GOVERNMENT OF NUNAVUT

Geotechnical Investigation Factual Report

Grise Fiord Community Harbour

Document No. Rev. 0: 317086-54170-00-SS-REP-00001



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PROJECT 317086-54170-00-SS-REP-00001 : Geotechnical Investigation Factual Report - Grise Fiord Community Harbour

Rev	Description	Originator	Reviewer	Worley Approver	Revision Date
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Executive Summary

The Government of Nunavut (GN), Department of Transportation and Infrastructure (formerly the Department of Community and Government Services) plans to develop a community harbour in the Hamlet of Grise Fiord. Worley Canada Services Ltd., operating as Worley Consulting (Worley), has been retained by the GN to perform detailed design, community consultation, and regulatory support services for the Project.

The scope of work planned for the summer/spring geotechnical site investigation included the following:

- Site reconnaissance within the footprint of the proposed community harbour and borrow source to assess access across sea ice for marine drilling locations and access along the existing road.
- Geophysical testing (comprising multibeam bathymetry, seismic refraction, and MASW surveys) at the community harbour footprint and one seismic refraction survey at the proposed borrow source.
- Geotechnical site walkovers at the community harbour and borrow source locations.
- Terrain Mapping of the proposed borrow source area.
- Drilling geotechnical boreholes within the footprint of the community harbour (drilling two boreholes onshore and one in the intertidal zone in August 2024 and subsequently six boreholes in the near-shore area in April 2025).
- Logging of soil in accordance with the Unified Soil Classification System (USCS) and the Canadian Foundation Engineering Manual (CFEM, 2023); logging of rock in accordance with CFEM (2023).
- Collection of disturbed samples for geotechnical laboratory testing.
- Photographs of soil and rock samples.
- Laboratory testing of collected soil samples from the community harbour area and rock cores from the proposed borrow source.
- Preparation of this Geotechnical Investigation Factual Report.

The geological assessment previously completed by Advisian (Advisian, 2019) and schematic design at the time of the investigation was used to define the scope of works for the geotechnical site investigation.

At the proposed harbour, the encountered subsurface conditions onshore typically consisted of compact to very dense, well to poorly graded gravel with sand, overlying silty sand/sandy silt. Permafrost was encountered at approximately 1 metre below ground surface in the nearshore boreholes (borehole BH24-02 and BH24-03). In the marine area, the subsurface conditions typically consisted of very dense gravel with sand and silt overlying at locations dense silty sand/sandy silt, and at locations stiff to hard sandy lean clay. In one borehole location (BH25-06), stiff to hard sandy lean clay was encountered from the seabed. All boreholes except for one (BH25-05) terminated in soil. Borehole BH25-05 encountered bedrock at approximately 7.3 metres below seabed comprising carbonate breccia.

At the proposed borrow source the encountered moraine deposits and rolling and ridged moraine deposits comprise mainly cobbles and boulders of weakly foliated granite to gneiss, slightly weathered, very strong to extremely strong (R5-R6 based on the International Society for Rock Mechanics [ISRM 1981]), blocky, with varying amounts of gravelly soils. Refer to Section 4 for more details of the borrow source materials.

1. Introduction

Worley Canada Services Ltd., operating as Worley Consulting (Worley), formerly Advisian, was retained by the Government of Nunavut (GN), Department of Transportation and Infrastructure (formerly the Department of Community and Government Services) to carry out a geotechnical site investigation to support the development of a community harbor in the Hamlet of Grise Fiord. This investigation was done with respect to the recommendations for future work outlined in the Grise Fiord Harbour Development Geological Assessment Report (Advisian 2019) prepared for the Department of Fisheries and Oceans Canada (DFO), Small Craft Harbours (SCH).

This harbour development falls under the memorandum of understanding (MOU) signed in August 2021 between the Qikiqtani Inuit Association (QIA), Transport Canada (TC), and the GN to deliver community harbours in Grise Fiord and Resolute Bay, Nunavut.

