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Bella Terra Investments 2 Inc.
1028 Ravenwood Drive
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December 15, 2023
File: 23403-C
R0

Attention: Tony Barone

Re: Geotechnical Investigation Report – Proposed Subdivision Development – Bella Terra Pinnacle Ridge, Anmore, BC
Lot 2 Sec 16 TP 39 New Westminster District PL BCP50903

1.0 INTRODUCTION

We understand that Bella Terra Investments 2 Inc. intends to develop a new residential subdivision at the above referenced property. The Landmark Engineering & Planning drawings, dated December 12, 2023, show a residential subdivision that includes 4 single family residential lots and 36 townhouse units with on-site paved roadways, utilities, and park dedication. This subdivision has been coordinated with adjoining residential subdivision developments proposed to the north, TREZ and Anmore Gate, among others, as part of a residential master plan. Future roadways for the subdivision development will be interconnected with these adjacent properties. The development would include the extension of the existing Ridge Mountain Drive, which provides access to the east portion of the sites, the extension of North Charlotte Drive, which connects to Charlotte Crescent in Port Moody, along with new internal roads

Due to the sloping topography of the site, we envisage basements would typically daylight downslope and below grade foundation walls may extend up to 2 levels at the up-slope side of structures. We anticipate wood frame construction for above grade and reinforced concrete for below grade parking, basement, and foundation walls so that loading is relatively light to moderately heavy.

This report presents the results of our geotechnical investigation and provides preliminary recommendations for the design and construction of the proposed development. This report has been prepared exclusively for Bella Terra Investments 2 Inc., for their use and the use of others on their design and construction team. We also expect this report will be relied upon by the Village of Anmore during their permit process. No other use of this report is permitted without written consent of GeoPacific.

2.0 SITE DESCRIPTION

The Anmore Gate property has an area of approximately 3.2 HA and is located within the Pinnacle Ridge area of Anmore. The site is bounded by the proposed Anmore Gate subdivision to the north, crown land and City of Port Moody boundary to the east, private property to the south, and single-family residential homes and private property lots to the west. Notable improvements in the area surrounding the site include a BC Hydro transmission ROW and Meridian Mobile Cell Tower further northeast, a water reservoir to the northeast, Pinnacle Ridge Estates subdivision including single family residential homes to the northwest, and an existing residential subdivision in Port Moody, further south.

The property slopes down from northeast to southwest with elevations of approximately 320 m to 215 m geodetic, based on our review of site contours provided in the Landmark Engineering & Planning drawings. In general, slopes throughout the site are moderate to steep with some shallow slopes in the east portion of the site.

The development site is currently undeveloped and forested with temporary access roads, extending from the upslope ends of asphalt paved Ridge Mountain Drive and North Charlotte Drive, through the general alignment of future road extensions.

3.0 INVESTIGATION

3.1 Drilling Investigation

GeoPacific Consultants Ltd. completed a geotechnical drilling investigation at the TREZ, Anmore Gate and Bella Terra sites on October 12th, 13th, and 16th, 2023. At that time, 21 solid stem auger boreholes were advanced up to 6.1 m below existing grades and eight standpipe piezometer groundwater monitoring wells were installed throughout the properties.

At the Bella Terra property, we completed four solid stem auger boreholes to depths of up to 6.1 m below existing site grades. All boreholes were supplemented with Dynamic Cone Penetration Test (DCPT) soundings to estimate the in-situ relative density of the upper soil profile. Two boreholes were completed as groundwater monitoring wells to aid in characterizing the hydrogeological conditions at the site. The drilling was completed utilizing a track mounted auger drill rig supplied and operated by Southland Drilling of Delta, BC.

The investigations were supervised by and the soils encountered were logged in the field by one of our technical staff. Selected samples were tested by our geotechnical laboratory for moisture content. Borehole with monitoring wells were installed with 50 mm diameter PVC well tubing, surrounded by a sand filter medium at depth, for the purpose of ground water monitoring. The remaining test holes were backfilled with excavated soil upon completion of logging and sealed with bentonite chips, in accordance with Provincial abandonment requirements.

The approximate locations of the auger test holes and monitoring wells with respect to the development site are shown on our Drawing No. 23403-C-01, following the text of this report. The results of our auger test holes and DCPTs are presented in Appendix A of this report. The Anmore Gate site area to the north was previously investigated by others in October of 2016, as indicated in the WSP Canada Inc. report dated December 20, 2016. At this time, 12 test pits were completed to depths ranging from 1.8 to 4.2 m below grade. The WSP test hole site plan and test hole logs are presented in Appendix A for reference.

3.2 Desktop Study

GeoPacific completed a desktop study of the site and surrounding area using available geological maps, mapping/imagery databases, historic aerial photographs, available lidar from BC Lidar Portal, and established surface characterization and previous investigations undertaken in the area. Select lidar images are presented in Appendix B for reference.

Review of historical aerial photographs from UBC's Department of Geography from 1940 to 2016, as well as available lidar from BC Lidar Portal, depicting the site and the surrounding area, was completed by GeoPacific to evaluate evidence of slope instabilities in the past. Our review of indicates no signs of slope instability throughout the site and nearby area. Based on our review of the aerial photographs and available mapping/imagery, we note the following:

- The lands were undeveloped and not subdivided in 1940 with selective logging throughout the area completed prior to 1940 and localized dwellings along the nearby East Road alignment.

- The nearby BC Hydro Transmission ROW clearing was observed in 1969 with Transmission Line construction completed prior to 1974.

- Further logging and clearing of a portion of the area was completed prior to 1996 with additional dwellings west of the site. The construction of residential subdivisions south of the site through the Fernway Drive area north of Forest Parkway in Port Moody were observed, and an access road for the nearby water reservoir was observed. The water reservoir construction was completed prior to 2004.

- Clearing for Ridge Mountain Drive and North Charlotte Road was completed prior to 2007. Our review of Google Earth imagery indicates these roadways were under constructed in 2008.

- Construction of residential developments throughout the Pinnacle Ridge Estates subdivision to west of the site began in 2014 with construction of localized residential lots in the area being completed to date.

We have also reviewed the Village of Anmore Official Community Plan Report, updated March 2014, and the Village of Anmore Stormwater Master Plan (SMP) Final Report, dated September 19, 2018. Our review of these reports is summarized in Sections 4.4 and 4.5 below.

3.3 Site Reconnaissance

GeoPacific completed site reconnaissance site visits throughout the TREZ, Anmore Gate, and Bella Terra properties and surrounding areas to identify and review features such as slopes and terrain, exposed soil and bedrock, vegetation conditions, evidence of previous slope instabilities and slope drainage. These features were visually reviewed to determine the potential for geotechnical hazards which could impact the proposed development. A selection of site photographs from our field reconnaissance is included in Appendix C following the text of this report. The existing slopes throughout the property generally range from 8.75% (5 degrees) to 25% (14 degrees), with localized steeper sloping areas up to 58% (30 degrees).

4.0 SITE CONDITIONS

4.1 Mapped Geology

Based on the Geological Survey of Canada Map 1484A – the site is underlain by Vashon Drift (Va) deposits comprised of lodgement till (with sandy loam matrix) and minor flow till containing lenses and interbeds of glaciolacustrine laminate stony silt, and the site is underlain by Pre-Tertiary Mesozoic bedrock (PT) including granitic and associated rock types; where bedrock is not at the surface, it is overlain by glacial deposits and colluvium. Based on the Geological Survey of Canada Map 1151A – the glacial deposits are underlain by granodiorite of the Coast Plutonic Rocks.

4.2 Subsurface Conditions

A general description of the soils encountered at the site during our investigation is provided below. For specific subsurface soil descriptions at each test hole location, please review our test hole logs in Appendix 'A', following this report. A general description of the soils encountered during our drill investigation are as follows:

FORREST LITTER / TOPSOIL

Our test holes were completed in locations where forest litter/topsoil had been stripped as part of the temporary access roads; however, we anticipate 0.3 to 0.6 m of loose topsoil and forest litter are present at surfaces throughout the site. These surficial soils were observed to contain organics, roots, varying amounts of sand and silt and are dark brown and moist.

SILTY SAND (Post Glacial)

Silty sand soil was observed at all test hole locations and extends 0.2 to 0.9 m below existing site grades at test hole locations. The silty sand was observed to vary in relative density from loose to compact. Silty sand with trace gravel and occasional cobble was observed at excavation cuts for temporary access roads; however, this soil was generally stripped during clearing and access road prior to our test hole drilling; therefore, we expect the silty sand deposit may be slightly thicker in in some areas of the undisturbed site.

Sand and gravel soils were observed at TH23-07 directly below the sandy silt. These post glacial soils were noted to be compact to dense and were observed to extend down to depths of up to 1.1 m below existing site grades.

SILTY SAND AND GRAVEL (Glacial Till)

Glacial till was observed at all test holes at depths ranging from near surface up to 6.1 m below existing site grades. DCPT refusal occurred at or near the top of the glacial till contact indicating that it is very dense. The glacial till is generally comprised of mixtures of silty sand and gravel with occasional cobbles and is grey and dry to moist. Exposed undisturbed glacial till was observed at localized areas along access road cuts slopes and was observed to be very dense to hard, showing no significant signs of erosion or disturbance from precipitation events. In our experience, frequent boulders may be present within the glacial till which may require splitting or removal during excavation. Excavation and stockpiling of boulders on steep sloping areas must be completed with care to mitigate rockfall risk.

Pre-Tertiary Bedrock

Based on our review of geological maps, pre-tertiary bedrock is present below the glacially deposited soils. Auger refusal at the Anmore Gate site to the south was encountered locally at 3.7 to 4.7 m below grade, indicating potential bedrock interface. We observed bedrock outcrops nearby at the northwest corner of Ridge Mountain Drive and North Charlotte Road, a potential bedrock outcrop or large boulder along the Ridge Mountain Drive alignment within the Anmore Gate property and observed a bedrock outcrop at the Meridian Cell Tower area to the east, during our geotechnical consulting for a new communication tower foundation support at this location in 2018.

For detailed soil descriptions please refer to our test hole logs provided in Appendix A of this report.

4.3 Hydrogeological Conditions (Groundwater)

4.3.1 General Comments

According to the BC Water Resources Atlas (WRBC), the majority of the site is located within the mapped extent of Aquifer #924. The Atlas states that the Aquifer #924 is comprised of confined glaciofluvial sand and gravel underneath glacial till. As noted previously, glacial till was noted to the termination depth of each of our boreholes. To supplement our hydrogeological knowledge of the site, GeoPacific reviewed well logs presented on the Atlas.

The nearest two registered wells to the site, within the mapped extent of Aquifer #924 have Well Tag Numbers (WTN's) 55546 and 58219. The civic addresses for each well are 261 Strong Road and 1640 East Road for WTN 55546 and 58219, respectively. No soil profile is presented for WTN 58219. The associated soil log for WTN 55546 indicates that granular soils, inferred to be preglacial are present below the glacial till at a depth of approximately 8 m. The preglacial soil are noted to extend down to at least 73 m below ground surface. The static groundwater level is shown to be approximately 67 m below site grades at WTN 55546 and 41 m below site grades at WTN 58219.

Thus, we expect the local static groundwater table is well below the likely founding elevation of any underground levels as well as below the depth of the cut and fill anticipated as part of the site preparation work. Perched groundwater may accumulate in the upper weathered soils where they contact the underlying, relatively impermeable glacial till. Some perched groundwater may also be present in laterally discontinuous sandier zones trapped within the glacial till matrix. These zones of moisture drain quickly when exposed to atmospheric pressure and do not typically create persistent drainage.

GeoPacific installed 2 groundwater monitoring wells at the site to further our understanding of the perched groundwater conditions. The relevant well installation details, and our initial manual groundwater level measurements are presented in Table 1 below.

Table 1: Well Screen Details and Initial Groundwater Measurements

Well #	Screened Material	Screened Interval (m bgs)	Water Level
			Nov 13, 2023
			m bgs
MW23-01	Glacial Till	3.6 – 5.2	2.1
MW23-02	Glacial Till	3.1 – 4.6	4.3

Our initial measurements suggest that the perched groundwater level varies from 2.1 to 4.3 m below existing site grades. The main recharge mechanism for perched groundwater is the percolation of precipitation. As a result, we expect that perched groundwater levels would be highest during wetter periods of the year and during the spring melt. We further expect elevated moisture levels in the surficial soils in areas directly adjacent to watercourses.

Temporary seepage from perched groundwater of this nature is typically relatively light and can likely be controlled using passive methods.

4.3.2 Hydraulic Conductivity Testing

As noted in Section 3.0, the drilling and well installation was completed in concurrence with two other nearby sites. A total of 8 monitoring wells were installed between all three sites. GeoPacific returned to each site on November 15th and 16th, 2023 to conduct rising head slug tests at all eight monitoring well locations. To complete each rising head test, an HDPE bailer was inserted into the well and 1.05 L of water was removed to create an instantaneous change in hydraulic head. Automated dataloggers were used to record the perched groundwater recovery during each slug test. The resulting recovery curves were analysed to determine an estimate of hydraulic conductivity of the glacial till at depth.

Our testing indicates that the hydraulic conductivity of the glacial soils ranges from approximately 9.4 x 10^{-9} m/s to 1.8 x 10^{-6} m/s, with a geometric mean of 1.8 x 10^{-7} m/s. Based on our results, we expect that the glacial till will act as an aquitard material with limited ability to transmit or store groundwater.

4.4 Terrain Conditions

GeoPacific has reviewed the Village of Anmore Official Community Plan (OCP) Report, updated March, 2014, and the Village of Anmore Stormwater Master Plan (SMP) Final Report, dated September 19, 2018. As noted in the OCP report, the site is designated as a rural area for hillside residential development. We understand the area is to be zoned as RS-1, with the potential for comprehensive development (CD), as per Figure 3.2 of the SMP report and presented in Appendix D for reference. Based on our review of the SMP report, the site is located in an area noted to be overlain by surficial Sandy Loam soils, as presented in Figure 5.8 presented in Appendix D for reference.

The site is within a bedrock controlled steep slope area (areas with slopes equal to or greater than 20%, or slopes equal to or greater than 11 degrees) as indicated on the OCP report Schedule D2, presented in Appendix E for reference. It should be appreciated that a 20% slope is considered moderate from a geotechnical perspective relatively shallow and generally would be expected to be relatively stable against slope instability considering the very dense glacially derived soils near the surface grades throughout the site.

Based on our site reconnaissance, review of contours and available mapping, including lidar, the natural slopes are thoroughly vegetated with tree cover as well as bushes, ferns and other forest vegetation and graded from 8.75% (5 degrees) to 25% (14 degrees), with localized steeper sloping areas up to 58% (30 degrees). No signs of slope failure were observed during our desk study review and trees generally showed no signs of slope creep. The surficial post-glacial and glacially derived soils contain frequent boulders; however, during our site reconnaissance, we did not observe any significant boulders on the existing vegetated slopes.

As described in Section 4.2, we observed bedrock outcrops nearby at the northwest corner of Ridge Mountain Drive and North Charlotte Road, potential bedrock outcrop or large boulder along the Ridge Mountain Drive alignment within the Anmore Gate property, and observed a bedrock outcrop at the Meridian Cell Tower area to the east during our geotechnical consulting for a new communication tower foundation support at this location in 2018. Exposed bedrock was noted to be granitic. Our experience at the nearby Meridian Cell Tower area indicates that the bedrock may have localized zones of weathered rock and fractures at the surface.

4.5 Hydrology Conditions (Surface Water)

GeoPacific has completed a preliminary review of the existing site hydrology, including review of existing drainage/watercourses and localized transient slope streams during our site reconnaissance and utilizing available mapping and public reports. We have reviewed the Village of Anmore Stormwater Master Plan (SMP) Final Report, dated September 19, 2018.

The SMP report provides details of the existing stormwater management and watercourses throughout the site and surrounding area, as presented in Figure 2.1 and 4.1 of the SMP report, shown in Appendix D for reference. Figure 2.1 of the SMP report provides details on the type of stormwater conveyance (i.e., creek, ditch, culvert), and Figure 4.1 of the SMP report indicates major and minor drainage systems. Relevant unnamed drainage systems have been named for reference, as shown on the mark-up site plans provided in Appendix D.

Named major system creeks in the area are Mossom Creek and West Noons Creek. Mossom Creek is located 400 m north of the TREZ development area, generally flowing from east to west towards to north end of East Road in Anmore, and West Noons Creek is located approximately 350 m east of the Bella Terra development area, flowing north to south into Port Moody. These carry sufficient flows year-round which require bridge spans at the upslope BC Hydro Transmission ROW roadways.

These creeks have no influence on the subject site; however, Mossom Creek receives flows from stormwater drainage in the development area and therefore may be influenced by the development. Figure 4.1 shows two unnamed major drainage systems in the area, denoted Major Drainage System #1 and Major Drainage System #2 herein, which are in closer proximity to the development area and described below:

- Major Drainage System #1 creek is approximately 200 m to the north of the TREZ development area, beginning at the west side of the BC Hydro Transmission Service Road area to the north. The open channel system flows from northeast to southwest into the northwest corner of the Pinnacle Ridge Estates properties at 2070 Ridge Mountain Drive. The system is culverted below Ridge Mountain Drive into an open channel at the property at 2069 Ridge Mountain Drive, and is culverted below Kinsey Drive into an open channel at the property at 209 Kinsey Drive, is culverted below East Road and further drains in an open channel towards the west, combining with Major Drainage System #2 at the 1040 Thomson Road property, further draining into Mossom Creek near the north end of the 1100 Thomson Road property.

  Major Drainage System #1 and has no influence on the subject site; however, it is joined by Major Creek System #2 and may be influenced by the proposed development.

- Major Drainage System #2 creek begins at the downslope side of North Charlotte way, draining downslope from east to west through the north portion of the 1976 North Charlotte Way property and is aligned north of Wyndham Crescent where it is culverted along the west end of the roadway and below East Road, draining in open channel towards the west, combining with other major drainage systems at the northeast end of Landcaster Court, flowing north where it combines with Major Drainage System #1 at the 1040 Thomson Road property, further draining into Mossom Creek near the north end of the 1100 Thomson Road property.

  Major Drainage System #2 is fed by a minor systems drainage swale along the upslope side of Ridge Mountain Drive which is culverted below Ridge Mountain Drive which connects to an open channel aligned along the south portion of 1983 North Charlotte Drive where it is then culverted below North Charlotte Drive, and drains into the upper extent of Major Drainage System #2. Therefore, Major Drainage System #2 and Mossom Creek may be influenced by the proposed development.

Minor drainage systems denoted on Figure 4.1 of the SMP report include drainage swales along the upslope sides of existing asphalt paved roadways, drainage swales, and stormwater conveyance pipes. Three relevant minor drainage systems in the general area, denoted Minor Drainage System #1 to Minor Drainage System #3, are described below:

- Minor Drainage System #1 begins as a drainage ditch along the upslope side of Ridge Mountain Drive which is culverted below Ridge Mountain Drive and into a minor drainage system open channel creek aligned along the south portion of 1983 North Charlotte Drive, where it is then culverted below North Charlotte Drive, and then drains into the upper extent of Major Drainage System #2.

- Minor Drainage System #2 originates from the cross-slope swale of the TREZ development site and drains downslope east to west through a portion of the TREZ development area, at the southwest extent of the property. The swale is observed to be constructed of non-woven filter fabric lined with a woven fabric, and includes Deltalok™ Geo-Modular Bag system at surface through the swale alignment, as shown in our site reconnaissance photographs. The swale drains into a stormwater pipe at the upslope extent of the Ridge Mountain Drive extension and drains downslope further conveyed by stormwater pipe through proposed lots 22-24 of the TREZ development, south of the residential development at 1923 North Charlotte Drive. The system drains into Major Drainage System #2 at Wyndham Crescent.

- Minor Drainage System #3 is located at the north end of the Anmore Gate development area. The system is shown to be a culvert/stormwater drainage pipe and an open channel stream/creek beginning west of the North Charlotte Road extension. The system drains west to East Road, flows north to a culvert below East Road, and further drains into Major Drainage System #2. We expect a minor drainage stream/swale is present at the downslope side of the North Charlotte Road extension connecting to the culvert downslope.

All minor drainage systems described above drain into Major Drainage System #2; therefore, Major Drainage System #2 may be influenced by the proposed development.

- Lidar Review: GeoPacific has completed a watershed analysis of lidar terrain data through the overall development area utilizing Global Mapper Pro software which interprets potential stream paths. Relevant lidar maps are presented in Appendix B for reference. The overland flow paths through the proposed development area are inferred to be natural depressions in the forested areas which primarily collect and convey seasonal precipitation induced surface runoff downslope.

It is our opinion the observed flows within minor drainage systems ditches described herein generally originate from perched water above the relatively impermeable glacial till layer below due to precipitation runoff. As such, we consider flows in minor creek systems/within drainage ditches to be anthropogenic and/or originating from stormwater runoff and are expected to be transient during wetter winter months and/or during periods of significant precipitation events.

In the dryer summer and fall months, we expect the minor drainage systems and transient forest overland flow streams described herein would be dry.

5.0 DISCUSSION

5.1 General Comments

The Landmark Engineering & Planning drawings, dated December 12, 2023, show a residential subdivision that includes 4 single family residential lots and 36 townhouse units with on-site paved roadways, utilities, and park dedication. This subdivision has been coordinated with adjoining residential subdivision developments proposed to the north, TREZ and Anmore Gate, among others, as part of a residential master plan. Future roadways for the subdivision development will be interconnected with these adjacent properties. The development would include the extension of the existing Ridge Mountain Drive, which provides access to the east portion of the sites, the extension of North Charlotte Drive, which connects to Charlotte Crescent in Port Moody, along with new internal roads.

