFILTRATION EVALUATION  
ARLINGTON APARTMENTS  
21117 59<sup>th</sup> Avenue Northeast  
Arlington, Washington

PROJECT NO. 24-207

October 2024

Prepared for:  
Quarterra



*Geotechnical & Earthquake  
Engineering Consultants*

October 21, 2024  
PanGEO Project No. 24-204.200

Mr. Peter van Overstreet  
**Quarterra**  
1325 Fourth Avenue, Suite 1300  
Seattle, Washington 98104

Subject: **Preliminary Infiltration Evaluation  
Proposed Arlington Apartments  
21117 59th Avenue Northeast, Arlington, Washington**

Dear Peter:

As requested, PanGEO, Inc. is pleased to present this report to assist the project team with the planning and design of the stormwater infiltration system for the Arlington Apartments at 21117 59<sup>th</sup> Avenue Northeast in Arlington, Washington. We previously prepared a geotechnical engineering study for this project dated June 25, 2024.

In preparing this report we conducted two infiltration tests each in the northeast and southwest basin infiltration system locations. Based on our evaluation, in our opinion, the site soils are suitable for infiltration with design infiltration rates of three inches per hour.

The northwest infiltration system was added after the testing program for the northeast and southwest infiltration systems was completed. The system was sized based on preliminary infiltration test results from our June 2024 geotechnical report. Additional testing will need to be performed at the northwest basin infiltration system location.

The wet season high groundwater level has not yet been determined. We are currently monitoring two standpipe piezometers installed at the site for groundwater levels over the 2024/2025 winter. We will address the wet season groundwater levels in an addendum report.

Infiltration Assessment

Proposed Arlington Apartments: 21117 59<sup>th</sup> Avenue Northeast, Arlington, Washington

October 21, 2024

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Should you have any questions, please do not hesitate to call.

Sincerely,

A handwritten signature in blue ink, appearing to read "SD Dinkelman", with a long horizontal flourish extending to the right.

Scott D. Dinkelman, LEG, LHG  
Principal Hydrogeologist

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**ATTACHMENTS:**

Figure 1                                      Vicinity Map  
Figure 2                                      Site and Exploration Plan

**Appendix A   Exploration Logs**

Figure A-1                                      Terms and Symbols for Boring and Test Pit Logs  
Figure A-2                                      Log of Test Pit TP-101  
Figure A-3                                      Log of Test Pit TP-102  
Figure A-4                                      Log of Test Pit PIT-101  
Figure A-5                                      Log of Test Pit PIT-102  
Figure A-6                                      Log of Test Pit PIT-103  
Figure A-7                                      Log of Test Pit PIT-104

**Appendix B   Summary Boring Logs**

Figure B-1                                      Log of Test Boring PG-1  
Figure B-2                                      Log of Test Boring PG-2  
Figure B-3                                      Log of Test Boring PG-3  
Figure B-4                                      Log of Test Boring PG-4

**Appendix C   Laboratory Test Results**

Figure C-1                                      Grain Size Distribution Test Results

**Appendix D   Analytical Laboratory Test Results**

**PRELIMINARY INFILTRATION EVALUATION**  
**PROPOSED ARLINGTON APARTMENTS**  
**21117 59<sup>TH</sup> AVENUE NORTHEAST**  
**ARLINGTON, WASHINGTON**

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**1.0 GENERAL**

As requested, PanGEO, Inc. is pleased to present this report summarizing our infiltration evaluation for the proposed Arlington Apartments located at 21117 59<sup>th</sup> Avenue Northeast in Arlington, Washington. This study was performed in general accordance with our mutually agreed scope of services outlined in our agreement dated October 3, 2024. Our scope of services included reviewing readily available geologic and geotechnical data, conducting four field infiltration tests and grain size tests, conducting a groundwater mounding analysis, and providing the infiltration recommendations presented in this report.

**2.0 SITE AND PROJECT DESCRIPTION**

The subject site is located at 21117 59<sup>th</sup> Avenue Northeast in the southeast corner of the intersection of the State Route 530 Northeast and 59<sup>th</sup> Avenue Northeast, in Arlington, Washington. The approximate location of the site is shown in Figure 1, Vicinity Map.

The rectangular shaped site comprises about 8.8 acres and is bordered to the north by State Route 530, to the west by 59<sup>th</sup> Avenue Northeast, to the south by vacant land and to the east by residences. The site is currently vacant of structures and the surface grade is relatively flat with less than about five feet of elevation change across the site.

We understand it is planned to develop the site with nine garden style apartment buildings and three retail buildings. The proposed development will also include a clubhouse building, surface parking and driveway areas, landscaping, stormwater, and utility improvements. It is planned to raise site grades by two to five feet in order to achieve construction subgrade elevations. The proposed layout is shown in the attached Figure 2, Site and Exploration Plan.

Surface water from the planned improvements will be collected and disposed of by infiltration into the site soils. Three infiltration basins have been established and are identified as the Southwest Basin, Northeast Basin, and Northwest Basin. The locations of the basins and proposed infiltration systems are shown in Figure 2.

The conclusions and recommendations in this report are based on our understanding of the proposed development, which is in turn based on the project information provided. If the above project description is incorrect, or the project information changes, we should be consulted to review the recommendations contained in this study and make modifications, if needed. In any case PanGEO should be retained to provide a review of the final design to confirm that our geotechnical recommendations have been correctly interpreted and adequately implemented in the construction documents.

### **3.0 SUBSURFACE EXPLORATION**

On October 2, 2024, we excavated two test pits and conducted four infiltration tests at the site. The test pits were excavated using a Yanmar ViC55 excavator under subcontract to PanGEO and were observed and logged by a geologist with PanGEO. The test pits are numbered TP-101 and TP-102 while the infiltration tests are numbered PIT-101 through PIT-104.

The approximate locations of our explorations were identified in the field relative to property corners and site features and are shown on Figure 2, Site and Exploration Plan.

The soils were logged in general accordance with the system summarized on Figure A-1, Terms and Symbols for Boring and Test Pit Logs.

In June 2024, we drilled four borings at the site extending to a depth of 41½ feet below grade. Logs of our test pits and borings are included in Appendix A and B, respectively.

### **4.0 LABORATORY TESTING**

#### **4.1 GRAIN SIZE ANALYSES**

Laboratory tests were conducted on representative soil samples to verify or modify the field soil classification and to evaluate the general physical properties and engineering characteristics of the soil encountered. Visual field classifications were supplemented by grain size analyses on representative soil samples. We submitted a total of four samples for particle size distribution testing in accordance with ASTM D-422 *Standard Test Method for Particle-Size Analysis of Soils*. The results of the grain size determinations for the samples were used in classification of the soils and are presented in Appendix C.

It is important to note that these test results may not accurately represent the overall in-situ

soil conditions. Our geotechnical recommendations are based on our interpretation of these test results and their use in guiding our engineering judgment.

#### 4.2 PERCENT ORGANICS

Laboratory tests were conducted on four representative soil samples evaluate the percentage of organics. The percentage of organics was determined in general accordance with ASTM D 2974 *Standard Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils*. The test results are summarized in Table 1, below.

**TABLE 1: Organic Matter of Organic Soils Test Results**

Location	Soil Sample Depth [feet below grade]	Organic Content [%]
PIT-101	4	4.74
PIT-102	4	2.92
PIT-103	4	3.68
PIT-104	4	3.74

#### 4.3 CATION EXCHANGE CAPACITY

The cation exchange capacity (CEC) of the soil refers to the capability of the soil to adsorb and exchange cations and anions. CEC testing was performed on soil samples collected in each of the PIT locations at four feet below grade. Table 2 provides a summary of the CEC test results.

**TABLE 2: Cation Exchange Capacity Test Results**

Location	Soil Sample Depth [feet]	CEC [meq/100g]
PIT-101	4	Not Detected
PIT-102	4	Not Detected
PIT-103	4	Not Detected
PIT-104	4	Not Detected

## 5.0 SUBSURFACE CONDITIONS

### 5.1 SITE GEOLOGY

Based on review of the *Distribution and Description of the Geologic Units in the Arlington West Quadrangle, Washington* (Minard, 1980), the geologic units in the vicinity of the site consist of Quaternary younger alluvium (Geologic Map Unit Qyal) and the Quaternary Marysville sand member (Qvrm). Quaternary younger alluvium is comprised of fine to coarse grained sand with silt and clay deposited in stream channels and as overbank flood deposits adjacent to stream channels.

The Marysville sand member consists of well-drained, stratified to massive outwash sand, some fine gravel, and silt and clay. This unit typically underlies the Quaternary younger alluvium.

### 5.2 SOIL CONDITIONS

For a detailed description of the subsurface conditions encountered at the infiltration system locations, please refer to our test pit logs provided in Appendix A, and logs of our previous test borings in Appendix B. The stratigraphic contacts indicated in test pit and boring logs represent the approximate depth to boundaries between soil units. Actual transitions between soil units may be more gradual or occur at different elevations. The descriptions of groundwater conditions and depths are likewise approximate.

The following is a generalized description of the soils encountered at the infiltration system locations.

***Topsoil:*** At all of our boring locations, we encountered a surficial layer of topsoil and roots. The topsoil layer consisted of dark silty sand with organics. This layer was typically 6 to 12 inches thick at our test boring locations.

***Quaternary Younger Alluvium (Qyal):*** Below the topsoil, we encountered very loose to medium dense silty fine to coarse sand with gravel, sandy silt, and poorly graded sand with silt containing scattered organics. We classified this material as Quaternary younger alluvium which is mapped as underlying this area. This unit extended to about 15 to 26 feet below existing grade.

Our infiltration tests were performed in the Quaternary younger alluvium deposit.

