TRUE NORTH
GEOTECHNICAL

Pacific Lifestyle Homes
Geotechnical Engineering Evaluation

Landing at Green Mountain Phase 2
22111, 22015, & 22007 NE 28th St
Camas, Washington

True North Project No. 24-0431-2

April 2025 (revised June 2025)

Exhibit 4 SUB25-1006

April 18, 2025 (revised June 17, 2025)

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Subject: **Geotechnical Engineering Evaluation**
Landing at Green Mountain Phase 2
22111, 22015, & 22007 NE 28th St
Camas, Clark County, Washington
Clark County Parcel Nos. 173169000, 173210000, & 173177000
True North Project # 24-0431-2

True North Geotechnical Services (True North) is pleased to submit our finalized Geotechnical Engineering Evaluation for the project noted above. This report was prepared in accordance with “True North Geotechnical - General Services Agreement (GSA) P24-0431-2” dated March 19, 2025, which was authorized by Samantha Zimmer with PLH on March 24, 2025. This report is intended to build off our conclusions summarized in our previously issued report, “Preliminary Geotechnical Engineering Evaluation – Landing at Green Mountain Phase 2”, dated January 30, 2025. This report summarizes the entirety of our work accomplished and provides our geotechnical recommendations for development of the property with the proposed Landing at Green Mountain Phase 2 development.

PROJECT UNDERSTANDING

Our current understanding of the project is based on the information provided to True North by Pacific Lifestyle Homes (PLH). We have been provided the following document related to the proposed project:

- **A one-page sketch, untitled, undated, unsigned**. This pre-application drawing shows the layout of the proposed development, including 57 single-family lots, a network of 2-lane local streets, and the proposed stormwater facility. The proposed development is overlain on the site’s existing conditions and includes an existing Bonneville Power Administration (BPA) transmission line easement.

Briefly, we understand that the subdivision will be developed with 57 single-family residential lots with concrete driveways. The remainder of the property will be developed with asphalt paved roads, associated utilities, landscape/hardscape, and stormwater management facilities. It is our understanding that the existing residence within the central property will remain, as will approximately an acre of pasture at the south of the residence.

We understand this project is in the preliminary planning stages. As such, we have not been provided any structural drawings or foundation loads other than an indication that the single-family residences will be 1- or 2-story buildings. Preliminarily, we have assumed that maximum building loads will on the order of be 4 kips per linear foot for continuous wall footings, 25 kips per isolated column footing, and 150 psf for floor slabs on grade. As the site is generally flat, or gently sloped, we anticipate cuts and fills no greater than 2 to 4 feet, with the exception of utility trenches, and assuming the proposed new residences are not planned to have basements. Finally, we have assumed that the proposed development will be constructed in accordance with the provisions of the 2021 International Building Code (IBC) as well as any jurisdictional code requirements.

SCOPE OF SERVICES

The purpose of our services was to explore the site surface and subsurface conditions in order to provide preliminary geotechnical recommendations for the proposed development. The following describes our specific scope of services:

- **Geologic Map Review**: We reviewed relevant available geologic maps of the site for information regarding geologic conditions and hazards at or near the site.
- **Subsurface Explorations**: We excavated 2 additional test pits (TP-5 and TP-6), to depths ranging between 8 to 9.5 feet below existing ground surface (bgs) across the existing lot to the far east, at the locations shown on Figure 2. This is in addition to our previously completed work, where we excavated a total of 4 test pits (TP-1 through TP-4) at the locations shown on Figure 2. Soil samples were collected from the major strata encountered in each test pit.
- **Infiltration Testing:** We previously performed infiltration testing at the location of the proposed stormwater detention facility, at a depth determined by the Geotechnical Engineer in the field. Infiltration testing was attempted at the location of IT-1 at a depth of 5.5 feet in the silty sand with gravel layer.
- **Laboratory Testing:** All samples were returned to our office and select samples were subjected to additional laboratory testing, that included: in-situ moisture content and fines content testing.
- **Engineering Analyses:** All data collected during the subsurface exploration, literature research, and laboratory testing was evaluated and used to develop geotechnical design and construction recommendations.
- **Geotechnical Engineering Evaluation:** This document summarizes our geotechnical services, and includes:
    - A site vicinity map and site plan showing the approximate locations of our explorations.
    - A discussion of subsurface conditions encountered including pertinent soil and rock properties as well as the encountered groundwater conditions.
    - Geotechnical related recommendations for foundation design including allowable bearing capacity and estimated settlements.
    - Seismic design parameters in accordance with ASCE 7-16.

- Structural fill recommendations, including an evaluation of whether the in-situ soils can be used as structural fill.
- Floor slab support recommendations.
- General retaining wall design parameter recommendations, including earth pressures, backfill, and drainage.
- Flexible and rigid pavement design recommendations.
- General comments regarding site grading and drainage.
- Discussions on other geotechnical issues that may impact the project.

SITE CONDITIONS

Surface Description

The proposed development is a combined 14.74-acre lot, located at 22111, 22015, and 22007 NE 28th Street, Camas, Clark County, Washington; Clark County Parcel numbers 173177000, 173210000, and 173169000, respectively. The site is bound to the north by NE 28th Street, to the west by a similarly rural single-family residence, and to the east by Phase 1 of the Landing at Green Mountain development, also owned by PLH. The parcel to the south is maintained as an open park space by Clark County Parks.

As mentioned above, the combined property of interest consists of three separate lots, all currently developed with single family residences and all associated utilities. Generally, all existing development is located within the northern portion of the parcels, closer to NE 28th Street. The central and eastern lots have gravel driveways and several outbuildings south of the residences; the western lot has an asphalt-paved driveway and does not have any additional structures. It is our understanding that the existing single-family residence and outbuildings on the central lot will remain, in addition to approximately an acre of pasture south of the outbuildings. We understand that the remaining structures on the east and west parcels are currently planned to be demolished to make way for the new development.

The central and eastern lots are generally maintained as fenced pasture, with some mature evergreen and deciduous trees surrounding the existing residences, along the fence lines, and concentrated at the southern extents of the lots. The northern quarter of the western lot is generally used as storage for fence debris and associated equipment for a fencing contractor operating out of the property, in addition to the existing residence. The central half of the western lot is partially within a wetlands area mapped by the National Wetlands Inventory (NWI), and as such, there is extensive standing water across the ground surface of the central half of this lot. The vegetation in this area is characteristic of wetland plants and mostly consists of dense, tall reeds and mature aspen trees. The southern extent of the western lot is heavily forested with mature evergreen and deciduous trees and low undergrowth.

In terms of topography, the northeastern corner of the property is located at approximately 280 feet AMSL (above median sea level), and the site descends at a gentle 0 to 10 percent gradient to the southwestern corner of the property, which is located at 222 feet AMSL. Overall, the slope descending from northeast to southwest across the development area is very gentle and consistent, with very few areas that may be considered locally flatter and/or steeper.

Geologic Setting

The map area lies on the eastern margin of the Portland Basin, which is part of the Puget-Willamette Lowland that separates the Cascade Range from the Oregon Coast Range. Since the late Eocene era, the Cascade Range has been the locus of an episodically active volcanic arc associated with underthrusting of oceanic lithosphere beneath the North American continent along the Cascadia Subduction Zone.

The underlying geologic unit at the subject property is mapped by the Washington Geologic Information Portal as “QTc – Quaternary-Tertiary continental sedimentary rocks and deposits – conglomerate with sandy and silty facies. Quaternary-Miocene pebble, cobble, and boulder gravel. Pleistocene-Pliocene gravel, sand, silt, and clay; deposits of the ancestral Columbia River.”

