FRONTERA GEOTECHNICAL

1 – 38920 Queens Way
Squamish, BC V8B 0K8
604-898-1093

Sunshine Coast Regional District
1975 Field Road
Sechelt, BC
V7Z 0A8

June 16, 2025
File: 2276

Attention: Bobby Rebner, Utilities Business Coordinator

RE: Preliminary Geotechnical Report, Proposed Generator Foundation, 4470 Garden Bay Road, Garden Bay, BC

1.0 INTRODUCTION

It is proposed to install a permanent backup generator at the North Pender Water Treatment Plant located at 4470 Garden Bay Road in Garden Bay, BC. Frontera Geotechnical Inc. (Frontera) has been engaged to provide geotechnical recommendations for the project.

Drawings were not available at the time of writing this report, however, we understand that the proposed generator is to be supported on a concrete pad. The generator is to be located east of the existing water treatment plant building.

This report provides geotechnical recommendations for the design and construction of the project. Frontera conducted an investigation with hand dug test pits and using a Scala Penetrometer on May 9, 2025. This report is based on our site review, a desktop review, and our experience in the area. All assumed soil conditions must be confirmed at the time of construction.

This report has been prepared exclusively for our client and for the use of others within their design and construction team, however it remains the property of Frontera Geotechnical Inc.

2.0 SITE DESCRIPTION

The property is bound to the north by a forested lot, the east by Corniche Road, the south by Lockhaven Road, and to the west by Garden Bay Road. Garden Bay Lake is located approximately 100 m to the north. The site is improved with an existing building and is predominantly covered with gravel at the south end of the lot and mature trees and vegetation to the north.

The property is relatively level at an elevation of approximately 33 m geodetic based on the Sunshine Regional Coast District (SCRD) web map.

3.0 SUBSURFACE CONDITIONS

3.1 Soil Conditions

Based on a review of the BC borehole and well data base, iMap BC, and the surficial geology map ‘Surficial Geology of the Sunshine Coast’ by J.W. McCammon, the site is underlain by overburden, usually till or marine veneer, over bedrock.

Frontera completed two Scala tests and one hand dug test pit. The Scala tests were completed to approximately 1 m and 1.95 m depth. The hand dug test pit was completed to a depth of approximately 0.45 m.

The Scala Penetrometer is a hand operated probe. The test provides penetration blow counts that can be correlated to SPT 'N' values which can be correlated with soil density.

In general, the soil was found to be loose to dense above inferred bedrock or very dense glacial till where refusal was encountered at approximately 1 m depth at SP1 and 1.95 m depth at SP2.

At our test pit location, approximately 0.45 m of granular fill was encountered over dense sand and gravel at refusal. The granular fill comprised of sand and gravel with trace cobbles. The fill was fine to medium grained, well graded, and moist.

Surficial bedrock outcrops were identified at the east and south ends of the site.

3.2 Groundwater Conditions

Groundwater was not encountered in our test pit. Perched water may be observed during the wetter months of the year overlying less permeable soils or bedrock. Fluctuations of the groundwater may occur depending on season, precipitation, and local land use.

4.0 DISCUSSION

In general, the site is expected to be underlain by granular fill over glacial till-like granular soils, over bedrock. We expect that the generator can be supported on a conventional spread foundation over a subgrade of dense engineered fill placed over dense native materials or bedrock.

Some of the subsurface conditions noted above are assumed or inferred and actual conditions may vary and must be confirmed by Frontera at the start of construction.

Bedrock, if encountered at or above the underside of foundation, may require blasting to achieve foundation subgrade elevation or to install underground conduits.

Provided the geotechnical considerations above are addressed as described below, we are of the opinion that the project is feasible from a geotechnical standpoint.

5.0 DESIGN RECOMMENDATIONS

5.1 Site Preparation

5.1.1 Site Stripping

Prior to construction, all existing vegetation, topsoil, fill, or other materials which could compromise the design recommendations stated herein should be removed within the construction area to expose a subgrade comprised of dense native soil or bedrock.

If grade reinstatement below the underside of foundations is required, site stripping should extend beyond the outer edge of the foundation a distance equal to 1.5 times the total thickness of fill required. For example, if 1 m of fill is to be placed below foundations, then stripping should extend a minimum distance of 1.5 m beyond the outside edge of foundations.

Blasting may be required to achieve foundation grades is bedrock is encountered.

Frontera should be contacted to review the exposed subgrade prior to placement of any fill or foundations.

5.1.2 General Excavation Requirements

All open excavations and trenching exceeding 1.2 m in depth, that require worker entry should conform to WorkSafeBC requirements or as recommended by a professional engineer.

All excavation recommendations must be confirmed by Frontera prior to the start of excavation.

5.1.3 Engineered Fill

Any grade reinstatement beneath foundations should be completed with “engineered fill”. In the context of this report “engineered fill” is defined as clean sand to sand and gravel fill, containing less than 8% fines, compacted in lifts to a minimum standard of 95% of its Modified Proctor Maximum Dry Density (ASTM D1557) while at a moisture content that is within 2% of its optimum for compaction.