***Marysville Sand Member (Qvrm):*** Underlying the younger alluvium, we borings encountered poorly graded very fine to coarse grained sand with thin lenses of silty sand. This unit varied from medium dense to dense. We classified this material as Marysville sand member recessional outwash which is mapped as underlying this area. Borings PG-1, PG-2, and PG-3 were terminated in recessional outwash at 41½ feet below grade.

**Vashon Till (Qvt):** At the location of Boring PG-4, we encountered dense to very dense silty sand with gravel at about 35½ feet below grade. We classified this material as Vashon till, which stratigraphically underlies the Marysville sand member.

Our subsurface descriptions are based on the conditions encountered at the time of our exploration. Soil conditions between our exploration locations may vary from those encountered. The nature and extent of variations between our exploratory locations may not become evident until construction. If variations do appear, PanGEO should be requested to reevaluate the recommendations in this report and to modify or verify them in writing prior to proceeding with earthwork and construction.

### **5.3 GROUNDWATER**

Groundwater seepage was encountered in Test Pits TP-101 and TP-102 at six to seven feet below grade.

Based on groundwater monitoring being conducted in PG-1 and PG-2 for the proposed development, groundwater levels generally range from about elevation 56.4 to 60.2 feet based on NAVD 88.

The designers should be aware that groundwater levels will fluctuate depending on seasonal fluctuations in precipitation. Groundwater levels are typically higher during the wet season (October through May). We are currently conducting groundwater level monitoring to determine the wet season high groundwater elevation.

## **6.0 INFILTRATION TESTING**

Our infiltration testing was conducted in general accordance with the City of Arlington Public Works Standards and Specifications (Arlington, 2008) and the Washington Department of Ecology Stormwater Management Manual for Western Washington (WDOE Manual) (WDOE, 2019). We used the Small Pilot Infiltration Tests (PIT) method outlined in the WDOE Manual, Volume III, Section 3.3.6.

## **6.1 SMALL PILOT INFILTRATION TESTING**

The field infiltration tests were conducted in general accordance with the procedure for the small PIT as outlined in the WDOE Manual. Plate 1 on the next page shows a test underway at the location of Test Pit TP-6. In general, the test consisted of the following procedure:

- A test pit was excavated with a minimum bottom area of 12 square feet.
- The test pit was pre-soaked using potable water from a municipal water source for six hours by maintaining a water level of at least 12 inches above the bottom of the pit. A flow meter was used to monitor the amount of water used during the pre-soak.
- At the end of pre-soak period, a flow meter was used to monitor the amount of water needed to maintain a constant head of 12 inches for at least one hour and until at least a point at which a constant volume of water per time unit was achieved.
- At the end of the constant head test, we measured the falling head infiltration rate by shutting off the water flow and recording the decrease in water level over regular time intervals until the water was infiltrated.



*Plate 1: View of infiltration testing in progress at Test Pit PIT-101.*

The field infiltration rates were calculated based on the measured flow per time unit, and the surface area of the bottom of the test pit. The results of our tests are summarized in Table 3 below.

**TABLE 3: Summary of Small Pilot Infiltration Testing**

Test	Infiltration System	Test Depth	Infiltration Rate $K_{SAT}$ (inches/hour)
PIT-101	SW Basin	4	8½
PIT-102	SW Basin	4	1/10
PIT-103	NE Basin	4	22½
PIT-104	NE Basin	4	8

## **6.2 CORRECTION FACTORS FOR DESIGN INFILTRATION RATE**

The small pilot infiltration test provides an uncorrected, saturated hydraulic conductivity ( $K_{sat}$ ) of the soil. To provide a long-term design infiltration rate, the  $K_{sat}$  value is factored by applying a series of correction factors (CF) outlined in Table 3.3.1 of the WDOE Manual. As discussed below, the correction factors account for the test method ( $CF_t$ ), influent control ( $CF_m$ ) and site variability ( $CF_v$ ). The value of each of these correction factors are discussed in Sections 6.2.1, 6.2.2 and 6.2.3, below.

### ***6.2.1 Test Method***

The correction factor for the test method ( $CF_t$ ) is used to account for differences between the test method and in-situ infiltration testing. WDOE Manual specifies a  $CF_t$  value of 0.5 based on the use of the small PIT method. This value was incorporated in our calculation.

### ***6.2.2 Influent Control***

The influent control correction factor ( $CF_m$ ) is intended to account for a reduction in infiltration capacity due to clogging from siltation and the build-up of biological material. An influent control factor of 0.9 was used in our calculation, assuming that when the infiltration systems lose 10 percent of their infiltration capacity due to clogging, the system will be maintained or cleaned.

### ***6.2.3 Site Variability***

The correction factor for site variability ( $CF_v$ ) is intended to correct for the number of locations sampled and the consistency of the underlying soil conditions. The value for  $CF_v$  ranges from 0.33 to 1.0. Based on the number of exploration locations, relatively uniform soil conditions encountered at our exploration locations and our experience and engineering judgment, we assigned a correction factor of 0.9 for site variability.

### ***6.2.4 Correction Factor***

The total correction factor ( $CF = CF_v \times CF_t \times CF_m = 0.40$ ) is then applied to the infiltration rate summarized in Table 2 to obtain a corrected infiltration rate appropriate for long term design purposes. Recommended design infiltration rates are included in Section 7.1 of this report.

### **6.3 INFILTRATION RECOMMENDATIONS**

Based on the results of our subsurface exploration, field infiltration testing and laboratory testing, infiltration of stormwater should be feasible. The field measured infiltration rates were variable, which is expected in the shallow alluvial soils underlying the site.

Based on our testing and after applying the total correction factor of 0.40 to the field measured  $K_{SAT}$  values provide in Table 2, the following corrected long-term infiltration rates should be used for the infiltration system design:

- NE Basin: 3 inches per hour
- SW Basin: 3 inches per hour

We encountered a layer of silty sand and sandy silt at the test elevation at PIT-102 which resulted in a reduced infiltration rate of  $1/10^{\text{th}}$  of an inch per hour. If lenses of silty sand or sandy silt are encountered in the base of the infiltration system elevation, we recommend they be overexcavated and replaced with a permeable soil such as pea gravel or washed

A representative from PanGEO should observe the infiltration system subgrade soils after excavation to verify the soils encountered are as anticipated.

Pilot infiltration tests were not performed in the NW Basin. An infiltration rate of 6 inches per hour was assumed based on the preliminary infiltration rates developed using the grain size analysis method presented in our June 2024 geotechnical report. Additional PIT testing will need to be performed for the NW Basin.

### **7.0 PRELIMINARY GROUNDWATER MOUNDING ANALYSIS**

As part of our infiltration evaluation, we conducted a preliminary groundwater mounding analysis. This analysis is considered preliminary, as the wet season high groundwater elevation has not been determined. We are currently monitoring groundwater levels over the 2024/2025 wet season and will need to modify our mounding analysis when the wet season high groundwater elevation is determined.

The MODRET computer program was used for our groundwater mounding analysis. MODRET is a commercially available software that uses the Greene and Ampt equation to simulate unsaturated flow conditions, and a modified version of the United States Geological Survey MODFLOW computer model to simulate saturated flow conditions. The data input included the infiltration system design information, subsurface soil and

groundwater conditions, and horizontal and vertical hydraulic conductivities based on infiltration testing and soil type.

A summary of the MODRET input parameters used in our analysis are summarized in Table 4, below.

**TABLE 4 – MODRET Input Parameters**

<b>Input Parameter</b>	<b>Value</b>	<b>Input Rationale</b>
Unsaturated Analysis: Yes/No	No	Assumes the ground is saturated at the time of analysis
Elevation of Effective Aquifer Base	Elevation 25½ feet (NAVD88)	The aquifer base is the top of the first restrictive layer. We encountered till in Boring PG-4 at 35½ or elevation 25 feet below grade. We set an effective aquifer base at 25½ feet.
Elevation of Seasonal High Groundwater Table	NE Basin – 56 feet SW Basin – 58 feet NW Basin – 56.4 feet	A preliminary estimate of the groundwater elevation was made based on review of groundwater measurements obtained in Borings PG-1 and PG-2.  Additional groundwater monitoring will need to be conducted over the 2024/2025 winter to establish the wet season high groundwater.
Average Effective Storage Coefficient of Soil for Unsaturated Analysis	0.1	PanGEO, Inc., selected as consistent with the soil types encountered.
Unsaturated Vertical Hydraulic Conductivity	NE Basin: 6 feet/day SW Basin: 6 feet/day NW Basin 12 feet/day	Based on infiltration testing conducted in October 2024. These values are the design infiltration rate, which includes reduction factors for test method, plugging, and site variability.
Factor of Safety applied to Unsaturated Vertical Hydraulic Conductivity	1	Since the unsaturated hydraulic conductivity has already been factored, an additional factor of safety was not applied.
Saturated Horizontal Hydraulic Conductivity	NE Basin: 13½ feet/day SW Basin: 13½ feet/day NW Basin 27 feet/day	PanGEO, Inc., derived based MODRET manual, reference materials, and King County Surface Water Manual methodology*
Average Effective Storage Coefficient of Soil for Saturated Analysis	0.05	PanGEO, Inc., selected as consistent with the soil types encountered
Average Effective Storage Coefficient of Pond/Exfiltration Trench	0.67	Estimated by civil designer.

\* The saturated vertical hydraulic conductivity ( $K_{vs}$ ) was derived based on the following relationship:  $K_{vs} = 1.5 K_{vu}$

Where  $K_{vu}$  (unsaturated vertical hydraulic conductivity) was obtained from our infiltration testing.

The saturated horizontal hydraulic conductivity ( $K_{vh}$ ) was derived based on the following relationship:  $K_{vh} = 1.5 K_{vs}$

Runoff hydrographs for the 100-year recurrence interval event were generated by the project civil designer. We modelled a 30-day period surrounding the 100-year recurrence interval event to include the effects of precipitation before and after the design level event.

