

City of Coquitlam  
3000 Guildford Way  
Coquitlam, BC V3B 7N2

November 25, 2024  
Valley Geo Project #: 44162-12

Attention: Irene Shams, MArch.  
Regarding: Geotechnical Investigation and Report for upgrades of Mackin Yard Baseball Diamond at 1046 Brunette Avenue, Coquitlam, BC

## 1.0 INTRODUCTION

Valley Geotechnical Engineering Services Ltd. (Valley Geo) has been retained by the City of Coquitlam to carry out a geotechnical investigation and provide geotechnical recommendations for the proposed upgrades of the Mackin Yard Baseball Diamond at above mentioned location. This report summarizes our work to date and presents our recommendations.

## 2.0 INFORMATION REVIEWED

Valley Geo previously did work on the same site for another baseball diamond in the south portion of the park, and has local experience on similar projects. In preparation of this report, Valley Geo has reviewed the following documents.

- Geotechnical Letter for Mackin Park Baseball Backstop at 1046 Brunette Avenue, Coquitlam, BC (2021), (Valley Geo Project - 43451-23).
- Mackin Park Playing Fields Preliminary Geotechnical Assessment, dated 30 December 2016, Thurber Engineering Ltd.
- Mackin Park Renovation 1046 Brunette Ave, Coquitlam (2011), (Valley Geo Project - 43451-06).
- Geotechnical Investigation and Report for Jim Lorimer Park Upgrades and Boardwalk across the Chubb Creek Wetland at 2338 Gilmore Avenue, Burnaby, BC (2024), (Valley Geo Project - 43451-33).
- Geotechnical Investigation and Report for the Pitt Meadows Athletic Park upgrades at 19375 Airport Way and 11431 Bonson Road, Pitt Meadows, BC (2024), (Valley Geo Project - 43451-35).
- Geotechnical Investigation and Report for Proposed Park Development at 289/291 Valley Road – Glenmore Recreation Park (Phase 5), Kelowna, BC (2023), (Valley Geo Project - 60306-01).

## 3.0 SITE DESCRIPTION

The property is Mackin Park with a civic address of 1046 Brunette Avenue, Coquitlam, BC. According to the City of Coquitlam's GIS map, the site is irregular in shape, with a plan area of approximately 7.1 ha. The site is bounded by Brunette Avenue to the north, Lougheed Highway to the south, King Edward Street to the east and Nelson Street to the west. Few mature trees are sporadically located throughout the property.

The study site and focus of this report is the north baseball diamond area only (see Appendix A). It is characterized by approximately flat topography and according to the GIS, the site elevations range between about 8m and 9m geodetic. The site is serviced by City of Coquitlam's water, storm and sanitary services.

## 4.0 PROPOSED DEVELOPMENT

The proposed design drawings were not available at the time of writing this report. However, we understand that it is proposed to upgrade the existing Mackin Yard Ball Diamond to address the aging infrastructure. The upgrades may include:

- Grading, layout, and replacement of existing retaining walls.
- Replacement of existing drainage and irrigation systems.
- Installation of new fencing, including structurally sound backstops, dugouts, a spectator booth, and related fencing.
- Enhancement of landscaping and athletic furnishings and
- Demolition of existing concession building located at the spectator side of the existing backstops.

## 5.0 SUBSURFACE INFORMATION

According to the published Geological Survey of Canada Map 1484A, the subject site is underlain by a geological unit (VC) consisting of Vashon Drift and Capilano Sediments. The glacial drift includes lodgment and minor flow till, lenses and interbeds of substratified glaciofluvial sand to gravel, and lenses and interbeds of glaciolacustrine laminated stony silt up to 25m thick.

The south side of the study area borders Fraser River Sediments (geological unit Fc) consist of overbank sediments containing silty to silt clay loam up to 2 m thick overlying 15 meters or more of deltaic and distributary channel fill containing sandy to silt loam, may also contain organic and fossiliferous material.

Valley Geo conducted an auger hole investigation on November 5, 2024, using a truck mounted drill rig provided by B-31 Drilling Ltd. The fieldwork consisted of four auger holes (AH1-AH4) extended to a maximum depth of 6.1m below the existing grade. Two auger holes AH1 and AH4 were terminated due to refusal, and other two auger holes were discontinued at the maximum depth of investigation.