1.1 Project Overview

Grise Fiord, also known as Aujuittuq in Inuktitut meaning “the place that never thaws”, has a population of 144 (Statistics Canada 2021). It is located on the southern coast of Ellesmere Island and is the most northern community in Nunavut.

The community’s marine infrastructure currently consists of a mooring basin and two mooring bollards for the fuel resupply tanker (Advisian 2019). Annual sealift cargo is unloaded on the beach by front-end loaders in front of the community. These infrastructure locations are shown in Figure 1-1.



Figure 1-1: Aerial View of Grise Fiord - Existing Marine Related Infrastructure

To address the community's needs for improved infrastructure, Worley developed three conceptual design options that were brought to the community for feedback in consultation sessions between 2018 and 2019 (Advisian 2019). Based on community feedback, cost, and maintenance of the current primary location for boat launching, one of the three options presented, named Option 1, was chosen to be carried forward to the Schematic Design Phase.

To source rock for the proposed harbour infrastructure, four quarry/borrow source locations were identified and investigated during the 2019 site reconnaissance (Advisian 2019). Borrow Source Location 2 (northwest of the community) was further investigated by Worley in 2024, the details of which are outlined in this report.

Refer to Figure 1 for the general layout, including the location of the community harbour, Borrow Source Location 2 and the haul road.

1.1.1 Community Harbour

Grise Fiord Option 1 is located to the northwest of the community in a small embayment, which aligns central to the northeast/southwest valley, as shown in Figure 1-2.