We modelled an effective aquifer base at elevation 25½ feet, which corresponds to the elevation where Vashon till was encountered in Boring PG-4.

Each of the infiltration systems was modelled as an individual system. Table 3 provides a summary of the estimated individual groundwater mound heights below the infiltration systems. In order to evaluate the aggregate impact of the groundwater mounds on the function of the adjacent infiltration systems and the future building, we used the principle of superposition to consider the effects of overlapping of the three separate mounds below the infiltration systems. The superimposed elevations are included in Table 5.

**TABLE 5: Mounding Analysis Summary**

Location	Estimated Individual Mound Height [feet]	Superposition Contribution [feet]			Estimated Superposition Mound Height [feet]
		SW	NE	NW	
NE Basin	58.7	0.8		0.5	60.1
SW Basin	60.7		1.0	0.6	62.3
NW Basin	57.6	0.8	0.6		59.0

The infiltration systems should be set above the mound heights provided in Table 3.

In our opinion, reducing the vertical separation of the infiltration systems to three feet should not adversely affect the infiltration system performance provided the base of the infiltration systems are set above the superimposed mound heights provided in Table 3.

## 8.0 CONSTRUCTION CONSIDERATIONS

Infiltration facilities are post-construction facilities which are designed to improve the quality and manage the volume of stormwater runoff by encouraging natural infiltration on-site. In order to protect the infiltration receptor soils from becoming clogged with

sediment and/or compacted during construction, we recommend the following measures be implemented during construction:

- The infiltration facilities should be constructed as late in the schedule as feasible and should not be constructed until after the upstream areas are stabilized.
- Heavy equipment traffic on prepared subgrades should be limited, especially during wet weather.
- If fine grained sediment is deposited or tracked onto the infiltration system subgrade, it should be removed using an excavator with a grade plate, small dozer or vacuum truck.
- The subgrade should be scarified prior to placing fill to prevent sealing of the receptor soils.
- Structural fill and aggregate base materials should be end-dumped at the edge of the fill area and the material pushed out over the subgrade.
- Grading of the infiltration galleries should be accomplished using low-impact earth-moving equipment to prevent compaction of the underlying soils. Wide tracked vehicles such as excavator, small dozers and bobcats are suggested.

## **9.0 ADDITIONAL SERVICES**

The recommended infiltration rate for the northwest basin are based on a sieve analysis conducted in Boring PG-1. We recommend field infiltration testing be performed at this location.

The mounding analysis was performed based on groundwater level measurements taken in August 2024 using the standpipe piezometer installed in PG-1 and PG-2. We are currently monitoring groundwater levels in PG-1 and PG-2 over the 2024/2025 wet season.

We recommend once the final infiltration system locations are set, that shallow standpipe piezometers be installed adjacent to the infiltration system to allow for groundwater level monitoring over the 2024/2025 wet season. The groundwater mounding analysis will need to be rerun after the wet season high groundwater elevation is determined.

To confirm that our recommendations are properly incorporated into the design and construction of the proposed addition, PanGEO should be retained to conduct a review of

the final project plans and specifications, and to monitor the construction of geotechnical elements.

## **10.0 CLOSURE**

We have prepared this report for Quarterra and the project design team. Recommendations contained in this report are based on a site reconnaissance, a subsurface exploration program, review of pertinent subsurface information, and our understanding of the project. The study was performed using a mutually agreed-upon scope of work.

Variations in soil conditions may exist between the locations of the explorations and the actual conditions underlying the site. The nature and extent of soil variations may not be evident until construction occurs. If any soil conditions are encountered at the site that are different from those described in this report, we should be notified immediately to review the applicability of our recommendations. Additionally, we should also be notified to review the applicability of our recommendations if there are any changes in the project scope.

Our scope of services does not include services related to construction safety precautions. Our recommendations are not intended to direct the contractors' methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design. Additionally, the scope of our services specifically excludes the assessment of environmental characteristics, particularly those involving hazardous substances. We are not mold consultants nor are our recommendations to be interpreted as being preventative of mold development. A mold specialist should be consulted for all mold-related issues.

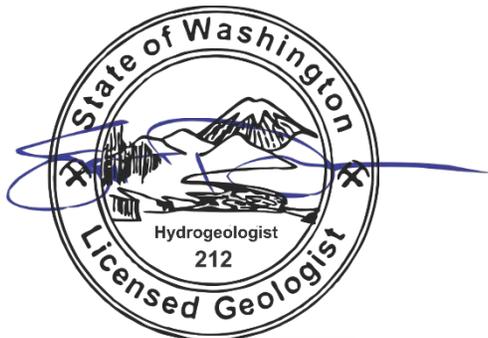
This report has been prepared for planning and design purposes for specific application to the proposed project in accordance with the generally accepted standards of local practice at the time this report was written. No warranty, express or implied, is made.

This report may be used only by the client and for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both off and on-site), or other factors including advances in our understanding of applied science, may change over time and could materially affect our findings. Therefore, this report should not be relied upon after 24 months from its issuance. PanGEO should be notified if the project is delayed by more than 24 months from the date of this report so that we may review the applicability of our conclusions considering the time lapse.

It is the client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk. Any party other than the client who wishes to use this report shall notify PanGEO of such intended use and for permission to copy this report. Based on the intended use of the report, PanGEO may require that additional work be performed and that an updated report be reissued. Noncompliance with any of these requirements will release PanGEO from any liability resulting from the use this report.

Sincerely,

**PanGEO, Inc.**



Scott D. Dinkelman

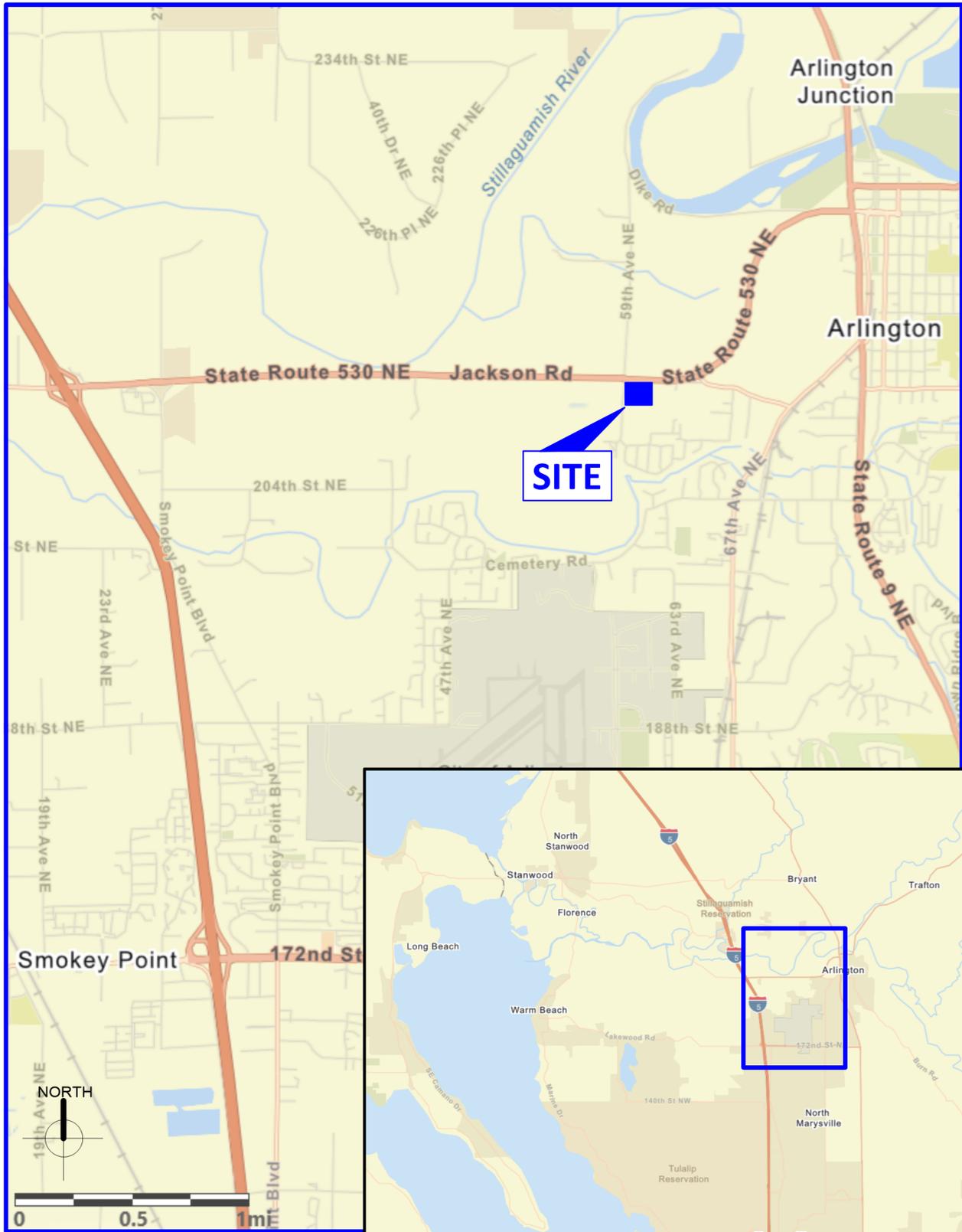
Scott D. Dinkelman, LEG, LHG  
Principal Hydrogeologist