The auger hole location and detailed logs are presented in Appendix B. The subsurface soil conditions encountered on site generally consist of the following:

- Fill /topsoil containing organics up to 0.9m thick, underlain by
- Medium dense to loose sand and gravel to silty sand with organics up to 3.5m thick, underlain by
- Dense silty sand some gravel (till) to the maximum depth of investigation.

Loose wood chips (up to 0.75m thick) underlain by soft sandy silt containing organics (up to 1.5m thick) were found below the fill in AH2 and AH3. The depth of till layer varies between about 2.1m and 5.2m depth below grade. Groundwater seepage was observed in all four auger holes between 0.9m and 1.5m below grade. It should be noted that groundwater may fluctuate throughout the seasons.

## 6.0 SEISMIC CONSIDERATIONS

In accordance with the British Columbia Building Code (2018) and based upon the soil conditions found at the site, the Site Class is D. Data provided by Earthquakes Canada (2015) indicates this site could be subject to a Peak Ground Acceleration of 0.333g and seismic hazard values of  $Sa(0.2)=0.769$ ,  $Sa(0.5)=0.677$  and  $Sa(1.0)=0.386$  during a 1 in 2475 design earthquake. The stratigraphy encountered at this site is considered to be non-liquefiable.

It should be noted that the adoption of new seismic values for 2024 BCBC is expected in the near future (March 2025). If the proposed development falls under the new BCBC, then a Site Designation  $X_D$  should be considered, and the corresponding values of  $S_a(T, X)$  and  $PGA(X)$  can be determined from the NBCC 2020 seismic Hazard Tool.

## 7.0 DISCUSSION AND RECOMMENDATIONS

The soil conditions and subsurface profile indicate that the site will be prone to settlements due to any additional load of grading fills and proposed structures. The sources of potential settlements include presence of fill, organics, wood chips and loose sand and silty sand layers above the dense till. A variable thickness of settlement-prone soil and the decaying process of wood chips and organics may cause both differential and long-term settlements. Increases in grading above existing elevations should be minimized where possible.

To minimize potential future settlements, we recommend the removal of all existing fill and wood chips, and replacement with granular lightweight fill (e.g. Garibaldi pumice) to allow for minimal to zero net load increase to the site. The existing loose soils below the wood chips should be compacted prior to the placement of any replacement fill. It is also recommended to install layers of geogrid on the subgrade and at 300mm vertical intervals within the replacement fill. The geogrid will help minimize the effects of any potential settlement deformations at the surface. It should be understood that long term settlements due to the decaying process of organics present in the underlying native soils at depth may still occur.

Alternatively, soil densification techniques such as preloading or complete removal of all compressible soils above the dense till could be considered to address the settlements. The complete removal of soft compressible soils would require extensive excavation up to about 5.2m. It should also be understood that long-term settlements would be reduced but not eliminated by preloading. These options can be further explored upon request.

Based on our review and provided our recommendations are followed during design and construction, we confirm that the upgrades at Mackin Yard Baseball Diamond are feasible from a geotechnical engineering standpoint. The following sub-sections present our recommendations. Additional recommendations can be provided as necessary upon review of the development design and grading plans when available.

### 7.1 Site Preparation

All topsoil, fill, wood chips and otherwise unsuitable materials within 0.6m horizontally beyond proposed settlement-sensitive features should be removed to expose the underlying subgrade. Excavation below proposed footings should extend to at least 600mm below footing elevation. We recommend that the subgrade be compacted using a large ride-on roller or hoe pack. The exposed subgrade should be inspected and approved by Valley Geo prior to the placement of any replacement fill.

If structural fill is required to bring the site up to design grades. It should consist of approved granular materials with a fines content of less than 5% or lightweight fill as described above. Structural fill should be placed in lifts no thicker than 300mm and compacted to 95% Standard Proctor Maximum Dry Density (SPMDD). Testing should be carried out during fill placement to confirm that the specified levels of compaction are achieved.

## 7.2 Excavations

All excavations, including foundations and utility trenches, must conform to Worksafe BC excavation regulations, which can be found in Part 20 from Section 20.78 to 20.95 of the Occupational Health and Safety Regulation posted on the Worksafe BC website. Excavations deeper than 1.2m must be carried out in accordance with the written recommendations of a Professional Geotechnical Engineer before workers enter the excavations.