According to the USDA Soil Survey, there are a number of surficial soils mapped at the site. Within the eastern lot, there are three mapped soils, which include: Lauren gravelly loam (LgB), 0 to 8 percent slopes, Lauren loam (LeB), 0 to 8 percent slopes, and McBee silt loam (MlA), coarse variant, 0 to 3 percent slopes. The Lauren series is considered to be well drained, with moderately high to high permeability, while the McBee series is a poorly drained, hydric soil, which have shallow depths to the water table and experience regular or extended flooding or ponding.

Subsurface Conditions

On December 16, 2024, we visited the site to excavate four exploratory test pits (TP-1 through TP-4), as part of our preliminary evaluation of the site. On March 21, 2025 we returned to excavate two additional test pits (TP-5 and TP-6). In all, we excavated a total of 6 test pits to depths ranging between 4.5 and 10 feet below existing ground surface (bgs) across the proposed development area. Soil samples were collected from the major strata encountered in each test pit and at the bottom of the infiltration test location, and were returned to our office for examination and index testing. See Figure 2 - Site & Exploration Plan for the locations of our explorations. Descriptions of field and lab procedures and the exploration logs are included in Appendix A. The following is a highly generalized description of the subsurface units encountered:

Native SILT

At the ground surface of all explorations, we encountered various soft, fine-grained soils, ranging from silt with varying amounts of clay at TP-1, TP-3 TP-4, TP-5 and TP-6 to highly organic clay at TP-2. These soft surficial soils extended to depths ranging between 1 to 5 feet bgs. Laboratory tests conducted on soil samples retrieved from this layer returned moisture contents ranging from 24 to 39 percent.

Native Sandy CLAY and Silty CLAY with Sand

Underlying the surficial silt at TP-2, TP-4 and TP-5, we encountered soft to medium stiff Sandy CLAY, which extended to depths of about 5 and 6.5 feet bgs, respectively. Laboratory testing conducted on samples retrieved from this layer returned a moisture content of 31 to 36 percent, and a fines content of 52 to 68 percent.

Native Silty SAND and GRAVEL

Underlying the sandy clay at TP-2 and TP-5 and the surficial silt at TP-1, TP- 3 and TP-6, we encountered dense Silty SAND and dense Silty GRAVEL, extending to depths of 8.5 and 7.5 feet bgs, respectively. Laboratory testing conducted on samples retrieved from this layer returned moisture contents ranging from 29 to 45 percent, and fines content ranging between 30 to 56 percent.

Weathered BEDROCK

Underlying the Silty SAND in and the Silty GRAVEL TP-3, TP-5 and TP-6, and underlying the Silty CLAY in TP-2, we encountered very dense Clayey SAND and GRAVEL with Clay, which we interpreted to be weathered bedrock. This layer extended to the termination depths of both explorations. Laboratory testing conducted on samples retrieved from this layer returned moisture contents ranging from 33 to 54 percent.

Groundwater

Groundwater was encountered in all our explorations except TP-6 at depths ranging from about 2 to 3.5 feet bgs. TP-1, TP-2, TP-4, TP-5 were excavated within or very near to the mapped hydric soils in the west and central areas of the site, TP-3 was excavated in non-hydric soils. Data published on Clark County MapsOnline indicates that overall, groundwater at the site is located between 0 to 20 feet bgs, which corresponds to the groundwater conditions observed during our explorations.

Depending on the time of year of construction, it may be possible that groundwater could be an issue during shallow foundation construction.Utility trenches may encounter perched water during construction, requiring the use of shoring and dewatering methods. Due to the shallow groundwater and hydric soils across the site, infiltration of stormwater is likely not feasible. Groundwater elevations can fluctuate depending on the time of year of construction and changes in land use.

Geologic Hazards Review

The following provides a geologic hazards review for the subject site in accordance with CCC 40.430. The geologic hazard review is based on our site reconnaissance and explorations, as well as a review of publicly available published literature and maps.

Mapped Hazards: As a part of our due diligence, we reviewed the Clark County Property Information Center - MapsOnline website (https://gis.clark.wa.gov/gis/property) for information on geologic hazards present at this property. No geologic hazards are mapped on this property. The site is mapped as having an NEHRP site class C and very low liquefaction susceptibility. We address the applicable sections of CCC 40.430 below:

Liquefaction: As stated above, the area to be developed is mapped as having a very low liquefaction susceptibility. This corresponds to the conditions observed in our explorations where dense soils with a significant coarse material percentage (eg, sand, gravel, cobbles, or boulders) were encountered at relatively shallow depths ranging between 4.5 and 7 feet bgs. Dense, large-grained soils below the water table (encountered at 5 feet bgs at the shallowest) have a very low potential for liquefaction.

Ground Motion Amplification: In accordance with ASCE 7-16, we recommend a Site Class C (dense soil and soft rock soil profile with an average N-value greater than 50) for this site when considering the average of the upper 100 feet of bearing material beneath the foundations. This recommendation is based on the results of our subsurface investigation as well as our understanding of the local geology.

Inputting our recommended Site Class as well as the site latitude and longitude into the ACSE 7 website (ASCE 7 Hazard Tool), we obtained the seismic design parameters shown in Table 1 below. Note that the values for F_a and F_v in Table 2 were obtained from ASCE's Supplement 3 dated November 5, 2021 and issued for ASCE 7-16 to correct some seismic design issues in the original publication.

Table 1. 2021 IBC (ASCE 7-16, Supplement 3) Seismic Design Parameters

Location	Short Period	1-Second
Maximum Credible Earthquake Spectral Acceleration	S_s = 0.794 g	S_1 = 0.350 g
Site Class	C	
Site Coefficient	F_a = 1.2	F_v= 1.5
Adjusted Spectral Acceleration	S_{MS} = 0.953 g	S_{M1} = 0.525 g*
Design Spectral Response Acceleration Parameters	S_{DS} = 0.635 g	S_{D1} = 0.350 g
MCE_G Peak Ground Acceleration	MCE_G PGA = 0.355 g	
Site Amplification Factor at PGA	F_{PGA} = 1.2	
Site Modified Peak Ground Acceleration	PGA_M = 0.427 g	

g – acceleration due to gravity, * See note below.

The return interval for the ground motions reported in the table above is 2 percent probability of exceedance in 50 years.

Infiltration Testing

We attempted infiltration testing at the location of the proposed infiltration facility, at a depth of approximately 5.5 feet bgs. No reliable data was collected over the course of the test, due to the presence of surface water and potential shallow groundwater.

Based on this and the presence of shallow groundwater at most of our other explorations, as well as the presence of hydric soil indicators across the site, it is our opinion that infiltration is not a feasible method of stormwater management at this site.

CONCLUSIONS AND RECOMMENDATIONS

Geotechnical Design and Construction Considerations

Based on the results of our Preliminary Geotechnical Engineering Evaluation, development of the site with the proposed development is feasible provided the recommendations in this report are included in the project design and implemented during construction. Again, this is a preliminary geotechnical investigation meant to create a “broad brush” understanding of the subsurface conditions across the site. We recommend lot-specific geotechnical explorations and recommendations if more detailed information is required/recommended.

The primary geotechnical concerns associated with the project are:

1. **Presence of soft surficial soils.** As noted above, we encountered variable depths of soft surficial soils across the site, ranging in thickness from 1 to 5 feet below existing ground surface (bgs). During mass grading we expect much of the surficial soils will be removed from the site or stockpiled for later use in landscape areas. Once the subgrade has been approved by True North, mass grading may begin using suitable onsite material or imported structural/engineered fill. We expect that foundations will generally bear on properly placed and compacted structural/engineer fill.