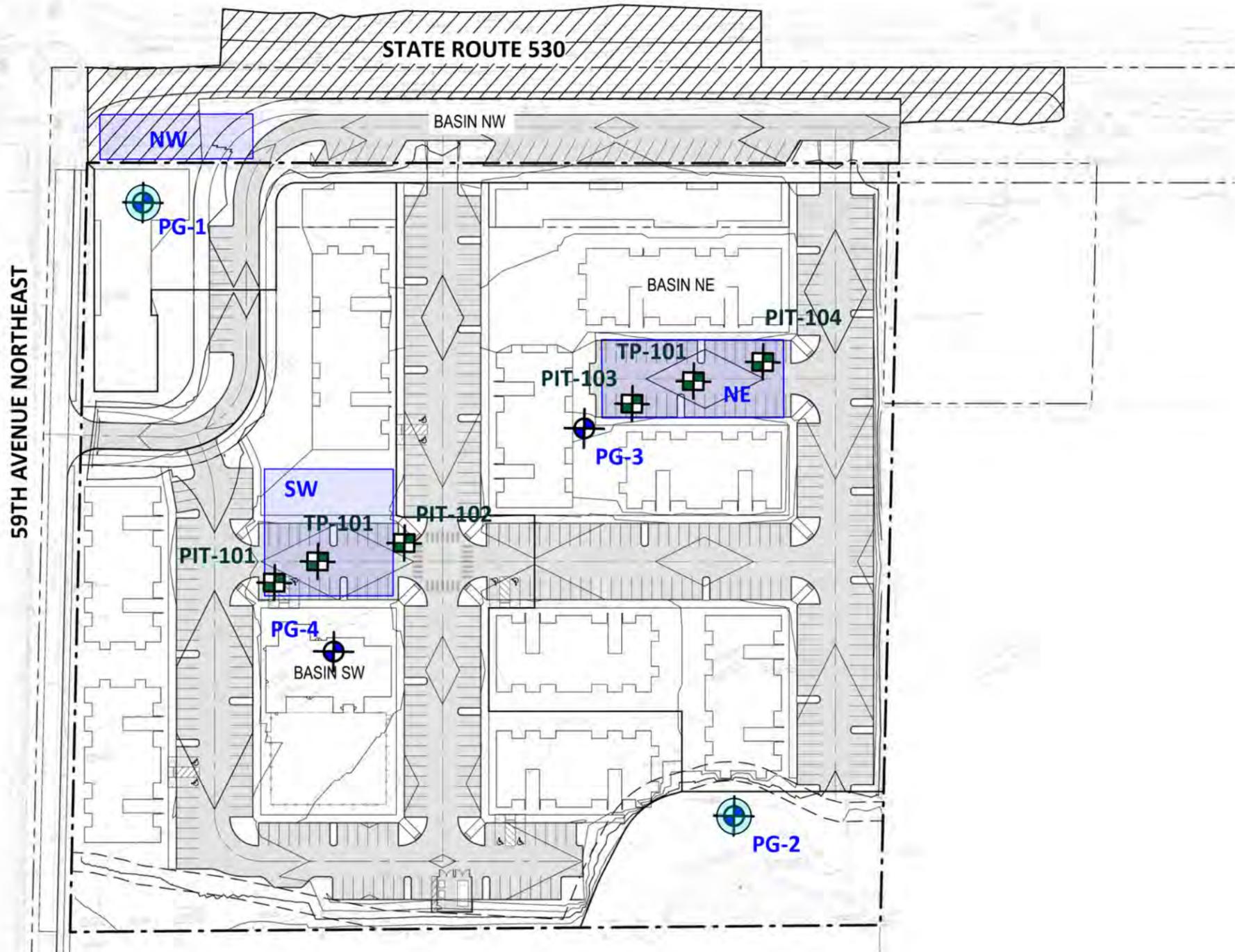
## 10.0 REFERENCES

Arlington, 2008, City of Arlington Public Works Standards and Specifications

Minard J. P. 1985, *Geologic map of the Arlington West 7.5-minute Quadrangle, Snohomish County, Washington. U.S. Geological Services, Miscellaneous Field Studies Map, Series 1740.*

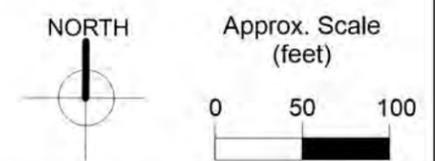
Washington State Department of Ecology, 2019, *Stormwater Management Manual for Western Washington*





**LEGEND:**

-  Subject Site
-  Proposed Infiltration Systems
-  Approximate Test Pit/Infiltration Test Location, PanGEO, Inc.
-  Approximate Boring Location, PanGEO, Inc.
-  Approximate Boring Location, with Standpipe Piezometer, PanGEO, Inc.



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	<b>Arlington Apartments</b> 21117 59th Ave NE Arlington, WA		<b>SITE AND EXPLORATION PLAN</b>	
	Project No.	24-207.200	Figure No.	2

**APPENDIX A**

**TEST PIT LOGS**

**RELATIVE DENSITY / CONSISTENCY**

SAND / GRAVEL			SILT / CLAY		
Density	SPT N-values	Approx. Relative Density (%)	Consistency	SPT N-values	Approx. Undrained Shear Strength (psf)
Very Loose	<4	<15	Very Soft	<2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Med. Dense	10 to 30	35 - 65	Med. Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	>50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	>30	>4000

**UNIFIED SOIL CLASSIFICATION SYSTEM**

MAJOR DIVISIONS		GROUP DESCRIPTIONS	
Gravel 50% or more of the coarse fraction retained on the #4 sieve. Use dual symbols (eg. GP-GM) for 5% to 12% fines.	GRAVEL (<5% fines)		GW: Well-graded GRAVEL
	GRAVEL (>12% fines)		GP: Poorly-graded GRAVEL
Sand 50% or more of the coarse fraction passing the #4 sieve. Use dual symbols (eg. SP-SM) for 5% to 12% fines.	SAND (<5% fines)		GM: Silty GRAVEL
			GC: Clayey GRAVEL
	SAND (>12% fines)		SW: Well-graded SAND
			SP: Poorly-graded SAND
Silt and Clay 50% or more passing #200 sieve	Liquid Limit < 50		SM: Silty SAND
			SC: Clayey SAND
			ML: SILT
	Liquid Limit > 50		CL: Lean CLAY
			OL: Organic SILT or CLAY
			MH: Elastic SILT
Highly Organic Soils			CH: Fat CLAY
			OH: Organic SILT or CLAY
			PT: PEAT

- Notes:**
- Soil exploration logs contain material descriptions based on visual observation and field tests using a system modified from the Uniform Soil Classification System (USCS). Where necessary laboratory tests have been conducted (as noted in the "Other Tests" column), unit descriptions may include a classification. Please refer to the discussions in the report text for a more complete description of the subsurface conditions.
  - The graphic symbols given above are not inclusive of all symbols that may appear on the borehole logs. Other symbols may be used where field observations indicated mixed soil constituents or dual constituent materials.

**DESCRIPTIONS OF SOIL STRUCTURES**

<b>Layered:</b> Units of material distinguished by color and/or composition from material units above and below	<b>Fissured:</b> Breaks along defined planes
<b>Laminated:</b> Layers of soil typically 0.05 to 1mm thick, max. 1 cm	<b>Slickensided:</b> Fracture planes that are polished or glossy
<b>Lens:</b> Layer of soil that pinches out laterally	<b>Blocky:</b> Angular soil lumps that resist breakdown
<b>Interlayered:</b> Alternating layers of differing soil material	<b>Disrupted:</b> Soil that is broken and mixed
<b>Pocket:</b> Erratic, discontinuous deposit of limited extent	<b>Scattered:</b> Less than one per foot
<b>Homogeneous:</b> Soil with uniform color and composition throughout	<b>Numerous:</b> More than one per foot
	<b>BCN:</b> Angle between bedding plane and a plane normal to core axis

**COMPONENT DEFINITIONS**

COMPONENT	SIZE / SIEVE RANGE	COMPONENT	SIZE / SIEVE RANGE
Boulder:	> 12 inches	Sand	
Cobbles:	3 to 12 inches	Coarse Sand:	#4 to #10 sieve (4.5 to 2.0 mm)
Gravel	3 to 3/4 inches	Medium Sand:	#10 to #40 sieve (2.0 to 0.42 mm)
		Fine Sand:	#40 to #200 sieve (0.42 to 0.074 mm)
Coarse Gravel:	3 to 3/4 inches	Silt	0.074 to 0.002 mm
Fine Gravel:	3/4 inches to #4 sieve	Clay	<0.002 mm

**TEST SYMBOLS**

for In Situ and Laboratory Tests listed in "Other Tests" column.

- ATT Atterberg Limit Test
- Comp Compaction Tests
- Con Consolidation
- DD Dry Density
- DS Direct Shear
- %F Fines Content
- GS Grain Size
- Perm Permeability
- PP Pocket Penetrometer
- R R-value
- SG Specific Gravity
- TV Torvane
- TXC Triaxial Compression
- UCC Unconfined Compression

**SYMBOLS**

Sample/In Situ test types and intervals

- 2-inch OD Split Spoon, SPT (140-lb. hammer, 30" drop)
- 3.25-inch OD Split Spoon (300-lb hammer, 30" drop)
- Non-standard penetration test (see boring log for details)
- Thin wall (Shelby) tube
- Grab
- Rock core
- Vane Shear

**MONITORING WELL**

- Groundwater Level at time of drilling (ATD)
- Static Groundwater Level
- Cement / Concrete Seal
- Bentonite grout / seal
- Silica sand backfill
- Slotted tip
- Slough
- Bottom of Boring

**MOISTURE CONTENT**

Dry	Dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

LOG KEY 08-118 LOG.GPJ\_PANGEO.GDT 11/12/13

# Test Pit Log

Project No: 24-207.200  
 Project Name: Arlington Apartments  
 Project Location: 21117 59<sup>th</sup> Avenue Northeast, Arlington, WA  
 Excavated: October 3, 2024