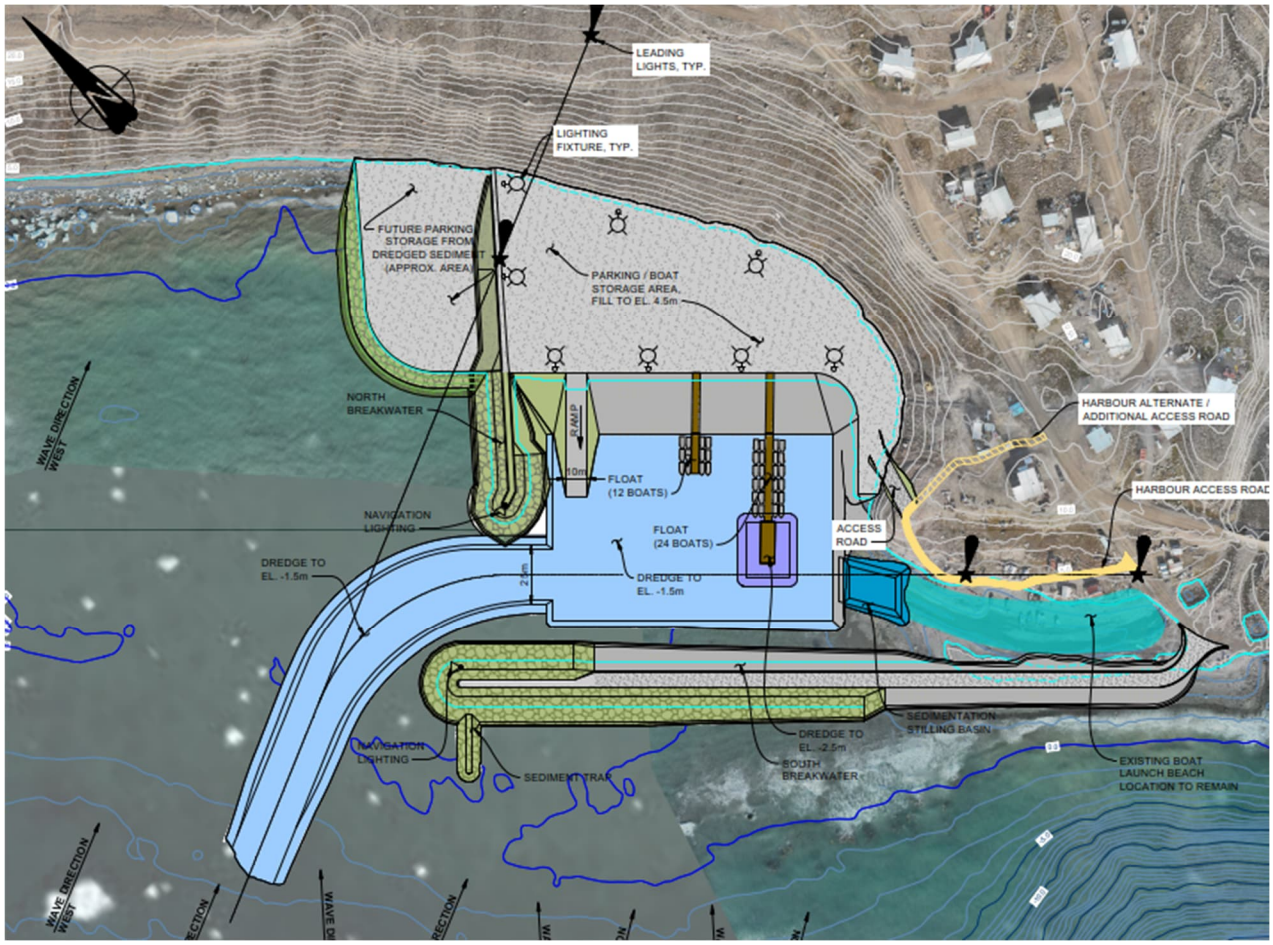


Figure 1-2: Schematic Design Option 1 for Grise Fiord Community Harbour

This layout incorporates a north and south breakwater, protecting a harbour basin of 1.3 hectares (ha). The north breakwater extends 200 metres (m) perpendicular to the shore with a crest at +5.0 m above Chart Datum (CD). This breakwater is not intended to be accessible by vehicles or pedestrians. The south breakwater extends to the northwest for 370 m, protecting the harbour from southern waves. The breakwater is accessible by vehicle and pedestrian via the 7 m wide road. The top elevation is set at +6.2 m CD, transitioning down to +4.5 m CD at the road tie-in. There is a small spur acting as a sediment trap at the end of the offshore side. The 25 m wide entrance to the harbour is placed between the breakwaters on the western corner with navigation lights on the end of each breakwater.

The layout includes approximately 2.0 ha of infilling along the shoreline, at a nominal surface elevation of +4.5 m CD, which is 0.5 m above extreme high water. The access road to the new storage area is proposed to be adjacent to the shacks that line the mooring basin and beside Lot Nos. 123 and 124 (which is the northwestern lot). It is expected that this parking area would be used for storage of boats and the floating docks during the winter. The float layout for this option includes two float stings. One float with a capacity of 24 boats next to the boat launch ramp at the southeast corner of the harbour and a float with a capacity of 12 boats situated next to it for a total of 36 boats. An additional larger float and deeper dredge pocket will be located at the end of the smaller string to accommodate larger vessels.

1.1.2 Borrow Source

A borrow source is required for the construction of the facility to source bulk fill, filter layers, and armour stone. In agreement with the Government of Nunavut post design contract award, Borrow Source Location 2 (areas 2A to 2D), a lowland valley extending northwest-southeast located to the northwest of the community, has been chosen as the preferred borrow source target. Refer to Figure 1. In previous communications this location was called Quarry Location 2.

The borrow source reconnaissance performed in 2019 (Advisian 2019) indicated Borrow Source Location 2 was comprised of large cobbles and boulders likely representing a combination of terminal and lateral moraines as well as rock falls and talus. The 2024 geotechnical investigation was executed to estimate the maximum attainable block sizes between the northwestern and southeastern portions of Location 2, as well as assess the rock type, durability, and acid rock drainage (ARD) potential.

1.2 Previous Studies (Worley)

A geological assessment was undertaken as part of a feasibility study undertaken by Advisian (Advisian 2019) to assess the potential construction of a community harbour in Grise Fiord. The geotechnical scope of works included:

- A geotechnical desktop study of the proposed harbour and surrounding area.
- Identification of potentially suitable sites to source rock for construction of breakwaters and hardstand areas for the proposed harbour.