2. **Presence of shallow groundwater and surficial water.** As stated above, we encountered groundwater at nearly all test pit locations over the course of our explorations. TP-1, TP-2, TP-4, and TP-5 were excavated within or very near to mapped hydric soils, and TP-2 was excavated just north of mapped NWI wetlands area, in a location with an excess of surficial water. It is also possible that the standing water at the ground surface may be an issue for mass grading and shallow foundation construction, and the contractor may need to take steps to dewater much of the western lot before beginning grading activities, depending on the time of year.

   Additionally, utility trenches and other embedded structure excavations will likely encounter groundwater during development of the site. The contractor will need to be prepared for this condition.

> As discussed previously, based on this and the presence of shallow groundwater at most of our explorations, as well as the presence of hydric soil indicators across the site, it is our opinion that infiltration is not a feasible method of stormwater management at this site.

In summary, provided the recommendations in this report are adhered to, we do not foresee any major issues that would preclude the proposed development. The above-mentioned factors are listed to draw the attention of the reader to the issues to address during design and construction.

Moisture Sensitive Soils/Weather Related Concerns

The fine-grained soils at this site are considered moisture sensitive. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

Given the depth of the soft surficial soils encountered across this site, the contractor may need to consider the construction of temporary haul roads depending on the time of year construction takes place. True North can provide more detailed wet weather recommendations if needed. Stormwater should not be allowed to collect on prepared subgrades.

Site Preparation

Site preparation will include clearing, grubbing, etc. to remove the soft upper organic soils to expose the underlying, native, medium-stiff sandy/silty clay. Once the stripping has been approved we recommend proofrolling the site with a fully loaded, tandem axle dump truck to identify any excessively soft spots under the observation of the Geotechnical Engineer during various phases of construction to ensure proper fill placement. Areas not able to be adequately proofrolled (or where not practical) will be evaluated by the Geotechnical Engineer using a ½-inch diameter steel probe rod. Any soft spots identified should be over excavated to expose firm and unyielding soils and replaced with compacted structural fill.

Any utilities present beneath the proposed construction will need to be located and rerouted as necessary and any abandoned pipes or utility conduits should be removed to inhibit the potential for subsurface erosion. Utility trench excavations should be backfilled with properly compacted structural fill in accordance with the structural fill recommendations in this report.

It should be noted that, due to the soft surficial soils observed in the west of the site, construction traffic on these upper soils may have a difficult time moving around on site. We recommend consideration be given to constructing haul roads depending on site conditions at the time of construction.

Subgrade Verification

Following site preparation as described above and compaction of the exposed subgrade prior to placing aggregate base for the foundations, building pad, or pavement section, the exposed subgrade should be evaluated. Subgrades should be evaluated by qualified True North personnel using a steel foundation probe or proofrolling. Unsuitable areas identified during the evaluation should be re-compacted or be excavated and replaced with imported granular structural fill.

Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document and subsequent updates were issued to better ensure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

Depending on the time of year, and the depth of the excavation, groundwater may be encountered at shallow depths. If groundwater is encountered during excavation, the soils encountered in our subsurface explorations should be classified as Type C soil according to the most recent OSHA regulations. If groundwater is not encountered or dewatering is accomplished in advance of excavation, the soils may be classified as Type B soil. In our opinion, excavations should be safely sloped or shored.

If groundwater is encountered during excavation, positive groundwater control will be required, including the possibility of wells extending below the depth of excavation. Groundwater levels will be lowest in the dry season, and construction during that time will minimize groundwater control problems. The groundwater conditions at the time of construction and the contractor’s ability to control these conditions will control the degree of inclination of temporary slopes. In our opinion, temporary excavation slopes can be constructed as steep as 1.5H:1V, if groundwater levels are maintained at least 2 feet below the bottom of the excavation. Slopes should be flattened if significant seepage or running soils are encountered.

If slopes of this inclination, or flatter, cannot be constructed, or if excavations greater than four feet in depth are required, temporary shoring may be necessary. This shoring would help protect against slope or excavation collapse and would provide protection to workmen in the excavation.

We are providing this information solely as a service to our client. True North does not assume responsibility for construction site safety or the contractor's compliance with local, state, and federal safety or other regulations.

Construction Dewatering

The results of our subsurface investigations indicate that the groundwater seepage at the site is located some 1 to 5 feet below the ground surface, and will fluctuate in response to seasonal precipitation. Excavations that extend below the groundwater level may result in caving, heaving, or running soils, especially if excavations extend into the sandy clay soils encountered in our explorations. The contractor should consider the use of a network of ditches and sumps, into which water can flow to be pumped out of the excavation.

The depth and dewatering time will need to be determined at the time of construction and adjusted depending on site conditions. Unprotected working should not be allowed near temporary un-shored excavations until groundwater levels have been stabilized and shoring, such as trench shields or bracing, has been installed.

Structural Fill

Structural fill should be granular, free of organics or other deleterious materials, have a maximum particle size less than 3 inches, be relatively well graded, and have a liquid limit less than 45 and plasticity index less than 25. In our professional opinion, we anticipate the surficial fine-grained soils stripped from this site may be used only in landscape areas. These soils are moisture sensitive and could be difficult (depending on time of year of construction) to properly moisture condition and place. As such, the contractor will need to account for the need to import material to raise site grades. We recommend crushed rock structural fill be placed beneath footings, slabs, or other structural elements to allow for uniform load distribution, to provide protection from the elements, and to create a clean working surface.

We recommend all structural fill be moisture conditioned to within 3 percentage points below and 2 percentage points above optimum moisture as determined by ASTM D1557 (modified proctor). If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying.

Fill should be placed in relatively uniform horizontal lifts on the prepared subgrade which has been stripped of deleterious materials (i.e. topsoil and fill) and approved by the Geotechnical Engineer or his representative. Each loose lift should be about 1-foot thick. The type of compaction equipment used will ultimately determine the maximum lift thickness. Structural fill should be compacted to at least 95 percent of modified proctor maximum dry density as determined by ASTM D1557. Each lift of compacted engineered fill should be tested by a representative of the Geotechnical Engineer prior to placement of subsequent lifts.

Utility Trench Backfill

Trench backfill for the utility pipe base and pipe zone should consist of well-graded granular material with a maximum particle size of ¾ inch and less than 8 percent by weight passing the U.S. Standard No. 200 Sieve. The material should be free of roots, organic matter, and other unsuitable materials.

Trench backfill should be compacted to at least 90 percent of the maximum dry density at depths greater than 4 feet below finished grade and to 95 percent of the maximum dry density within 4 feet of finished grade. Compaction is based on ASTM D1557/AASHTO T-180, the modified proctor test, or as recommended by the pipe manufacturer.

Foundation Recommendations

Once the site has been properly prepared as discussed above, the planned construction can be supported on a conventional shallow foundation system. All foundations should bear on native, undisturbed, medium stiff silty/sandy clay, or atop compacted granular crushed rock structural fill placed atop the approved subgrade soils. Spread footings for building columns and continuous footings for bearing walls supported on the above-mentioned materials can be designed for an allowable soil bearing pressure of 2,000 psf based on dead load plus design live load and can be increased by one-third when including short-term wind or seismic loads. The above allowable soil bearing pressures can be increased by one-third when including short-term wind or seismic loads. Construction shall be accomplished in accordance with the 2021 International Building Code (IBC).

Lateral frictional resistance between the base of footings and the subgrade can be expressed as the applied vertical load multiplied by a coefficient of friction of 0.33 for concrete foundations bearing directly on the subgrade soils described above or on compacted structural fill placed atop that strata. In addition, lateral loads may be resisted by passive earth pressures based on an equivalent fluid pressure of 250 pounds per cubic foot (pcf) for footings poured “neat” against the above-mentioned soil/rock strata. These are ultimate values—we recommend a factor of safety of 1.5 be applied to the equivalent fluid pressure, which is appropriate due to the amount of movement required to develop full passive resistance.