<b>Test Pit No. TP-101</b>	
Location: 48.187357, -122.149329 (WGS84)	
Approximate ground surface elevation: 61 feet (NAVD88)	
Depth (ft)	Material Description
0 – 1	<b>Topsoil</b> Loose, brown to black silty very fine to medium SAND with numerous organics
1 – 2	<b>Alluvium</b> Loose, gray to tan silty very fine to medium SAND to sandy SILT - Organic rootlets present to 2½ feet
2 – 3½	Loose, gray silty fine to medium SAND - Orange-brown soil mottling from 2 to 3 feet
3½ – 8	Loose, gray fine to coarse SAND with gravel and scattered cobble - Strong sidewall caving below 6 feet
	
Image of test pit soils at approximately 7 feet below grade. Groundwater was encountered at approximately 6 feet below grade during excavation. Soil caving was observed from 6 to 8 feet.	
<b>Logged by:</b> E. Eckles	

# Test Pit Log

Project No: 24-207.200  
 Project Name: Arlington Apartments  
 Project Location: 21117 59<sup>th</sup> Avenue Northeast, Arlington, WA  
 Excavated: October 3, 2024

<b>Test Pit No. TP-102</b>	
Location: 48.187591, -122.148685(WGS84)	
Approximate ground surface elevation: 61 feet (NAVD88)	
Depth (ft)	Material Description
0 – 1	<b>Topsoil</b> Loose, brown to black silty very fine to medium SAND with numerous organics
1 – 2	<b>Alluvium</b> Loose, gray to tan silty very fine to medium SAND to sandy SILT - Organic rootlets present to 2 feet
2 – 4	Loose, gray silty fine to medium SAND - Orange-brown soil mottling from 2 to 3½ feet
4 – 8	Loose, gray fine to coarse SAND with gravel and scattered cobble - Strong sidewall caving below 4 feet
	
Image of test pit soils encountered approximately 8 feet below grade. Groundwater was encountered at about 7 feet below grade. Sidewall caving was observed from 7 to 8 feet.	
<b>Logged by:</b> E. Eckles	

# Test Pit Log

Project No: 24-207.200  
Project Name: Arlington Apartments  
Project Location: 21117 59<sup>th</sup> Avenue Northeast, Arlington, WA  
Excavated: October 3, 2024

<b>Test Pit No. PIT-101</b>	
Location: 48.187259, -122.1495082 (WGS84)	
Approximate ground surface elevation: 61 feet (NAVD88)	
Depth (ft)	Material Description
0 – 1	<b>Topsoil</b> Loose, brown to black silty very fine to medium SAND with numerous organics
1 – 2	<b>Alluvium</b> Loose, gray to tan silty very fine to medium silty SAND to sandy SILT - Organic rootlets present to 2 feet
2 – 4	Loose, gray silty fine to coarse SAND - Orange-brown soil mottling from 2 to 3 feet
4 – 8	Loose, gray fine to coarse SAND with gravel and scattered cobble - Strong sidewall caving below 4 feet



The photograph shows a vertical test pit excavation. The soil is dark brown and silty. A blue measuring tape is visible on the left side of the pit, extending from the surface down to approximately 4 feet. The bottom of the pit is filled with water and some debris. The soil appears to be caving in on the sides, particularly below the 4-foot mark.

Image of small PIT test pit setup approximately 4-ft below grade. Soil caving was observed from 4 to 8 feet.

**Logged by:** E. Eckles

# Test Pit Log

Project No: 24-207.200  
 Project Name: Arlington Apartments  
 Project Location: 21117 59<sup>th</sup> Avenue Northeast, Arlington, WA  
 Excavated: October 3, 2024

<b>Test Pit No. PIT-102</b>	
Location: 48.187296, -122.149505 (WGS84)	
Approximate ground surface elevation: 61 feet (NAVD88)	
Depth (ft)	Material Description
0 – 1	<b>Topsoil</b> Loose, brown to black silty very fine to medium SAND with numerous organics
1 – 5	<b>Alluvium</b> Loose, gray to brown silty very fine to medium SAND to sandy SILT <ul style="list-style-type: none"> <li>- Organic rootlets present to 2 feet</li> <li>- Orange-brown soil mottling from 1½ to 3½ feet</li> </ul>
5 – 7½	Loose, gray silty very fine to coarse SAND with gravel and occasional cobble <ul style="list-style-type: none"> <li>- Strong sidewall caving below 4 feet</li> </ul>
	
Image of small PIT test pit setup approximately 4-ft below grade. Soil caving was observed from 4½ feet to 7½ feet.	
<b>Logged by:</b> E. Eckles	

# Test Pit Log

Project No: 24-207.200  
 Project Name: Arlington Apartments  
 Project Location: 21117 59<sup>th</sup> Avenue Northeast, Arlington, WA  
 Excavated: October 3, 2024

<b>Test Pit No. PIT-103</b>	
Location: 48.187486, -122.148998 (WGS84)	
Approximate ground surface elevation: 61 feet (NAVD88)	
Depth (ft)	Material Description
0 – 1	<b>Topsoil</b> Loose, brown to black silty very fine to medium SAND with numerous organics
1 – 2½	<b>Alluvium</b> Loose, gray to tan silty very fine to medium SAND to sandy SILT - Organic rootlets present to 2½ feet
2½ – 4	Loose, gray silty fine to medium SAND - Orange-brown soil mottling from 2 to 3 feet
4 – 8	Loose, gray fine to coarse SAND with gravel and scattered cobble - Strong sidewall caving below 4 feet
	
Image of test pit soils at approximately 4 feet below grade. Soil caving was observed was observed from 4 feet to 8 feet.	
<b>Logged by:</b> E. Eckles	

# Test Pit Log

Project No: 24-207.200  
 Project Name: Arlington Apartments  
 Project Location: 21117 59<sup>th</sup> Avenue Northeast, Arlington, WA  
 Excavated: October 3, 2024

<b>Test Pit No. PIT-104</b>	
Location: 48.187556, -122.148675 (WGS84)	
Approximate ground surface elevation: 61 feet (NAVD88)	
Depth (ft)	Material Description
0 – 1	<b>Topsoil</b> Loose, brown to black silty very fine to medium SAND with numerous organics
1 – 2	<b>Alluvium</b> Loose, gray to tan silty very fine to medium SAND to sandy SILT - Organic rootlets present to 2½ feet
2 – 3½	Loose, gray silty fine to medium SAND - Orange-brown soil mottling from 2 to 3 feet
3½ – 8	Loose, gray fine to coarse SAND with gravel and scattered cobble - Strong sidewall caving below 3½ feet
	
Image of PIT setup at approximately 4 feet below grade. Soil caving was observed from 3½ to 8 feet.	
<b>Logged by:</b> E. Eckles	

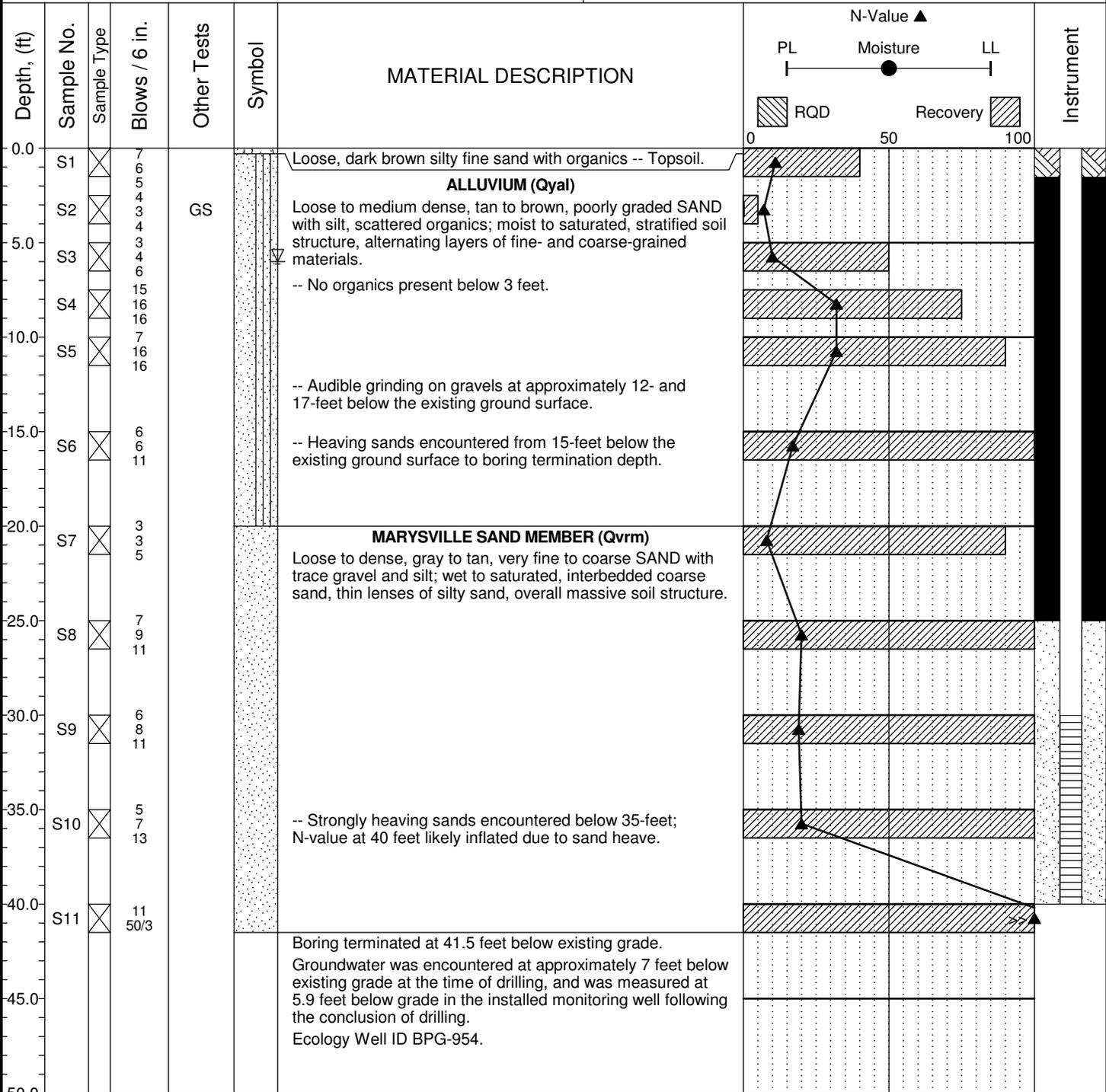
# Test Pit Log

Project No: 24-207.200  
Project Name: Arlington Apartments  
Project Location: 21117 59<sup>th</sup> Avenue Northeast, Arlington, WA  
Excavated: October 3, 2024