Due to the sloping topography of the site, we envisage basements would typically daylight downslope and below grade foundation walls may extend up to 2 levels at the up-slope side of structures. We anticipate wood frame construction for above grade and reinforced concrete for basement and foundation walls so that loading is relatively light to moderately heavy. The development would include the extension of existing local roadways Ridge Mountain Drive and North Charlotte Drive, and new internal local roadways.

We anticipate retaining walls would be constructed in localized downslope areas of site grading and locally along the downslope of internal roadways, similar to those present along the upper Ridge Mountain Drive and North Charlotte Drive. We anticipate modular mechanically stabilized retention systems would be utilized for any new walls.

The general site slopes down from east to west in the west portion and north to south in the east portion. The existing slopes throughout the property generally range from 8.75% (5 degrees) to 25% (14 degrees), with localized steeper sloping areas up to 58% (30 degrees) and the slopes are underlain by very dense glacially derived soils near the surface with granitic bedrock below; therefore, the possibility of near surface or deep-seated global instability are considered remote. Erosion and surface wash outs due to site disturbance and/or improper stockpiling of material may cause debris flows and present the most significant geohazard risk at the site. This risk can be addressed with appropriate erosion and sediment control (ESC) measures and stormwater management plan, to be included into the development work plan. We expect that completing grading works in the dryer summer and fall months would provide significant advantages to the subdivision construction process.

The excavation requirements would be revisited once the design has progressed, once the location and depth of any basement and below grade parking levels are available for our review. At this time, we expect that sloped excavations would be utilized where feasible; however, some form of temporary and/or permanent vertical shoring or retention support may be required for deeper excavations and cuts, depending on the finalized design.

Based on the anticipate founding elevations for future structures, the soils present at the underside of the proposed foundations are expected to be very dense glacial till or engineered fill placed above very dense glacial till. We expect that these soils will provide adequate support to utilize conventional pad and strip foundations. All post-glacial/colluvial soil would be removed to expose very dense glacial till through building footprint, retaining structures, and steep sloping grading infill locations. The subsurface soils underneath the founding level are not prone to liquefaction or other forms of ground softening under the design earthquake defined under the 2018 British Columbia Building Code.

We expect that updated plans would be provided to GeoPacific for review well in advance of construction to provide further recommendations for the design and construction of the proposed development, if necessary. We further expect that additional drilling will be completed in areas of the site that were not accessible at the time of our investigation due to the presence of mature trees and other access constraints and to confirm bedrock depth, if necessary.

We confirm, from a geotechnical point of view, that the proposed development is feasible, provided the preliminary recommendations outlined in Section 6.0 are incorporated into the overall design.

5.2 Storm Water

5.2.1 Natural Exfiltration of Storm Water

Our test hole information indicates that the near surface soil overlying the glacial till typically have variable silt contents and therefore are not well suited for storm water infiltration. Our hydraulic conductivity testing within the glacial till indicate the glacial soils are relatively impermeable and not suitable for heavy infiltration purposes. Discharge for infiltration of stormwater into the surficial soils is not recommended as they may become saturated at points of the year and not provide satisfactory infiltration rates. The addition of water to these deposits may also have potential impacts to downslope lots.

In summary, infiltration of storm water on this site is not recommended in our opinion and potentially poses risks to down slope lots. We recommend that detention and/or stormwater conveyance systems be explored in lieu of infiltration for the stormwater management on-site.

5.2.2 Storm Water Management

We anticipate that some excavations for new utilities or below grade structures may encounter zones of permeable soils which generate seepage. Where these conditions are encountered some additional drainage measures may be required including, for example, trench drains in the road right-of-way's or in the lots to convey excess water to the City storm system.

These conditions may not be readily evident until construction and site preparation is underway. Therefore, some flexibility in the storm water management design to allow for additional capacity is recommended.

5.3 Septic System Infiltration

We understand the nearby single family residential developments in the area, including those through the adjacent Pinnacle Ridge Estates hillside, utilize septic tank and septic field infiltration systems, and it is intended to utilize these systems for the proposed subdivision. Our test hole information indicates that the near surface soil overlying the glacial till would have limited capacity for infiltration. Based on information provided to us, we understand the septic systems would be designed as follows:

- Designs based on Sewage System Regulations.
- Maximum sewage flow per lot (townhome or apartment) is 22.6 m^3/day (22,600 L/day).
- Septic field placement to be confirmed and finalized during DP or BP stage. Septic Fields should be extended along the contour as best as possible and try to avoid stacking.
- Septic System to be on "time dosing" which evens out the flow throughout the day and not "demand" (which has heavier dosing during morning and evenings).

GeoPacific would complete supplementary in-situ testing utilizing Double Ring Infiltration Test (DRIT) methods at septic field locations to be utilized by others in the future design of the proposed septic fields. Some increase in grading through and below septic fields may be required to provide adequate cover and infiltration.

6.0 RECOMMENDATIONS

6.1 Site Preparation

Preliminary Grading Plans have not been provided; however, we understand that the development would be constructed on the hillside with cuts at the top of the slope and fills at the bottom of the slope to flatten the overall site grades at building locations.

Prior to placement of fill, construction of foundations, floor slabs and new on-site drive aisles and services, and retaining walls, all vegetation, topsoil, construction debris, loose to compact post-glacial surficial soil and otherwise unsuitable/disturbed soils must be removed from the construction areas to expose very dense GLACIAL TILL. Minimum stripping depths are between 0.5 to 0.9 m below existing grades at our test hole locations.

We emphasize that the stripping depths are the minimum stripping depths at the test hole locations. It should be recognized that the thickness of post-glacial or other unsuitable soil can vary throughout the site.

Any grade reinstatement under buildings, roads or utilities should be completed with "engineered fill". In the context of this report, "engineered fill" is generally defined as ***clean sand and gravel*** *containing silt and clay less than 5% by weight,* compacted in 300 mm loose lifts to a minimum of 95% of the ASTM D1557 (Modified Proctor) maximum dry density at a moisture content that is within 2% of optimum for compaction. Preferably, grading fill would be completed with a 150 mm to 75 mm minus engineered fill with angular crushed rock and gravel.

The subgrade soils may be sensitive to changes in moisture content; therefore, the excavation subgrade should be graded to prevent the ponding of water at footing locations. Any water softened subgrade must be excavated to expose undisturbed material.

We advise that minimum 2H:1V permanent fill slopes would be required, preferably to be constructed at 3H:1V for downslope areas and may be further dependent on the type of fill utilized, water seepage throughout the area, among other factors. During fill placement, flat benches should be cut into any moderate to steep sloping stripped subgrade surfaces to key the structural fill into the natural topography, and drainage and retention of the fill at the base/toe should be considered to mitigate potential washout.

Temporary cut slopes within the surficial soils would be at sloped minimum 1H:1V, and unsupported cut slopes within glacial till can typically be sloped at minimum 3H:4V; however, these may be flattened due to localized soil and/or perched water conditions.

We expect loose to compact surficial SILTY SAND may contain roots and other organics and would not be best suited for re-use; however, we envision this material may be used locally through mild sloping areas or upslope grading areas outside of building footprints and other structures after removal of all organic material and GeoPacific review for suitability as engineered fill. We envision that the very dense GLACIAL TILL could be re-used as engineered fill. However, all native soils are expected to be moisture sensitive and should only be considered for re-use in the dryer summer and early fall months. Moisture conditioning may be required to achieve optimum moisture content prior to placement and compaction. The native soils are not considered free draining and additional measures, such as drainage conveyance pipes and/or strategically placed free draining material may be required to utilize these materials in areas which may encounter perched water seepage.

Stripping should extend out beyond the building envelope and/or footing locations at a distance equal to the thickness of any engineered fill needed beneath the footings. For example, if 1 metre of engineered fill will underlie a footing then stripping should extend a minimum distance of 1 metre beyond the outer edge of that footing.

The geotechnical engineer shall be contacted for the review of stripping and any engineered fill placement and compaction.

6.2 Foundations and Bearing Capacity

Based on the borehole information provided to us, we expect that footings would be placed on compact to dense post glacial sand or dense to very dense glacial till. Conventional pad and strip foundations may be used to support the proposed structures. Footings can be designed on the basis of a serviceability limit state (SLS) bearing pressure of:

- 120 kPa based on support on compact engineered fill, placed above very dense glacial soils.
- 300 kPa based on support on dense to very dense glacial soils

Factored ultimate limit state (ULS) bearing pressures, for transient loads such as those induced by wind and earthquakes, may be taken as 1.5 x the SLS bearing pressure provided above.

We estimate for foundations designed as recommended, settlements will not exceed 25 mm total and 2 mm per metre differential. Irrespective of the allowable bearing pressures given, pad footings should not be less than 600 mm by 600 mm and strip footings should not be less than 450 mm in width. Footings should also be buried a minimum of 450 mm below the surface for frost protection. Grade reinstatement below foundation locations would require the use of minimum 5MPa lean mix concrete to achieve the 300 kPa (SLS) bearing pressure.

Adjacent footings should achieve a maximum elevation difference equal to half of their horizontal distance to avoid superimposing the upper foundation loading to the lower foundation. The depth and offset of proposed pad and strip foundations to adjacent slopes would need to be reviewed as part of a slope stability analysis once detailed development plans are available.

Foundation subgrades must be reviewed by the geotechnical engineer prior to footing construction.

6.3 Slab-on-Grade Floors

In order to provide suitable support and drainage for slab-on-grade floors, we recommend that floor slabs should be underlain by a minimum of 150 mm of a free draining granular material, such as 19 mm clear crushed gravel, and hydraulically connected to perimeter drainage. The crushed gravel fill should be compacted to a minimum of 95% Modified Proctor dry density (ASTM D1557), at a moisture content that is within 2% of its optimum for compaction. A moisture barrier should underlie the slab directly above the free draining granular material.

If required, general grade reinstatement or backfill should be completed with engineered fill, as discussed in the site preparation section.

The geotechnical engineer shall be contacted to review the slab-on-grade construction.

6.4 Seismic Design of Foundations

We have considered the 2018 BCBC design earthquake with a 2% probability of exceedance over a 50-year period which equates to a return period of 2,475 years. Accordingly, we have considered an earthquake having a peak horizontal ground acceleration of 0.32 g for this site. This site qualifies as "Site Class C" as defined in Table 4.1.8.4.A of the 2018 British Columbia Building Code (BCBC).

6.5 Temporary Excavations

We expect that temporary excavations would be sloped where possible since it is more economical to do so in shallower portions of the excavation. We would expect that slopes cut to 1H:1V can be constructed in the existing surficial topsoil. Slope cuts of 3H:4V may be constructed in the glaciomarine deposits. All slopes should be covered in poly sheeting to prevent erosion of the slope face.

Light seepage during the wetter months should be expected due to the formation of perched water tables. We expect that inflows may be handled with sumps and sump pumps.

Temporary cut slopes in excess of 1.2 m in height must be covered in poly sheeting and require inspection by a professional engineer in accordance with Work Safe B.C. guidelines, prior to worker-entry.

6.6 Site and Foundation Drainage

Given the existing slope of the site, we expect that the majority of drainage could be achieved by sloping stripped areas down gradient. In stripped or benched areas where perched groundwater or precipitation accumulates, it is anticipated that gravity drainage such as French drains, open channels or piping systems will be an effective means to convey any seepage from the construction and development areas. Sumps and sump pumps may be required to convey perched inflows from relatively deep excavations in the location of below grade structures.

A perimeter drainage system, as described in the BCBC 2018, should be installed around any portion of a buried foundation wall to prevent the accumulation of water behind foundation walls and beneath slabs.

6.6 Retaining Walls

As part of the anticipated cut and fill grading approach for the site, retaining walls may be anticipated to be constructed to meeting site grading plans. Following site stripping recommendations outlined in Section 6.1, retaining walls can be founded on engineered fill placed and compacted above flat benches within the very dense glacial soils, or directly on glacial soils. Retaining wall design should consider the apparent earth pressures outlined in Section 6.8 as well as employ suitable drainage systems behind the walls to avoid the development of hydrostatic pressure. The drainage system should be discharged to proposed and/or existing storm water conveyance systems.

GeoPacific may provide retaining wall designs for mechanically stabilized walls upon request.

6.7 Utility Installation

For utilities bedded on compact to dense post glacial sand or very dense glacial till, settlements are anticipated to be negligible. Groundwater seepage during utility installation may need to be controlled using sumps and sump pumps.

We recommend that any trenches be sloped or shored as per the latest Work Safe BC regulations. We recommend that all service trenches be backfilled with clean granular material, which conforms to municipal standards, compacted to 95% “Modified Proctor” dry density (ASTM D1557), with a moisture content within 2% of optimum for compaction.

6.8 Lateral Pressure of Foundation Walls

Lateral pressures against foundation walls are dependent on factors such as, available lateral restraint along the wall, surcharge loads, backfill materials, compaction of the backfill and drainage conditions. We assume the backfill would be a free-draining granular material such as birds eye gravel or clean sand. The foundation wall is expected to be partially yielding and fully restrained between floors. We recommend that foundation walls be designed to resist the following unfactored lateral earth pressures:

Static: Triangular soil pressure distribution of 5.0H kPa (where H is equal to the total backfill height in metres).

Seismic: Inverted triangle seismic surcharge of 3.0H kPa (where H is equal to the total backfill height in metres).

Any additional surcharge loads located near the foundation walls should be added to the earth pressures given.

6.9 New Pavement Structures

As indicated above, new asphaltic concrete pavements are anticipated throughout the development. Following the recommended site preparation in Section 6.1, we expect that the following pavement design structure, given in Table 1, is sufficient to carry the anticipated vehicle traffic loads for on-site local roads.

Table 2: Recommended Minimum Pavement Structure for Local Roads

Material	Thickness (mm)
Asphaltic Concrete	85
19 mm minus crushed gravel base course	100
75 mm minus crushed gravel sub-base course	250

All base and sub-base fills should be compacted to a minimum of 95% Modified Proctor dry density with a moisture content within 2% of optimum for compaction. The stripped road subgrade should be proof rolled to locate any soft/loose spots. Where existing soils are soft/loose and cannot be re-compacted to a minimum of 95% Modified Proctor dry density, they must be excavated and replaced with engineered fill.

7.0 SLOPE STABILITY

7.1 Qualitative Assessment

The existing slopes throughout the property generally range from 8.75% (5 degrees) to 25% (14 degrees), with localized steeper sloping areas up to 58% (30 degrees). Given the presence of competent very dense glacially-derived soils on-site near the surface and the anticipated development locations provided on the subdivision drawings, there are no geotechnical slope stability concerns for the overall development property, provided our recommendations in this report are adhered to. GeoPacific would complete a subsequent slope stability analysis once future detailed development plans and grading drawings are prepared.

7.2 Slope Stability Assessment

We have completed a slope stability assessment for the proposed residential subdivision at the above reference site. The slope stability assessment was completed under static and seismic conditions in accordance with the 2018 BC Building Code (BCBC) and the EGBC “Guidelines for Landslide Assessment in B.C.” (Revised March 2023). Based on the *EGBC’s Guidelines for Landslide Assessment in B.C. (Revised March 2023) Table B-6 of Types of static and seismic slope stability*, the site is classified as Class 2.

Subsurface stratigraphy and soil strength parameters were interpreted based on our geotechnical field investigation and experience in the area. We utilized topographic drawings provided by Landmark Engineering & Planning Ltd. to create sections through the proposed development and existing slopes. A critical section was determined along the natural slope and within the proposed development as shown on our Drawing No. 23403-C-01, as presented in Appendix F.

The stability assessment was carried out using the software program SLOPE/W (2021), which employs the Morgenstern-Price limit equilibrium method. The Morgenstern-Price method is a widely accepted and industry-standard approach for conducting slope stability analysis in geotechnical engineering. It provides a systematic framework to assess the stability of slopes, embankments, and retaining walls. This method takes into account various factors such as soil properties, groundwater conditions, and external loads to determine the safety of a slope or structure against potential failure.

Our analysis has considered the evaluation of the current stability of the site and the effects of the proposed development on the global stability of the slope under both static and seismic conditions in accordance with EGBC's Guidelines for Landslide Assessment in B.C. (Revised March 2023).

EGBC's guidelines for Landslide Assessments in British Columbia (March 1, 2023) and the 2018 British Columbia Building Code (BCBC) recommend utilizing the peak ground acceleration based on the 1:2,475-year design earthquake referred to in NBC 2015 as a conservative approach for slope stability analyses. Where the seismic factor of safety is not met with the full peak ground acceleration, the EGBC guideline requires a probabilistic method of analysis to determine seismic slope displacement from each earthquake source type contributing to the hazard at a specified response spectral acceleration. EGBC's guidelines for Landslide Assessments in British Columbia (March 1, 2023) recommend that 15 cm or less be considered as a tolerable seismic slope displacement.

We used a probabilistic approach to determine seismic slope displacement from each earthquake source types contributing to the hazard at a specified response spectral acceleration. The results indicate that the predicted slope displacements are less than the acceptable threshold limit of 15 cm under all source of earthquakes under the 2,475-year return period seismic event, which is determined as the tolerable slope displacement by EGBC's guidelines.

As per EGBC guidelines, the minimum factor of safety for static analysis is 1.5 for permanent developments. Slope stability results for static conditions indicate that the minimum factor of safety for the proposed development exceeds 1.5 under static conditions. Analysis of the static global stability of the slope at the critical section show the **minimum factor of safety of 2.28 under static conditions**, which is considered to be stable for permanent developments.

The stability analysis indicates that the possibility of a deep-seated failure which extends within the proposed subdivision property lines of the site is unlikely under both static and seismic conditions, considering the 2018 BCBC design earthquake, and provided that our recommendations outlined in this report are adhered to, the site can be used safely for the use intended. For the proposed structures constructed in accordance with the recommendations described in this report, the property meets the requirements for development established in EGBC's guidelines for Landslide Assessments in British Columbia (March 1, 2023), and the site is safe for the use intended.

7.3 Considerations for Development

The following recommendations are not intended to mitigate any present risk to geotechnical hazards, but rather to ensure that the existing risks to geotechnical hazards are maintained at an acceptable low level during construction and post-construction.

Modifications to the grading of the site which result in permanent slopes within soils should be graded no steeper than 50% (2.0H:1V), provided they are protected to resist surface erosion. Any fill material placed in sloping areas should be compacted to the minimum equivalent of 95% of the Modified Proctor Dry Density (MPDD – ASTM D1557) at a moisture content that is within 2% of optimum to ensure adequate compaction.

Vegetation is beneficial to maintain or improve surficial soil stability and mitigate soil erosion on sloping sites as well as improve drainage. We understand that the clearing of vegetation would be limited to the immediate areas where construction of buildings, roads, and services, and that the existing vegetation would be maintained as much as possible across the site. Following construction, we recommend that exposed soils be protected to mitigate erosion. Soil protection could consist of soft or hard landscaping and can be coordinated with the landscape consultant or architect for the project. The re-establishment of vegetation would ideally be completed using native grass, plant, or tree species with dense or propagating root structures. In areas that are undisturbed during construction, the existing forest floor is expected to continue to provide adequate protection of subsurface soils.

The geotechnical engineer should review finalized development plans to ensure the recommendations above are adhered to well in advance of construction.

8.0 DESIGN REVIEWS AND CONSTRUCTION INSPECTIONS

The preceding sections make recommendations for the design and construction of the proposed improvements. The report is based on preliminary information received at the time of the report preparation. We expect that the report would be updated once final design plan drawings are available. We have recommended the review of certain aspects of the design and construction in this report.

In summary, geotechnical field reviews for the following aspects of this scheme are required:

1. Review of site stripping
2. Review of foundation subgrade prior to footing construction
3. Review of slab-on-grade fill compaction prior to slab construction
4. Review of the compaction of engineered fill
5. Review of temporary cut slopes or excavation in excess of 1.2 m in height prior to worker-entry
6. Review of pavement structure subgrade prior to sub-base placement
7. Review of base and sub-base fill materials and compaction
8. Review of retaining wall foundation subgrade and wall construction

It is critical that these reviews are carried out to ensure that our intentions have been adequately communicated. It is also critical that contractors working on the site view this document in advance of any work being carried out so that they become familiarised with the sensitive aspects of the works proposed. It is the responsibility of the developer to notify GeoPacific Consultants Ltd. when conditions or situations not outlined within this document are encountered.

9.0 CLOSURE

This report has been prepared exclusively for our Client for the purpose of providing geotechnical recommendations for the design and construction of the proposed residential development, temporary excavations and related earthworks. The report remains the property of GeoPacific Consultants Ltd. and unauthorized use of, or duplication of, this report is prohibited.

We are pleased to assist you with this project and we trust that this information is helpful and sufficient for your purposes at this time. Should you require any further details or if you would like clarification of any of the above, please do not hesitate to call or contact us.

For:

GeoPacific Consultants Ltd.

