October 6, 2023

Ken Onyima, AICP
Senior Development Planner City of Gresham
Urban Design & Planning
Ken.onyima@greshamoregon.gov

RE: City of Gresham File Number SD/MIS 20-26000343 (MPLAN 21-00652)
Veranda Master Plan and Subdivision

Dear Ken:

At the suggestion of the City, the applicant contracted with Hardman Geotechnical Services Inc (Hardman Geotechnical) to conduct preliminary geotechnical test pit excavations on the Veranda Master Plan and Subdivision site to document presence or absence of a shallow groundwater table.

Hardman Geotechnical dug a total of nine geotechnical test pits surrounding and within Wetland 1. Test pits were excavated up to 19 feet below ground surface during July and August, 2023. Test pit locations are shown on Figure 2 of the attached Hardman Geotechnical report, with excavator test pit data included at the end of the report. As shown in the Backhoe/Excavator Test Pit data sheets, shallow groundwater was not observed at any of the nine test pits ranging from 17 feet up to 19 feet below ground surface. All test pits were dry, including Test Pit 5 located within Wetland 1. As documented in the attached excavator test pits data sheets, no seepage or static groundwater was encountered by Hardman Geotechnical at any of the plots.

Test Pit 5 located within Wetland 1 was excavated on August 1, 2023 and was left open for a few days to allow for sufficient time for a groundwater table to stabilize into excavated test pit. I visited the site on August 4, 2023 to document whether a groundwater table had equilibrized into Test Pit 5. As shown on the attached AKS representative photo sheet, Test Pit 5 was dry on August 4, 2023 after being left open for four days. I did not observe any sidewall seeps or glistening sidewall peds (see attached AKS Photo Pages).

This study documents a lack of shallow subsurface groundwater within Wetland 1 up to 17 feet below ground surface during the warmer months. Test Pit 5 was dug to a depth equivalent to the toe slope adjacent to Kelley Creek in the northern portion of the site. Based on this clear evidence, Wetland 1 does not have a subsurface connection to provide an *improvement* for 303(d) temperature attenuation of water cooling benefit to Kelley Creek during the warmer summer months.

As stated in my May 23, 2023 *Veranda at Pleasant Valley Master Plan and Subdivision ESRA-PV Mitigation Plan Technical memorandum* submitted to the City, the applicant is required to receive permits, including mitigation, for all unavoidable wetland impacts associated with the project from Department of State Lands (DSL) and U.S. Army Corps of Engineers. Mitigation will be conducted in accordance with Oregon Administrative Rule (OAR) 141-085-0680 *Compensatory Mitigation Applicability and Principal Objective* standards. Per OAR 141-085-0690(1), permittee-responsible wetland mitigation must be located within the 4th field Hydrologic Unit Code (HUC) of the impact site, which is within the local watershed.

In addition to the wetland mitigation that will be required for state and federal wetland permits, the applicant has voluntarily agreed to conduct +/-8.26 acres of enhancement within on-site ESRA-PV adjacent to Kelley Creek. Enhancement includes removing all non-native invasive vegetation followed by dense native tree and shrub plantings (over 17,000 native trees and shrubs prescribed to be voluntarily planted by the applicant). By providing a dense canopy to shade Kelley Creek, the voluntary enhancement will result in significant water cooling benefit over current site conditions.

Please let me know if you have any questions.

Sincerely,

AKS ENGINEERING & FORESTRY, LLC

Stacey Reed

Stacey Reed, PWS, Senior Wetland Scientist
503-563-6151 | staceyr@aks-eng.com

Attachments:

Hardman Geotechnical Servies Inc Preliminary Geotechnical Report and Geologic Hazard Evaluation Veranda, 7928 SE 190th Drive, Gresham Oregon

AKS Representative Site Photographs, August 4, 2023

Photo A. View north of Hardman Geotechnical Excavator Test Pit #5.

Photo B. View looking down into Hardman Geotechnical Excavator Test Pit #5.

Photo C. View looking down into Hardman Geotechnical Excavator Test Pit #5.

Photo D. View of Hardman Geotechnical Excavator Test Pit #5 eastern sidewall.

Photos taken by Stacey Reed, August 4, 2023

HARDMAN GEOTECHNICAL SERVICES INC.
Practical, Cost-Effective Engineering Solutions

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August 3, 2023
HGSI Project No. 23-3128

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Via e-mail with hard copies mailed on request

Subject: **PRELIMINARY GEOTECHNICAL REPORT AND GEOLOGIC HAZARD EVALUATION**
VERANDA
7928 SE 190TH DRIVE
GRESHAM, OREGON

This report presents the results of a preliminary geotechnical engineering study conducted by Hardman Geotechnical Services Inc. (HGSI) for the proposed residential development at the site with address 7928 SE 190th Drive near Gresham, Oregon (Figure 1). The purpose of this study was to provide a preliminary evaluation of soil conditions and potential geologic hazards on site to aid in planning the project. This geotechnical study was performed in accordance with HGSI Proposal No. 22-160a, dated December 13, 2022, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site area is comprised of a single tax lot (1S3E20D-01200) that is irregularly shaped and roughly 38.9 acres (Figure 1). SE 190th Drive skirts the west side of the site, and there is a small gravel driveway leading into the site near the northwest corner. Currently there are three dilapidated buildings onsite at the northwest corner. The majority of the site remains undeveloped outside of a couple remnant fence lines that surround the building areas and another that runs north-south through the center of the site. Vegetation consists of many tall grasses, blackberries and other invasive weeds such as thistle. Along the north side of the site, there is an increase in green vegetation surrounding Kelley Creek.

Site topography is gently- to moderately-sloping with a noticeable increase in slope steepness directly adjacent to the creek on the north side. General slopes trend to the north-northwest with the lowest portions of the site along the western edge near an existing culvert and roadside drainage.

As we understand, the project consists of grading and developing the site into a residential subdivision with new lots for home construction. Included in this project is the planned demolition of the existing single-family residence and two outbuildings in the northwest portion. Due to the presence of setbacks along the

creek, the northernmost area of the site is to remain open space. It is also our understanding that stormwater from the site will be directed to the new wet pond which is located on Tax Lot 400 of Multnomah County Assessor's Map 1S 3E 20C. Although infiltration testing was not included in the preliminary scope of work, it is expected that soils in the northwest area of the site would exhibit low infiltration rates due to the silt and clay content of the soils in the area.