During construction, temporary site dewatering would likely be required. Dewatering of the site may be carried out by using sump pumps. If the pumps cannot handle the water flow, a dewatering contractor may be required to provide a site-specific design and procedures.

## 7.3 Building Foundations

Concrete foundations for lightweight structures (eg. backstops, retaining walls, etc.) should bear on at least 600mm of compacted and approved structural fill. Based on the discussion in *Section 7.0 above*, the following geotechnical parameters are recommended for foundation design for structures where the silt and organics at depth are left in place:

Factored Ultimate Limit State (ULS)	42 kPa (900 psf)
Serviceability Limit State (SLS)	28 kPa (600 psf)

Strip and pad footings should be subject to minimum 450 mm and 600 mm footing width, respectively. All footings must be provided with a minimum of 450mm of frost protection. Valley Geo should be contacted to review and approve the excavation subgrade and foundation-bearing surfaces prior to the placement of any structural fill or construction of any footings. If large post lighting will be constructed, their foundations should extend down into the native till. Additional recommendations can be provided where necessary depending on the development design.

As described above, there is potential long-term settlement of structures and finished grade where the underlying soft silts and organics layers are left at depth. This should be considered and allowances should be made for future maintenance and adjustment of the structures, if required.

## 7.4 Drainage

An under-field drainage system should be designed for the sports field by a qualified civil engineer. The drains should consist of a perforated PVC pipe (minimum 100mm diameter) surrounded by drain-rock, covered in a non-woven needle punched filter fabric and backfilled with relatively free-draining granular soil.

Finished site grades should be designed to shed water away from any structures or pathways. All surface water should be intercepted and directed to an on-site stormwater management system.

Based on the subsurface soil conditions being relatively impermeable, and high groundwater levels, a stormwater system relying on infiltration is not recommended. Collected stormwater should be directed to the municipal storm main or other suitable discharge location.

## 7.5 Construction Monitoring & Reviews

Regular site reviews during construction should be carried out by Valley Geo to ensure that all the recommendations provided in this report are understood and followed. Valley Geo should be contacted for:

- Reviews of site stripping and preparation works,
- Reviews of all foundation excavations, subgrades, and bearing surfaces,
- Compaction testing of all structural fill, including, but not limited to, utility trenches, pavement structures, and walkways.

## 8.0 LIMITATIONS & CLOSURE

The recommendations presented in this report are based on the analysis of the results of the subsurface investigation and other information deemed relevant to the subject site. Variation in the subsurface conditions from those described in this report should be anticipated. If conditions should differ from those presented in our report, Valley Geo should be notified immediately to examine the conditions and reassess our recommendations.

This report has been prepared for the exclusive use of the City of Coquitlam and their agents for the purpose stated. It has been prepared in accordance with generally accepted engineering practices and no other warranty, expressed or implied, is made. Any use which a Third Party makes of this report, or reliance on decisions to be made based on it, is the responsibility of such Third Party.

We trust that this report provides you with the information required at this time. If you have any questions, please contact the undersigned.

Regards,  
**Valley Geotechnical Engineering Services Ltd.**



Jaspreet Kaur Bring, MSc, EIT.  
Geotechnical Engineer



Bryan Lui, P.Eng.  
Geotechnical Engineer – Partner

Attachments:  
Appendix A – Site Location Map  
Appendix B – Auger Hole Location Plan and Soil Logs