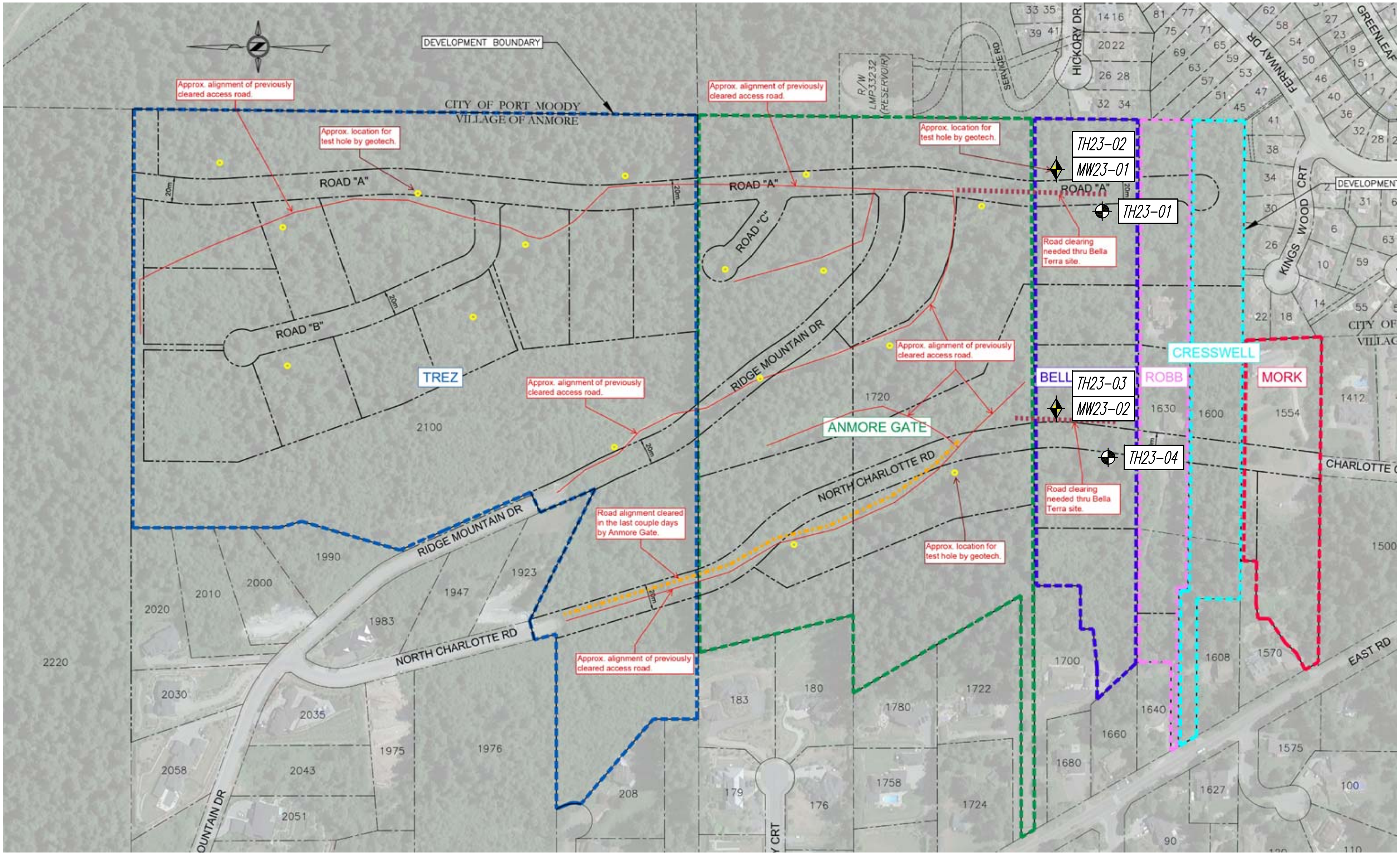
Reviewed by:

W. M. JOHNSON
57217

Permit to Practice
EGBC 1000782
2023-12-20

Wyatt Johnson, B.Eng., P.Eng.
Project Engineer

Matt Kokan, M.A.Sc., P.Eng.
Principal



⌖ TH23-XX – TEST HOLE (TH) LOCATION 2023

✦ MW23-XX – MONITORING WELL (MW) LOCATION 2023

* APPROXIMATE/PRELIMINARY ACCESS ROAD ALIGNMENTS SHOWN IN RED

SITE PLAN

N/A

*TEST LOCATIONS ARE APPROXIMATE

REFERENCE:
Landmark Engineering & Planning Ltd. Overall Plan Drawing

J:\Jobs\AutoCad -after July 16, 2004\TTL BLOCKS\LOGOS\Geo_Logo_Landscape_WithConsultants_Lrg_JPEG.jpg

DATE: October 13, 2023		
DRAWN BY: SH	APPROVED BY: WJ	REVIEWED BY: WJ
SCALE: AS SHOWN		

BELLA TERRA
PINNACLE RIDGE, ANMORE, BC
TEST HOLE SITE PLAN

FILE NO.: 23404-C

DWG. NO.: 23404-C-01

REVISIONS:
A.
B.
C.

ORIGINAL PAPER SIZE 8.5"x11"

APPENDIX A

Test Hole Logs

(Completed by GeoPacific Consultants Ltd. 2023)

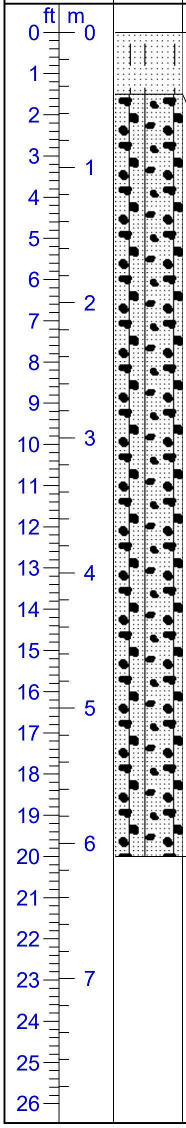
Test Hole Log: TH23-01

File: 23403-C
Project: BELLA TERRA HOUSE
Client: BELLA TERRA INVESTMENTS 2 INC
Site Location: PINNACLE RIDGE ESTATE, ANMORE

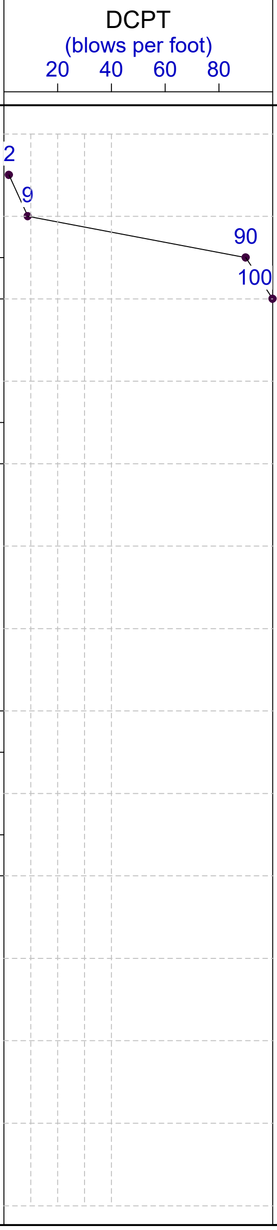
GEOPACIFIC
CONSULTANTS

1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE



SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
Ground Surface				
Silty Sand compact silty SAND, medium grained, trace organics and root fibers, brown, slightly moist	0.0			
Silty Sand and Gravel [Glacial Till] dense to very dense silty SAND and GRAVEL till, fine to medium grained sand, 5-25mm gravel, some cobbles, weathered tan to light grey to 0.9m, grey after, slightly moist	0.5			
		8.6		1.2m DCPT refusal
		10.7		
		6.5		
		5.3		
End of Borehole	6.1			



Logged: SH
Method: Solid Stem Auger
Date: 2023-OCT-12

Datum: Ground Elevation
Figure Number: A.01
Page: 1 of 1

Test Hole Log: TH23-02 (MW23-01)

File: 23403-C
Project: BELLA TERRA HOUSE
Client: BELLA TERRA INVESTMENTS 2 INC
Site Location: PINNACLE RIDGE ESTATE, ANMORE

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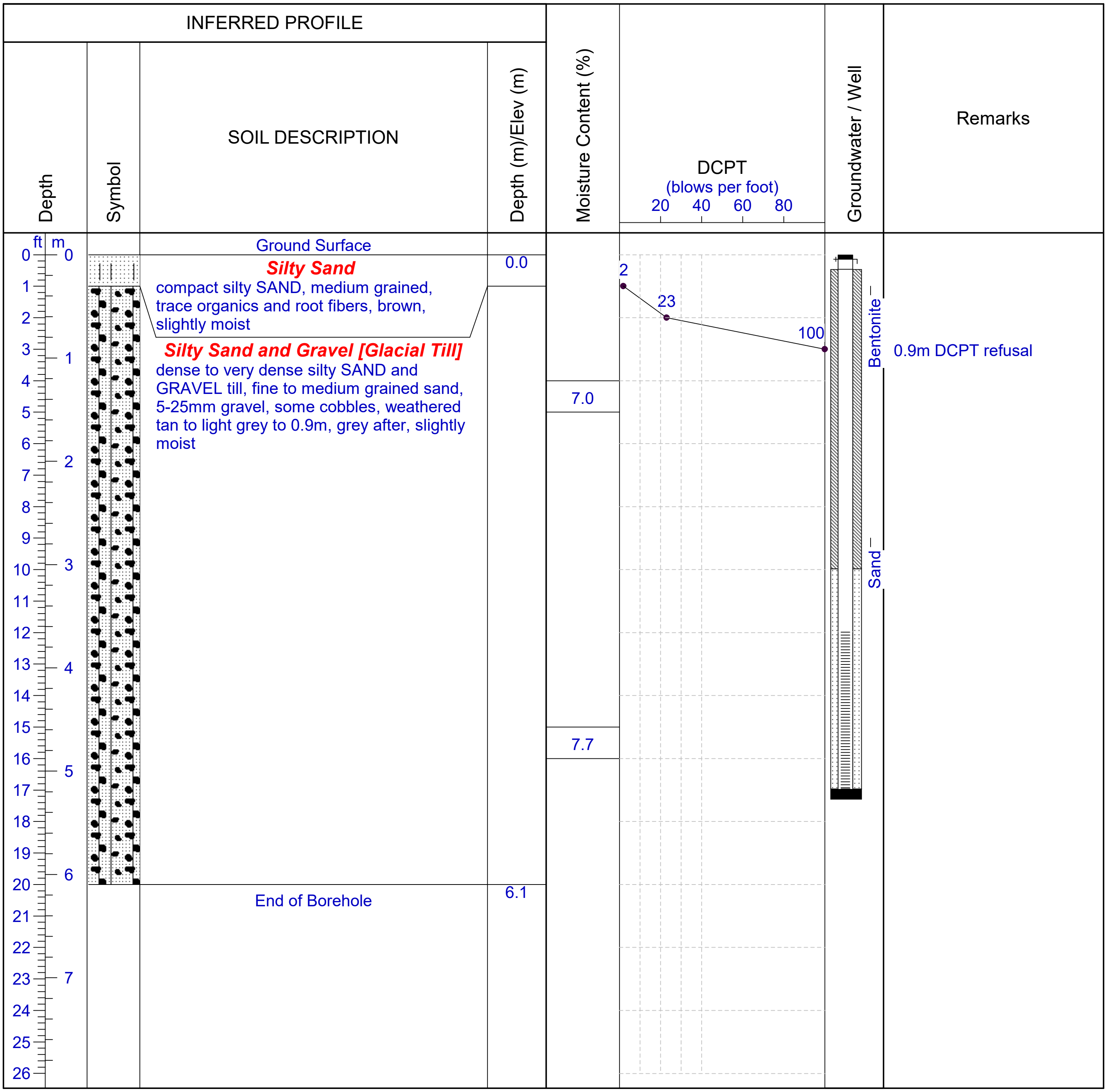
CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189



Ground Surface

Silty Sand
compact silty SAND, medium grained, trace organics and root fibers, brown, slightly moist

Silty Sand and Gravel [Glacial Till]
dense to very dense silty SAND and GRAVEL till, fine to medium grained sand, 5-25mm gravel, some cobbles, weathered tan to light grey to 0.9m, grey after, slightly moist

End of Borehole

0.9m DCPT refusal

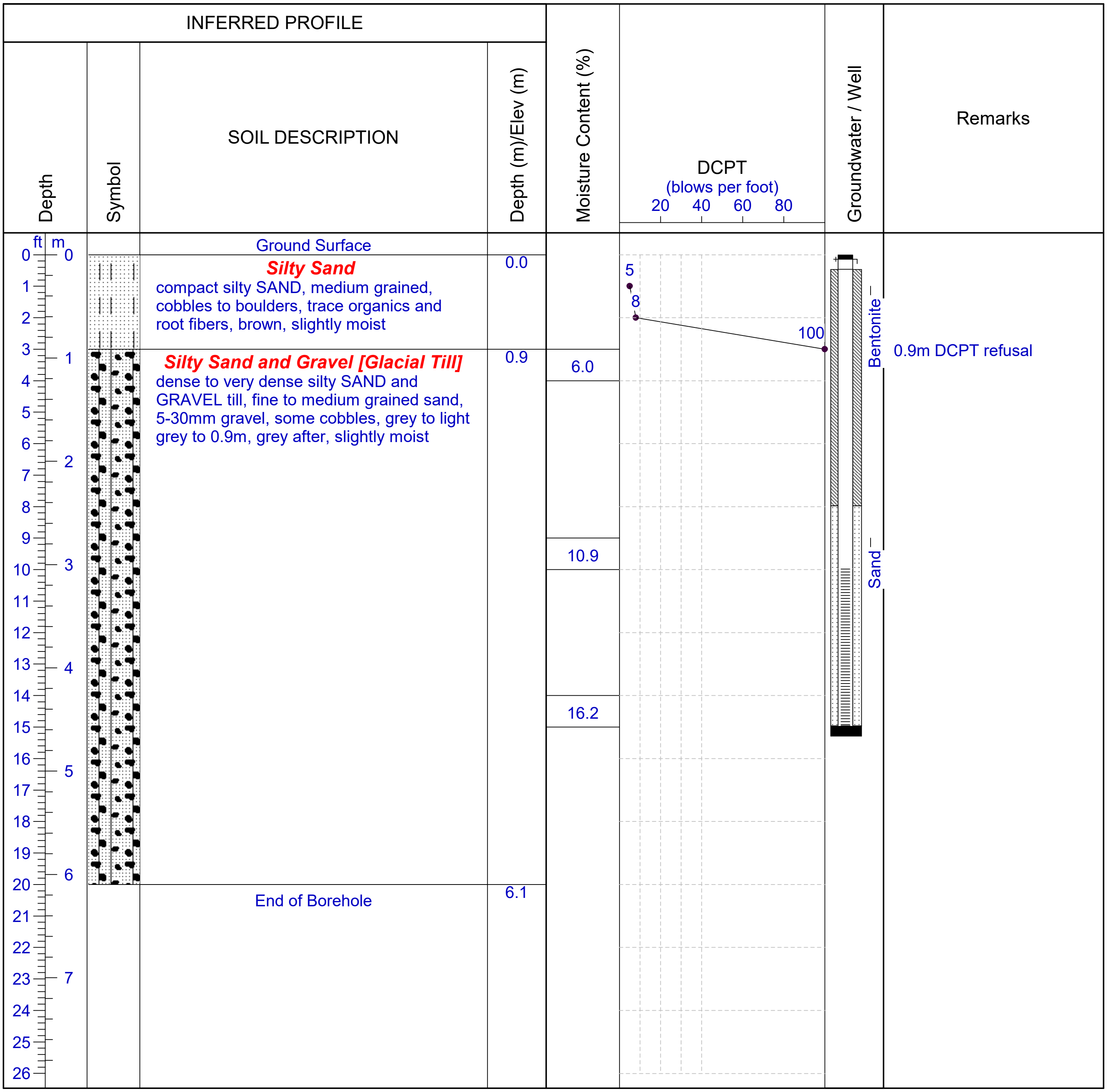
Logged: SH
Method: Solid Stem Auger
Date: 2023-OCT-12

Datum: Ground Elevation
Figure Number: A.02
Page: 1 of 1

Test Hole Log: TH23-03 (MW23-02)

File: 23403-C
Project: BELLA TERRA HOUSE
Client: BELLA TERRA INVESTMENTS 2 INC
Site Location: PINNACLE RIDGE ESTATE, ANMORE

GEOPACIFIC CONSULTANTS
1779 West 75th Avenue, Vancouver, BC, V6P 6P2
Tel: 604-439-0922 Fax:604-439-9189



Depth (m)/Elev (m)	SOIL DESCRIPTION	Remarks
	Ground Surface	
0.0	***Silty Sand*** compact silty SAND, medium grained, cobbles to boulders, trace organics and root fibers, brown, slightly moist	
0.9	***Silty Sand and Gravel [Glacial Till]*** dense to very dense silty SAND and GRAVEL till, fine to medium grained sand, 5-30mm gravel, some cobbles, grey to light grey to 0.9m, grey after, slightly moist	0.9m DCPT refusal
6.1	End of Borehole	

Logged: SH
Method: Solid Stem Auger
Date: 2023-OCT-12

Datum: Ground Elevation
Figure Number: A.03
Page: 1 of 1

Test Hole Log: TH23-04

File: 23403-C
Project: BELLA TERRA HOUSE
Client: BELLA TERRA INVESTMENTS 2 INC
Site Location: PINNACLE RIDGE ESTATE, ANMORE

GEOPACIFIC
CONSULTANTS

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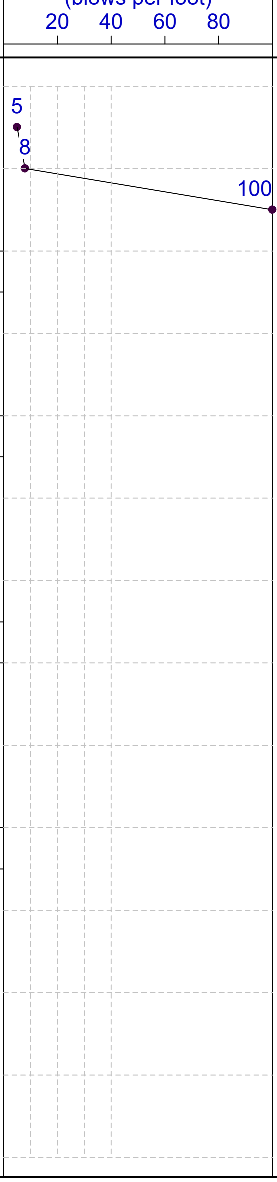
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	DCPT (blows per foot)	Groundwater / Well	Remarks
ft / m		Ground Surface					
		Silty Sand compact silty SAND, medium grained, cobbles to boulders, trace organics and root fibers, brown, slightly moist	0.0		5 8 100		0.9m DCPT refusal
		Silty Sand and Gravel [Glacial Till] dense to very dense silty SAND and GRAVEL till, fine to medium grained sand, 5-30mm gravel, some cobbles, grey to light grey, slightly moist	0.9	3.6 6.2 13.0 8.8			
		End of Borehole	6.1				

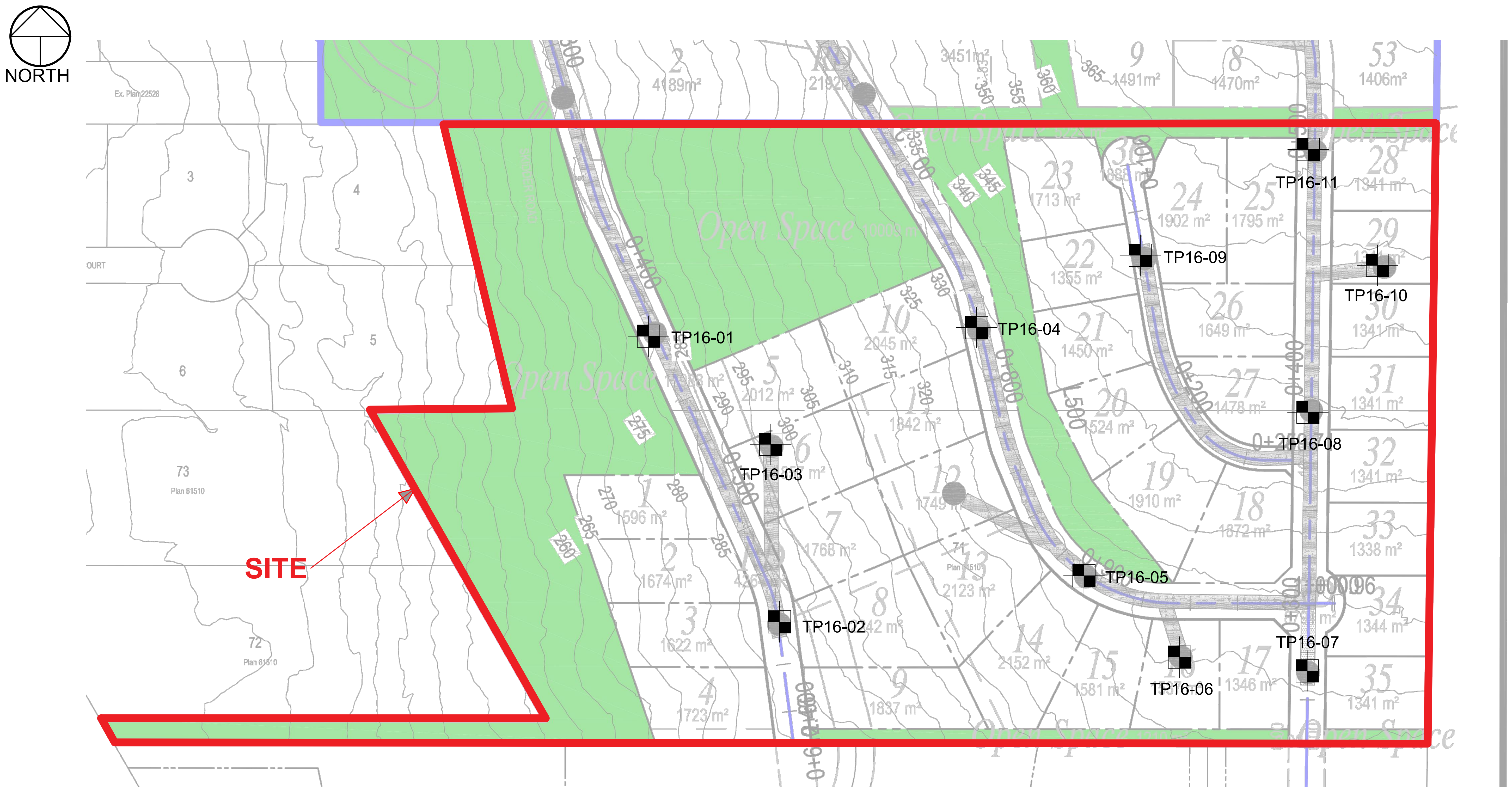


Logged: SH
Method: Solid Stem Auger
Date: 2023-OCT-12

Datum: Ground Elevation
Figure Number: A.04
Page: 1 of 1

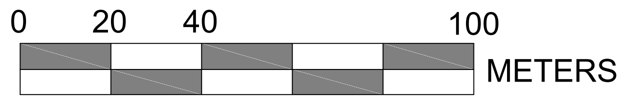
Test Pit Logs

(Completed by WSP 2016)