REGIONAL GEOLOGY AND SEISMIC SETTING

The subject site lies within the Portland Basin, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. The Portland Basin is a northwest-southwest trending structural basin produced by broad regional down warping of the area. The Portland Basin is approximately 20 miles wide and 45 miles long and is filled with consolidated and unconsolidated sedimentary rocks of late Miocene, Pliocene and Pleistocene age.

Geologic maps indicate the subject site is underlain by Quaternary age (last 1.6 million years) Fine-grained facies of the Missoula Flood Deposits; clay, silt, and sand deposits that mantle older deposits of basalt bedrock, within lowland areas in the Portland region (Beeson et al., 1989). The fine-grained facies generally consists of massive sand, silt, and clay deposits following repeated catastrophic flooding events in the Willamette Valley, the last of which occurred about 10,000 years ago. Regionally, the total thickness of fine-grained facies ranges from 6 feet to greater than 100 feet.

Underlying the fine-grained facies, regional geologic mapping indicates the subject site is likely underlain by the Boring Lava lithologic unit which consists of basaltic and basaltic andesite lava flows erupted from a series of local volcanic vents during Plio-Pleistocene time (about 600,000 thousand to 2.6 million years ago) (Trimble, 1963; Madin, 1990). The total thickness of the Boring Lava unit ranges from greater than 600 feet near vents to less than 50 feet on the outer margins.

At least three major seismic source zones capable of generating damaging earthquakes are known to exist in the region. These include the Portland Hills Fault Zone, Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone. These potential earthquake source zones are included in the determination of seismic design values for structures incorporated in current building codes. The site has no greater seismic risk than surrounding areas and the Gresham area in general.

FIELD EXPLORATION

Exploratory Test Pit Excavations

The site-specific exploration for this study was conducted on July 11 and 26, 2023 and continued August 1, 2023. These explorations consisted of nine test pit excavations (designated TP-1 through TP-9) excavated and re-excavated with track mounted machines of increasing size. Extents of excavations reached maximum depths of 19 feet below ground surface (bgs) at the approximate locations shown on the attached Site Map, Figure 2.

Test pit locations were determined in the field by pacing or taping distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate.

Explorations were conducted under the full-time observation of HGSI personnel. Soil samples obtained from the explorations were classified in the field and representative portions were placed in relatively air-tight plastic bags. These soil samples were then returned to the laboratory for further examination. Pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater

occurrence was recorded. Soils were classified in general accordance with the Unified Soil Classification System.

Summary exploration logs are attached to this report. The stratigraphic contacts shown on the individual logs represent the approximate boundaries between soil types. The actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times.

SUBSURFACE CONDITIONS

The following discussion is a summary of subsurface conditions encountered in our explorations. For more detailed information regarding subsurface conditions at specific exploration locations, refer to the attached exploration logs. Also, please note that subsurface conditions can vary between exploration locations, as discussed in the *Uncertainty and Limitations* section below.

Soil

On-site soils are anticipated to consist of organic-rich topsoil, Missoula Flood deposits of the fine-grained variety, and weathered Troutdale formation materials as described below.

> ***Topsoil –*** Topsoil was found mainly at surface level in all five test pit excavations. The maximum depth of a moderately organic topsoil unit was 8 to 10 inches. The topsoil unit was mainly composed of a moist to slightly moist dark brown silt unit with many roots ranging in size.
>
> ***Missoula Flood Deposits*** – Below the topsoil unit, our explorations encountered a unit of dry to slightly moist, brown silt with varying amounts of sand and clay. The soils generally increased in moisture content and stiffness with greater depth. These soils were medium stiff to very stiff and were slightly micaceous confirming the interpretation of the soils being Missoula Flood deposits. The presence of many mottles indicates that these soils are likely undisturbed and beginning weathering in-situ. All of the test pits except TP-1, TP-2 and TP-3 were terminated in the fine-grained Missoula Flood Deposits at depths of 17 to 19 feet bgs.
>
> ***Weathered Troutdale Formation*** – In TP-1 and TP-3 we encountered weathered Troutdale formation materials at depths of 16 and 16.5 feet bgs. The materials consisted generally of gravelly clay with fine to medium sand that appeared somewhat lithified (rock-like). TP-1 and TPP-3 were terminated within these materials at depths of 17 and 19 feet bgs respectively.

Groundwater

During the field exploration, no groundwater or seepage were encountered in test pits TP-1 through TP-9.

SLOPE STABILITY AND GEOLOGIC HAZARDS

For the purpose of evaluating slope stability and geologic hazards, we reviewed published geologic and hazard mapping, reviewed regional site topography and LIDAR images, performed a field reconnaissance, and evaluated subsurface soil conditions in exploratory test pits and borings.

Reconnaissance observations indicate that slope geomorphology at the site is generally smooth and uniform, consistent with stable slope conditions. No geomorphic evidence of prior slope instability (such as hummocky topography, benches or old scarps) was observed. No seeps or springs were observed on site. As shown in the bare-earth lidar mapping, Figures 3 and 3a, there are several areas mapped as being underlain

by ancient debris-flow materials. The features are mapped with Moderate (11-29%) Confidence Level, and are of prehistoric origin (older than 150 years). The presence of the ancient debris flow soils (if the mapping is correct) does not represent a geologic hazard to the site.

Regional geologic mapping and the Oregon Department of Geology and Mineral Industries online landslide database (SLIDO, 2021) shows that, across much of the site, the landslide susceptibility for shallow slides is low to moderate except at the northeast portion along Kelley Creek where susceptibility is high to very high, as shown in Figure 3b. The areas of high risk for shallow sliding will be avoided by the site development plan.

In HGSI's our opinion, no special design or construction provisions are needed to address slope issues on the site. Development of the site is not anticipated to have a negative impact slope stability of the site or adjacent properties. The project will be designed and constructed per current building codes, City of Gresham requirements, and the current standard-of-practice in geotechnical engineering. As such, it is our opinion that adequate slope stability factors of safety will be maintained for both temporary construction, and long-term conditions.

Surface water / storm water management systems should be designed such that potential overflow is discharged in a controlled manner away from structures and slopes.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Results of this study indicate that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. Soil and groundwater conditions are similar to those encountered on previous phases of the Brookside subdivisions just north of the site, and during grading of the large regional stormwater facility just northwest of the site. We did not encounter any unusual soil conditions that would necessitate special planning or construction measures other than those typically used in the site area.