- A geological walkover covering areas including the shoreline at the proposed harbour site, potential haul routes and potential borrow source/ quarry locations, including preliminary assessment of the rock mass and collection of rock samples for further identification, classification, and laboratory testing.
- Laboratory testing of rock samples including rock strength, durability tests, and ARD testing.
- Preliminary assessment of rock suitability from potential borrow source/ quarry location.
- Preliminary assessment of geotechnical conditions at the potential harbour location.
- Geophysical surveys (seismic refraction and sub-bottom profiling) at the proposed harbour locations to access foundation conditions, conducted by Frontier Geosciences Inc (Frontier); seismic lines SL19-01 and SL19-02 in Figure 1-3.

Findings and results of the rock tests and geophysics are summarized in the Grise Fiord Harbour Development Geological Assessment report (Advisian 2019, Appendix 5). The geological assessment supported the small craft feasibility study (Advisian 2019, Document No. 307071-01306-00-MA-REP-0003) for DFO.

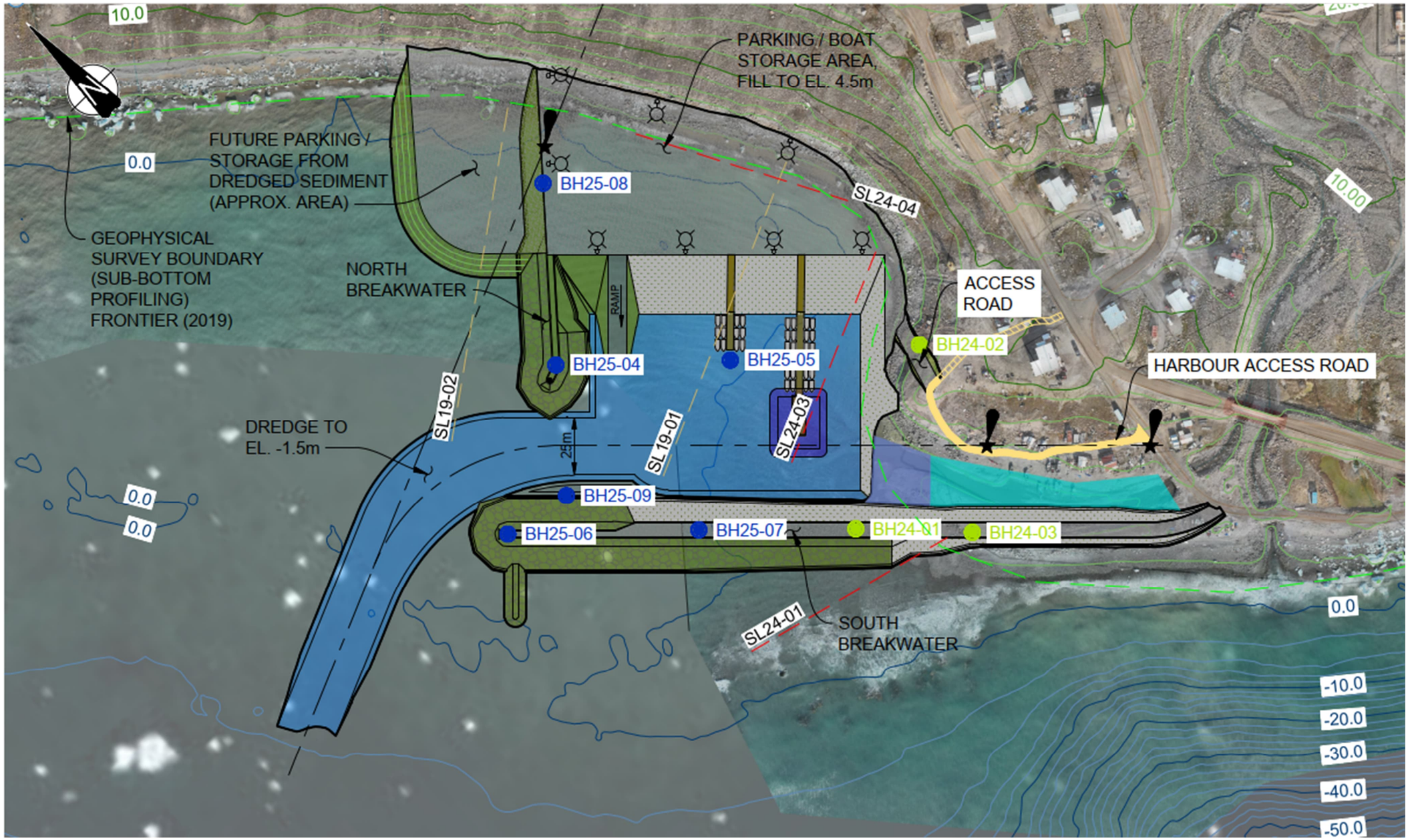


Figure 1-3: Geotechnical/Geophysical Investigation Locations at the Harbour Area

1.3 Current Scope of Work

1.3.1 General

Worley has been retained by the Department of Transportation and Infrastructure as the Prime Consultant for improvements to the marine infrastructure in Grise Fiord. The overall scope of work includes further development of previous studies for a community harbour from a concept level through to detailed design and construction. The project includes the following phases:

- Pre-Design Works
- Schematic Design
- Permitting Support
- Design Development
- Construction Documents
- Construction and Contract Administration

Concurrent with the Marine Facilities Schematic Design, Worley has also undertaken the following tasks in support of the project:

- Geological and geotechnical field investigations.
- Baseline environmental studies and impact assessments.
- Permit applications.
- Community consultations.

The community harbour facility is expected to include:

- Parking/boat storage area with boat launch ramp, lighting, and accessories.
- Two breakwaters.
- Small craft floats.
- Harbour basin and entrance channel dredging to -1.5 m CD, with a -2.5 m CD dredged pocket at the end of the float string to accommodate larger vessels.
- Navigation lighting.

The following additional scope/future expansion is not part of the current facility; however, has been considered at the conceptual phase of the project:

- Increased parking/boat storage area.
- A fixed dock to support fishery vessels (Arctic Fisheries Alliance).
- Dredged turning circle and entrance channel for larger vessels.
- Additional area lighting for future parking/boat storage area.
- Additional float strings to accommodate small craft vessels.

The final scope of facilities will be driven by community need and available funding, and will be influenced by residents, Hunters and Trapper Associations, small vessel owners, and selected industry (tourism, sealift, refuelling) representatives.

1.4 Site Investigation

The geological assessment previously completed by Advisian (Advisian 2019) and schematic design at the time of investigation was used to define the scope of works for the geotechnical site investigation.

The scope of work planned for the geological and geotechnical site investigation at the proposed community harbour and quarry targets was divided into a summer 2024 and spring 2025 investigation and is summarized in the sections below. Geotechnical investigation locations (boreholes and geophysical survey lines are shown in Figure 1-3).

1.4.1 Geotechnical and Geophysical Investigation

1.4.1.1 Community Harbour - Summer 2024

The geotechnical investigation comprised:

- Multibeam bathymetric survey of the proposed harbour area completed by Frontier on September 2, 2024.
- Three seismic refraction and multi-channel analysis of Surface Waves (MASW) survey lines in the footprint of the proposed harbour, completed by Frontier on September 7, 2024 - survey lines SL24-01, SL24-03, and SL24-04.
- Collection of drill rig and sea container from Nunavut Eastern Arctic Shipping Inc. (NEAS) sealift.
- Supervision and coordination during the drilling of three geotechnical boreholes within the footprint of the proposed harbour area in the onshore and intertidal area (Boreholes BH24-01, BH24-02, and BH24-03) on September 14 and 15, 2024.

1.4.1.2 Borrow Source Targets - Summer 2024

The geotechnical investigation comprised:

- Site reconnaissance including geological field mapping and drone survey (by Underhill Geomatics Ltd.) within Borrow Source Location 2 (2A to 2D) and potential haul road routes.
- Terrain mapping of the identified moraine area by Gretchen Minning (GVM Geological Consultants Ltd).
- Collection of representative rock samples at each borrow source location for rock durability tests.
- One seismic refraction line (by Frontier) at the Borrow Source 2 location on September 8, 2024.