LEGEND

TP16-01 APPROXIMATE TEST PIT LOCATION



REVISIONS

REV	Date	Issue/Revision Description	Drawn	Check

ADAPTED FROM: MCELHANNEY

PROJECT/DWG. NO: 2111-3603-00

DATE: JUNE 29, 2016

TITLE:

TEST PIT LOCATION PLAN

PROJECT: PROPOSED THIRTY-FIVE LOT RESIDENTIAL DEVELOPMENT

ADDRESS: RIDGE MOUNTAIN DRIVE, ANMORE, BC

CLIENT: ATTI GROUP

SEAL:

WSP

DESIGN: NA
DATE: DEC 2016
CHECK: NA
SCALE: NTS
DRAWN: BO
FILE NO: 161-10710-00
FIG. NO: 3

WSP Canada Inc.
100 - 20339 96 Avenue
Langley, B.C. V1M 0E4
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Fax: +1 604-533-0768
www.wspgroup.com

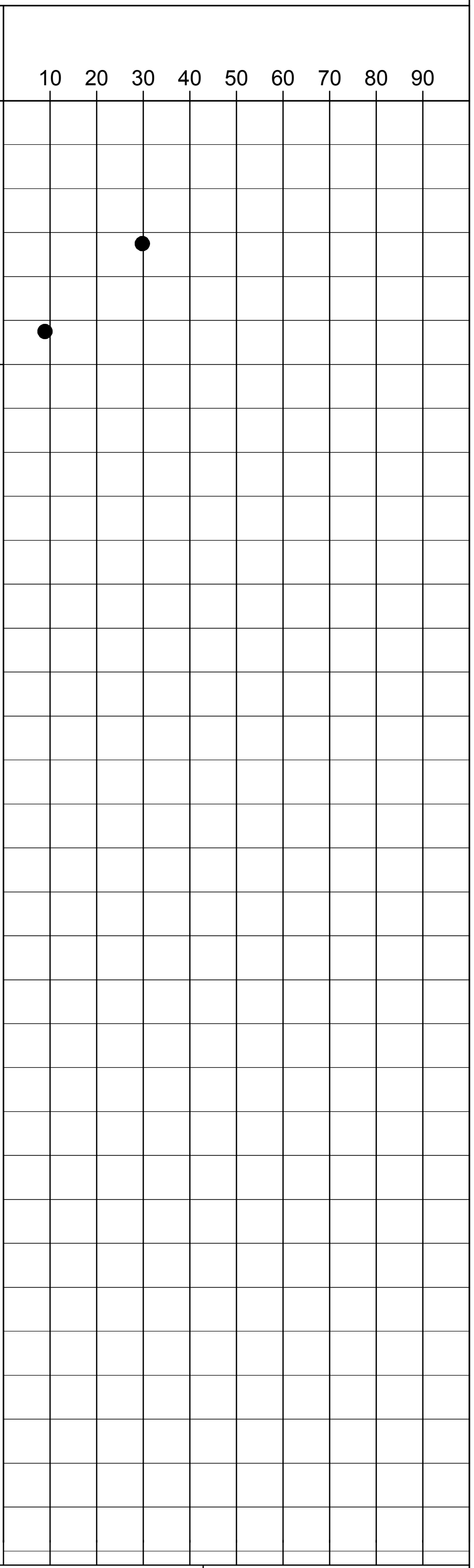
35 Lot Subdivision
Atti Group c/o McElhanney
Anmore BC

TP16-01

Pg 1 of 1
Project No: 161-10710-00

Depth (m) (ft)	Description	C	N	Type/ Sample #	Water Level
	Loose to compact brown SAND and GRAVEL, some silt, cobbles and boulders present, tree roots throughout, moist.			GB	
	Very dense grey SAND and GRAVEL, some silt and cobbles, moist, Till-like.			GB	▼ P1 Oct 27 2016
	End Test Pit. Digging refusal on bedrock or large boulder @ 2.0m. Light groundwater seepage at 1.7m. Bottom of test pit at 1.8 metres				

(m): 2, 4, 6, 8
(ft): 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32



C: Condition of Sample	**Type: Type of Sampler**	**N: Number of Blows**
Good ▇	SPT : 2 in. standard	WH : Weight of Hammer
Disturbed ▥	ST : Shelby	WR : Weight of Rod
No Recovery ☐	G : Grab	Standard Penetration Test : ASTM D1586
	CORE	Hammer Type:

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

DYNAMIC CONE PENETRATION TEST

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Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)

▼	Ground Water Level
∞	Shear strength in kPa (Torvane)
PP	Pocket Penetrometer (compressive strength in kPa)
X	Shear strength in kPa (Unconfined)
⊗	Shear strength in kPa (Field vane)
⊠	Remolded strength in kPa
■	Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
Logged by: TBH
Checked by:

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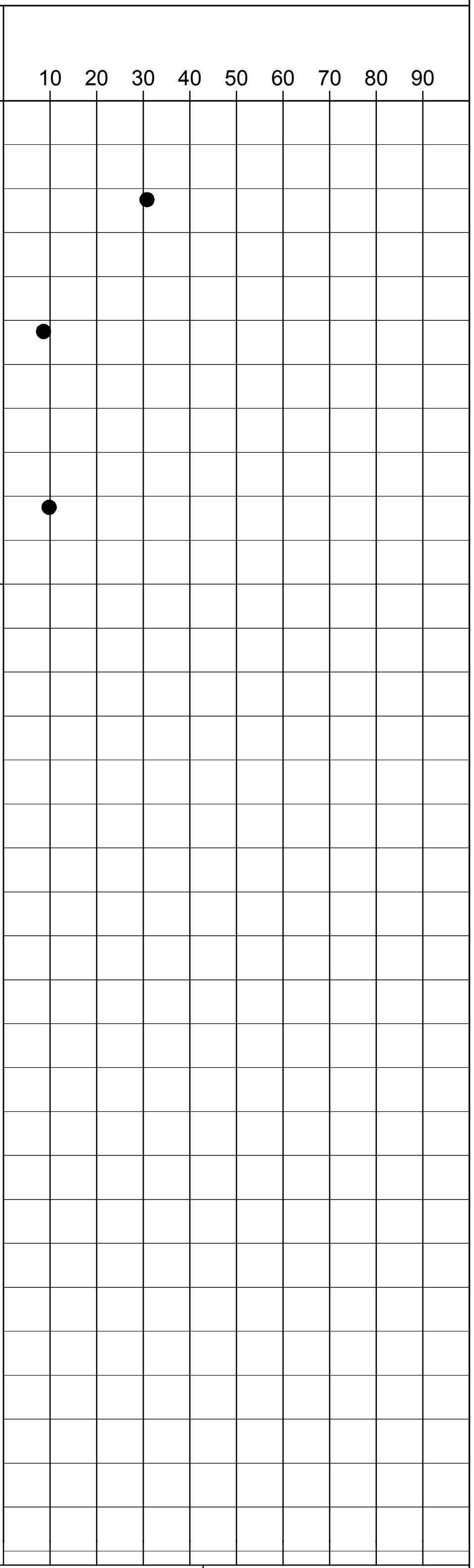
35 Lot Subdivision
Atti Group c/o McElhanney
Anmore BC

TP16-02

Pg 1 of 1
Project No: 161-10710-00

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
0 – 1.2	0 – 4	Loose-compact brown SAND and GRAVEL, some silt, cobbles and boulders present, tree roots throughout, moist.			GB	P1 Oct 28 2016
1.2 – 3.4	4 – 11	Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB GB	
		End Test Pit. Light groundwater seepage at 1.2m. Bottom of test pit at 3.4 metres				



C: Condition of Sample
Good ▩
Disturbed ▥
No Recovery ☐

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:

DYNAMIC CONE PENETRATION TEST

Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)
▼ Ground Water Level
ꝏ Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
☒ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
Logged by: TBH
Checked by:

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

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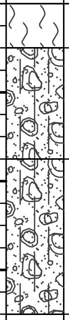
35 Lot Subdivision
Atti Group c/o McElhanney
Anmore BC

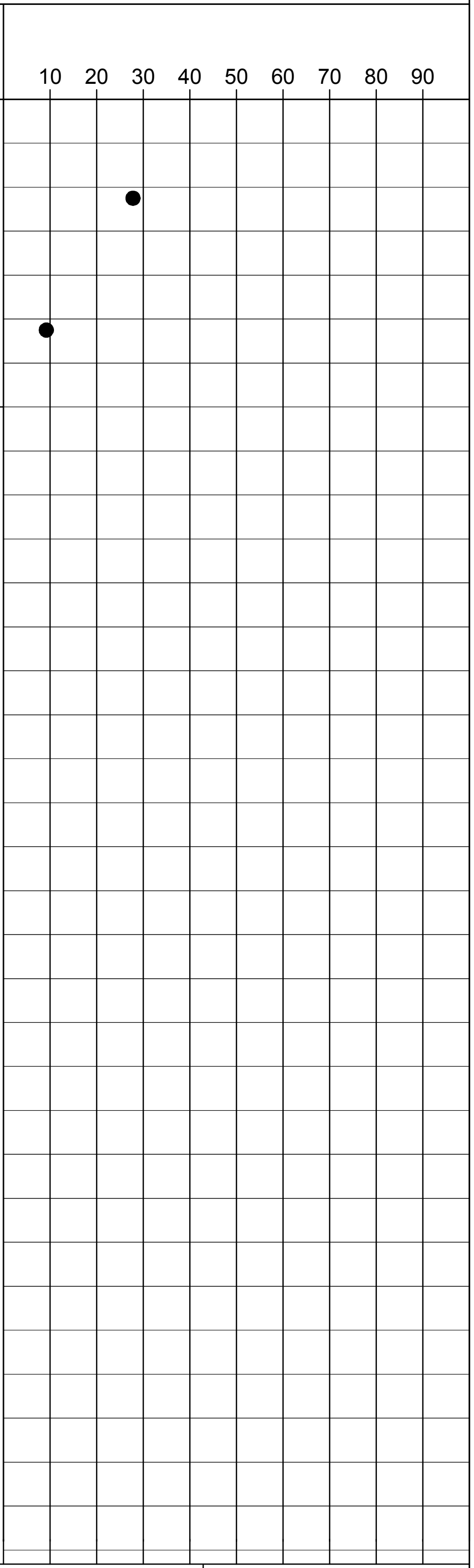
TP16-03

Pg 1 of 1
Project No: 161-10710-00

Depth (m): 2, 4, 6, 8
Depth (ft): 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32



Description	C	N	Type/ Sample #	Water Level
Forest Litter.				
Loose-compact brown SAND and GRAVEL, some silt, cobbles and boulders present, moist.			GB	
Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB	▼ P1 Oct 28 2016
End Test Pit. Light groundwater seepage at 1.1m. Bottom of test pit at 2.1 metres				



C: Condition of Sample
- Good ▇
- Disturbed ▥
- No Recovery ☐

Type: Type of Sampler
- SPT : 2 in. standard
- ST : Shelby
- G : Grab
- CORE

N: Number of Blows
- WH : Weight of Hammer
- WR : Weight of Rod
- Standard Penetration Test : ASTM D1586
- Hammer Type:

SOIL CLASSIFICATION IN ACCORDANCE WITH THE CANADIAN FOUNDATION ENGINEERING MANUAL 4TH EDITION 2006.

DYNAMIC CONE PENETRATION TEST

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Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)

▼	Ground Water Level
⊗	Shear strength in kPa (Torvane)
PP	Pocket Penetrometer (compressive strength in kPa)
X	Shear strength in kPa (Unconfined)
⊗	Shear strength in kPa (Field vane)
☒	Remolded strength in kPa
■	Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
Logged by: TBH
Checked by:

WSP Canada Inc.
100 - 20339 96 Avenue
Langley, B.C. V1M 0E4
Tel: +1 604-533-2992
Fax: +1 604-533-0768
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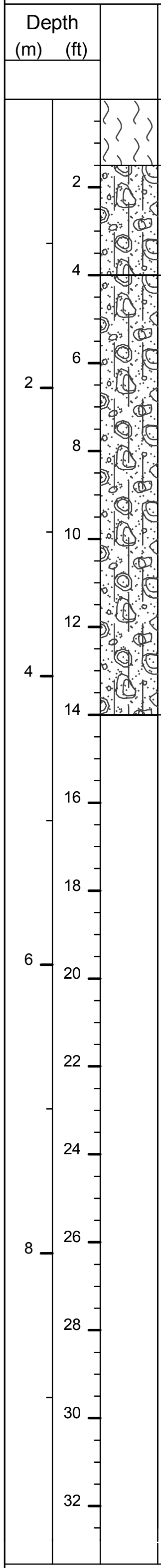
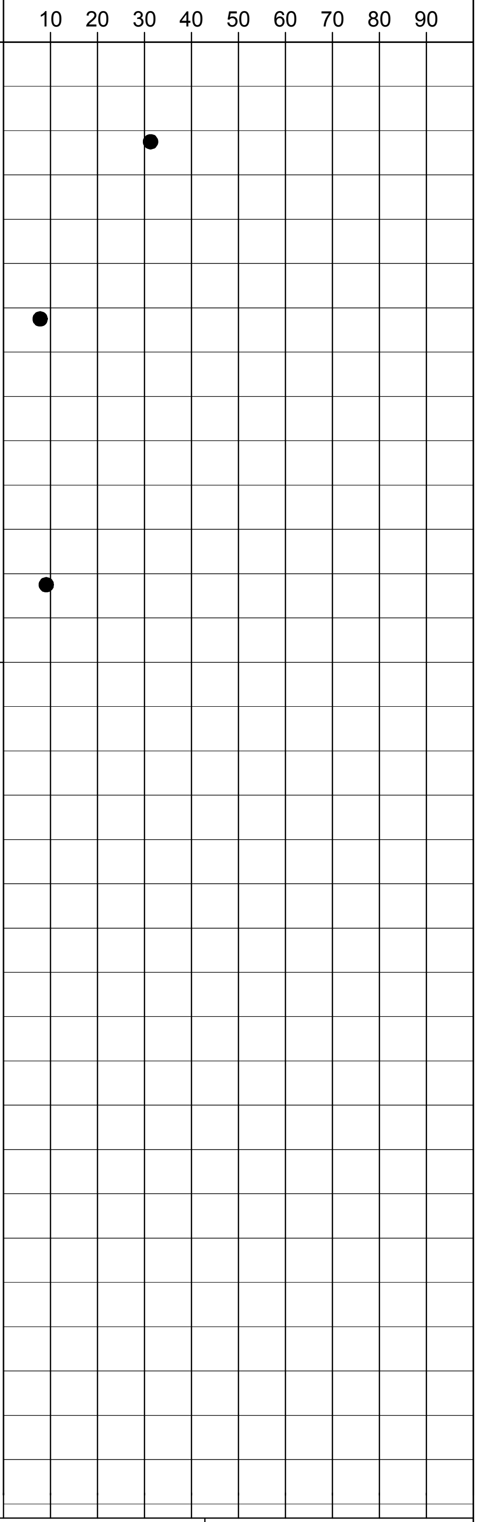
Atti Group c/o McElhanney
Anmore BC

TP16-04

Pg 1 of 1
Project No: 161-10710-00

Description	C	N	Type/ Sample #	Water Level
Forest Litter.				
Loose-compact brown SAND and GRAVEL, some silt, cobbles and boulders present, tree roots throughout, moist.			GB	
Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB GB	▼P1 Oct 28 2016
End Test Pit. Light groundwater seepage at 1.2m. Bottom of test pit at 4.3 metres				





C: Condition of Sample
Good ▆
Disturbed ▥
No Recovery ☐

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:

DYNAMIC CONE PENETRATION TEST

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Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)

- ▼ Ground Water Level
- ⊗ Shear strength in kPa (Torvane)
- PP Pocket Penetrometer (compressive strength in kPa)
- X Shear strength in kPa (Unconfined)
- ⊗ Shear strength in kPa (Field vane)
- ⊠ Remolded strength in kPa
- ■ Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
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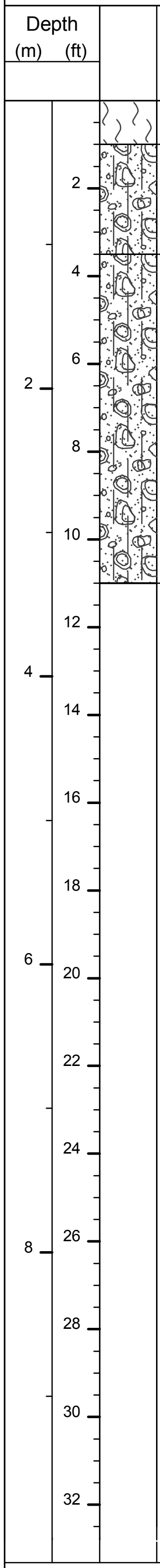
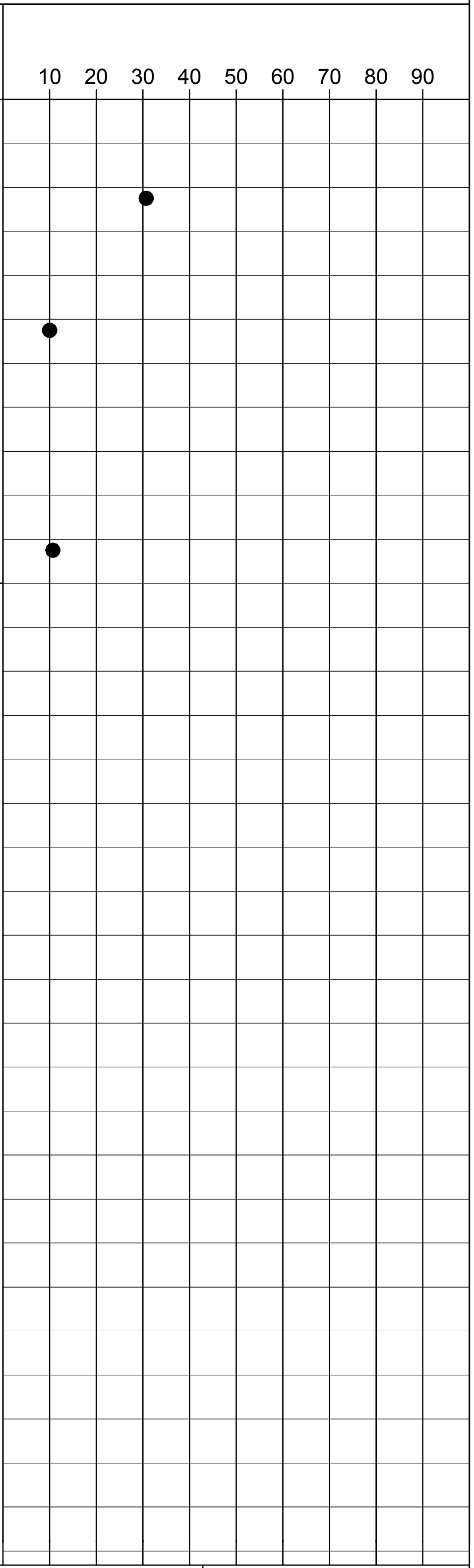
TP16-05

Pg 1 of 1
Project No: 161-10710-00



Description	C	N	Type/ Sample #	Water Level
Forest Litter.				
Loose to compact brown SAND and GRAVEL, some silt, cobbles and boulders present, tree roots throughout, moist.			GB	
Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB GB	▼ P1 Oct 28 2016
End Test Pit. Light groundwater seepage at 1.1m. Bottom of test pit at 3.4 metres				



C: Condition of Sample
Good ▆
Disturbed ▥
No Recovery ☐

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:

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Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)

▼	Ground Water Level
∞	Shear strength in kPa (Torvane)
PP	Pocket Penetrometer (compressive strength in kPa)
X	Shear strength in kPa (Unconfined)
⊗	Shear strength in kPa (Field vane)
⊠	Remolded strength in kPa
■	Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
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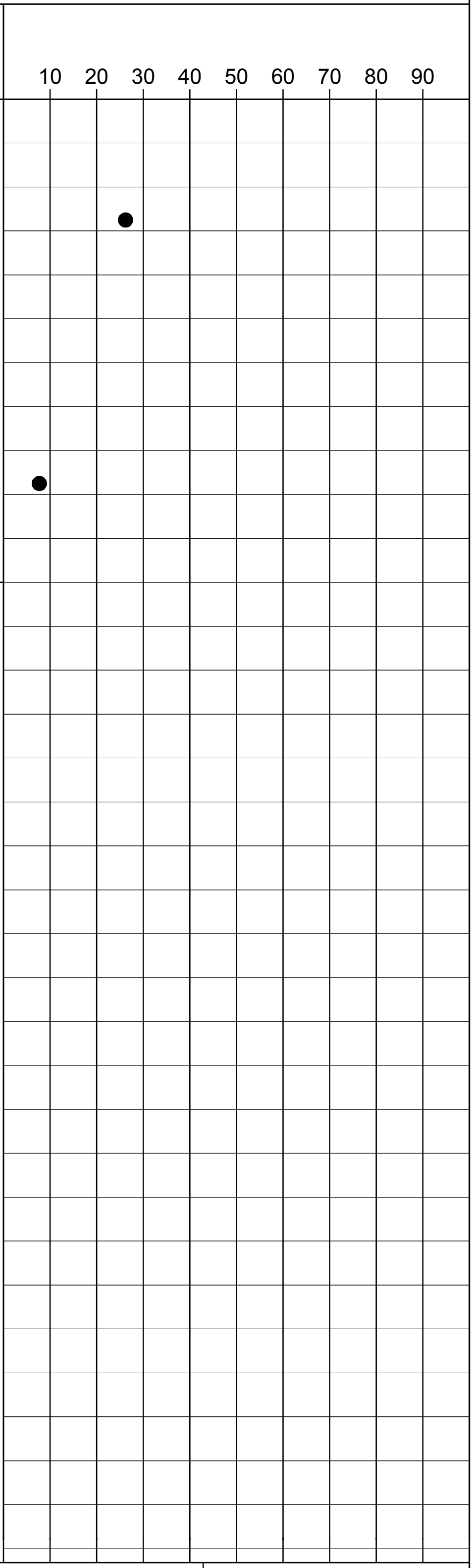
TP16-06

Pg 1 of 1
Project No: 161-10710-00

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
	2 4	Compact-loose brown SAND and GRAVEL, some silt, cobbles and boulders present, tree roots throughout, moist.			GB	
2	6 8 10	Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB	▼P1 Oct 28 2016
4 6 8	12 14 16 18 20 22 24 26 28 30 32	End Test Pit. Light seepage at 1.4m. Bottom of test pit at 3.4 metres				



C: Condition of Sample
Good ▆
Disturbed ▥
No Recovery ☐

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:

DYNAMIC CONE PENETRATION TEST

Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)
▼ Ground Water Level
∞ Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
Logged by: TBH
Checked by:

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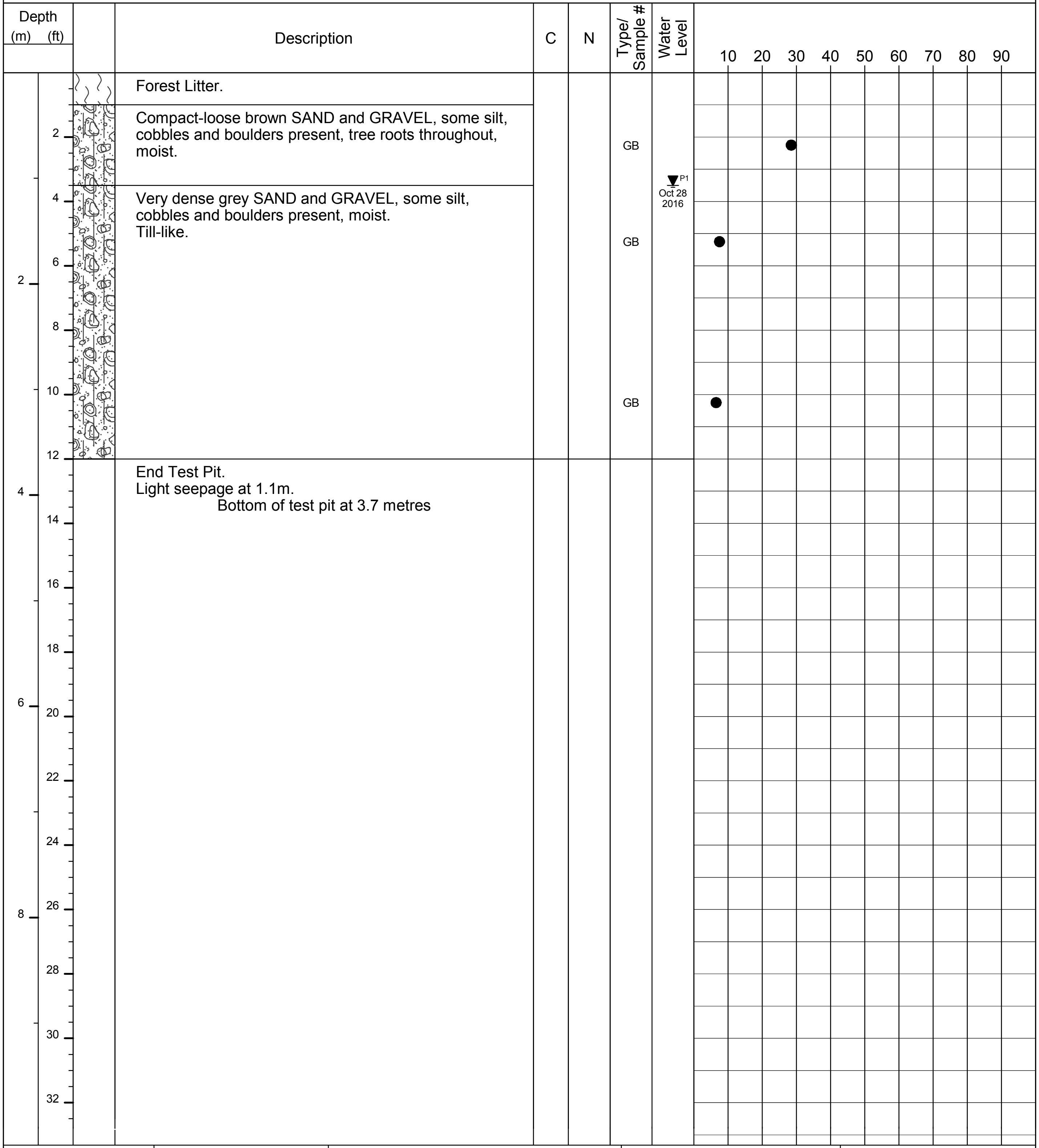
TP16-07

Pg 1 of 1
Project No: 161-10710-00

Depth (ft)	Description	C	N	Type/ Sample #	Water Level
0 – 1	Forest Litter.				
1 – 3.5	Compact-loose brown SAND and GRAVEL, some silt, cobbles and boulders present, tree roots throughout, moist.			GB	P1 Oct 28 2016
3.5 – 12	Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB GB	
12	End Test Pit. Light seepage at 1.1m. Bottom of test pit at 3.7 metres				



C: Condition of Sample
Good ▬
Disturbed ▥
No Recovery ☐

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:

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Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)
▼ Ground Water Level
⊗ Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
Logged by: TBH
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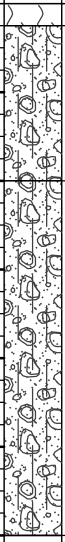
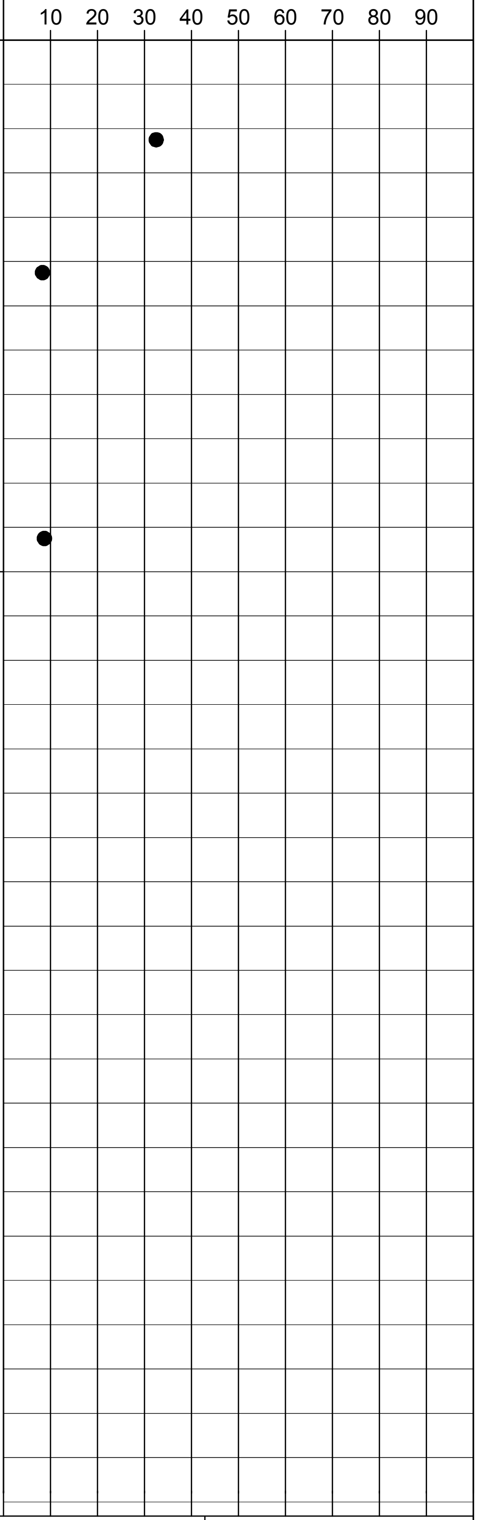
TP16-08

Pg 1 of 1
Project No: 161-10710-00

Depth (ft)	Description	C	N	Type/ Sample #	Water Level
0	Forest Litter.				
2	Compact-loose brown SAND and GRAVEL, some silt, cobbles and boulders present, moist.			GB	
4	Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB GB	P1 Oct 28 2016
12	End Test Pit. Light seepage at 1.2m. Bottom of test pit at 3.7 metres				





C: Condition of Sample
Good ▇
Disturbed ▥
No Recovery ☐

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:

DYNAMIC CONE PENETRATION TEST

Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)
▼ Ground Water Level
Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
Logged by: TBH
Checked by:

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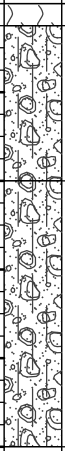
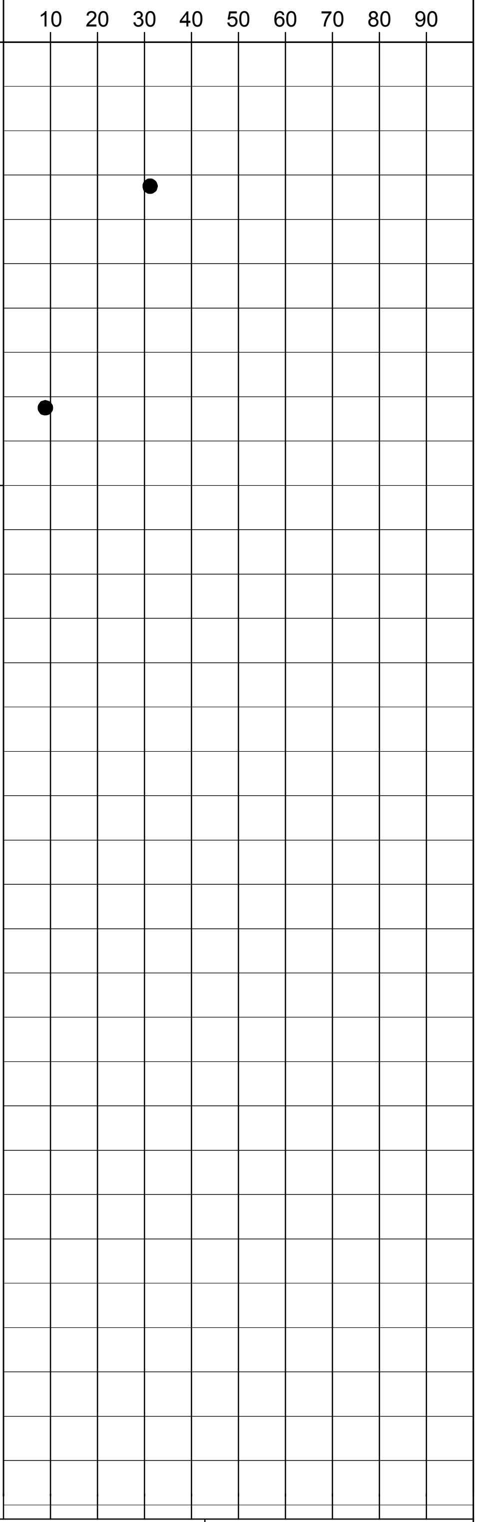
TP16-09

Pg 1 of 1
Project No: 161-10710-00

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
		Forest Litter.				
	2	Compact-loose brown SAND and GRAVEL, some silt, cobbles and boulders present, tree roots throughout, moist.			GB	▼P1 Oct 28 2016
2	4 – 10	Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB	
	10	End Test Pit. Light groundwater seepage at 1.2m. Bottom of test pit at 3.0 metres				

Depth (m): 2, 4, 6, 8
Depth (ft): 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32





C: Condition of Sample	Type: Type of Sampler	N: Number of Blows
Good ▆	SPT : 2 in. standard	WH : Weight of Hammer
Disturbed ▥	ST : Shelby	WR : Weight of Rod
No Recovery ☐	G : Grab	Standard Penetration Test : ASTM D1586
	CORE	Hammer Type:

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Plastic Limit (%) ▶—●—◀ Liquid Limit (%)
Moisture Content (%)
▼ Ground Water Level
ꝏ Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
⊠ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
Logged by: TBH
Checked by:

1 LOG PER PAGE 12/19/16

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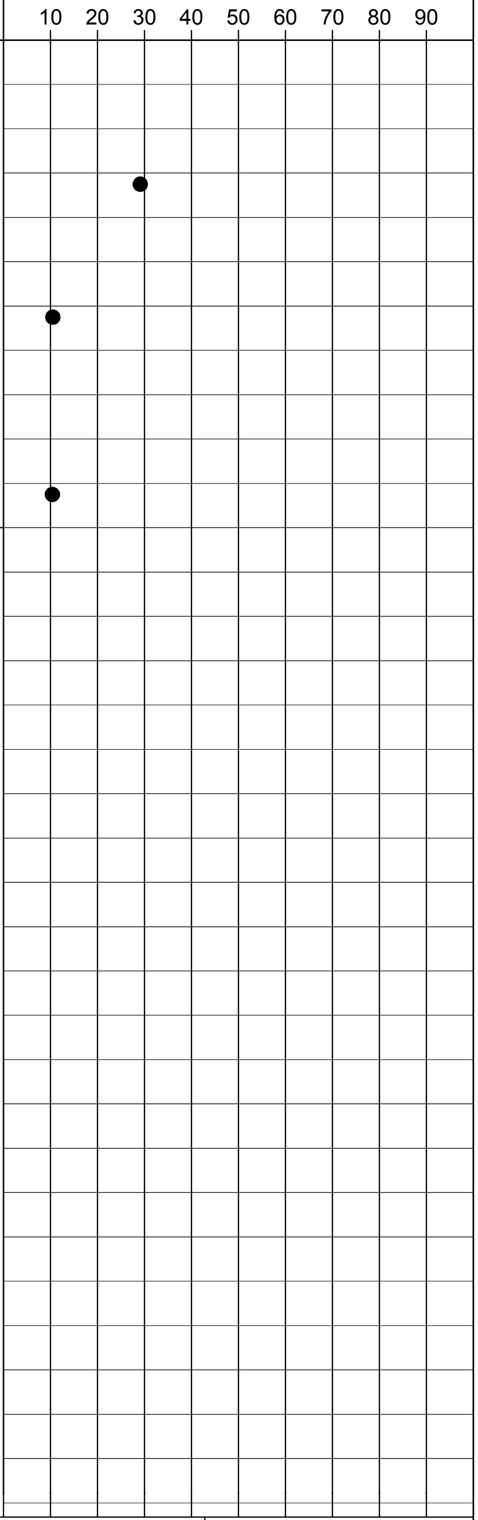
TP16-10

Pg 1 of 1
Project No: 161-10710-00

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
	0	Forest Litter.				
		Compact-loose brown SAND and GRAVEL, some silt, cobbles and boulders present, tree roots throughout, moist.			GB	
		Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB GB	P1 Oct 28 2016
		End Test Pit. Digging refusal @ 3.3m on bedrock or large boulder. Light groundwater seepage at 1.5m. Bottom of test pit at 3.4 metres				

Depth (m): 2, 4, 6, 8
Depth (ft): 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32



C: Condition of Sample	**Type: Type of Sampler**	**N: Number of Blows**
Good ▮	SPT : 2 in. standard	WH : Weight of Hammer
Disturbed ▥	ST : Shelby	WR : Weight of Rod
No Recovery ☐	G : Grab	Standard Penetration Test : ASTM D1586
	CORE	Hammer Type:

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Plastic Limit (%) Liquid Limit (%)
▶—●—◀
Moisture Content (%)
▼ Ground Water Level
⊗ Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
☒ Remolded strength in kPa
■ Percent Passing # 200 sieve

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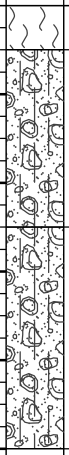
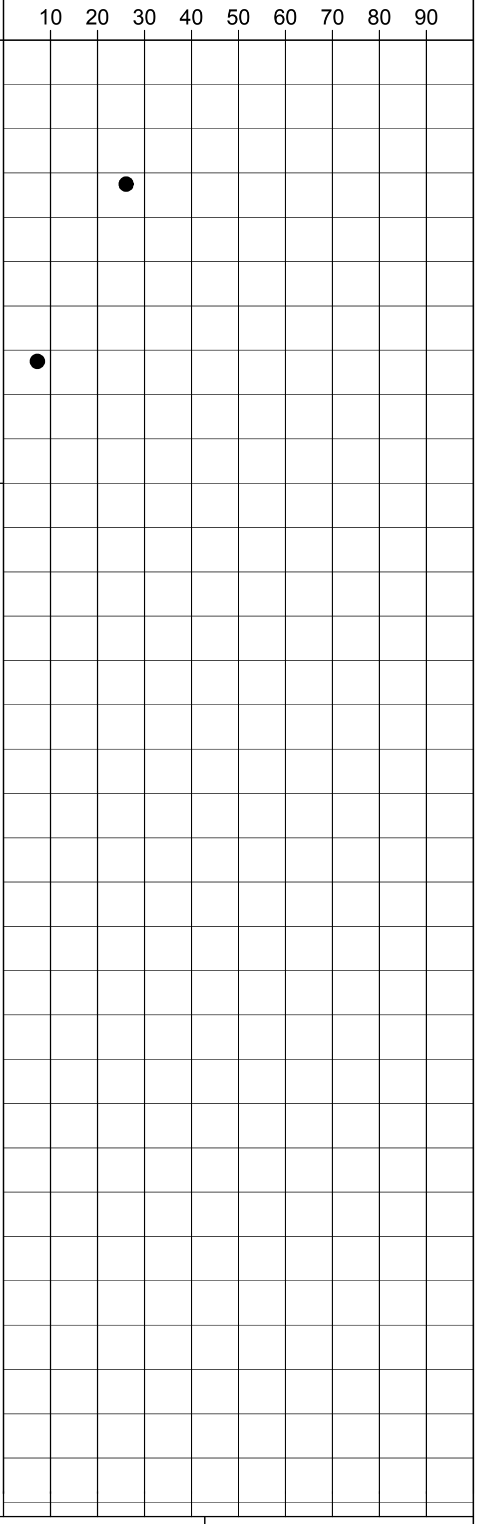
TP16-11

Pg 1 of 1
Project No: 161-10710-00

Depth (m)	Depth (ft)	Description	C	N	Type/ Sample #	Water Level
	0–1	Forest Litter.				
	1–5	Compact to loose brown SAND and GRAVEL, some silt, cobbles and boulders present, tree roots throughout, moist.			GB	▼P1 Oct 28 2016
2	5–10	Very dense grey SAND and GRAVEL, some silt, cobbles and boulders present, moist. Till-like.			GB	
	10	End Test Pit. Light groundwater seepage at 1.5m. Bottom of test pit at 3.0 metres				





C: Condition of Sample
Good ▨
Disturbed ▥
No Recovery ☐

Type: Type of Sampler
SPT : 2 in. standard
ST : Shelby
G : Grab
CORE

N: Number of Blows
WH : Weight of Hammer
WR : Weight of Rod
Standard Penetration Test : ASTM D1586
Hammer Type:

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Moisture Content (%)
▼ Ground Water Level
⊗ Shear strength in kPa (Torvane)
PP Pocket Penetrometer (compressive strength in kPa)
X Shear strength in kPa (Unconfined)
⊗ Shear strength in kPa (Field vane)
☒ Remolded strength in kPa
■ Percent Passing # 200 sieve

Drill Method: Test Pit
Date Drilled: 10/28/2016
Logged by: TBH
Checked by:

APPENDIX B

Lidar Data Images and Water Shed Stream Analysis

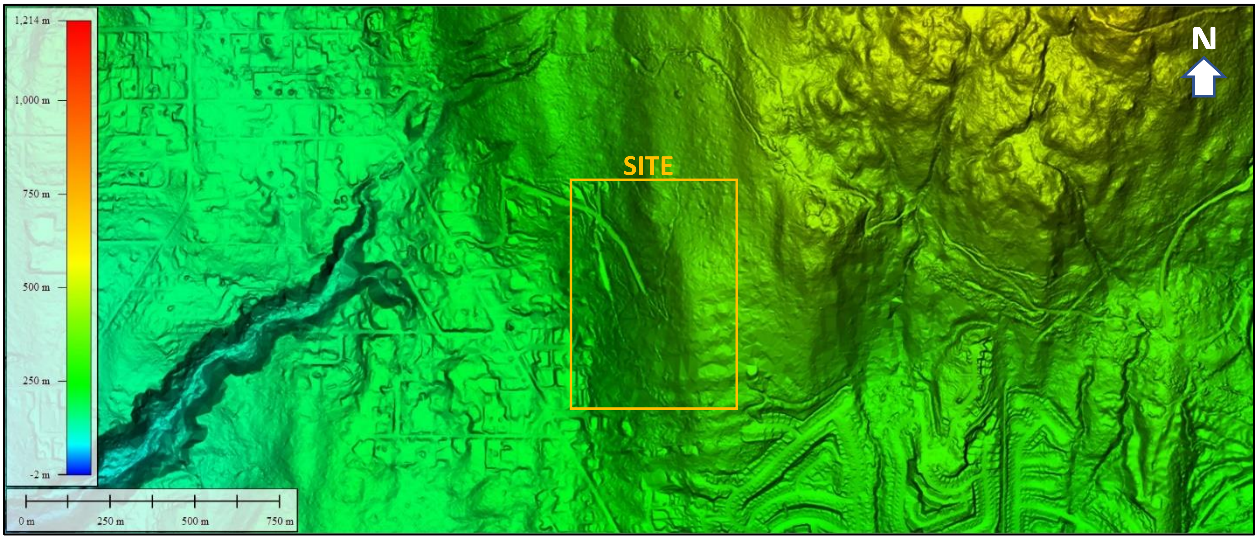


Figure 1: Lidar Area Overview, combined site approximate area marked-up.