It is our opinion that the site can be developed using construction practices typical of those used in the area, for similar developments. Additional geotechnical explorations and engineering will be needed in association with development. During site development, geotechnical monitoring and testing should be performed of site stripping, undocumented fill removal and recompaction (if encountered), site earthwork and fill compaction, utility trench backfill and paving.

Stripping Depths: Based on the test pits performed, we anticipate stripping depths of about 8 to 10 inches in most areas. Deeper stripping may be needed in areas of heavy vegetation or formerly treed areas.

Undocumented Fill: Localized areas of undocumented fill may be encountered on site, although undocumented fill was not encountered in the test pits conducted for this study. Where it occurs, undocumented fill would generally require removal and replacement with properly compacted engineered fill in areas of structures, pavements, or other settlement sensitive improvements. We anticipate that the removed fill materials will generally be suitable for re-use as compacted engineered fill, except that any zones of organic soils, animal remains or other unsuitable materials will need to be removed prior to use as engineered fill.

Earthwork: Site soils are anticipated to be moisture sensitive, and as a result earthwork operations will be most efficient and least costly during the dry summer months. Wet weather earthwork would require special provisions such as cement treatment of fill soils and roadway subgrades, greater

stripping and removal depths, increased rock sections beneath pavements, and/or use of imported granular fill, as would be the case for any development in the site area.

Excavating Conditions and Hard Rock: We anticipate that on-site soils can be excavated to depths of at least 10 feet across much of the site using conventional heavy equipment such as scrapers and trackhoes. The backhoe test pits did not meet refusal or encounter had rock to the maximum depth of exploration, 10.8 feet.

Slope Stability: Slopes on site are relatively gentle, and we did not observe any indications of unstable slope conditions during our site reconnaissance. Geologic maps reviewed for this study did not indicate the presence of landslides or mapped slope stability hazards. We do not anticipate that project design will be impacted by steep slope areas or landslide hazard zones. Stability of cut or fill slopes created during site development can be maintained by proper design and construction practices. For planning purposes, cut and fill slopes should be no steeper than 2H:1V (Horizontal:Vertical).

Structural Foundations: In general, we anticipate that typical spread footing foundations will be acceptable for use on the project site, with allowable soil bearing capacities ranging from 2,000 to 2,500 psf.

Seismic Design: The site is subject to moderate earthquake risk, and project elements should be designed in accordance with applicable seismic codes. Soil Class D, Stiff Soil, should be assumed for site soils. Seismic design parameters for use under the current building code were determined for the site using the ASCE 7-16 Hazard Tool; results are attached to this report. Based on our experience in the area, the explorations performed and available geologic mapping, we do not anticipate the presence of liquefiable soils on site. The site is anticipated to have no greater seismic risk than surrounding properties and the Gresham area in general.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and his/her consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HGSI should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, HGSI executed these services in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

August 3, 2023
HGSI Project No. 23-3128

We appreciate this opportunity to be of service.

Sincerely,

HARDMAN GEOTECHNICAL SERVICES INC.

Jarred A. Clos, E.I.T.
Engineering Staff

Scott L. Hardman, P.E., G.E.
Geotechnical Engineer

Attachments: References
Figure 1 – Vicinity Map
Figure 2 – Site Map
Figure 3 – Bare Earth LiDAR Mapping
Figure 3a – LiDAR and Landslides Mapping
Figure 3b – Landslide Susceptibility Mapping
Logs of Backhoe Test Pits TP-1 through TP-9

REFERENCES

Beeson, M.H., Tolan, T.L., and Madin, I.P., 1991, Geologic map of the Portland Quadrangle, Multnomah, and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries Geological Map Series GMS-75, scale 1:24,000.

Madin, I.P., 1994, Geologic map of the Damascus quadrangle, Clackamas and Multnomah Counties, Oregon, Oregon Department of Geology and Mineral Industries, Geological Map Series 60, scale 1:24,000.

Oregon Department of Geology and Mineral Industries SLIDO, Version 4.4, updated October 29, 2021. https://gis.dogami.oregon.gov/maps/slido/

Trimble, D.E., 1963, Geology of Portland, Oregon and adjacent areas; US Geological Survey Bulletin B-1119, Scale 1:62,500.