**APPENDIX B**

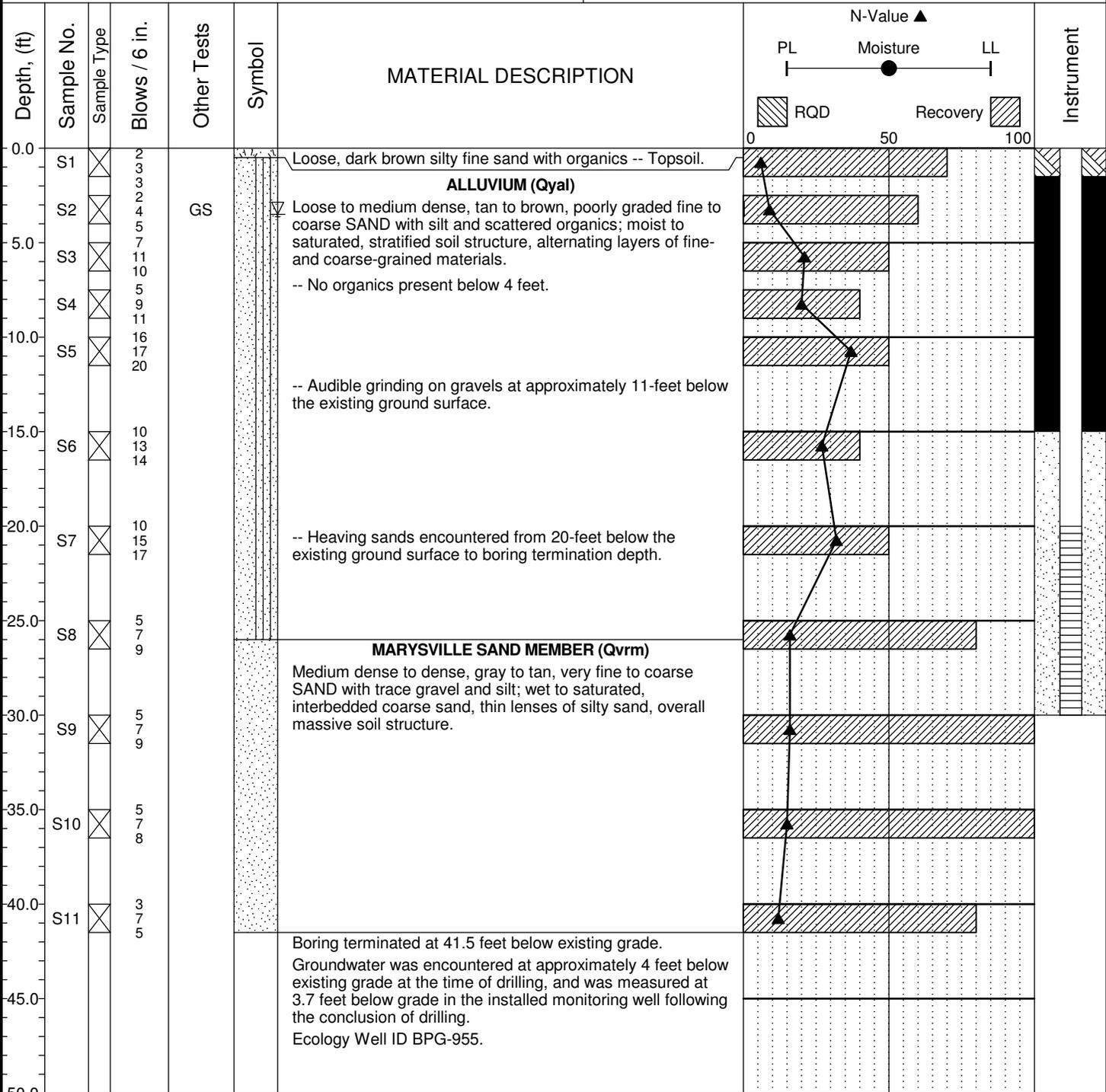
**BORING LOGS**

Project:	21117 59th Avenue Northeast	Surface Elevation:	64.0ft
Job Number:	24-207	Top of Casing Elev.:	64.0ft
Location:	21117 59th Ave NE, Arlington, WA	Drilling Method:	EC55 Track Drill Rig, Hollow Stem Auger
Coordinates:	Northing: 48.1879372, Easting: -122.1504602	Sampling Method:	SPT w/rope & cathead



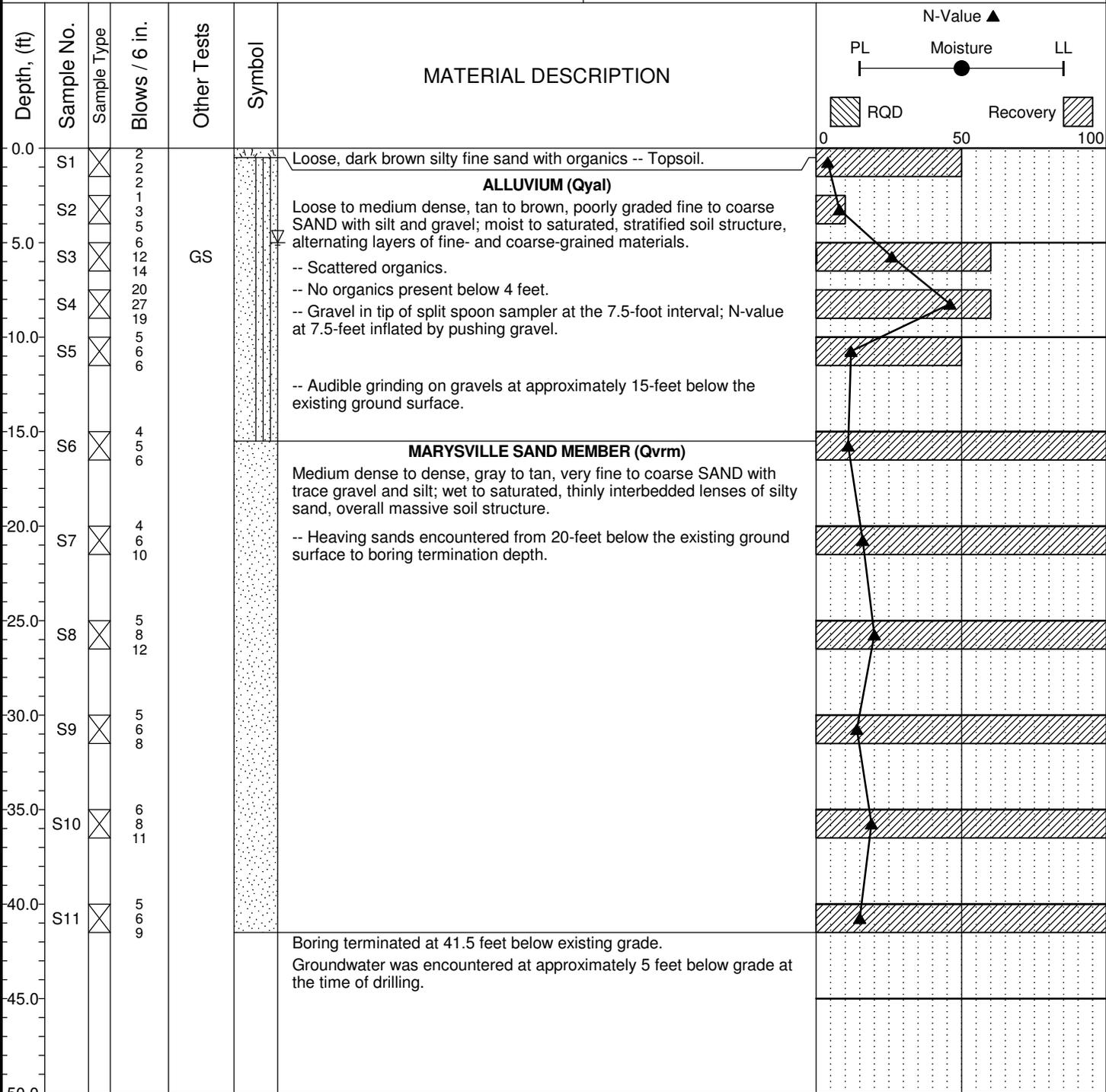
Completion Depth:	41.5ft	Remarks: Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Approximate state plane coordinates and elevation are based on Google Earth. This information is provided for relative information only and is not a substitution for field survey. <b>Datum: Washington North / NAVD88</b>
Date Borehole Started:	6/27/24	
Date Borehole Completed:	6/27/24	
Logged By:	E. Eckles	
Drilling Company:	Boretect1 Inc.	