Frontera should be contacted to review fill placement and compaction.

5.2 Foundations

5.2.1 Bearing Capacity

We expect that the generator will be supported on a spread foundation.

Following the recommended site preparation, a subgrade of dense engineered fill is expected to be suitable to support the foundations at a Serviceability Limit State (SLS) bearing pressure of 125 kPa and a factored Ultimate Limit State (ULS) bearing pressure of 250 kPa.

If bedrock is encountered Frontera should be notified to review and update our recommendations.

All foundation subgrades must be reviewed by Frontera prior to foundation construction.

5.2.2 Settlement of Foundations

Post construction settlements are expected to be less than 15 mm with differential settlements of less than 1 in 300.

5.2.3 Seismic Design of Foundations

We recommend that the site to be classified as Site Class B as defined in Table 4.1.8.4.-B of the 2024 British Columbia Building Code (2024 BCBC) for structural design purposes as bedrock is expected within 3 m of the foundation.

The underlying soils are not considered susceptible to ground liquefaction or other forms of ground softening caused by earthquake induced ground motions.

5.2.4 Frost Protection

The underside of the foundation should be located at least 0.45 m below finished site grades for frost protection. If foundations are placed directly on bedrock, frost coverage is not required from a geotechnical standpoint.

Alternatively, the foundation pad could be placed over non frost-susceptible materials such as clear crushed rock.

Backfill around foundations should be reviewed by Frontera to ensure adequate frost protection is achieved.

5.3 Drainage

We recommend that local site grades around the generator foundation be graded away to ensure water does not pond adjacent to the foundation. As there is no interior space, a foundation drainage system is not considered necessary.

6.0 FIELD REVIEWS

As is normally required for Municipal Letters of Assurance, Frontera Geotechnical Inc. should be asked to carry out sufficient field reviews during construction to ensure that the Geotechnical Design recommendations contained within this report have been adequately communicated to the design team and to the contractors implementing the design. These field reviews are not carried out for the benefit of the contractors and therefore do not in any way affect the contractor's obligations to perform under the terms of their contract.

It is the contractors' responsibility to advise Frontera Geotechnical Inc. (a minimum of 24 hours in advance) that a field review is required. Geotechnical field reviews are normally required at the time of the following:

1. Subgrade — Review of foundation subgrade prior to placing fill
2. Engineered Fill — Review of engineered fill placement and compaction
3. Backfill — Review of foundation backfill

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 familiarized with the sensitive aspects of the works proposed. It is the responsibility of the developer to notify Frontera Geotechnical Inc. when conditions or situations not outlined within this document are encountered.

7.0 CLOSURE

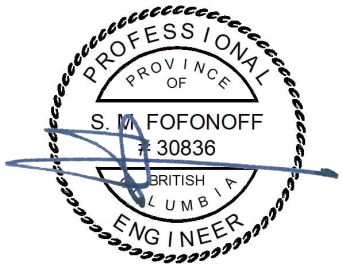
This report is prepared solely for use by our client and their design team for this project as described to the general standards of similar work for similar projects in this area and no other warranty of any kind is expressed or implied. Frontera Geotechnical Inc. accepts no responsibility for any other use of this report.

We are pleased to assist you with this project, and we trust this information is helpful and sufficient for your purposes at this time. Please do not hesitate to call the undersigned if you require clarification or additional details.

Yours truly,

Frontera Geotechnical Inc.

Reviewed by:



PTP# 1001392

2025-06-16

Tatumn Page, EIT.
Junior Geotechnical Engineer

Steven Fofonoff, M.Eng., P.Eng.
Principal

Geotechnical Investigation

Proposed Generator Foundations
4470 Garden Bay Road, Garden Bay
Scala Penetrometer and Test Pit Location Plan

FILE NO.
2276
DWG NO.
2276 - 01

LEGEND
Test Pit / Scala Penetrometer Test Location

Date: 2025-05-16

Drawn By:	Approved By:	Reviewed By:
TJP		

Scale: NTS, Locations Approximate

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#1 - 38920 Queens Way
Squamish BC
Tel: (604) 898 1093

SCALA PENETROMETER LOG

Job No: 2276
Project: Generator Foundations
Location: 4470 Garden Bay Road, Garden Bay,
Level: -