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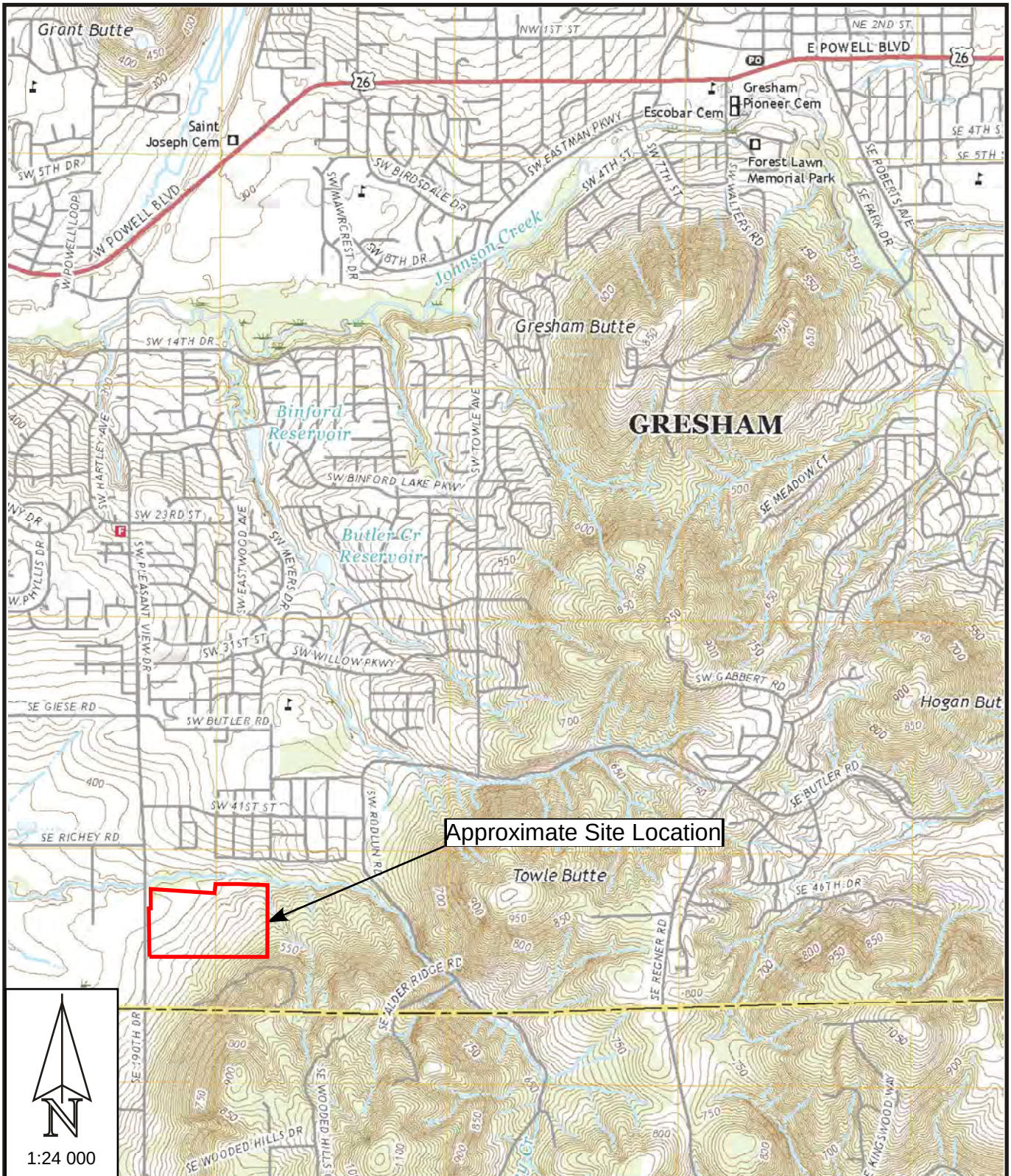
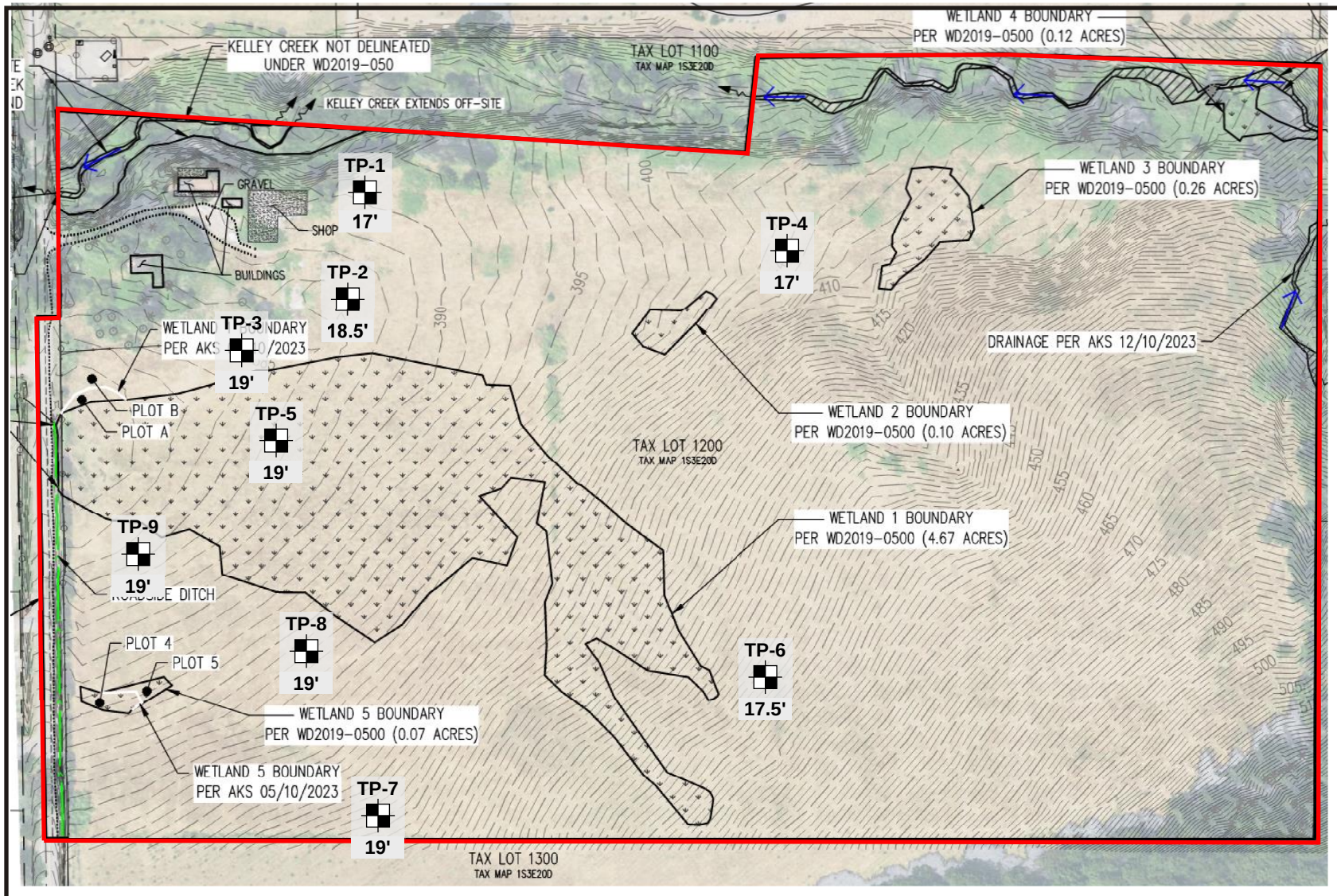
VICINITY MAP



Project: Veranda Gresham, Oregon	Project No. 23-3128	FIGURE 1



LEGEND

TP-X — Test Pit Designation and Approx. Location

XX' — Depth to bottom of test pit (feet)