1.4.1.3 Community Harbour - Spring 2025

The geotechnical investigation comprised:

- Supervision and coordination during the drilling of six boreholes on the sea ice within the proposed dredge and breakwater areas of harbour Option 1 from April 5 to 7, 2025:
  - One borehole within the proposed dredging area (Borehole BH25-05).
  - Four boreholes along the proposed breakwaters footprint (Boreholes BH25-4, BH25-06, BH25-07, and BH25-9).
  - One borehole along the footprint of the proposed laydown area.

1.4.1.4 General

The geotechnical investigation also included the below tasks:

- Logging of soil in accordance with the Unified Soil Classification System (USCS) (ASTM D2487-17) and the Canadian Foundation Engineering Manual (CFEM, 2023); logging of rock in accordance with CFEM (2023).
- Collection of disturbed soil and rock samples, where applicable, for geotechnical laboratory testing.
- Photographs of soil and rock samples.
- Laboratory testing of collected soil and rock samples.
- Preparation of this Geotechnical Investigation Factual Report to outline the work completed, including the methodology used and the results.

1.5 Roles and Responsibilities

The roles and responsibilities of the participants in the geotechnical investigation are summarized in Table 1-1.

Table 1-1: Roles and Responsibilities

Company	Role/Responsibilities
Government of Nunavut, Department of Transport and Infrastructure	Customer
Worley	Geotechnical Consultant to GN: • Quarry/borrow source identification, mapping, and sampling. • Subcontracted charter flight, ice engineer, geophysical contractor, drilling contractor, and laboratory testing companies. • Engaged local support and equipment (wildlife monitors, helpers and truck). • Prime contractor during drilling program including leading and managing contractors. • Staked drilling locations on the sea ice and identified access routes and drill pad dimensions. • Provided technical direction and fieldwork supervision, including soil sampling, geotechnical borehole logging, and in situ testing. • Interpreted field investigation findings, laboratory testing results, and other background information pertaining to the Site characterization work. • Prepared this geotechnical investigation report.

Company	Role/Responsibilities
Kenn Borek Air	Subcontractor to Worley: • Provided return-chartered flight services from Resolute Bay to Grise Fiord.
Frontier Geosciences Ltd.	Subcontractor to Worley: • Provided geophysical services.
Alietum Ice	Subcontractor to Worley: • Provided ice engineering and ice profiling services.
NOVA Drilling Inc.	Subcontractor to Worley: • Provided geotechnical drilling services. • Subcontracted local heavy equipment and operators.
Local Support	Subcontractor to Worley: • Provided wildlife monitoring services.
Solum Consultants Ltd.	Subcontractor to Worley: • Provided basic and specialized geotechnical laboratory testing services.
Vancouver Petrographics Ltd.	Subcontractor to Worley: • Provided petrological assessment of rock samples.
SGS Canada	Subcontractor to Worley: • Provided ARD laboratory testing services.
GVM Geological Consultants Ltd.	Subcontractor to Worley: • Provided terrain mapping services.

2. Site Conditions

2.1 Site Location and Existing Marine Infrastructure

Grise Fiord is located on the south coast of Ellesmere Island, on Jones Sound and north of the Arctic Circle. As the northernmost community in Canada, it is one of the coldest inhabited locations in the world with an annual average temperature of -16.5 deg. C. The population of 144 (Statistics Canada 2021) is supplied via sealift during the shipping season and is accessible by air only via twin otter aircraft from Resolute Bay.

The community of Grise Fiord does not currently have an established harbour. As protection from storm waves, boat owners moor their boats in a rudimentary mooring basin, in one of two arms of the mouth of the Kuuraaluk, the major creek running through the middle of the Hamlet (see Figure 2-1 and Figure 2-2). There are no construction details of the basin. According to residents (Advisian 2019), the creek was diverted to direct partial discharge into the mooring basin via three large diameter culverts through a creek crossing. Access into and out of the creek basin is restricted at low tide. Reportedly, the protecting berm erodes from wave action. The only other marine infrastructure consists of two mooring bollards for the fuel resupply tanker.