**Appendix A:**  
**Site Location Map**



A	2024-11-21	Issued with Report
REV	DATE	DESCRIPTION

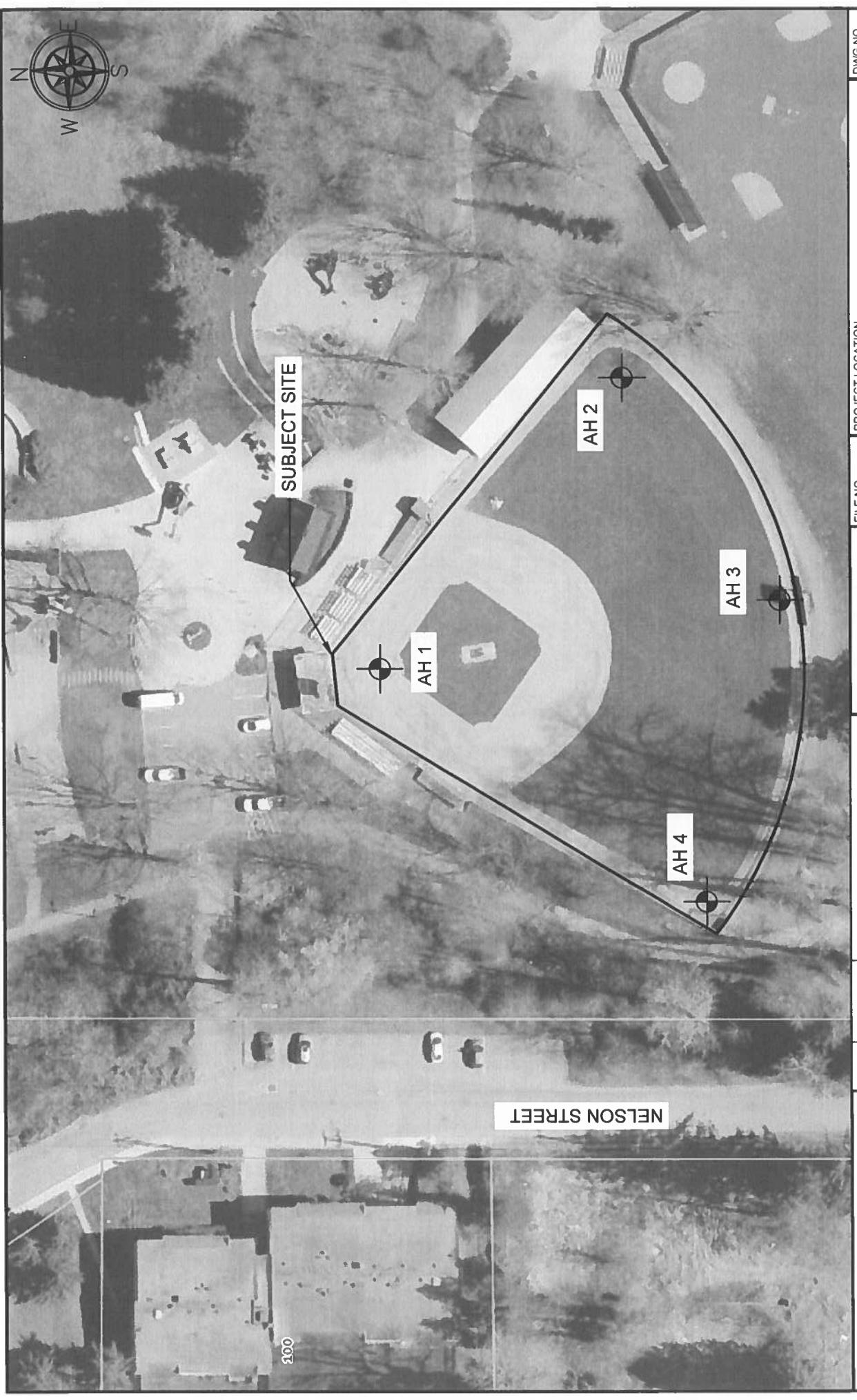
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		DRAWING TITLE / DESCRIPTION Study Site Location Map	Sheet
	DATE 2024-11-21	REV. NO.	A
		DEVELOPER / CLIENT City of Coquitlam	

NOTE: CONTRACTOR TO CONTACT BC HYDRO, TELUS, FORTIS BC, AND BC ONE CALL AND TO CONFIRM LOCATIONS OF ALL UTILITIES AND APPURTENANCES PRIOR TO CONSTRUCTION  
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**PERMIT NUMBER:** 1000207      Unit 15 20279 97th Avenue  
Langley BC, V1M 4B9