Project:	21117 59th Avenue Northeast	Surface Elevation:	62.0ft
Job Number:	24-207	Top of Casing Elev.:	62.0ft
Location:	21117 59th Ave NE, Arlington, WA	Drilling Method:	EC55 Track Drill Rig, Hollow Stem Auger
Coordinates:	Northing: 48.18686, Easting: -122.1487876	Sampling Method:	SPT w/rope & cathead



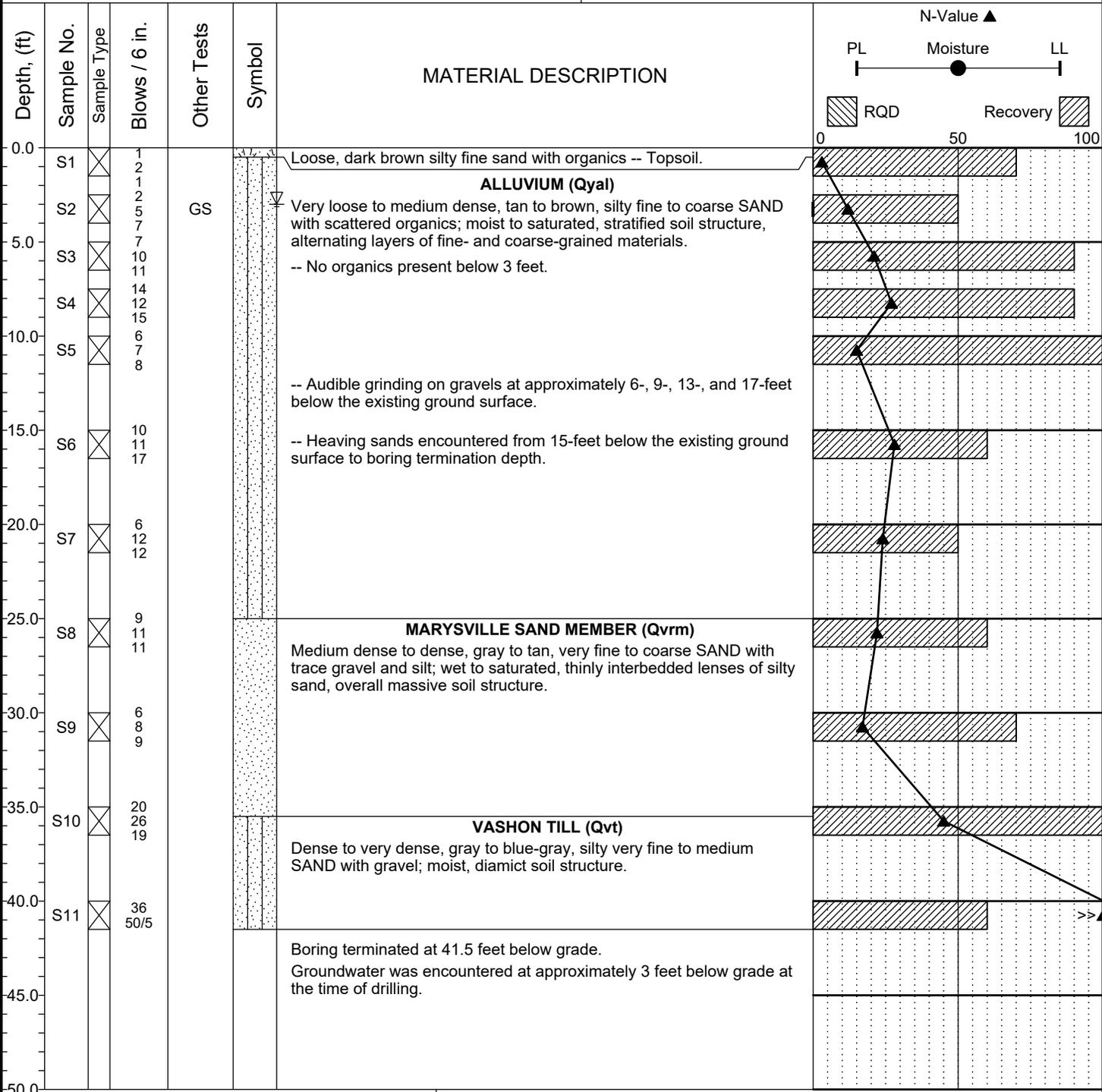
Completion Depth:	41.5ft	Remarks: Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Approximate state plane coordinates and elevation are based on Google Earth. This information is provided for relative information only and is not a substitution for field survey. <b>Datum: Washington North / NAVD88</b>
Date Borehole Started:	6/27/24	
Date Borehole Completed:	6/27/24	
Logged By:	E. Eckles	
Drilling Company:	Boretect1 Inc.	

Project:	21117 59th Avenue Northeast	Surface Elevation:	65.0ft
Job Number:	24-207	Top of Casing Elev.:	
Location:	21117 59th Ave NE, Arlington, WA	Drilling Method:	EC55 Track Drill Rig, Hollow Stem Auger
Coordinates:	Northing: 48.1874709, Easting: -122.1491178	Sampling Method:	SPT w/rope & cathead



Completion Depth:	41.5ft	Remarks: Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Approximate state plane coordinates and elevation are based on Google Earth. This information is provided for relative information only and is not a substitution for field survey. <b>Datum: Washington North / NAVD88</b>
Date Borehole Started:	6/28/24	
Date Borehole Completed:	6/28/24	
Logged By:	E. Eckles	
Drilling Company:	Boretect1 Inc.	

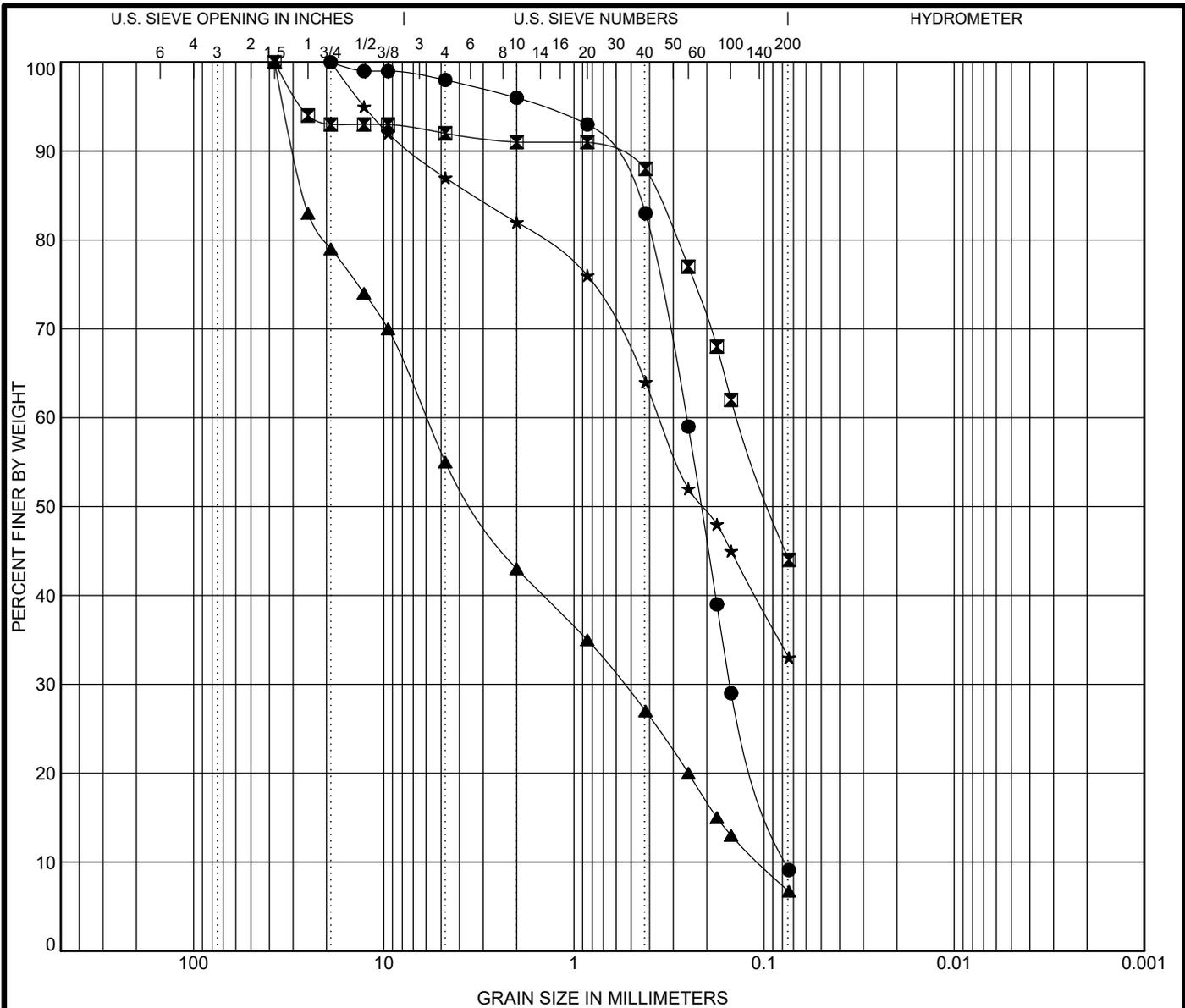
Project:	21117 59th Avenue Northeast	Surface Elevation:	63.0ft
Job Number:	24-207	Top of Casing Elev.:	
Location:	21117 59th Ave NE, Arlington, WA	Drilling Method:	EC55 Track Drill Rig, Hollow Stem Auger
Coordinates:	Northing: 48.1871629, Easting: -122.1499584	Sampling Method:	SPT w/rope & cathead



Completion Depth:	41.5ft	Remarks: Standard penetration test (SPT) sampler driven with a 140 lb. safety hammer. Hammer operated with a rope and cathead mechanism. Approximate state plane coordinates and elevation are based on Google Earth. This information is provided for relative information only and is not a substitution for field survey. <b>Datum: Washington North / NAVD88</b>
Date Borehole Started:	6/28/24	
Date Borehole Completed:	6/28/24	
Logged By:	E. Eckles	
Drilling Company:	Boretac1 Inc.	