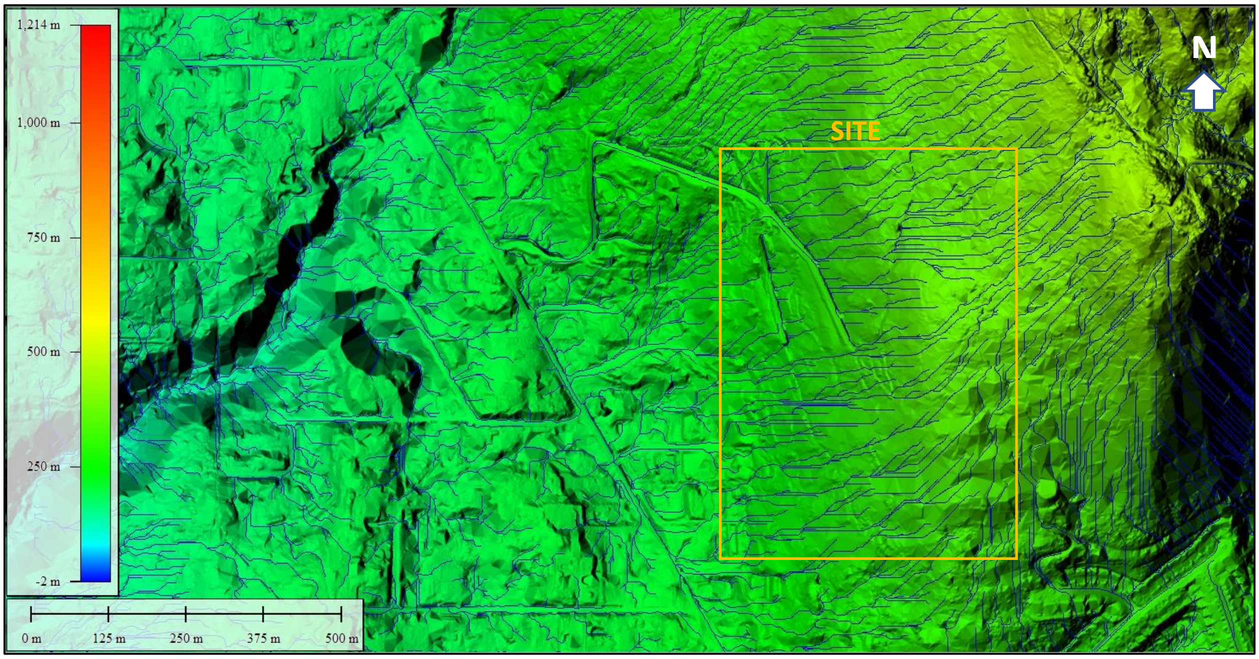


Figure 2: Lidar watershed and stream analysis, combined site approximate area marked-up.

APPENDIX C

Site Reconnaissance Photographs

Photo 1*: Existing access road extension from Ridge Mountain Drive, looking north (October 6, 2023)*

***Photo 2**: Existing access road extension from Ridge Mountain Drive, looking south (October 6, 2023)*

***Photo 3**: New/re-worked access road from Ridge Mountain Drive extension (October 6, 2023)*

***Photo 4**: New access road from Ridge Mountain Drive extension (October 6, 2023)*

***Photo 5**: Transient stream flow north of Ridge Mountain Drive flowing into Minor Drainage System #1 ditch along upslope side of road (December 11, 2023)*

***Photo 6**: Transient stream flow north of Ridge Mountain Drive (December 11, 2023)*

Photo 7*: Minor Drainage System # 2, drainage swale at south extent of asphalt paved Ridge Mountain Drive, collecting drainage from the cross-slope swale within TREZ development area, looking upslope/east (December 11, 2023)*

***Photo 8**: Minor Drainage System # 2, stormwater drainage pipe at south extent of asphalt paved Ridge Mountain Drive, collecting drainage from the swale shown in Photo 7, looking downslope/west (December 11, 2023)*

***Photo 9**: Exposed very dense glacial till and large boulder/bedrock outcrop along the Ridge Mountain Drive extension (December 11, 2023)*

Photo 10*: Transient stream along the Ridge Mountain Drive extension (December 11, 2023)*

Photo 11*: Transient stream along at upper access road extensions (December 13, 2023)*

***Photo 12**: Upper access road extensions through relatively flat/mild sloping area in the upper access roads of Anmore Gate (December 13, 2023)*

Photo 13*: Upper extent of Minor Drainage System #2, downslope drainage swale at southern portion of TREZ development (December 13, 2023)*

***Photo 14**: Downslope drainage swale at southern portion of TREZ development showing Deltalok™ Geo-Modular Bags (December 13, 2023)*

Photo 15*: Cross-slope swale at southern portion of TREZ development (December 13, 2023)*

Photo 16*: Cross-slope swale at northern portion of TREZ development (December 13, 2023)*

***Photo 17**: Bedrock outcrop at NE corner of intersection of Ridge Mountain Drive and North Charlotte Way (December 13, 2023)*

***Photo 18**: Minor System #1 draining into culvert at east side of North Charlotte Drive at south portion of 1983 North Charlotte Drive (December 13, 2023)*

Photo 19*: Access road at south extent of North Charlotte Drive (December 13, 2023)*

Photo 20*: Minor Drainage System #2, stormwater drainage pipe intake at west side of North Charlotte Drive extension (December 13, 2023)*

***Photo 21**: Minor Drainage System #2, stormwater drainage pipe at west side of North Charlotte Drive extension (December 13, 2023)*

***Photo 22**: North Charlotte Drive extension and groundwater monitoring well (December 13, 2023)*

Photo 23*: Property west of Bella Terra at past end of North Charlotte Drive Extension*

(December 13, 2023)

***Photo 24**: MSE Retaining wall along west/downslope side of North Charlotte Drive (December 13, 2023)*

***Photo 25**: MSE Retaining wall along west/downslope side of North Charlotte Drive (December 13, 2023)*

***Photo 26**: Minor Drainage System #1 downslope of culvert at Ridge Mountain Drive*

(December 13, 2023)

***Photo 27**: Minor Drainage System #1 upslope of culvert at Ridge Mountain Drive*

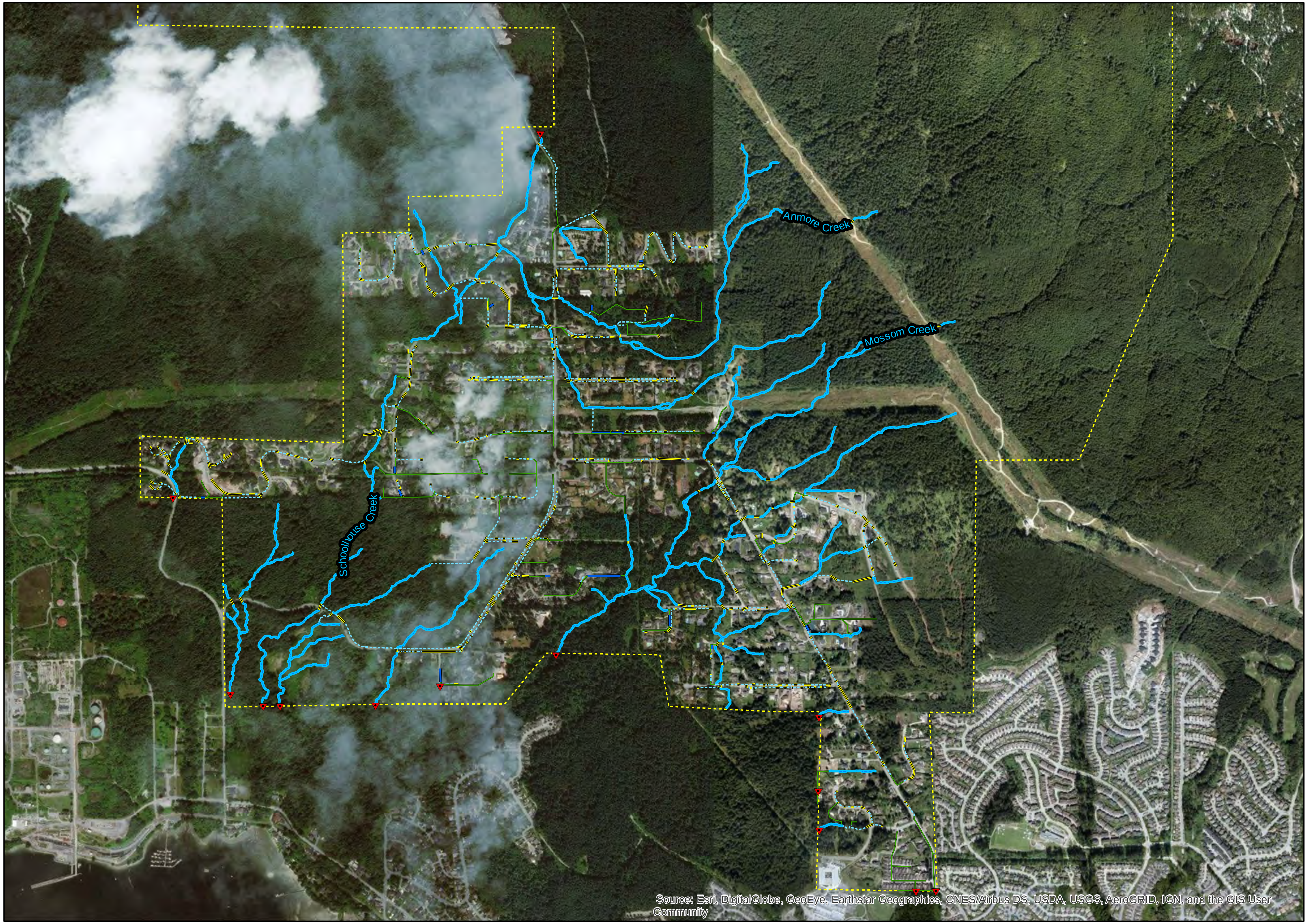
(December 13, 2023)

***Photo 28**: MSE Retaining wall along west/downslope side of Ridge Mountain Drive (December 13, 2023)*

Photo 29*: MSE Retaining wall along west/downslope side of Ridge Mountain Drive (December 13, 2023)*

APPENDIX D

Excerpt Figures from Village of Anmore SMP Final Report, dated September 19, 2018.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

GeoAdvice Engineering Inc.

Legend

- ▼ Outfall
- Culvert
- Storm Main
- Creek
- Ditch
- Detention Main
- Village of Anmore Boundary

Village of Anmore Stormwater System

VILLAGE OF ANMORE

Project: Stormwater Master Plan
Client: Village of Anmore, BC
Date: April 2018
Created by: RD
Reviewed by: WdS

DISCLAIMER: GeoAdvice does not warrant in any way the accuracy and completeness of the information shown on this map. Field verification of the accuracy and completeness of the information shown on this map is the sole responsibility of the user.

0 0.25 0.5 1
Kilometers

N
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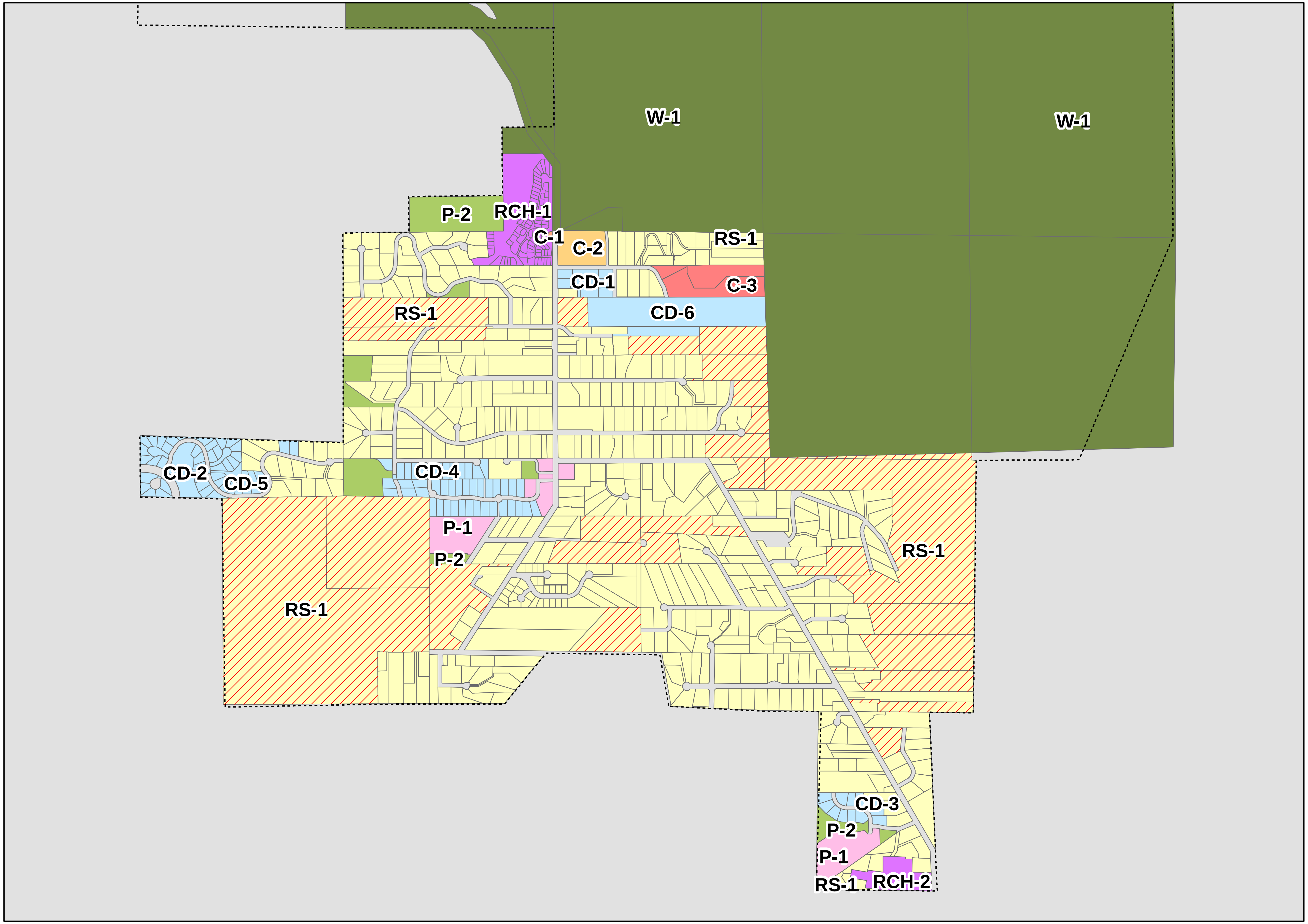
Figure 2.1



GeoAdvice Engineering Inc.

Legend

⬚ Village of Anmore Boundary

Land Use Zoning Code

- 🟧 Local Commercial (C-1)
- 🟨 Campground Commercial (C-2)
- 🟥 Equestrian Commercial (C-3)
- 🟦 Comprehensive Development (CD-1, CD-2, CD-3, CD-4, CD-5, CD-6)
- 🟪 Civic Institutional (P-1)
- 🟩 Park (P-2)
- 🟪 Compact Housing(RCH-1, RCH-2)
- 🟨 Residential 1 (RS-1)
- 🟩 Watershed (W-1)
- ▨ Future development areas designated as RS-1 in the OCP were changed to comprehensive development (CD) for modeling purposes

Future Landuse Zoning

VILLAGE OF ANMORE

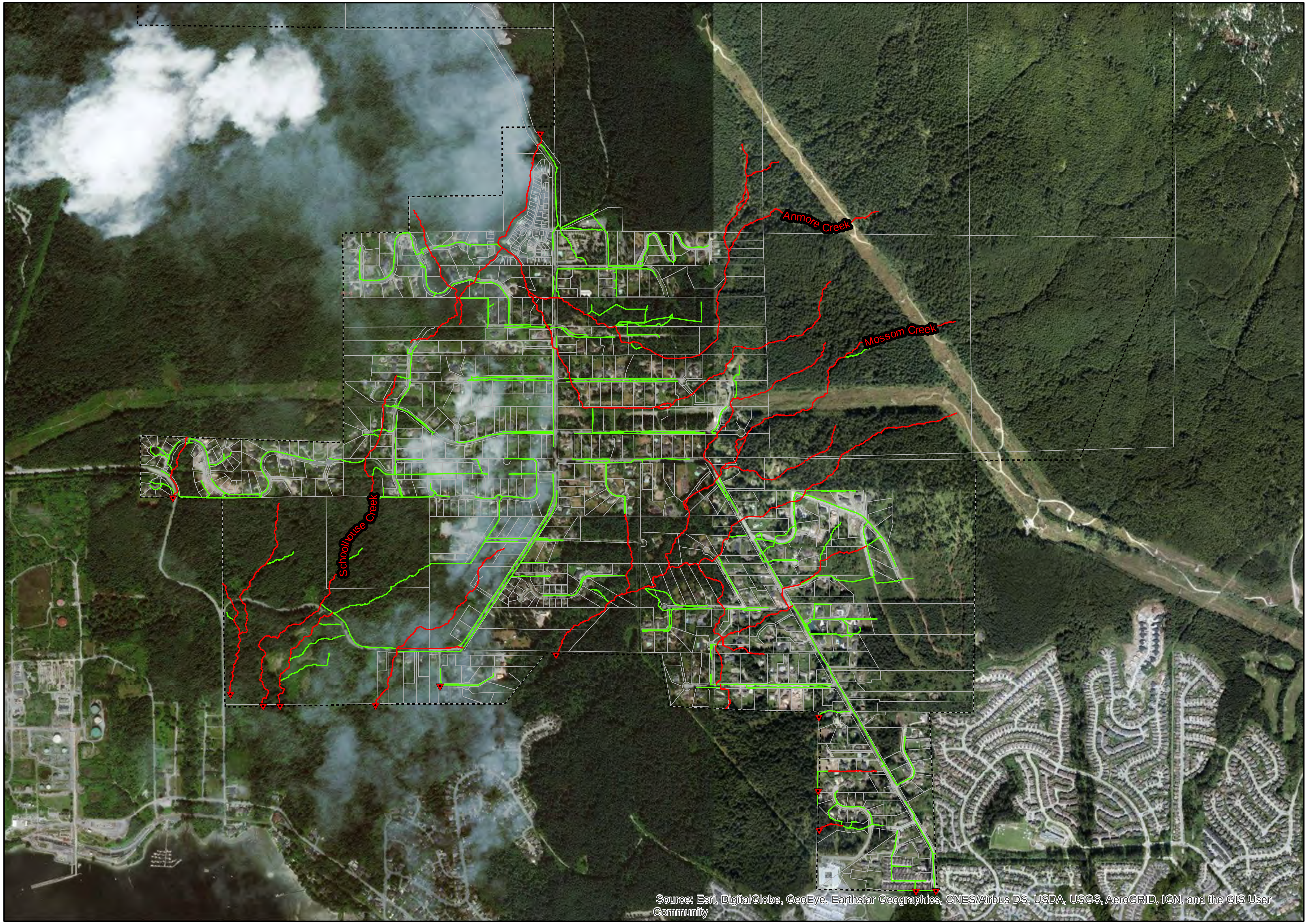
Project: Stormwater Master Plan
Client: Village of Anmore, BC
Date: April 2018
Created by: RD
Reviewed by: WdS