Figure 2-1: View of the Mooring Basin (View Looking Southeast)



Figure 2-2: Existing Mooring Basin and Sheltered Bay (Location of Proposed Community Harbour) at Northern End of the Community (Looking North)

2.2 Geological Setting

The surficial geology surrounding Grise Fiord includes predominantly glacial deposits, marine terraces, and colluvial deposits. Glacial deposits are evident within neighbouring valleys and include predominantly morainal deposits composed of clay, silt, sand, gravel, cobbles, and boulders. Colluvial deposits consist of rubble, derived from crystalline bedrock, medium grade metamorphic substrate and cemented sandstone (Gilbert et al. 2006), with sand and silt. The area features a series of five marine terraces formed by sea erosion and deposition during postglacial isostatic rebound following the retreat of continental ice sheets in the Pleistocene and Holocene epochs. These terraces, arranged in a staircase-like formation from sea level up to 80 m elevation, exhibit a range of surface and subsurface characteristics, including gravelly and cobbly soils, scattered boulders, and varying degrees of drainage and vegetation. Lower terraces contain stratified marine sediments, while higher ones show signs of periglacial processes, such as patterned ground and colluvial deposits from adjacent cliffs (Tetra Tech 2021).

Bedrock in the Grise Fiord area is within Etah plutonic assemblage, which is Orosirian in age (1,980 to 1,915 million years ago). Rock types typically comprise orthopyroxene granite with perthite porphyroblasts. (Harrison et al., 2014). An approximate fault line is shown to run approximately southwest to northeast through the community.

2.3 Topography and Drainage

The region is characterized by mountains with large U-shaped valleys carved out by a network of active and/or retreating glaciers, fed by the area's ice caps.

There are two main valleys, one running northwest to southeast and the other northeast to southwest, which connect north of the community, approximately 500 m to 750 m higher in elevation. Valley walls are dominated by individual and coalescing rock fall talus cones and/or avalanche cones and boulder tongues, with very steep rock walls at the top, becoming gentler due to the accumulation of talus nearer the base (Tetra Tech 2021).

The community is located at the mouth of the two valleys which is relatively flat and is part of a series of raised beach terraces. A seasonal creek coming from the northeastern valley, runs through the Grise Fiord community, passing to the east of the airport runway. The shoreline includes a narrow beach, strewn with large boulders and is moderately sloped (Tetra Tech 2021).

Natural drainage into Jones Sound generally follows the area's topography; however, the construction of fill pads for buildings and road embankments has altered this set of natural watercourses, resulting in increased surface runoff and higher peak flows. A significant portion of this runoff originates from the steep slopes located behind the community, with the headwaters of the streams situated in the mountainous terrain to the east. The largest stream flowing through the hamlet begins approximately 10 kilometres (km) northeast of the community (Tetra Tech 2021).

2.4 Permafrost

Melting permafrost can result in changes to ecosystems as well as infrastructure. This effect is most pronounced over land where melting permafrost can cause slope instabilities, softening foundations under infrastructure, and a shortened season for land transportation over winter roadways. In addition, melting permafrost can release gases into the atmosphere and affect the local ecosystem while exacerbating the progression of permafrost melting.

According to the Permafrost Atlas of Canada, Grise Fiord is located in a region of continuous permafrost (Natural Resources Canada [NRC] 2021). Specific data on permafrost depth and annual mean ground temperatures for the Grise Fiord region is not available.

Information regarding the extent and depth of permafrost in the Sound itself is not known. While melting permafrost could affect the structures, it is unlikely in this case since melting subsea permafrost is a relatively slow process, and it is typically located well below the seabed surface.

2.5 Regional Seismicity

Grise Fiord is located in an area of low seismicity.

Based on the site investigation/observations, considering the soils at the top 30 m below ground surface (mbgs), the site can be characterized as Site Class D.

The seismic hazard for Grise Fiord was calculated using the NRC Seismic Calculator (NRC 2020) for interpolated seismic hazard for the 1:475-year and 1:2,475-year return periods, for Site Class D and 5% damping ratio, and spectral acceleration values are shown in Table 2-1.