**APPENDIX C**

**LABORATORY TESTING**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● PG-1 @ 2.5 ft.	POORLY GRADED SAND with SILT(SP-SM)				1.18	3.34
☒ PG-2 @ 2.5 ft.	SILTY SAND(SM)					
▲ PG-3 @ 5.0 ft.	POORLY GRADED SAND with SILT and GRAVEL(SP-SM)				0.47	56.05
★ PG-4 @ 2.5 ft.	SILTY SAND(SM)					

Specimen Identification	D100	D90	D60	D10	%Gravel	%Sand	%Silt	%Clay
● PG-1 2.5	19	0.688	0.255	0.076	2.0	88.5	9.5	
☒ PG-2 2.5	37.5	0.672	0.138		8.0	47.7	44.3	
▲ PG-3 5.0	37.5	29.543	5.985	0.107	45.0	48.2	6.8	
★ PG-4 2.5	19	7.2	0.353		13.0	53.8	33.2	

**GRAIN SIZE DISTRIBUTION**



Project: 21117 59th Avenue Northeast  
 Job Number: 24-207  
 Location: 21117 59th Ave NE, Arlington, WA

**Figure C-1**

GRAIN SIZE 24-207 BORING LOGS.GPJ PANGE.GDT 7/24/24

## **APPENDIX D**

# **ANALYTICAL LABORATORY TEST RESULTS**

**PanGEO Inc**  
Scott Dinkelman  
3213 Easklake Ave E, Suite B  
Seattle, WA 98102

**RE: Arlington Apartments, 24-207**  
**Work Order Number: 2410142**

October 14, 2024

**Attention Scott Dinkelman:**

Fremont Analytical, Inc, an Alliance Technical Group company, received 4 sample(s) on 10/7/2024 for the analyses presented in the following report.

***Cation Exchange Capacity by EPA 9081***  
***Organic Content of Soils by ASTM D2974***

All analyses were performed according to our accredited Quality Assurance program. Please contact the laboratory if you should have any questions about the results.

Please note, while the appearance of our logo and branding will update, our commitment to accuracy, speed, and customer service remain values celebrated and shared by Alliance Technical Group. Thank you for the opportunity to serve you.

Sincerely,



Brianna Barnes  
Project Manager

*DoD-ELAP Accreditation #79636 by PJLA, ISO/IEC 17025:2017 and QSM 5.4 for Environmental Testing*  
*ORELAP Certification: WA 100009 (NELAP Recognized) for Environmental Testing*  
*Washington State Department of Ecology Accredited for Environmental Testing, Lab ID C910*

Original



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**CLIENT:** PanGEO Inc  
**Project:** Arlington Apartments  
**Work Order:** 2410142

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## Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2410142-001	PIT-101	10/03/2024 5:30 PM	10/07/2024 12:42 PM
2410142-002	PIT-102	10/03/2024 5:00 PM	10/07/2024 12:42 PM
2410142-003	PIT-103	10/03/2024 5:10 PM	10/07/2024 12:42 PM
2410142-004	PIT-104	10/03/2024 5:20 PM	10/07/2024 12:42 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

**CLIENT:** PanGEO Inc  
**Project:** Arlington Apartments

---

**I. SAMPLE RECEIPT:**

Samples receipt information is recorded on the attached Sample Receipt Checklist.

**II. GENERAL REPORTING COMMENTS:**

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

**III. ANALYSES AND EXCEPTIONS:**

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

### Qualifiers:

- \* - Flagged value is not within established control limits
- B - Analyte detected in the associated Method Blank
- D - Dilution was required
- E - Value above quantitation range
- H - Holding times for preparation or analysis exceeded
- I - Analyte with an internal standard that does not meet established acceptance criteria
- J - Analyte detected below Reporting Limit
- N - Tentatively Identified Compound (TIC)
- Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- S - Spike recovery outside accepted recovery limits
- ND - Not detected at the Reporting Limit
- R - High relative percent difference observed

### Acronyms:

- %Rec - Percent Recovery
- CCB - Continued Calibration Blank
- CCV - Continued Calibration Verification
- DF - Dilution Factor
- DUP - Sample Duplicate
- HEM - Hexane Extractable Material
- ICV - Initial Calibration Verification
- LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
- MCL - Maximum Contaminant Level
- MB or MBLANK - Method Blank
- MDL - Method Detection Limit
- MS/MSD - Matrix Spike / Matrix Spike Duplicate
- PDS - Post Digestion Spike
- Ref Val - Reference Value
- REP - Sample Replicate
- RL - Reporting Limit
- RPD - Relative Percent Difference
- SD - Serial Dilution
- SGT - Silica Gel Treatment
- SPK - Spike
- Surr - Surrogate

**CLIENT:** PanGEO Inc  
**Project:** Arlington Apartments

**Lab ID:** 2410142-001

**Collection Date:** 10/3/2024 5:30:00 PM

**Client Sample ID:** PIT-101

**Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b><u>Cation Exchange Capacity by EPA 9081</u></b>				Batch ID: R94997		Analyst: ME
Cation Exchange Capacity	ND	1.00		meq/100g	1	10/14/2024 11:20:00 AM
<b><u>Organic Content of Soils by ASTM D2974</u></b>				Batch ID: R94838		Analyst: JH
Organic Matter	4.74	0.500		%	1	10/7/2024 2:39:07 PM

**Lab ID:** 2410142-002

**Collection Date:** 10/3/2024 5:00:00 PM

**Client Sample ID:** PIT-102

**Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b><u>Cation Exchange Capacity by EPA 9081</u></b>				Batch ID: R94997		Analyst: ME
Cation Exchange Capacity	ND	1.00		meq/100g	1	10/14/2024 11:25:00 AM
<b><u>Organic Content of Soils by ASTM D2974</u></b>				Batch ID: R94897		Analyst: JH
Organic Matter	2.92	0.500		%	1	10/9/2024 3:08:23 PM

**Lab ID:** 2410142-003

**Collection Date:** 10/3/2024 5:10:00 PM

**Client Sample ID:** PIT-103

**Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b><u>Cation Exchange Capacity by EPA 9081</u></b>				Batch ID: R94997		Analyst: ME
Cation Exchange Capacity	ND	1.00		meq/100g	1	10/14/2024 11:28:00 AM
<b><u>Organic Content of Soils by ASTM D2974</u></b>				Batch ID: R94897		Analyst: JH
Organic Matter	3.68	0.500		%	1	10/9/2024 3:08:23 PM

**CLIENT:** PanGEO Inc  
**Project:** Arlington Apartments

**Lab ID:** 2410142-004

**Collection Date:** 10/3/2024 5:20:00 PM

**Client Sample ID:** PIT-104

**Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<b><u>Cation Exchange Capacity by EPA 9081</u></b>				Batch ID: R94997		Analyst: ME
Cation Exchange Capacity	ND	1.00		meq/100g	1	10/14/2024 11:30:00 AM
<b><u>Organic Content of Soils by ASTM D2974</u></b>				Batch ID: R94897		Analyst: JH
Organic Matter	3.74	0.500		%	1	10/9/2024 3:08:23 PM

**Work Order:** 2410142  
**CLIENT:** PanGEO Inc  
**Project:** Arlington Apartments

**QC SUMMARY REPORT**  
**Cation Exchange Capacity by EPA 9081**

Sample ID: <b>MB-CEC</b>	SampType: <b>MBLK</b>	Units: <b>meq/100g</b>	Prep Date: <b>10/14/2024</b>	RunNo: <b>94997</b>							
Client ID: <b>MBLKS</b>	Batch ID: <b>R94997</b>	Analysis Date: <b>10/14/2024</b>	SeqNo: <b>1983194</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	ND	1.00									

Sample ID: <b>LCS-CEC</b>	SampType: <b>LCS</b>	Units: <b>µg/L</b>	Prep Date: <b>10/14/2024</b>	RunNo: <b>94997</b>							
Client ID: <b>LCSS</b>	Batch ID: <b>R94997</b>	Analysis Date: <b>10/14/2024</b>	SeqNo: <b>1983195</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium	1,080	100	1,000	0	108	75	125				

Sample ID: <b>2410142-001ADUP</b>	SampType: <b>DUP</b>	Units: <b>meq/100g</b>	Prep Date: <b>10/14/2024</b>	RunNo: <b>94997</b>							
Client ID: <b>PIT-101</b>	Batch ID: <b>R94997</b>	Analysis Date: <b>10/14/2024</b>	SeqNo: <b>1983197</b>								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	ND	1.00						0		30	

Client Name: PANGEO	Work Order Number: 2410142
Logged by: Clare Griggs	Date Received: 10/7/2024 12:42:00 PM

**Chain of Custody**

1. Is Chain of Custody complete?      Yes       No       Not Present
2. How was the sample delivered?      Client

**Log In**

3. Custody Seals present on shipping container/cooler?  
(Refer to comments for Custody Seals not intact)      Yes       No       Not Present
4. Was an attempt made to cool the samples?      Yes       No       NA
5. Were all items received at a temperature of >2°C to 6°C \*      Yes       No       NA
6. Sample(s) in proper container(s)?      Yes       No
7. Sufficient sample volume for indicated test(s)?      Yes       No
8. Are samples properly preserved?      Yes       No
9. Was preservative added to bottles?      Yes       No       NA
10. Is there headspace in the VOA vials?      Yes       No       NA
11. Did all samples containers arrive in good condition(unbroken)?      Yes       No
12. Does paperwork match bottle labels?      Yes       No
13. Are matrices correctly identified on Chain of Custody?      Yes       No
14. Is it clear what analyses were requested?      Yes       No
15. Were all hold times (except field parameters, pH e.g.) able to be met?      Yes       No

**Special Handling (if applicable)**

16. Was client notified of all discrepancies with this order?      Yes       No       NA

Person Notified: <input style="width: 100%;" type="text"/>	Date: <input style="width: 100%;" type="text"/>
By Whom: <input style="width: 100%;" type="text"/>	Via: <input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding: <input style="width: 100%;" type="text"/>	
Client Instructions: <input style="width: 100%;" type="text"/>	

17. Additional remarks:

**Item Information**

Item #	Temp °C
Sample	2.4

\* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C