0 0.25 0.5 1
Kilometers

N
W E
S

Figure 3.2

GeoAdvice Engineering Inc.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

⬚	Village of Anmore Boundary
▭	Parcels
▼	Outfall
—	Major System
—	Minor System

Minor and Major Systems

VILLAGE OF
ANMORE

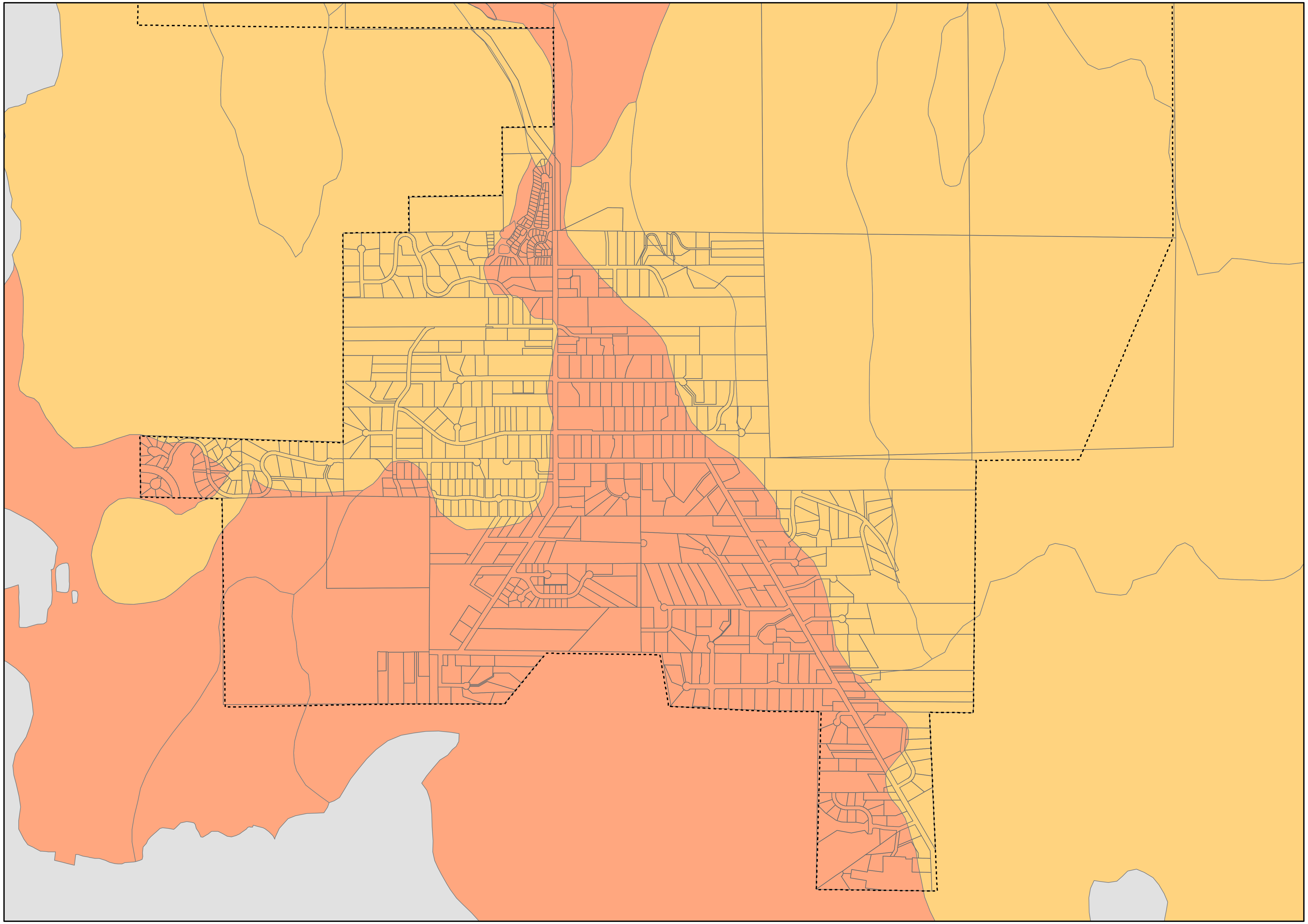
Project:	Stormwater Master Plan
Client:	Village of Anmore, BC
Date:	April 2018
Created by:	RD
Reviewed by:	WdS

DISCLAIMER: GeoAdvice does not warrant in any way the accuracy and completeness of the information shown on this map. Field verification of the accuracy and completeness of the information shown on this map is the sole responsibility of the user.

0 0.25 0.5 1
Kilometers

N
W E
S

Figure 4.1



GeoAdvice Engineering Inc.

Legend

⬚ Village of Anmore Boundary

Soil Classification*

🟧 Silt Loam

🟨 Sandy Loam

*Source: Detailed Soil Survey (DSS) Compilations, Agriculture and Agri-Food Canada

Soil Type Classification

VILLAGE OF ANMORE

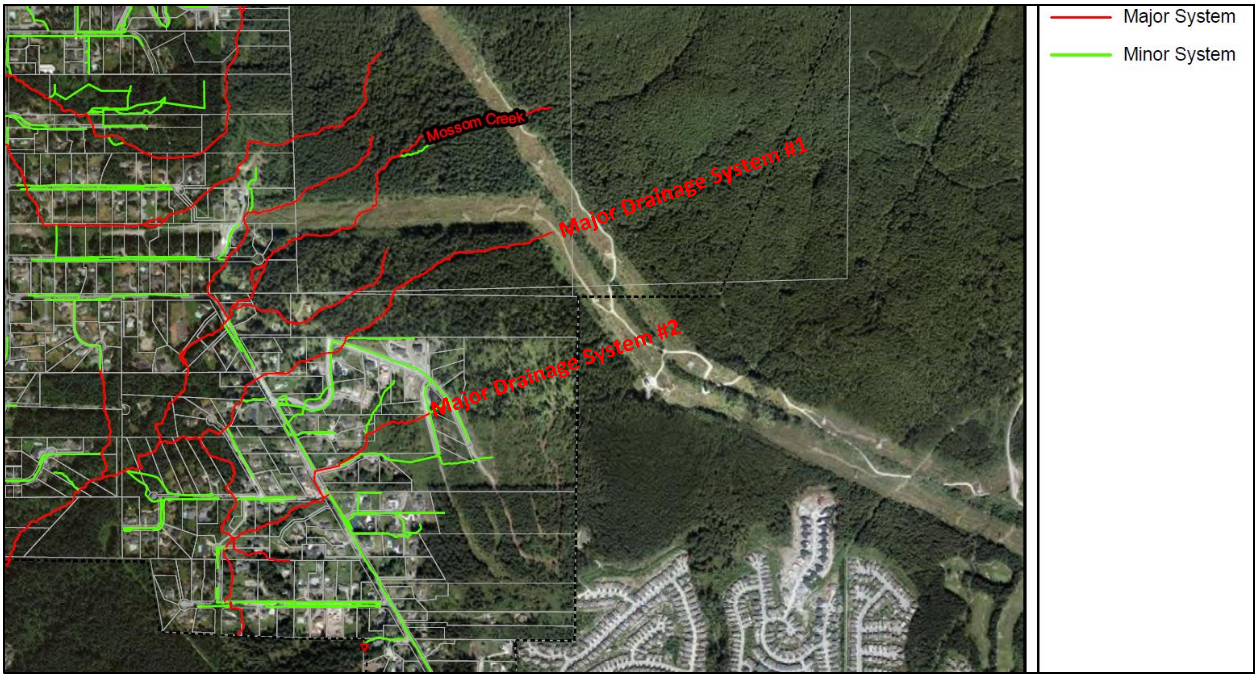
Project: Stormwater Master Plan
Client: Village of Anmore, BC
Date: April 2018
Created by: RD
Reviewed by: WdS

0 0.25 0.5 1
Kilometers

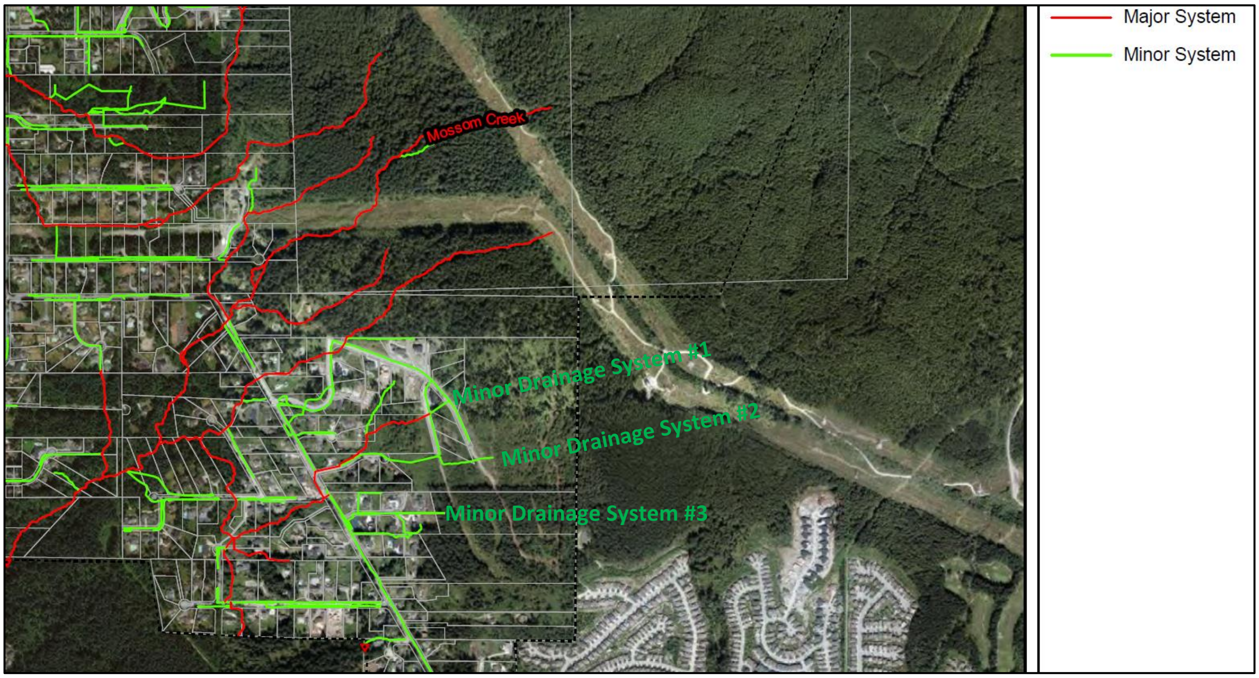
N
W E
S

Figure 5.8

1. **SMP Figure 4.1 Mark-Up:** Major Drainage System Naming System Mark-Up



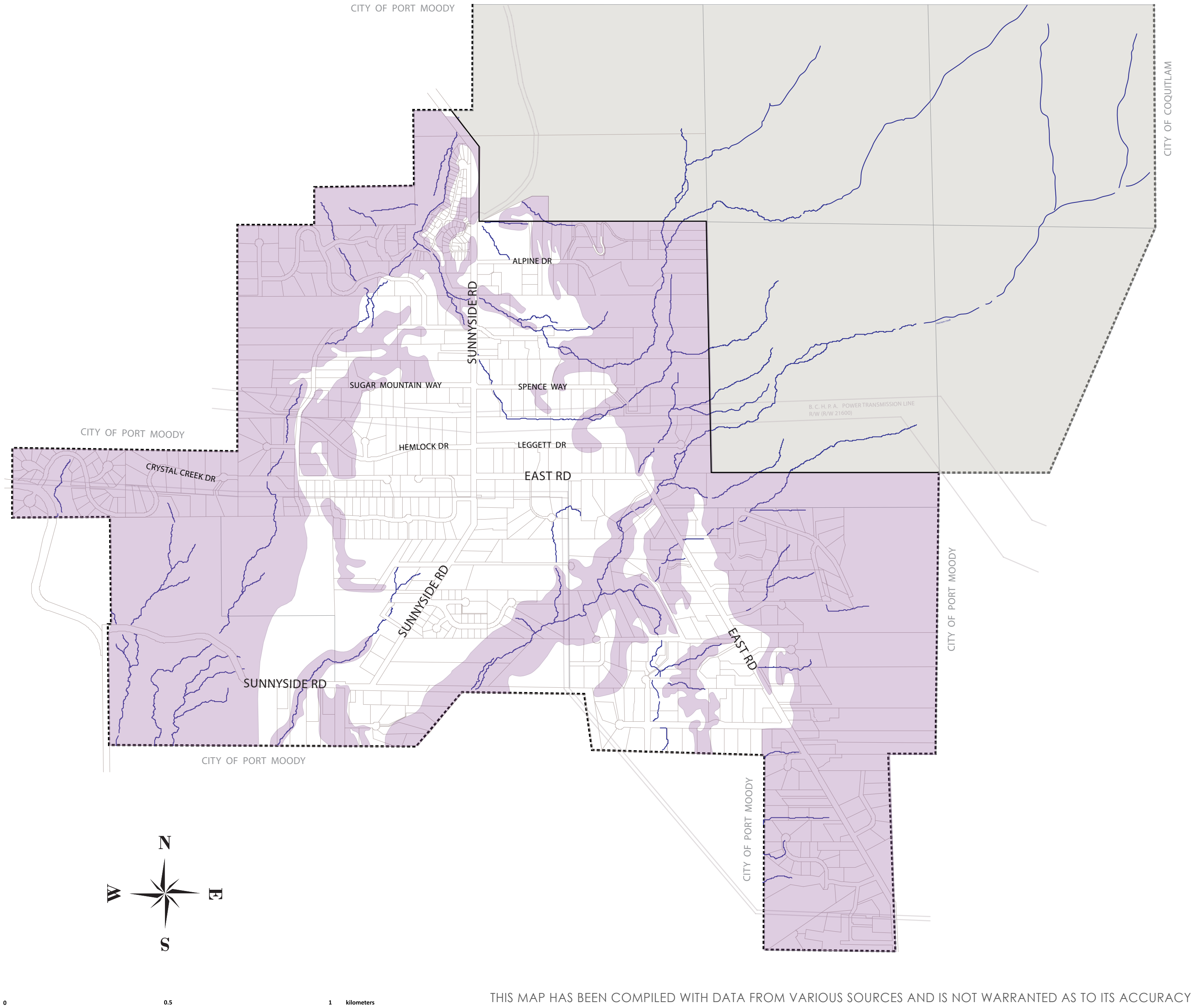
2. **SMP Figure 4.1 Mark-Up:** Minor Drainage System Naming System Mark-Up



APPENDIX E

Excerpt Figures from Village of Anmore Village of Anmore OCP Report, updated March, 2014

SCHEDULE D2: STEEP SLOPES MAP



LEGEND

🟪 Steep Slopes
(equal to or greater than 20% slope)

〰 Watercourses

┄ Municipal Boundary

— Right of Way

☐ Rural Residential

▨ Conservation & Recreation

VILLAGE OF ANMORE

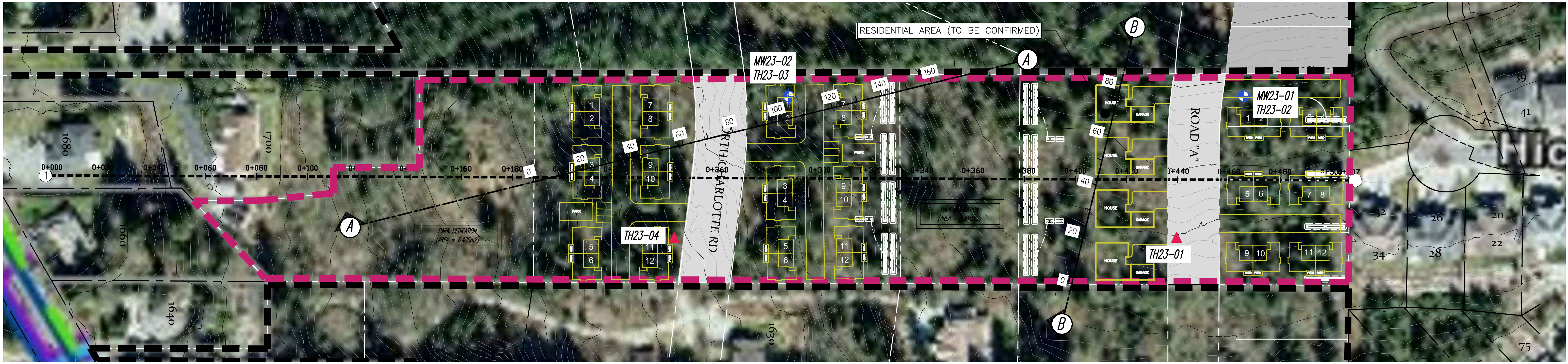
2697 Sunnyside Road, Anmore, BC, V3H 5G9 Ph: 604-469-9877

THIS MAP HAS BEEN COMPILED WITH DATA FROM VARIOUS SOURCES AND IS NOT WARRANTED AS TO ITS ACCURACY OR SUFFICIENCY BY THE VILLAGE OF ANMORE. THE DATA IS PROVIDED FOR INFORMATION PURPOSED ONLY AND IS NOT TO BE SOLELY RELIED UPON TO PROVIDE A DETAILED DEPICTION OF ALL EXISTING NATURAL FEATURES OR CONDITIONS.

THE VILLAGE OF ANMORE DOES NOT ASSUME RESPONSIBILITY FOR THE CORRECTNESS OF THIS MAP AS IT IS INTENDED FOR GENERAL REFERENCE ONLY. LAST UPDATED MARCH 2014.

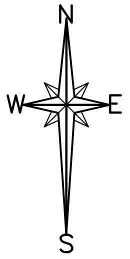
APPENDIX F

Slope Stability Site Plan and Section Drawings



SITE PLAN

SCALE 1:1500



L E G E N D :

⊕ MW23-XX – MONITORING WE (MW) LOCATION

▲ TH23-XX – TEST HOLE (TH) LOCATION

REFERENCE:

GEOPACIFIC
CONSULTANTS

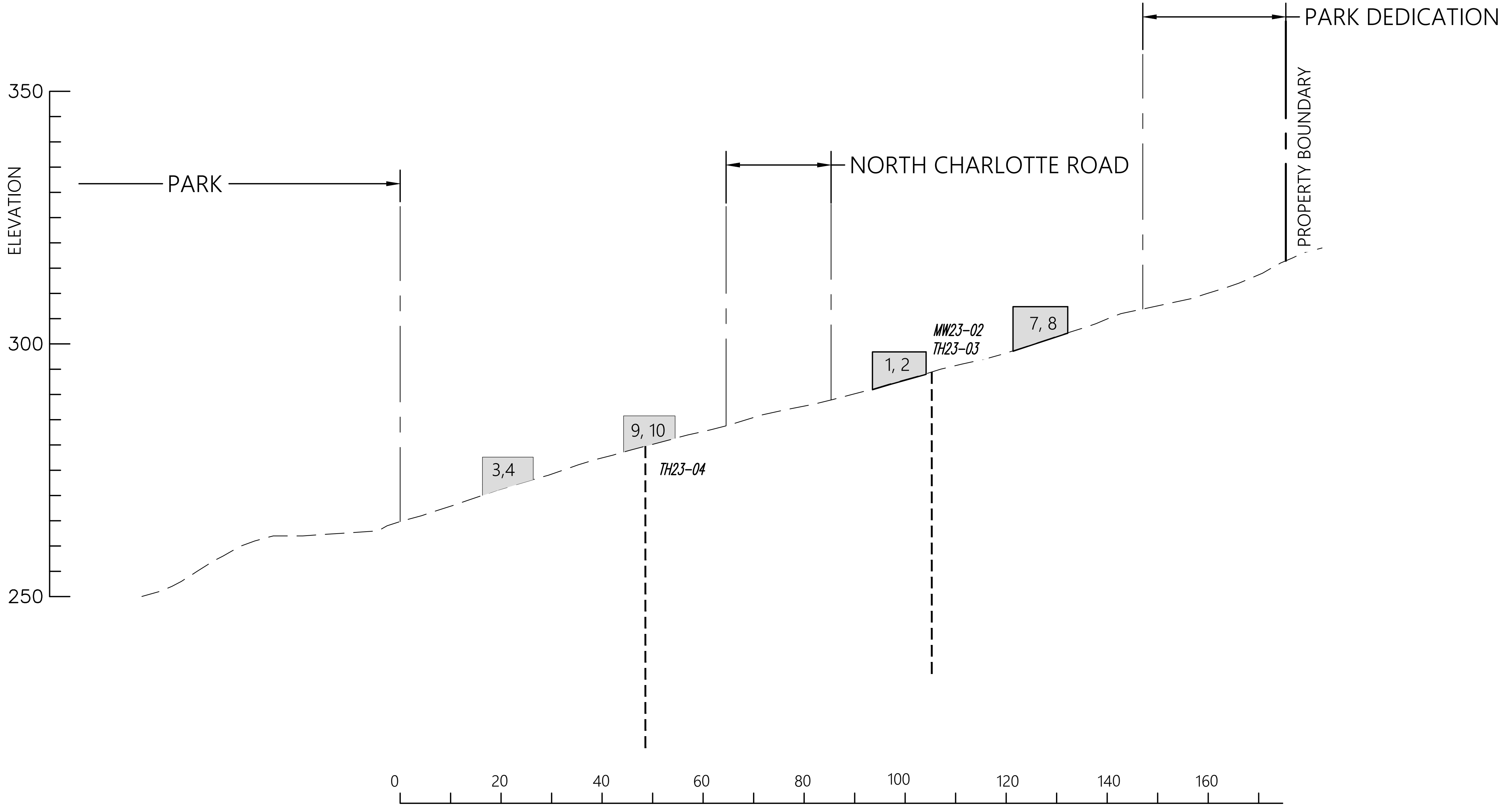
DATE: DECEMBER 6, 2023
DRAWN BY: M.S.
APPROVED BY: M.J.K.
REVIEWED BY: W.J.
SCALE: AS SHOWN

BELLA TERRA HILLSIDE
PINNACLE RIDGE, ANMORE, B.C.
SITE PLAN

FILE NO.: 23403-C
DWG. NO.: G-1

REVISIONS:
A.
B.
C.