Approximate Site Area

FIGURE 2
SITE MAP

Project: Veranda - 7928 SE 190th Drive
Gresham, Oregon

Project No.: 23-3128

Jurisdiction: City of Gresham

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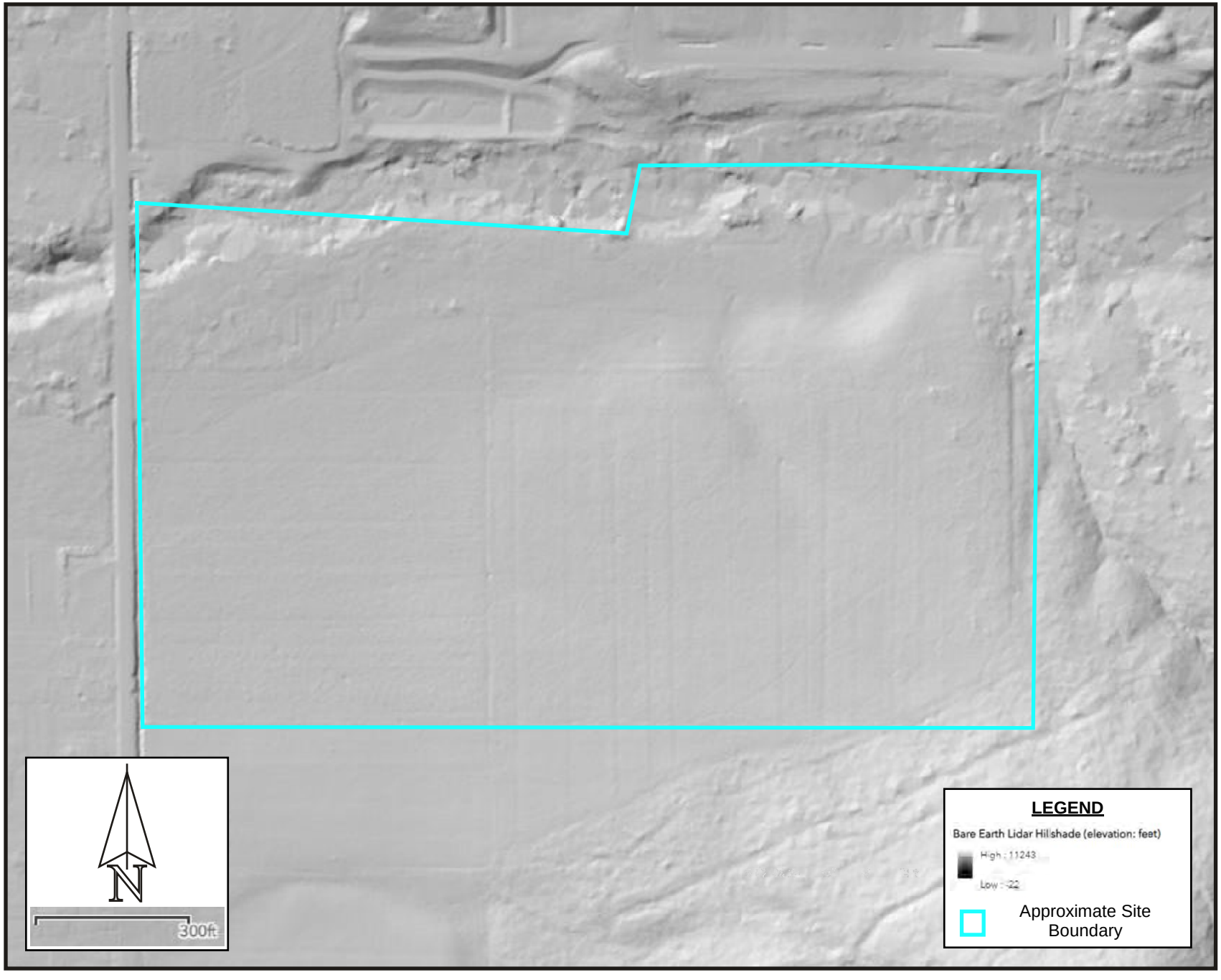

FIGURE 3
LiDAR MAP

Project: Veranda - 1928 SE 190th Drive
Gresham, Oregon

Project No.: 23-3128

Jurisdiction: City of Gresham

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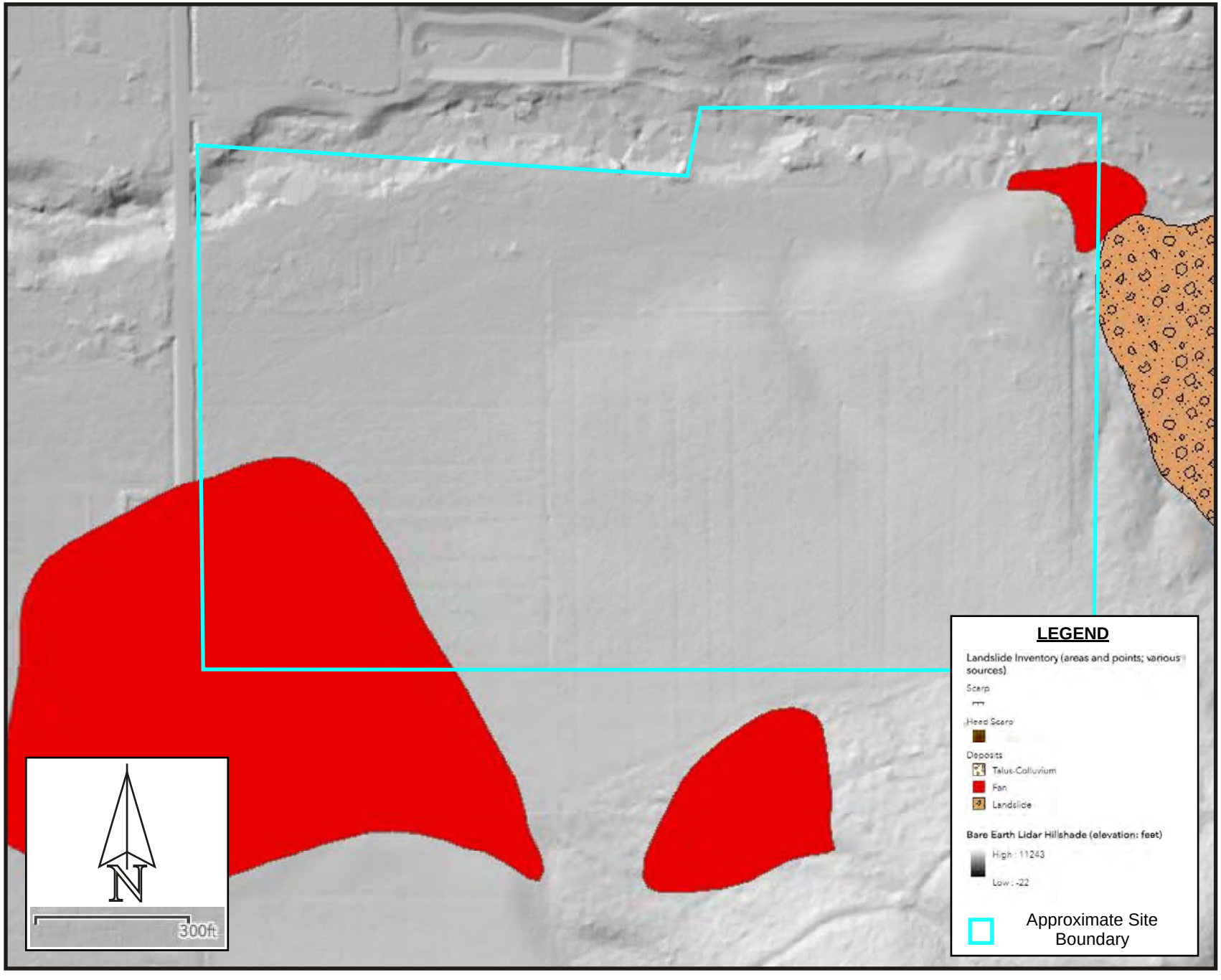