Phone (604) 882-8475  
www.valleygeo.ca

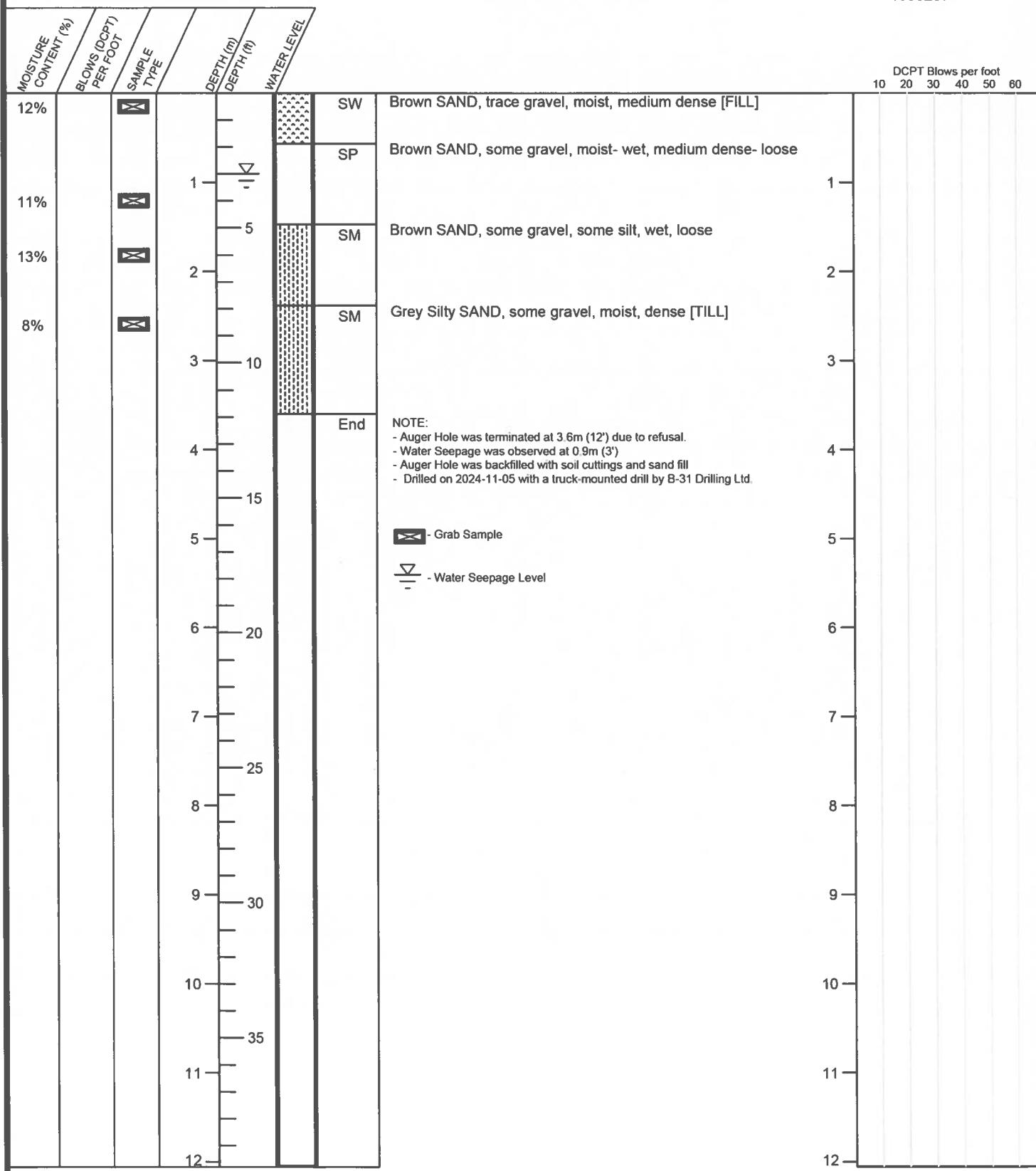
**Appendix B:**  
**Auger Hole Location Plan and Soil Logs**



FILE NO. 44162-12		PROJECT LOCATION 1046 Brunette Avenue, Coquitlam, BC	DWG NO. 1 of 1
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CHECKED BL	DRAWING DESCRIPTION Site Location Plan		
SCALE 1:750	DEVELOPER / CLIENT City of Coquitlam		
		SEAL	
NOTE: CONTRACTOR TO CONTACT BC HYDRO, FORTIS BC, AND BC ONE CALL AND TO CONFIRM LOCATIONS OF ALL UTILITIES AND APPURTENANCES PRIOR TO CONSTRUCTION			
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<b>PERMIT NUMBER:</b> 1000207			
Unit 15 20279 97th Avenue Langley BC, V1M 4B9			
Phone (604) 882-8475 www.valleygeo.ca			
VALLEY GEOTECHNICAL Engineering Services Ltd.			