Exterior footings and foundations in unheated areas should be located at a depth of at least 18 inches below the final exterior grade to provide adequate frost protection. If the construction takes place during the winter months and the foundation soils will likely be subjected to freezing temperatures after foundation construction, then the foundation soils should be adequately protected from freezing. Otherwise, interior foundations can be located at nominal depths compatible with architectural and structural considerations.

The foundation excavations should be observed by a representative of the Geotechnical Engineer prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the materials discussed in this report. Unsuitable soil zones encountered at the bottom of the foundation excavations should be removed and replaced with properly compacted structural fill as directed by the Geotechnical Engineer.

The fine-grained soils at this site are moisture sensitive. As such, they should be kept to as close to their in-situ moisture content. This should be accomplished during construction by covering the soil subgrade the same day it is exposed with crushed rock structural fill. Surface run-off water should be drained away from the excavations and not be allowed to pond.

Based on the known subsurface conditions we anticipate that properly designed and constructed foundations supported on the above-mentioned materials could experience maximum total settlement on the order of 1-inch and differential settlement on the order of 1/2-inch over 30 horizontal feet.

Granular Pads: Granular pads should be used if unsuitable foundation conditions are encountered at the proposed foundation subgrade elevations. Granular pads should extend 6 inches horizontally beyond the margins of the footings for each foot of the pad thickness or to the depth of firm, undisturbed native soil. The granular pads should be a minimum of 6 inches thick, however if embedded structures are encountered in the foundation areas, the embedded structure should be removed down to a minimum 24-inches below the base of footing, and granular pads should be thickened accordingly.

The granular pads should consist of ¾-inch minus crushed rock that is fairly well graded between coarse and fine, contains no organic matter or other deleterious materials, and has less than 5 percent passing the U.S. Standard No. 200 Sieve. The imported crushed rock should be compacted to not less than 92 percent of the maximum dry density, as determined by ASTM D 698.

Retaining Walls

We were not provided any construction drawings that would indicate if site retaining walls are necessary to complete the grading of the site. True North is available to provide a separate retaining wall design for any planned walls. We provide the following recommendations for use by the Structural Engineer in the event additional stem walls or other concrete structural walls are required for the homes.

The foundations for the proposed walls should be designed in accordance with foundation recommendations above. Lateral earth pressures on walls, which are not restrained at the top, may be calculated on the basis of an “active” equivalent fluid pressure of 40 pcf for level backfill, and 60 pcf for sloping backfill with a maximum 2H:1V slope. Lateral earth pressures on walls that are restrained from yielding at the top (i.e. stem walls) may be calculated on the basis of an “at-rest” equivalent fluid pressure of 60 pcf for level backfill, and 90 pcf for sloping backfill with a maximum 2H:1V slope. The stated equivalent fluid pressures do not include surcharges, such as foundation, vehicle, equipment, etc., behind walls, hydrostatic pressure buildup, or earthquake loading.

For seismic loading on retaining walls with level backfill, new research indicates that the seismic load is to be applied at 1/3 H of the wall instead of 2/3 H, where H is the height of the wall. We recommend that a Mononobe-Okabe earthquake thrust per linear foot of 4.8 psf* H^2 be applied at 1/3 H, where H is the height of the wall measured in feet. For a maximum 2H:1V slope we recommend 6.6 psf*H^2. This assumes a combination of soil and granular backfill retained by the walls within the active wedge.

All backfill for retaining walls should be select granular material, such as sand or crushed rock with a maximum particle size between ¾ and 1 ½ inches, having less than 5 percent material passing the No. 200 sieve. Because of their silt content, the native soils do not meet this requirement, and it will be necessary to import material to the project for wall backfill. Silty soils can be used for the last 18 to 24 inches of backfill, thus acting as a seal to the granular backfill. All backfill behind retaining walls should be moisture conditioned to within ± 2 percent of optimum moisture content and compacted to a minimum of 90 percent of the material's maximum dry density as determined in accordance with ASTM D1557. Fill materials should be placed in layers that, when compacted, do not exceed about 8 inches. Care in the placement and compaction of fill behind retaining walls must be taken in order to ensure that undue lateral loads are not placed on the walls. An adequate subsurface drain system will need to be installed behind retaining walls to prevent hydrostatic buildup.

Slab-on-grade Floors

Support for lightly loaded floor slabs can be obtained on the undisturbed native soil or on engineered structural fill. A minimum 4-inch-thick layer of imported granular material should be placed and compacted over the prepared subgrade to assist as a capillary break and provide uniform load distribution.

A subgrade modulus of 150 pounds per cubic inch may be used to design floor slabs. Imported granular material should be crushed rock or crushed gravel and sand that is well-graded between coarse and fine, contain no deleterious materials, have a maximum particle size of 1½ inches, and have less than 5% by weight passing the U.S. Standard No. 200 Sieve. The imported granular material may be placed in one lift and should be compacted until well-keyed, about 95% of the maximum dry density as determined by ASTM D1557 (AASHTO T-180).

Pavement Recommendations

The following pavement recommendations are presented as preliminary for your consideration. We assume the roads which are to run through the development connecting N 82nd Avenue to the east and NE 28th Street to the north are classified by the City of Camas as “Local Streets”. These roads serve to distribute traffic from collectors and provide direct access for abutting properties. The City of Camas street construction details specify a minimum pavement thickness of 4 inches overlying

2 inches of crushed rock top course overlying 9 inches of crushed rock base course.

Below, we performed a preliminary analysis of the minimum design pavement section for the road noted above based on assumed traffic loading which includes residential traffic, through trips, and regular and miscellaneous heavy-vehicle traffic. The Civil Engineer for the project may have more traffic and project design data available than is presently known as well as more information regarding the County classification of the road noted above and may wish to modify and/or refine our pavement section thickness recommendations. We are available, upon request, to provide a more detailed pavement design if more definitive traffic information is available.

For analysis of the asphaltic concrete pavement section thickness design recommendations, we have assumed the following design parameters: a design life of approximately 20 years, a Terminal Serviceability Index (P_t) of 2 (i.e. poor condition), and a Regional Factor (R) of 3. We assumed an average of 1,184 trips of a passenger car in and out of the neighborhood per day (684 trips generated by residents and 500 miscellaneous through trips). We also assumed miscellaneous heavier traffic such as garbage trucks, school buses, and delivery vans/trucks. This assumed traffic loading results in 388 equivalent 18,000 pound equivalent single axle loads per day (ESALs). Additionally, we used an assumed CBR value of 3 for the existing medium stiff fine grained clayey soils. These parameters result in a required Structural Number of 3.03 for the new road. Based on these parameters, find that the standard pavement section consisting of 4 inches of Asphalt Concrete over 11 inches of aggregate base is anticipated to be sufficient for the local streets within the planned new subdivision and meets the City of Camas Engineering Standards for a two-lane Local Street, as outlined in the City of Camas Design Standards, Standard Detail ST2. Again, we are available to modify our recommendation if provided with more detailed pavement design traffic loadings and/or route classification.

We recommend the subgrade be proofrolled with a fully loaded tandem axle dump truck dump truck to confirm adequate subgrade conditions. It is possible that there will be areas that are observed to yield that will require correction prior to pavement construction (i.e. ripping wet subgrade soils with the teeth of a dozer to dry them out, and/or re-compacting soils that are soft).