FIGURE 3a

LiDAR with Landslides

Project: Veranda - 1928 SE 190th Drive
Gresham, Oregon

Project No.: 23-3128

Jurisdiction: City of Gresham

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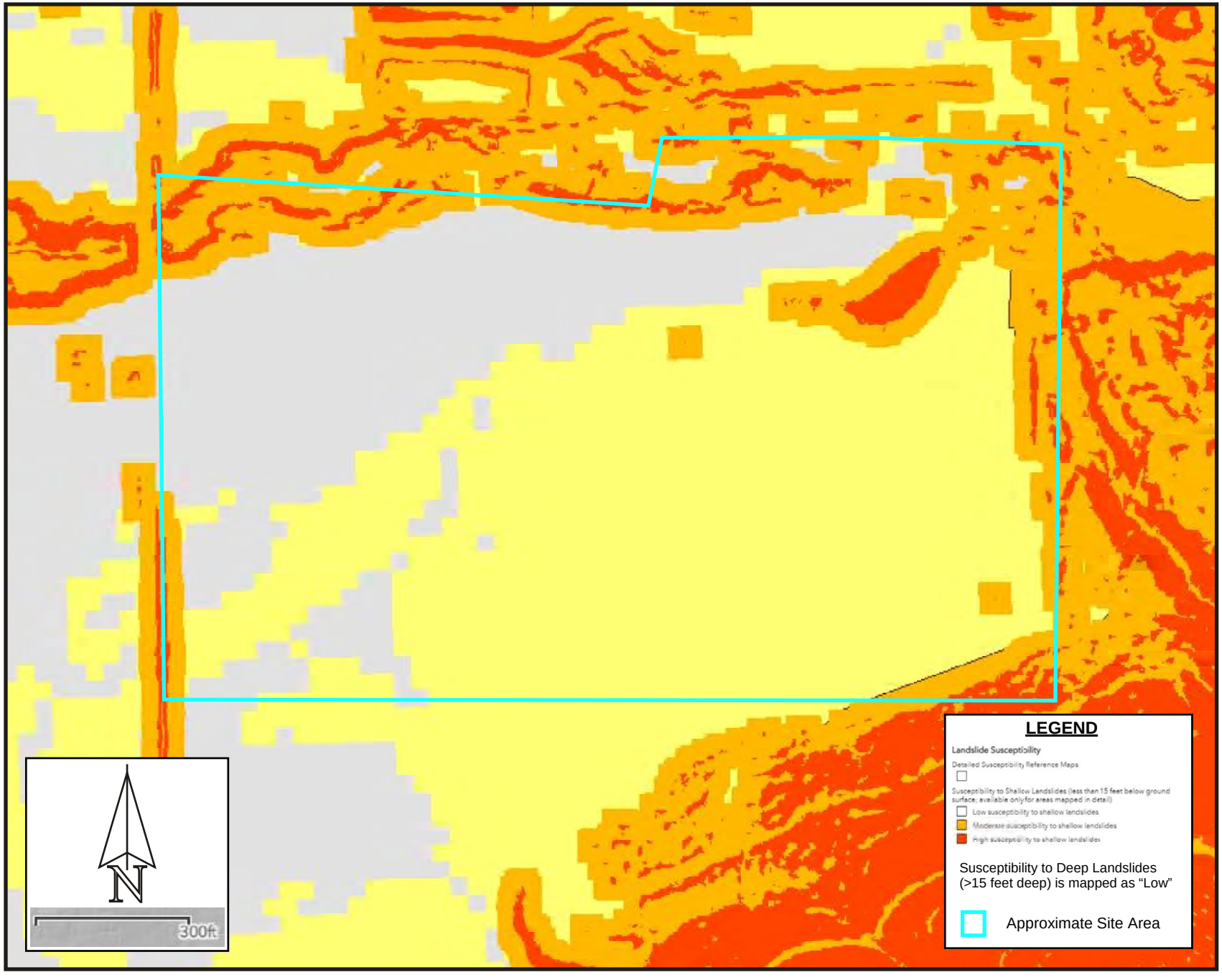

FIGURE 3b

Landslide Susceptibility

Project: Veranda - 1928 SE 190th Drive Gresham, Oregon

Project No.: 23-3128

Jurisdiction: City of Gresham

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LOG OF BACKHOE / EXCAVATOR TEST PIT

Project: Veranda - 7928 SE 190th Drive Gresham, Oregon	Project No. 23-3128	Test Pit No. **TP - 1**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
0						Dry (Baked), Nonplastic, Noncohesive, Medium Stiff to Stiff, Brown SILT (ML), Highly Organic with Small Grass Roots *[Topsoil]*
1						Dry, Nonplastic, Noncohesive, Stiff, Brown SILT (ML), Slightly Micaceous *[Missoula Flood Deposits - Fine Grained Facies]*
2						Slightly Moist, Nonplastic, Slightly Cohesive, Stiff, Brown to Red-Brown Clayey SILT (MH), Slightly Micaceous, with Gray & White Streaking, Many Orange & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
9						Slightly Moist to Moist, Nonplastic, Slightly Cohesive, Stiff, Brown-Gray Clayey SILT with Fine Sand (MH), Slightly Micaceous, with Orange, White, & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
11						Moist, Nonplastic, Slightly Cohesive, Stiff to Very Stiff, Gray-Brown Silty CLAY with Trace Fine Sand (CL), Slightly Micaceous, with Many Orange Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
16						Very Moist, Slightly Plastic, Slightly Cohesive, Very Stiff to Hard/Dense, Gray-Brown Gravelly CLAY with Trace Sand (CL), Slightly Micaceous, with Heavy Gray & Orange Mottling *[Weathered Troutdale Formation Soils]*
17						*Test pit terminated at 17 feet* *No Seepage or Static Groundwater Encountered* *No Caving*
22						