## AUGERHOLE No. 1

PERMIT NUMBER:  
1000207

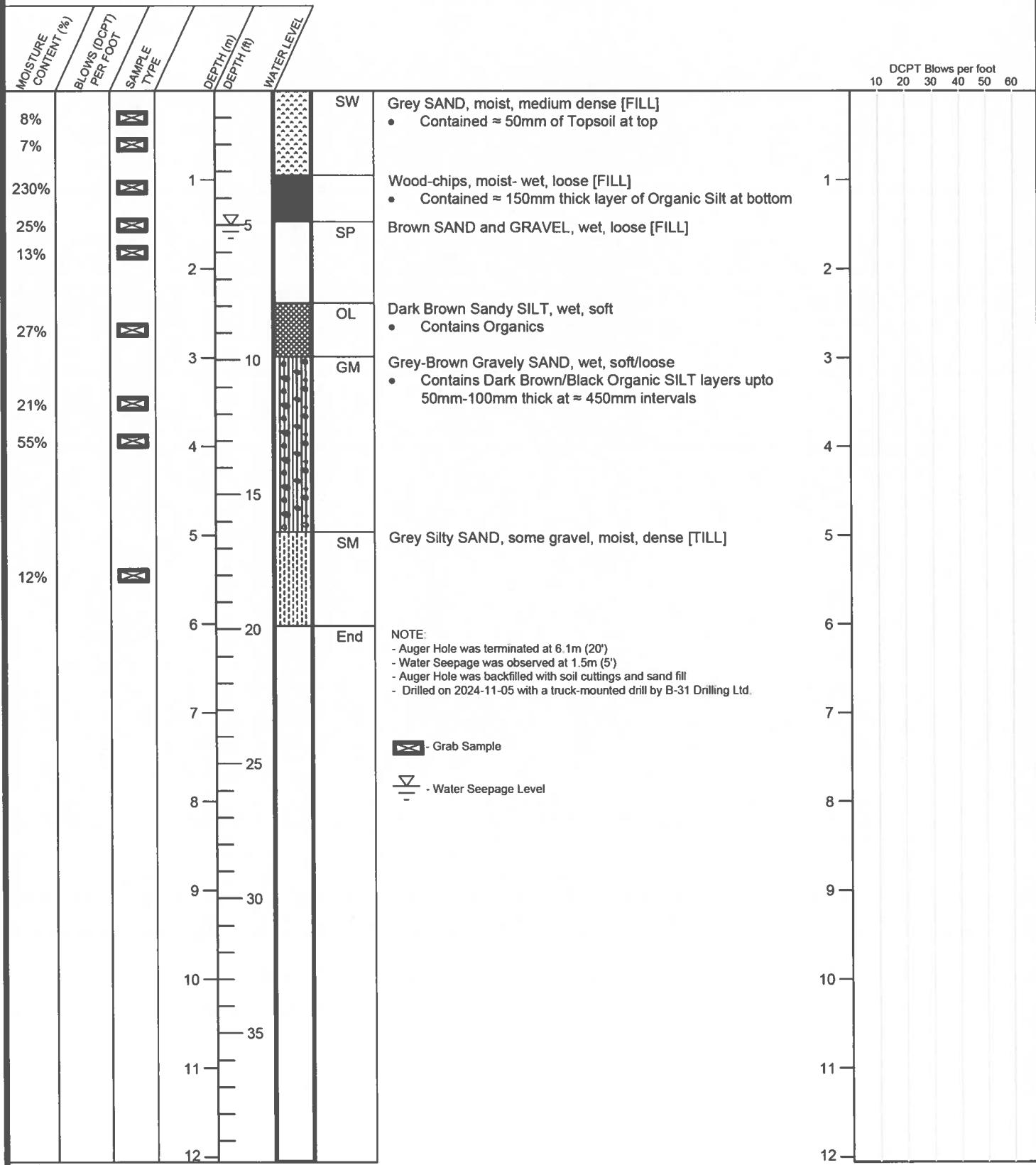




Unit 15 - 20279 97th Avenue  
Langley, BC V1M 4B9  
Phone: (604) 882-8475  
Fax: (604) 882-8476