ORIGINAL PAPER SIZE 11"x17"

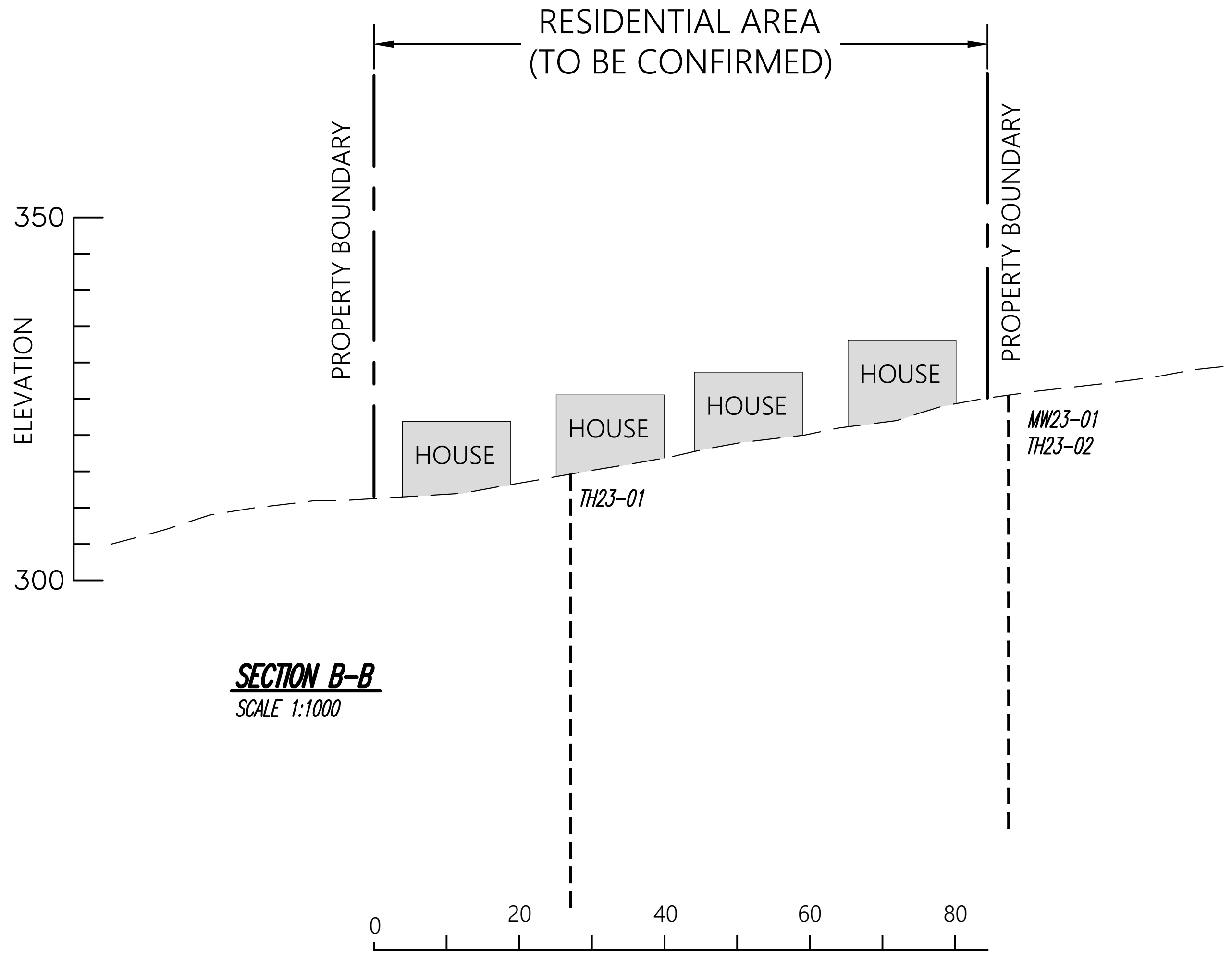


SECTION A-A

SCALE 1:1000

REFERENCE:	GEOPACIFIC CONSULTANTS	DATE: DECEMBER 6, 2023 DRAWN BY: M.S. APPROVED BY: M.J.K. REVIEWED BY: W.J. SCALE: AS SHOWN	BELLA TERRA HILLSIDE PINNACLE RIDGE, ANMORE, B.C. SECTION A-A	FILE NO. 23403-C DWG. NO.: G-2A	REVISIONS: A. B. C.

ORIGINAL PAPER SIZE 11"x17"



SECTION B-B
SCALE 1:1000

ORIGINAL PAPER SIZE 11"x17"

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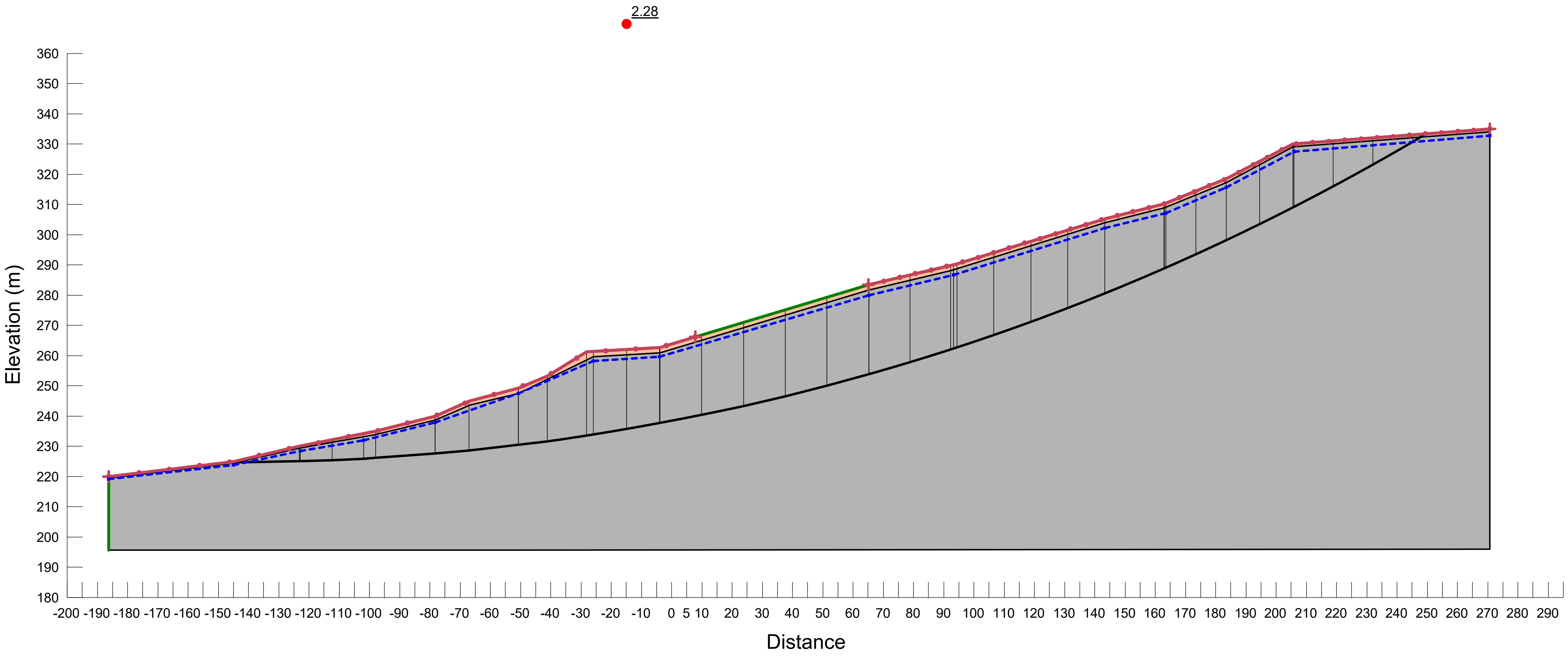
		DRAWN BY: M.S.	APPROVED BY: M.J.K.	REVIEWED BY: W.J.		DWG. NO.: G-2B	A. B. C.
		SCALE: AS SHOWN					

APPENDIX G – SLOPE STABILITY ANALYSIS



Section A

Color	Name	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
▨	GLACIAL TILL	22	10	45
🟧	SANDY SILT	18	0	30

Project: Bella Terra

Model: Pre-Development Static Global Condition

Method: Morgenstern-Price

Horz Seismic Coef.: 0

Site Address : Pinnacle Ridge, Anmore, BC

Job No.: 23403-C

Date: December 14, 2023

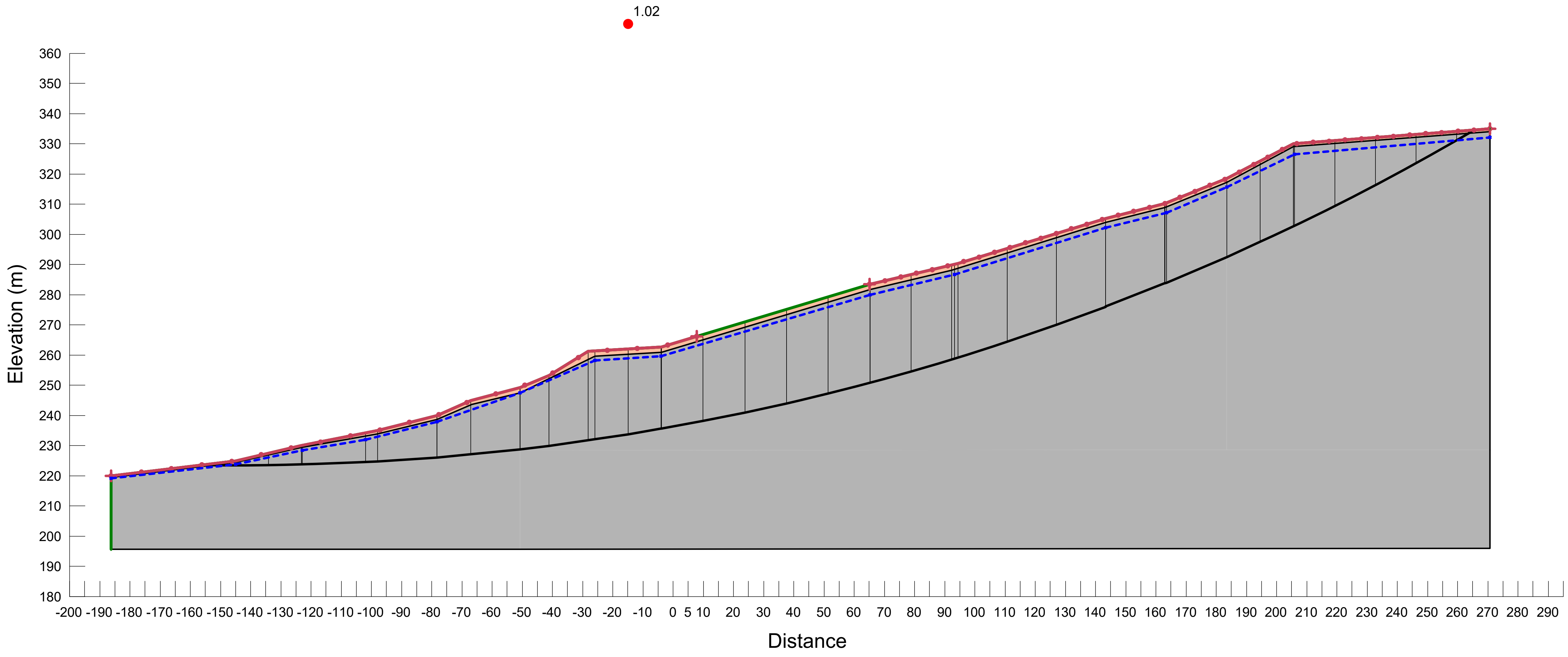
Scale : 1:1,600

Analysis by: AAn

GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

1779 W. 75th Avenue
Vancouver, B.C. V6P 6P2
P 604.439.0922
F 604.439.9189

R:\Jobs\23000 FILES\23400\23403-B - Anmore Gate, Pinnacle Ridge, Anmore BC\Analysis\Slope Stability\Section A\Perched\23403-B - Pre-Construction Global (Static) - 20220224 (res).gsz



Section A

Color	Name	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
▨	GLACIAL TILL	22	15	45
🟧	SANDY SILT	18	0	30

Project: Bella Terra		**Job No.: 23403-C**
Model: Pre-Development Seismic Global Condition		Date: December 14, 2023
Method: Morgenstern-Price	Horz Seismic Coef.: 0.3	Scale : 1:1,600
Site Address : Pinnacle Ridge, Anmore, BC		Analysis by: AAn

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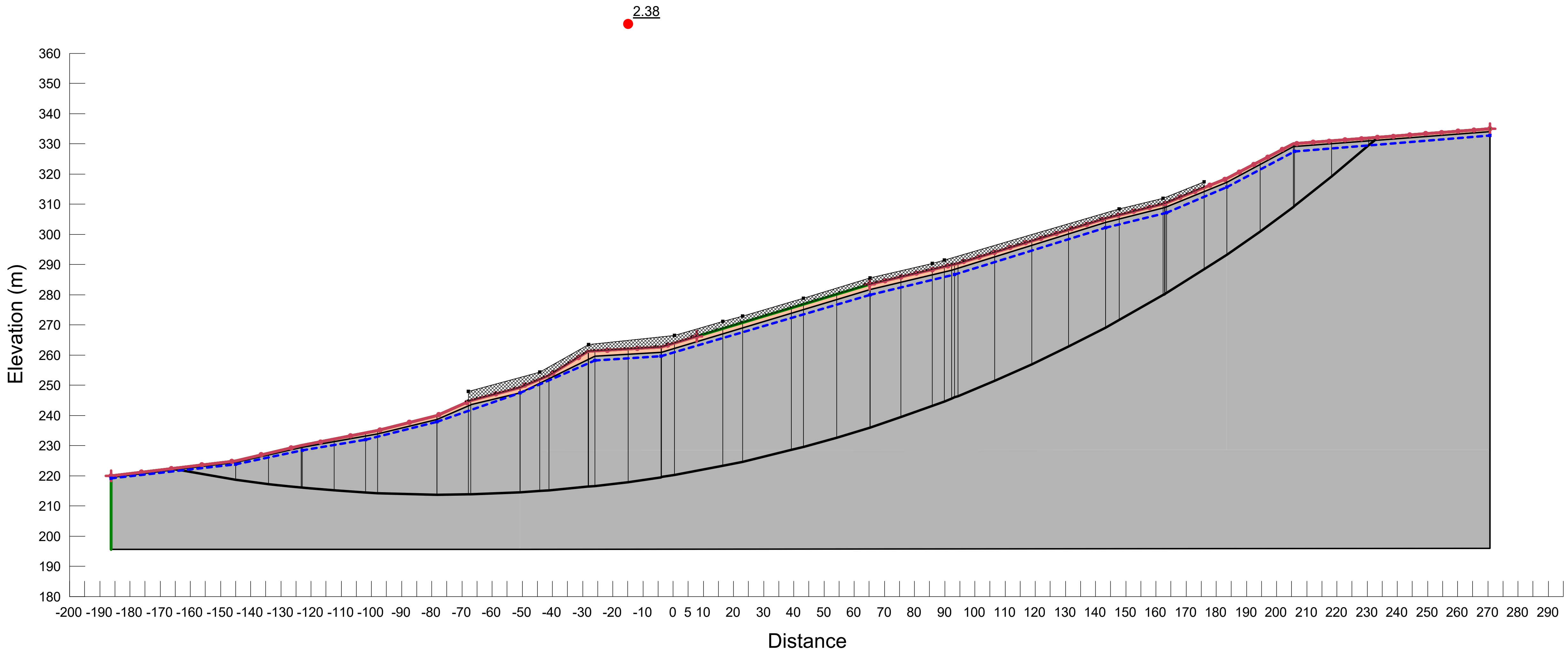

Section A

Color	Name	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
⬜	GLACIAL TILL	22	10	45
🟧	SANDY SILT	18	0	30

Project: Bella Terra

Job No.: 23403-C

Model: Post-Development Static Global Condition

Date: December 14, 2023

Method: Morgenstern-Price

Horz Seismic Coef.: 0

Scale : 1:1,600

Site Address : Pinnacle Ridge, Anmore, BC

Analysis by: AAn

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VANCOUVER KAMLOOPS CALGARY

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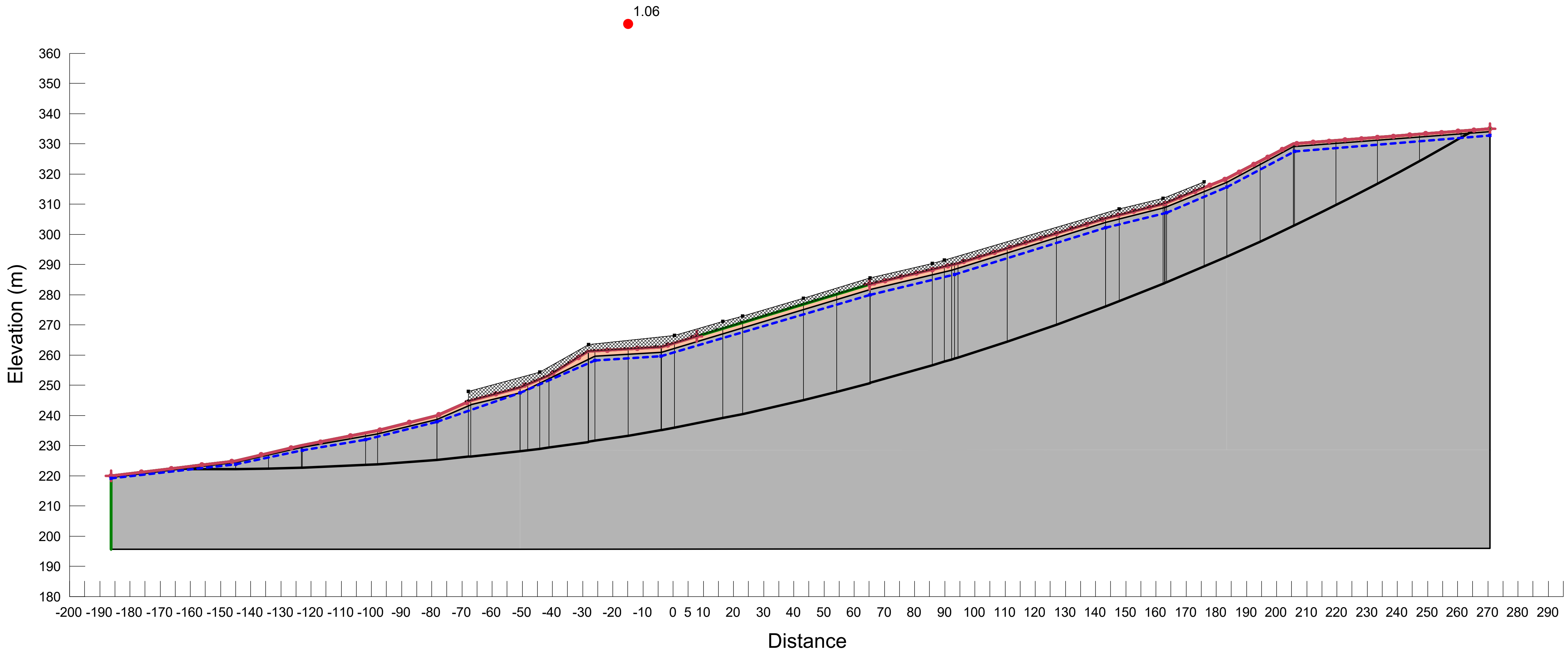

Section A

Color	Name	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
⬛	GLACIAL TILL	22	15	45
🟧	SANDY SILT	18	0	30

Project: Bella Terra

Model: Post-Development Seismic Global Condition

Method: Morgenstern-Price

Site Address : Pinnacle Ridge, Anmore, BC

Horz Seismic Coef.: 0.32

Job No.: 23403-C

Date: December 14, 2023

Scale : 1:1,600

Analysis by: AAn

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