We recommend the placement of a woven geotextile fabric (Mirafi HP270 or equivalent) over the native soil subgrade after it has been prepared and approved, to reduce the risk of contaminating the base course with the native fine-grained soil. Asphalt pavement base course material should consist of a well-graded 1½-inch or ¾-inch-minus crushed rock having less than 5 percent material passing the No. 200 sieve. The base course and asphaltic concrete materials should conform to the requirements set forth in the latest edition of the State of Washington, Standard Specifications for Highway Construction. Base course material should be moisture conditioned to within ± 2 percent of optimum moisture content, and compacted to a minimum of 95 percent of the material's maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor). Fill materials should be placed in layers that, when compacted, do not exceed about 8 inches. Asphaltic concrete material should be compacted to at least 91 percent of the material's theoretical maximum density as determined in accordance ASTM D2041 (Rice Specific Gravity).

In order to achieve the assumed 20 year design life, pavement requires regular maintenance to protect the underlying subgrade from being damaged. The primary concern is subgrade saturation which can cause it to weaken. Proper site drainage should be maintained to protect pavement areas. In addition, cracks that develop in the pavement should be sealed on a regular basis.

Drainage: Permanent, properly installed drainage is also an essential aspect of pavement design and construction. All paved areas should have positive drainage to prevent ponding of surface water and saturation of the base course. This is particularly important in cut sections or at low points within the paved areas, such as around stormwater catch basins. Effective means to prevent saturation of the base course including installing weep holes in the sidewalls to catch basins.

Geotextile Separation Fabric: A geotextile separation fabric will be required at the interface of the native soil and imported subgrade material beneath the proposed roadways. The separation fabric should meet the specificiation provided in WSS 9-33.2(1) – Geotextile Properties (Table 3) for soil separation. The geotextile should be installed in conformance with the specifications provided in WSS 2-12 – Construction Geosynthetic.

Stabilization Material: In the case of unsuitable or unstable pavement subgrade conditions, stabilization material consisting of pit- or quarry-run rock or crushed rock should be placed below the above-described pavement sections. The material should have a maximum particle size of 6-inches and less than 5 percent by dry weight passing the U.S. Standard No. 4 sieve, have at least two mechanically fractured faces, and be free or organic matter or other deleterious material. Material meeting the specification provided in WSS 9-27.3(6) – Stone is generally acceptable for use. Stabilization material should be placed in lifts between 12 and 18 inches thick and compacted to a firm condition with a smooth-drum roller without using vibratory action.

Drainage and Groundwater Considerations

The Contractor should be made responsible for temporary drainage of surface water and groundwater as necessary during construction to prevent standing water and/or erosion at the site.

As a matter of good construction practice, we recommend that perimeter drains be installed for all buildings. Perimeter drains should consist of perforated drainpipe embedded in a zone of free draining fill that is wrapped in a non-woven geotextile filter. The pipe should be connected to a tightline drainpipe leading to storm drain facilities. Foundation and crawl space drainage should be sloped to drain to a sump or low point drain outlet. Water should not be allowed to pond within crawl spaces. Roof drains should be connected to a tightline drainpipe leading to storm drain outlet facilities.

Water should not be allowed to collect in the foundation excavations or on prepared subgrades for the foundations/slabs/roadway during construction. Positive site drainage should be maintained throughout construction activities. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff.

The site grading plan should be developed to provide rapid drainage of surface water away from the building areas and to inhibit infiltration of surface water around the perimeter of the buildings and beneath the floor slabs. The grades should be sloped away from the building area. We anticipate stormwater will be routed to a stormwater management system to be constructed as part of this development.

Soil Erosion

Site-specific erosion control measures should be implemented to address the maintenance of slopes or exposed areas. This may include silt fence, bio-filter bags, straw wattles, or other suitable methods. During construction, all exposed areas should be well compacted and protected from erosion. Temporary slopes or exposed areas may be covered with straw, crushed aggregate, or rip in localized areas to minimize erosion.

CONSTRUCTION OBSERVATIONS

Satisfactory earthwork performance depends on the quality of construction. Sufficient monitoring of the contractor’s activities is a key part ensuring that work is completed in accordance with the construction drawings and specifications. We recommend that True North observe that the subsurface conditions observed during our site investigation are consistent with those encountered during construction, and that foundation subgrades are suitable for placement of structural fill, rebar, or concrete for the new structures. True North cannot accept any responsibility for any conditions that deviate from those described in this report, nor for the performance of the foundations if not engaged to also provide construction observation for this project.

The City of Camas will require a final letter of geotechnical compliance before they finalize a permit. If such a letter is required, a representative from True North MUST observe foundation subgrades PRIOR to concrete being poured for the foundation. If True North does not perform this observation, we cannot provide a final letter of geotechnical compliance, and a permit will not be eligible for final sign-off. It is the owner’s responsibility to ensure that True North be notified in a timely manner (i.e., at least 48 hours prior to the required observation) of the need for our services during construction.

LIMITATIONS

This report was prepared for the exclusive use of Pacific Lifestyle Homes and members of the design team for specific application to the Landing at Green Mountain Phase 2 development located at the address noted above. It should be made available to prospective contractors for information on the factual data only, and not as a warranty of subsurface conditions such as those interpreted from the explorations and presented in the discussions of the subsurface conditions included in this report.

The recommendations contained in this report are based on information derived through subsurface sampling. No matter how effective subsurface sampling may be, variations between exploration location and the presence of unsuitable materials are possible and cannot be determined until exposed during construction. Accordingly, True North’s recommendations can be finalized only through True North's observation of the project's earthwork construction. True North accepts no responsibility or liability for any party's reliance on True North's preliminary recommendations.

Within the limitations of the scope, schedule and budget, the analyses, conclusions, and recommendations presented in this report were prepared in accordance with generally accepted professional geotechnical engineering principles and practice in this area at the time this report was prepared. We make no warranty, either express or implied.

CLOSING

We appreciate the opportunity to be of service to you. If you have any questions, or if we can be of further assistance to you, please contact us at (360) 984-6584.