Date: 2025-05-14
Operated by: TJP
Logged by: TJP
Checked by: RB

Test No. SP1
Sheet 1
of 1

mm Driven	No. of Blows	mm Driven	No. of Blows
50	3	2550	
100	3	2600	
150	6	2650	
200	9	2700	
250	7	2750	
300	6	2800	
350	11	2850	
400	6	2900	
450	6	2950	
500	3	3000	
550	3	3050	
600	2	3100	
650	2	3150	
700	1	3200	
750	2	3250	
800	1	3300	
850	1	3350	
900	1	3400	
950	2	3450	
1000	20	3500	
1050		3550	
1100		3600	
1150		3650	
1200		3700	
1250		3750	
1300		3800	
1350		3850	
1400		3900	
1450		3950	
1500		4000	
1550		4050	
1600		4100	
1650		4150	
1700		4200	
1750		4250	
1800		4300	
1850		4350	
1900		4400	
1950		4450	
2000		4500	
2050		4550	
2100		4600	
2150		4650	
2200		4700	
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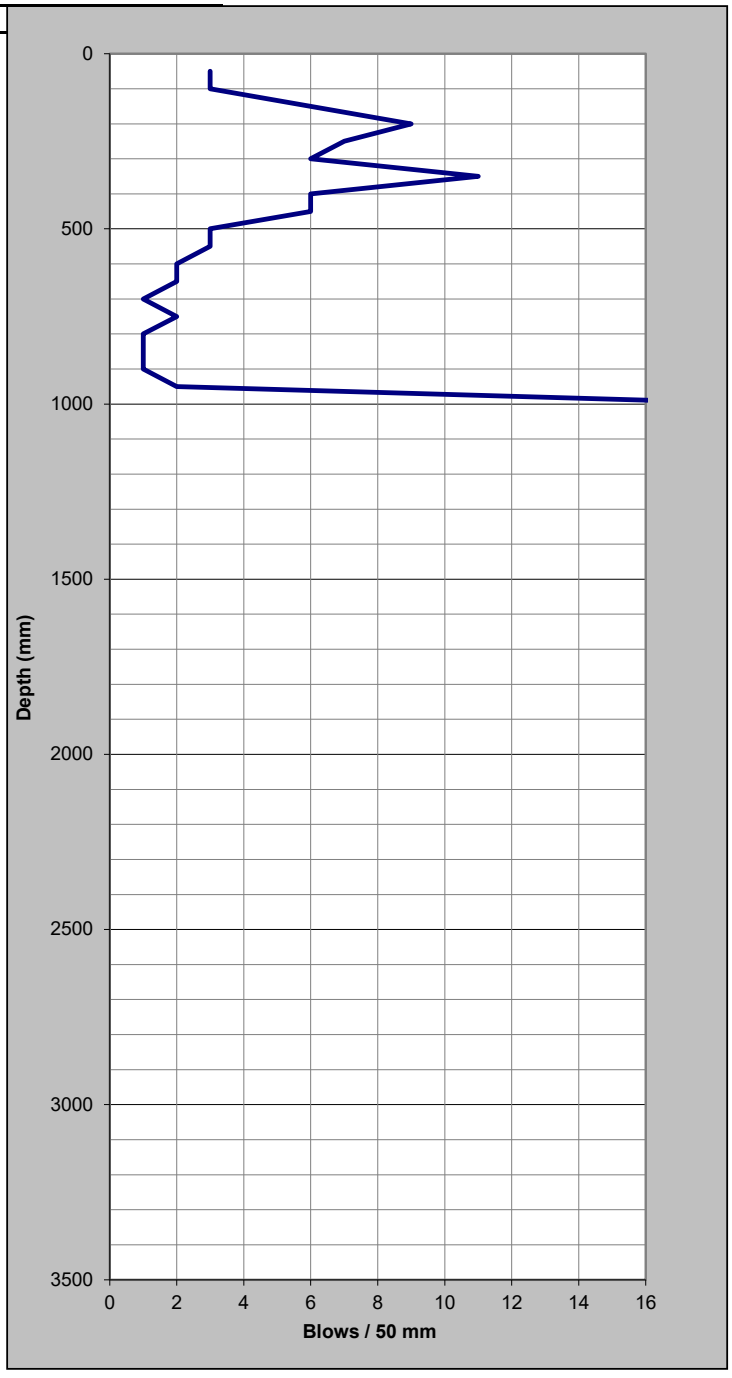
2300		4800	
2350		4850	
2400		4900	
2450		4950	
2500		5000	



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Project: Generator Foundations
Location: 4470 Garden Bay Road, Garden Bay,
Level: -

Date: 2025-05-14
Operated by: TJP
Logged by: TJP
Checked by: RB

Test No. SP2
Sheet 1
of 1

mm Driven	No. of Blows	mm Driven	No. of Blows
50	1	2550	
100	2	2600	
150	3	2650	
200	6	2700	
250	6	2750	
300	5	2800	
350	3	2850	
400	5	2900	
450	6	2950	
500	4	3000	
550	3	3050	
600	4	3100	
650	5	3150	
700	3	3200	
750	3	3250	
800	2	3300	
850	1	3350	
900	1	3400	
950	2	3450	
1000	6	3500	
1050	3	3550	
1100	4	3600	
1150	5	3650	
1200	4	3700	
1250	4	3750	
1300	8	3800	
1350	7	3850	
1400	6	3900	
1450	3	3950	
1500	4	4000	
1550	6	4050	
1600	15	4100	
1650	8	4150	
1700	5	4200	
1750	6	4250	
1800	7	4300	
1850	5	4350	
1900	5	4400	
1950	30	4450	
2000		4500	
2050		4550	
2100		4600	
2150		4650	
2200		4700	
2250		4750	
2300		4800	
2350		4850	
2400		4900	
2450		4950	
2500		5000