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LEGEND

S-# Soil Sample Depth Interval and Designation

Water Level at Time of Excavation

Date Excavated: 7/26/2023

Logged By: JAC/SLH

LOG OF BACKHOE / EXCAVATOR TEST PIT

Project: Veranda - 7928 SE 190th Drive Gresham, Oregon	Project No. 23-3128	Test Pit No. **TP - 2**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
1						Dry (Baked), Nonplastic, Noncohesive, Medium Stiff to Stiff, Brown SILT (ML), Highly Organic with Small Grass Roots *[Topsoil]*
2						Dry to Slightly Moist, Nonplastic, Noncohesive, Stiff, Brown SILT (ML), Slightly Micaceous *[Missoula Flood Deposits - Fine Grained Facies]*
3						
4						
5						
6						
7						
8						Slightly Moist to Moist, Nonplastic, Slightly Cohesive, Stiff, Brown to Red-Brown Clayey SILT (MH), Slightly Micaceous, with Gray & White Streaking, Many Orange & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
9						
10						
11						Moist, Nonplastic, Slightly Cohesive, Stiff to Very Stiff, Silty CLAY with Trace Fine Sand (CL), Slightly Micaceous, with Many Gray & Orange Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
12						
13						Very Moist, Slightly Plastic, Slightly Cohesive, Very Stiff to Hard, Red Brown Gravelly Silty CLAY with Trace Sand (CL), Slightly Micaceous, with Heavy Gray & Orange Streaking/Mottling *[Missoula Flood Deposits - Fine Grained Facies]*
14						
15						
16						Moist to Very Moist, Moderately Plastic, Cohesive, Medium Stiff to Soft, Dark Gray-Blue Sandy CLAY (CL), Slightly Micaceous *[Missoula Flood Deposits - Fine-Grained Facies]*
17						
18						
19						*Test pit terminated at 18.5 feet* *No Seepage or Static Groundwater Encountered* *No Caving*
20						
21						
22						

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LEGEND

S-# Soil Sample Depth Interval and Designation

Water Level at Time of Excavation

Date Excavated: 8/01/2023

Logged By: JAC/SLH

LOG OF BACKHOE / EXCAVATOR TEST PIT

Project: Veranda - 7928 SE 190th Drive Gresham, Oregon	Project No. 23-3128	Test Pit No. **TP - 3**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
1						Dry (Baked), Nonplastic, Noncohesive, Medium Stiff to Stiff, Brown SILT (ML), Highly Organic with Small Grass Roots *[Topsoil]*
2						Dry, Nonplastic, Noncohesive, Stiff, Brown SILT (ML), Slightly Micaceous *[Missoula Flood Deposits - Fine Grained Facies]*
3					○	3-inch-diameter clay drain tile at 36 inches invert depth, south side of test pit Dry.
4						
5						
6						
7						
8						Slightly Moist to Moist, Nonplastic, Slightly Cohesive, Stiff, Brown to Red-Brown Clayey SILT (MH), Slightly Micaceous, with Gray & White Streaking, Many Orange & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
9						
10						
11						
12						Moist, Nonplastic, Slightly Cohesive, Stiff to Very Stiff, gray with orange mottling, Silty CLAY (CL-ML), Trace fine Sand, Slightly Micaceous, *[Missoula Flood Deposits - Fine Grained Facies]*
13						
14						Moist, Slightly Plastic, Slightly Cohesive, Very Stiff/Dense, Gray-Brown Gravelly CLAY with Some Sand (CL), Slightly Micaceous, with Heavy Orange & Gray Streaking/Mottling *[Weathered Troutdale Formation}*
15						
16						
17						
18						
19						*Test pit terminated at 19 feet* *No Seepage or Static Groundwater Encountered* *No Caving*
20						
21						
22						

HARDMAN GEOTECHNICAL SERVICES INC.
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LEGEND

☒ S-# — Soil Sample Depth Interval and Designation

▽ — Water Level at Time of Excavation

Date Excavated: 8/01/2023

Logged By: JAC/SLH

LOG OF BACKHOE / EXCAVATOR TEST PIT

Project: Veranda - 7928 SE 190th Drive Gresham, Oregon	Project No. 23-3128	Test Pit No. **TP - 4**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
0 – 1						Dry (Baked), Nonplastic, Noncohesive, Medium Stiff to Stiff, Brown SILT (ML), Highly Organic with Small Grass Roots *[Topsoil]*
1 – 3						Dry, Nonplastic, Noncohesive, Stiff, Brown SILT (ML), Slightly Micaceous *[Missoula Flood Deposits - Fine Grained Facies]*
3 – 9						Very Slightly Moist, Nonplastic, Slightly Cohesive, Stiff, Brown to Red-Brown Clayey SILT (MH), Slightly Micaceous, with Gray & White Streaking, Many Orange & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
9 – 13						Moist to Very Moist, Nonplastic, Slightly Cohesive, Stiff, Brown-Gray Clayey SILT with Fine Sand (MH), Slightly Micaceous, with Orange, White, & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
13 – 17						Moist to Very Moist, Moderately Plastic, Cohesive, Stiff, Dark Blue-Gray Sandy CLAY (CL), Slightly Micaceous, with Few White Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
17 – 22						*Test pit terminated at 17 feet* *No Seepage or Static Groundwater Encountered* *No Caving*

HARDMAN GEOTECHNICAL SERVICES INC.
Practical, Cost-Effective Engineering Solutions