Respectfully Submitted,

TIMOTHY JAMES NORTH
48620

04/18/25

Timothy J. North, P.E.
Principal Geotechnical Engineer

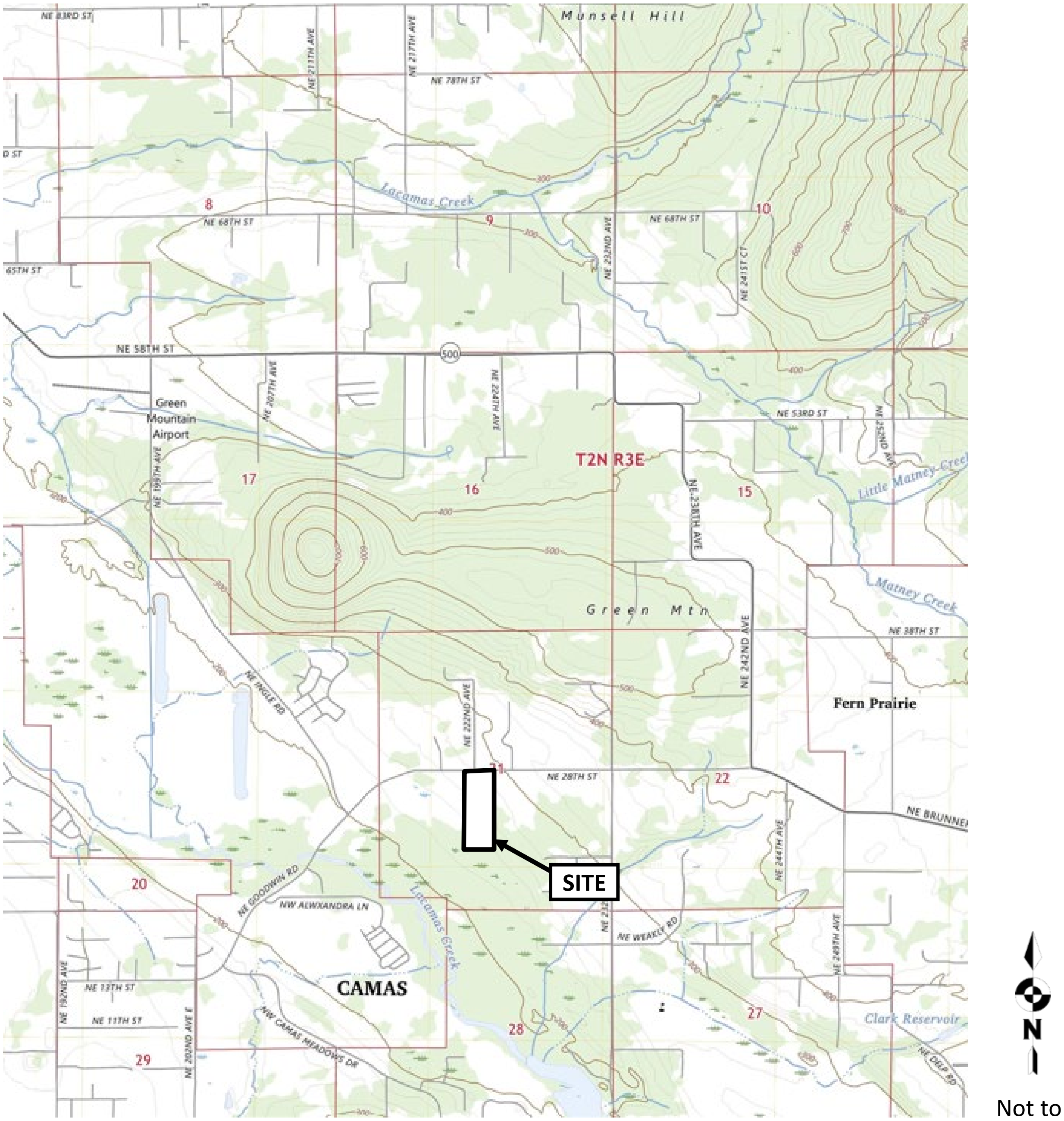
Reviewed By:

Lauren Shepherd, E.I.T.
Staff Geotechnical Engineer

Attachment:	Figure 1 – Site Vicinity
	Figure 2 – Site Layout and Explorations
	Figure 3 – Site Photographs
	Appendix A – Field Exploration Methods, Lab Testing Procedures, Exploration Logs

FIGURES

Exhibit 4 SUB25-1006

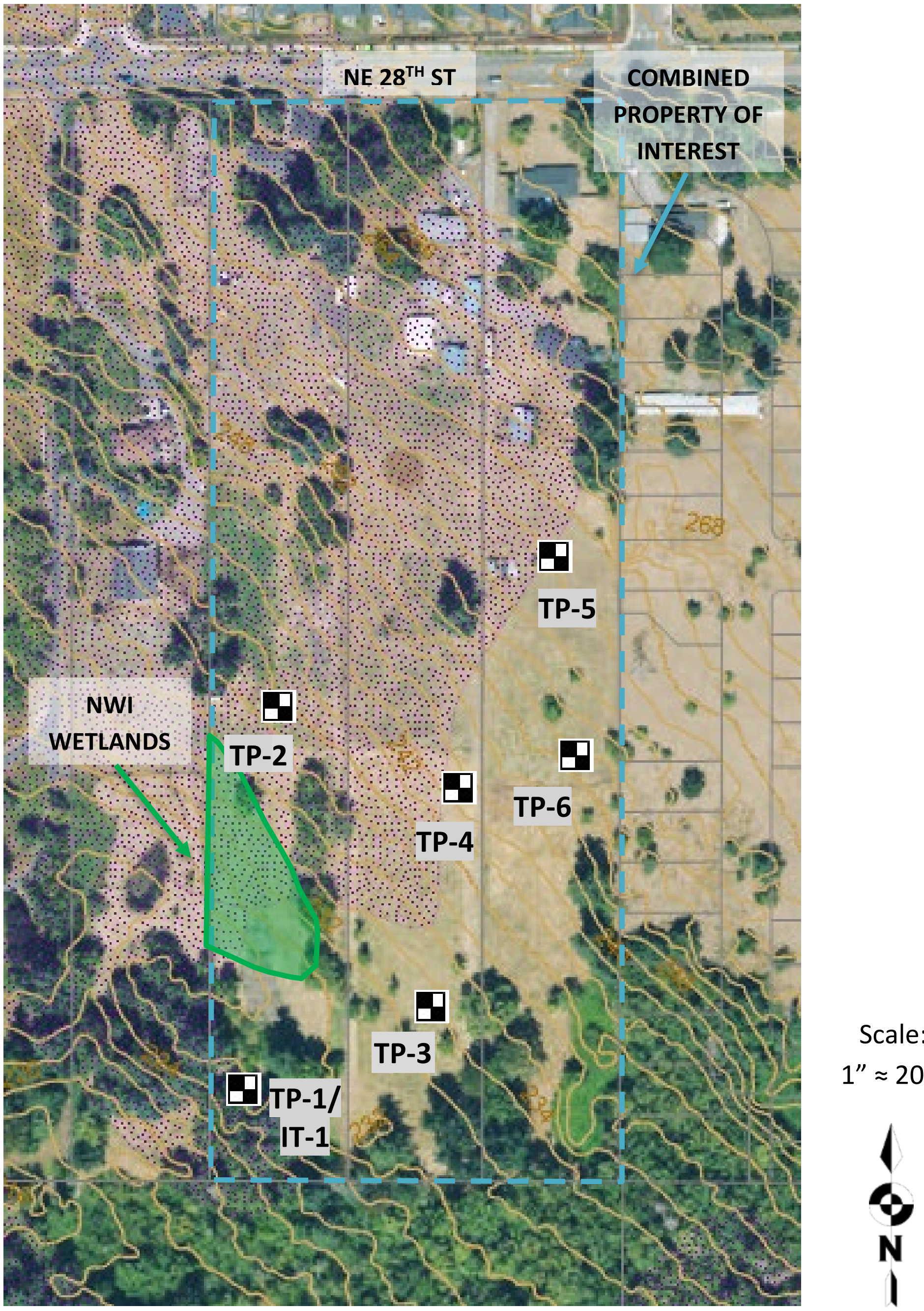


Not to Scale

Source: "Topographic Map of the Lacamas Creek Quadrangle, 7.5 minute series" 2023, United States Geological Survey (USGS).

TRUE NORTH GEOTECHNICAL	Pacific Lifestyle Homes Landing at Green Mountain Ph 2 Camas, Washington	Project # 24-0431-2
219 West 4th Street Vancouver, WA 98660 360-984-6584	April 2025	Figure 1 – Vicinity Map

Exhibit 4 SUB25-1006



▚ TP-1 Approximate Exploratory Test Pit Locations, December 16, 2024, and March 21, 2025.

Note: Purple shading indicates hydric soils.

Source: Aerial & Topo – Clark County MapsOnline, accessed January 6, 2025.

TRUE NORTH GEOTECHNICAL	Pacific Lifestyle Homes Landing at Green Mountain Ph 2 Camas, Washington	Project # 24-0431-2
219 West 4th Street Vancouver, WA 98660 360-984-6584	March 2025	Figure 2 – Site & Exploration Plan

Photo 1. From the approximate location of TP-2, looking south at the location of TP-1

Photo 2. From the approximate location of TP-2, looking east across the combined properties

TRUE NORTH GEOTECHNICAL	Pacific Lifestyle Homes Landing at Green Mountain Ph 2 Camas, Washington	Project # 24-0431-2
219 West 4th Street Vancouver, WA 98660 360-984-6584	April 2025	Figure 3A – Site Photographs (1 of 4)

Photo 3. From the approximate center of the eastern lot, looking southwest

Photo 4. From the approximate center of the center lot, looking north at the existing structures on the lots.