## AUGERHOLE No. 2

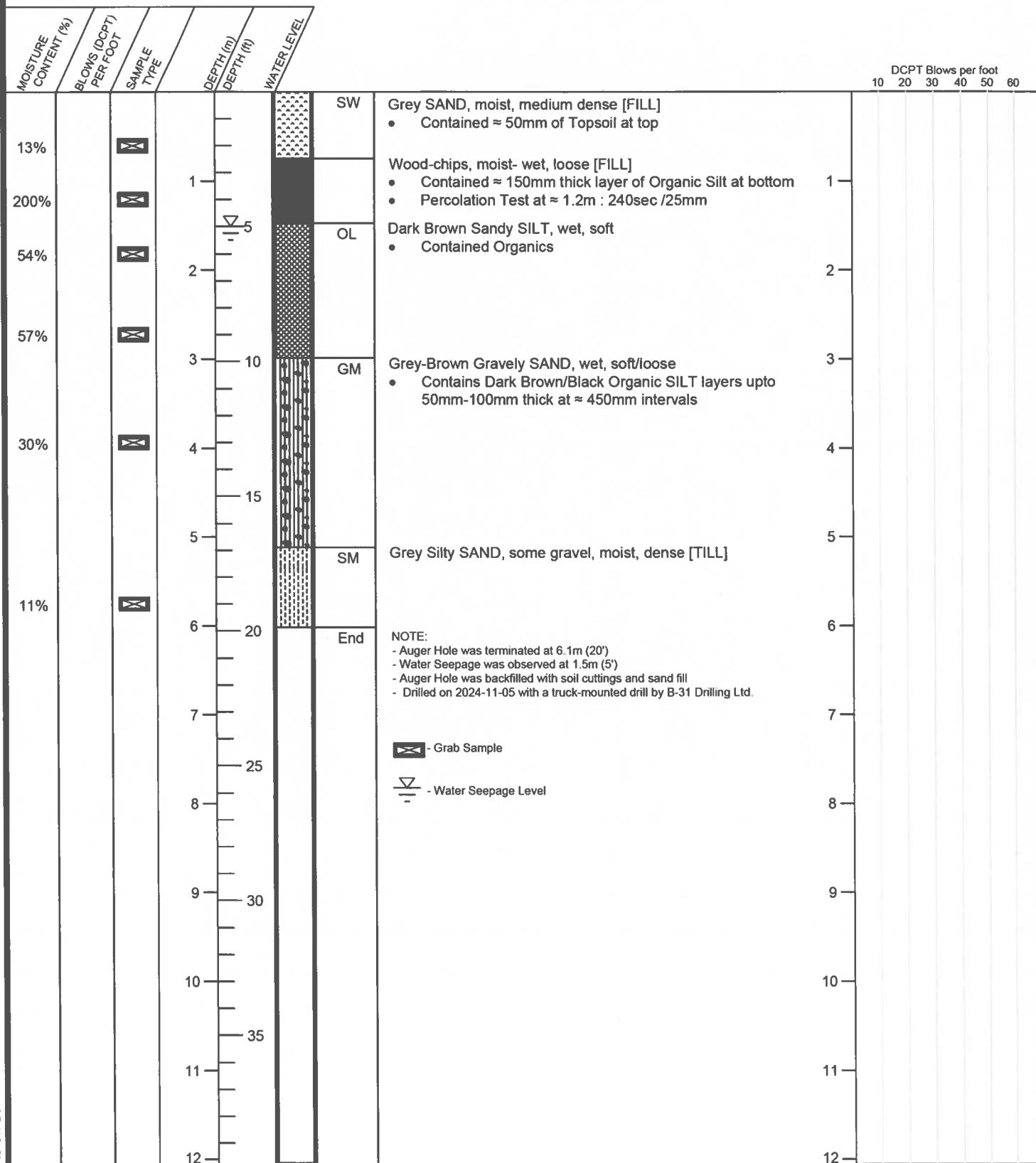
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## AUGERHOLE No. 3

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## AUGERHOLE No. 4

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