LEGEND

S-# Soil Sample Depth Interval and Designation

Water Level at Time of Excavation

Date Excavated: 8/01/2023

Logged By: JAC/SLH

LOG OF BACKHOE / EXCAVATOR TEST PIT

Project: Veranda - 7928 SE 190th Drive Gresham, Oregon	Project No. 23-3128	Test Pit No. **TP - 5**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
0 – 1						Dry (Baked), Nonplastic, Noncohesive, Medium Stiff to Stiff, Brown SILT (ML), Highly Organic with Small Grass Roots *[Topsoil]*
1 – 3						Dry, Nonplastic, Noncohesive, Stiff, Brown SILT (ML), Slightly Micaceous *[Missoula Flood Deposits - Fine Grained Facies]*
3 – 9						Slightly Moist, Nonplastic, Slightly Cohesive, Stiff, Brown to Red-Brown Clayey SILT (MH), Slightly Micaceous, with Gray & White Streaking, Many Orange & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
9 – 12						Slightly Moist to Moist, Nonplastic, Slightly Cohesive, Stiff, Brown-Gray Clayey SILT with Fine Sand (MH), Slightly Micaceous, with Orange, White, & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
12 – 17						Moist, Nonplastic, Slightly Cohesive, Stiff to Very Stiff, Gray Silty CLAY with Trace Fine Sand (CL), Slightly Micaceous, with Many Orange Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
17 – 22						*Test pit terminated at 17 feet* *No Seepage or Static Groundwater Encountered* *No Caving*

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LEGEND

S-# Soil Sample Depth Interval and Designation

Water Level at Time of Excavation

Date Excavated: 8/01/2023

Logged By: JAC/SLH

LOG OF BACKHOE / EXCAVATOR TEST PIT

Project: Veranda - 7928 SE 190th Drive Gresham, Oregon	Project No. 23-3128	Test Pit No. **TP - 6**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
1–12						Dry (Baked) to Very Slightly Moist, Nonplastic, Noncohesive, Stiff to Medium Stiff Brown SILT (ML), Slightly Micaceous, Top 10" Highly Organic with Small Grass Roots, with Some Orange & Gray Mottles *[Topsoil / Missoula Flood Deposits - Fine-Grained Facies]*
2–12						Moist, Nonplastic, Slightly Cohesive, Stiff, Gray-Brown Clayey SILT (ML), Slightly Micaceous, with Heavy Orange, Gray, & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
12–17						Slightly Moist to Moist, Nonplastic, Slightly Cohesive, Stiff, Brown to Red-Brown Clayey SILT (MH), Slightly Micaceous, with Gray & White Streaking, Many Orange & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
17–18						*Test pit terminated at 17.5 feet* *No Seepage or Static Groundwater Encountered* *No Caving*

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LEGEND

S-# Soil Sample Depth Interval and Designation

Water Level at Time of Excavation

Date Excavated: 8/01/2023

Logged By: JAC/SLH

LOG OF BACKHOE / EXCAVATOR TEST PIT

Project: Veranda - 7928 SE 190th Drive Gresham, Oregon	Project No. 23-3128	Test Pit No. **TP - 7**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
1						Dry (Baked) to Very Slightly Moist, Nonplastic, Noncohesive, Stiff to Medium Stiff Brown SILT (ML), Slightly Micaceous, Top 10" Highly Organic with Small Grass Roots, with Some Orange & Gray Mottles *[Topsoil / Missoula Flood Deposits - Fine-Grained Facies]*
3						Moist, Nonplastic, Slightly Cohesive, Stiff, Gray-Brown Clayey SILT (ML), Slightly Micaceous, with Heavy Orange, Gray, & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
12						Slightly Moist to Moist, Nonplastic, Slightly Cohesive, Stiff, Brown to Red-Brown Clayey SILT (MH), Slightly Micaceous, with Gray & White Streaking, Many Orange & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
19						*Test pit terminated at 19 feet* *No Seepage or Static Groundwater Encountered* *No Caving*

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LEGEND

S-# Soil Sample Depth Interval and Designation

Water Level at Time of Excavation

Date Excavated: 8/01/2023

Logged By: JAC/SLH

LOG OF BACKHOE / EXCAVATOR TEST PIT

Project: Veranda - 7928 SE 190th Drive Gresham, Oregon	Project No. 23-3128	Test Pit No. **TP - 8**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
1						Dry (Baked) to Very Slightly Moist, Nonplastic, Noncohesive, Stiff to Medium Stiff Brown SILT (ML), Slightly Micaceous, Top 10" Highly Organic with Small Grass Roots, with Some Orange & Gray Mottles *[Topsoil / Missoula Flood Deposits - Fine-Grained Facies]*
3						Moist, Nonplastic, Slightly Cohesive, Stiff, Gray-Brown Clayey SILT (ML), Slightly Micaceous, with Heavy Orange, Gray, & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
12						Slightly Moist to Moist, Nonplastic, Slightly Cohesive, Stiff, Brown to Red-Brown Clayey SILT (MH), Slightly Micaceous, with Gray & White Streaking, Many Orange & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
18						Moist, Moderately Plastic, Cohesive, Medium Stiff to Soft, Dark Gray-Blue Sandy CLAY (CL), Slightly Micaceous *[Missoula Flood Deposits - Fine-Grained Facies]*
19						*Test pit terminated at 19 feet* *No Seepage or Static Groundwater Encountered* *No Caving*

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LEGEND

S-# Soil Sample Depth Interval and Designation

Water Level at Time of Excavation

Date Excavated: 8/01/2023

Logged By: JAC/SLH

LOG OF BACKHOE / EXCAVATOR TEST PIT

Project: Veranda - 7928 SE 190th Drive Gresham, Oregon	Project No. 23-3128	Test Pit No. **TP - 9**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Interval	Sample Designation	Moisture Content (%)	Groundwater	Material Description
1						Dry (Baked) to Very Slightly Moist, Nonplastic, Noncohesive, Stiff to Medium Stiff, Brown SILT (ML), Slightly Micaceous, Top 10" Highly Organic with Small Grass Roots, with Some Orange & Gray Mottles *[Topsoil / Missoula Flood Deposits - Fine-Grained Facies]*
3						Moist, Nonplastic, Slightly Cohesive, Stiff, Gray-Brown Clayey SILT (ML), Slightly Micaceous, with Heavy Orange, Gray, & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
11						Slightly Moist to Moist, Nonplastic, Slightly Cohesive, Stiff, Brown to Red-Brown Clayey SILT (MH), Slightly Micaceous, with Gray & White Streaking, Many Orange & Black Mottles *[Missoula Flood Deposits - Fine Grained Facies]*
17						Moist, Moderately Plastic, Cohesive, Medium Stiff to Soft, Dark Gray-Blue Sandy CLAY (CL), Slightly Micaceous *[Missoula Flood Deposits - Fine-Grained Facies]*
19						*Test pit terminated at 19 feet* *No Seepage or Static Groundwater Encountered* *No Caving*

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S-# — Soil Sample Depth Interval and Designation

Water Level at Time of Excavation

Date Excavated: 8/01/2023

Logged By: JAC/SLH