TRUE NORTH GEOTECHNICAL	Pacific Lifestyle Homes Landing at Green Mountain Ph 2 Camas, Washington	Project # 24-0431-2
219 West 4th Street Vancouver, WA 98660 360-984-6584	April 2025	Figure 3B – Site Photographs (2 of 4)

Photo 1. TP-6 in progress, looking northwest

Photo 2. TP-6 in progress, looking west

TRUE NORTH GEOTECHNICAL	Pacific Lifestyle Homes Landing at Green Mountain Ph 2 Camas, Washington	Project # 24-0431-2
219 West 4th Street Vancouver, WA 98660 360-984-6584	April 2025	Figure 3C – Site Photographs (3 of 4)

Photo 3. TP-5 in progress, looking southeast

Photo 4. Existing structures on the eastern lot, looking north.

TRUE NORTH GEOTECHNICAL	Pacific Lifestyle Homes Landing at Green Mountain Ph 2 Camas, Washington	Project # 24-0431-2
219 West 4th Street Vancouver, WA 98660 360-984-6584	April 2025	Figure 3D – Site Photographs (4 of 4)

Exhibit 4 SUB25-1006

APPENDIX A

Field Exploration Procedures
Laboratory Testing Procedures
Test Pit Logs

FIELD EXPLORATION PROCEDURES

General

We excavated a total of 26test pits (TP-1 and TP-6) to depths ranging between 8 and 10 feet below existing ground surface (bgs) across the proposed development area. The excavations were advanced utilizing a Link-Belt 80 X3 with a 30-inch wide toothed bucket subcontracted from Thompson Brothers Excavating. Soil samples were collected from the major strata encountered in each test pit and at the bottom of each infiltration test pit location The approximate exploration locations are shown in Figure 2.

Soil Sampling

Representative grab samples of the soil observed in the explorations were obtained from the sidewalls or spoils. Samples obtained in the exploration were sealed in airtight, plastic bags to retain moisture and returned to our laboratory for additional examination and testing. The test explorations were loosely backfilled.

Pocket Penetrometer Testing

The undrained shear strength of fine-grained soil (silt and clay) was estimated with a pocket penetrometer applied to the sidewalls of the test pits. A pocket penetrometer is a hand-held device that indicates undrained compressive strength in tons per square foot. The test method is approximate and applicable only to fine-grained soil.

Field Classification

Soil samples were initially classified visually in the field. Consistency, color, relative moisture, degree of plasticity, peculiar odors, and other distinguishing characteristics of the soil samples were noted. The terminology used is described in the key and glossary that follow.

Summary Exploration Logs

Results from the explorations are shown in the summary exploration logs. The left-hand portion of a log provides our interpretation of the soil encountered, sample depths, and groundwater information. The right-hand, graphic portion of a log shows the results of pocket penetrometer and laboratory testing. Soil descriptions and interfaces between soil types shown in summary logs are interpretive, and actual transitions may be gradual.

LABORATORY TESTING PROCEDURES

Soil samples obtained during field explorations are examined in our laboratory, and representative samples may be selected for further testing.

Visual-Manual Classification

Soil samples are classified in general accordance with guidelines presented in ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). The physical characteristics of the samples are noted and the field classifications are modified, where necessary, in accordance with ASTM terminology, though certain terminology that incorporates current local engineering practice may be used. The term which best described the major portion of the sample is used to describe the soil type.'

Natural Moisture Content

Natural moisture content is determined in general accordance with guidelines presented in ASTM D2216, Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass. The natural moisture content is the ratio, expressed as a percentage, of the weight of water in a given amount of soil to the weight of solid particles.

Fines Content

Fines content testing is performed in general accordance with guidelines presented in ASTM D1140, *Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No.200) Sieve in Soils by Washing*. The fines content is the fraction of soil that passes the U.S. Standard Number 200 Sieve. This sieve differentiates fines (silt and clay) from sand and gravel. Soil material that remains on the Number 200 sieve is sand. Material that passes the sieve is fines. The test is used to refine soil type.

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TABLE A1
Key to Exploration Logs - Terminology and Symbols

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTION
			GRAPHIC	GROUP	
Coarse Grained Soils More Than 50% Material Retained on No. 200 Sieve	Gravel and Gravelly Soils More Than 50% Coarse Fraction Retained on No. 4 Sieve	Clean Gravels (Little or No Fines)	▨	GW	Well-graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			▨	GP	Poorly-graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		Gravels with Fines (Significant Percentage of FInes)	▨	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
			▨	GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	Sand and Sandy Soils More Than 50% Coarse Fraction Passing No. 4 Sieve	Clean Sands (Little or No Fines)	▨	SW	Well-graded Sands, Gravelly Sands, Little or No Fines
			▨	SP	Poorly-graded Sands, Gravelly Sands, Little or No Fines
		Sands with Fines (Significant Percentage of FInes)	▨	SM	Silty Sands, Sand-Silt Mixtures
			▨	SC	Clayey Sands, Sand-Clay Mixtures
Fine Grained Soils More Than 50% Material Passing No. 200 Sieve	Silts and Clays	Liquid Limit Less than 50 percent	▨	ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty-Clayey Fine Sands, Clayey Silts
			▨	CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays
			▨	OL	Organic Silts and Organic Silty Clays of Low Plasticity
	Silts and Clays	Liquid Limit Greater than 50 percent	▨	MH	Inorganic Silts Micaceous or Diatomaceous Fine Sand or Silty Soils
			▨	CH	Inorganic Clays of High Plasticity, Fat Clays
			▨	OH	Organic Clays of Medium to High Plasticity, Organic Silts
Topsoil			▨	TS	Topsoil, Humus, Duff or Peat (PT) Layers
Fill			▨	F	Highly Variable Constituents
Bedrock			▨	BR	Basalt, Sandstone, Shale, etc.

Relative Density of Coarse-Grained Soils	
Relative Density	N - Blows per Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50+

Consistency of Fine-Grained Soils	
Relative Density	N - Blows per Foot
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 -8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	30 - 50
Very Hard	50+

▼	Observed Groundwater Elevation

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Geotechnical Log - Test Pit

TP-1

UTM	: 10T	**Excavator**	: Link-Belt	**Job Number**	: 24-0431-2
Latitude	: 45.63994	**Excavator Supplier**	: Thompson Brothers Excavating	**Client**	: Pacific Lifestyle Homes
Longitude	: -122.44693	**Logged By**	: LS	**Project**	: Landing at Green Mountain - Phase II
Ground Elevation	: 224 (ft)	**Reviewed By**	: TJN	**Location**	: 22007 NE 28th St, Camas, WA 98607, USA
Total Depth	: 8 ft BGL	**Date**	: 12/16/2024	**Loc Comment**	:

Depth (ft)	Sample No.	Graphic Log	USCS Symbol	Soil Description	Water Content (%)	Fines Content (%)	Pocket Pen (TSF)	Notes
			CL-ML	Soft, dark brown, SILTY CLAY; rooted to 1 foot bgs; very moist.				
1							0.5	
2	S1				24		0.75	
3							1.75	
▼			CL-ML	As above, but soft to medium stiff, dark brown with red mottling, wet.				
4								
5			SM	Medium dense, gray brown, SILTY SAND WITH GRAVEL; decreasing fines content with depth; wet.				
	S2				31	41		Infiltration testing attempted at 5.5 feet bgs
6	S3				33	30		
7								
	S4				31	36		

Terminated due to refusal on boulders. Groundwater first encountered at 3.5 feet bgs. Test pit backfilled with excavated soils and tamped to grade.

Exhibit 4 SUB25-1006

True North Geotechnical

219 W. 4th Street Vancouver, WA 98660

Phone: (360) 984-6584

Geotechnical Log - Test Pit

TP-2

UTM : 10T
Latitude : 45.64119
Longitude : -122.44682
Ground Elevation : 240 (ft)
Total Depth : 8 ft BGL

Excavator : Link-Belt
Excavator Supplier : Thompson Brothers Excavating
Logged By : LS
Reviewed By : TJN
Date : 12/16/2024

Job Number : 24-0431-2
Client : Pacific Lifestyle Homes
Project : Landing at Green Mountain - Phase II
Location : 22007 NE 28th St, Camas, WA 98607, USA
Loc Comment :

Depth (ft)	Sample No.	Graphic Log	USCS Symbol	Soil Description	Water Content (%)	Fines Content (%)	Pocket Pen (TSF)	Notes
		▥	OL	Soft, gray, ORGANIC CLAY; wet.				
1	S1	▥			39		0.5	
▼ 2		▨	SC	Soft to medium stiff, gray brown with red mottling, SANDY CLAY; wet.			0.5	
3		▨					2.5	
	S2	▨			36	52		
4		▨					3.75	
5		░	SM	Medium dense, brown with red mottling, SILTY SAND; increasingly coarse with depth; wet.				
	S3	░			33	33		
6		░						
7		░						
	S4	░			32			
				Terminated due to refusal on boulders. Groundwater first encountered at 2 feet bgs. Test pit backfilled with excavated soils and tamped to grade.				

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True North Geotechnical

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Geotechnical Log - Test Pit

TP-3

UTM	: 10T	**Excavator**	: Link-Belt	**Job Number**	: 24-0431-2
Latitude	: 45.64000	**Excavator Supplier**	: Thompson Brothers Excavating	**Client**	: Pacific Lifestyle Homes
Longitude	: -122.44616	**Logged By**	: LS	**Project**	: Landing at Green Mountain - Phase II
Ground Elevation	: 234 (ft)	**Reviewed By**	: TJN	**Location**	: 22007 NE 28th St, Camas, WA 98607, USA
Total Depth	: 10 ft BGL	**Date**	: 12/16/2024	**Loc Comment**	:

Depth (ft)	Sample No.	Graphic Log	USCS Symbol	Soil Description	Water Content (%)	Fines Content (%)	Pocket Pen (TSF)	Notes
0		▥	ML	Soft, dark brown, SILT, some clay; very moist.				
1		▥	CL-ML	Soft, brown with red mottling, SILTY CLAY WITH SAND; wet.			0.5	
2	S1	▥			27		0.5	
▼								
3	S2	▨	SC	Soft to medium stiff, brown with red mottling, SANDY CLAY WITH GRAVEL; wet.	32	56	1.0	
4		▨					3.0	
5		▨						
6		▨						
7		⁘	SP	Medium dense, gray with red mottling, POORLY GRADED SAND; increasingly coarse with depth; wet.				
8	S3	⁘			37			
9		⁘						
	S4	⁘			37			

Groundwater first encountered at 2.5 feet bgs. Test pit backfilled with excavated soils and tamped to grade.

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Geotechnical Log - Test Pit

TP-4

UTM	**: 10T**	**Excavator**	**: Link-Belt**	**Job Number**	**: 24-0431-2**
Latitude	**: 45.64097**	**Excavator Supplier**	**: Thompson Brothers Excavating**	**Client**	**: Pacific Lifestyle Homes**
Longitude	**: -122.44581**	**Logged By**	**: LS**	**Project**	**: Landing at Green Mountain - Phase II**
Ground Elevation	**: 246 (ft)**	**Reviewed By**	**: TJN**	**Location**	**: 22007 NE 28th St, Camas, WA 98607, USA**
Total Depth	**: 9 ft BGL**	**Date**	**: 12/16/2024**	**Loc Comment**	**:**

Depth (ft)	Sample No.	Graphic Log	USCS Symbol	Soil Description	Water Content (%)	Fines Content (%)	Pocket Pen (TSF)	Notes
			ML	Soft, dark brown, SILT, some clay; very moist.				
1							0.5	
			CL-ML	Soft to medium stiff, brown, SILTY CLAY; wet to very moist.				
2							0.5	
	S1				31	55		
3							1.75	
▼								
4							2.25	
5	S2		SP	Gray-brown, POORLY GRADED SAND WITH GRAVEL; medium sized gravel; medium to coarse grained sand; wet.	33			
6								
7								
8								
	S3				46			
				Groundwater first encountered at 3.5 feet bgs. Test pit backfilled with excavated soils and tamped to grade.				

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Geotechnical Log - Test Pit

TP-5

UTM : 10T
Latitude : 45.64172
Longitude : -122.44533
Ground Elevation : 253.58 (ft)
Total Depth : 9.5 ft BGL

Excavator : Link-Belt
Excavator Supplier : Thompson Brothers Excavating
Logged By : LS
Reviewed By : TJN
Date : 03/21/2025

Job Number : 24-0431-2
Client : Pacific Lifestyle Homes
Project : Landing at Green Mountain - Phase II
Location : 22007 NE 28th St, Camas, WA 98607, USA
Loc Comment :

Depth (ft)	Sample No.	Graphic Log	USCS Symbol	Soil Description	Water Content (%)	Fines Content (%)	Pocket Pen (TSF)	Notes
1		▥	ML	Soft, dark brown, SILT; heavily rooted to 0.5 feet bgs; moist.				
2 ▼ 3 4 5 6	S1	▨	SC	Soft to medium stiff, brown with gray and red mottling, Sandy CLAY; moist to wet.	35	68		
7 8	S2	▒	SM	Dense, brown with gray and red mottling, Silty SAND with cobbles and boulders; boulders up to 14 inches in diameter; moist to wet.	29	47		
9	S3	▦	GP-GC	Very dense, yellow brown, GRAVEL with Clay (weathered bedrock); moist to wet.	41			
				TP-5 Terminated at 9.5ft (Groundwater encountered at 3 feet bgs. Test pit backfilled with excavated soils and tamped to grade.)				

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True North Geotechnical

219 W. 4th Street Vancouver, WA 98660
Phone: (360) 984-6584

Geotechnical Log - Test Pit

TP-6

UTM	: 10T	**Excavator**	: Link-Belt	**Job Number**	: 24-0431-2
Latitude	: 45.64090	**Excavator Supplier**	: Thompson Brothers Excavating	**Client**	: Pacific Lifestyle Homes
Longitude	: -122.44529	**Logged By**	: LS	**Project**	: Landing at Green Mountain - Phase II
Ground Elevation	: 245.31 (ft)	**Reviewed By**	: TJN	**Location**	: 22007 NE 28th St, Camas, WA 98607, USA
Total Depth	: 8 ft BGL	**Date**	: 03/21/2025	**Loc Comment**	:

Depth (ft)	Sample No.	Graphic Log	USCS Symbol	Soil Description	Water Content (%)	Fines Content (%)	Pocket Pen (TSF)	Notes
1			ML	Soft, dark brown, SILT; heavily rooted to 0.75 feet bgs; moist.				
2			GM	Dense, gray brown, Silty GRAVEL; slightly moist to moist.				
	S1				45			
3 4 5								
6	S2				36	49		
7								
	S3		SC	Very dense, yellow gray, Clayey SAND with cobbles and boulders (weathered bedrock); moist to dry.	54			

TP-6 refusal at 8ft (Refusal at 8 feet bgs due to practical equipment failure. Groundwater not encountered. Test pit backfilled with excavated soils and tamped to grade.)