Table 2-1: NBCC (2020) Interpolated Seismic Hazard Values

Sa and PGA (as a Ratio of Gravity)[1, 2, 3]	Probability of Exceedance in 50 Years (Return Period)	
	2% (1:2,475)	10% (1:475)
Sa (0.2)	0.311	0.131
Sa (0.5)	0.325	0.140
Sa (1.0)	0.207	0.0851
Sa (2.0)	0.104	0.0407
Sa (5.0)	0.0292	0.0102
Sa (10.0)	0.00925	0.00332
PGA	0.176	0.0721

Notes:

- Sa = Spectral horizontal acceleration for Site Class D, with period in seconds shown in brackets.
- PGA = Peak Ground Acceleration for Site Class D.
- Sa and PGA are given in units of gravity, i.e., 9.81 m/s^2.

2.6 Tidal Water Levels

Tide levels for Grise Fiord were obtained from Canadian Tide and Current Tables, Volume 4 (DFO 2025) and are provided in Table 2-2. Extremes are estimated based off the extremes at the reference station of Resolute Bay.

Table 2-2: Tide Levels at Grise Fiord

Tide	Elevation (m, CD)
Extreme High*	3.9
Higher High Water Mean Large (HHWLT)	3.6
Higher High Water Mean Tide (HHWMT)	3.0
Mean Water Level (MWL)	1.7
Lower Low Water Mean Tide (LLWMT)	0.6
Lower Low Water Large Tide (LLWLT)	-0.1
Extreme Low*	-0.4

Notes:

- *Extremes are estimated based off the extreme reference station of Resolute Bay.

2.7 Horizontal and Vertical Datum

2.7.1 Horizontal Datum

The reference horizontal datum is Universal Transverse Mercator (UTM) NAD83 18N.

2.7.2 Vertical Datum

The vertical reference datum used is local Chart Datum (CD).

A shift of +1.872 m is used to convert Canadian Geodetic Vertical Datum (CGVD2013) to CD.

2.8 Topographic and Bathymetric Data

A topographic survey and a multibeam bathymetric survey within the footprint of the proposed community harbour and associated infrastructure, potential borrow source targets, and haul road routes was undertaken by Underhill Geomatics and Frontier, respectively, in August 2024. The overwater multibeam bathymetry survey was completed using an Imagenex DeltaT multibeam sonar, and the position of the sonar system was correlated with a differential Garmin 19xHVS so that each sonar record could be contoured for final data presentation and interpretation.

3. Site Investigations

Worley completed a geological desktop assessment and site reconnaissance program in August 2019 (Advisian 2019), including geophysical surveys by Frontier (two MSAW and seismic refraction survey lines). Then in August 2024, Worley performed a site reconnaissance of the Borrow Source Location 2 and Frontier performed an additional geophysical survey of that borrow source (one seismic refraction line). This work was followed by two geotechnical drilling programs, one in September 2024 and one in April 2025, and a final geophysical survey by Frontier in September 2024 (one multibeam bathymetric survey and three seismic refraction and MASW survey lines). Also, GVM Geological Consultants Ltd. performed terrain mapping of the Borrow Source 2 moraine deposits in 2024.

Figure 1 provides a plan showing the location of the proposed community harbour, potential borrow source targets, and haul road routes. Figure 1-3 shows the locations of the completed boreholes and geophysical survey lines.

Photographs of the general area, and retrieved soil samples from the 2024/2025 geotechnical investigations are included in Appendix A and Appendix B, respectively. Photographs from the 2019 reconnaissance are included in Appendix C (Photographs 9 to 19 show the general area around Borrow Source Location 2, whereas Photographs 39 to 51 show the general area at the location of the proposed community harbour). The 2024/2025 borehole logs are included in Appendix D and their explanatory notes in Appendix E. Geotechnical laboratory testing results from the 2024/2025 investigation are included in Appendix F. The Frontier geophysical survey report, after a calibration of the results with the borehole data, is included in Appendix G. The terrain mapping report is included in Appendix H.

3.1 Worley Supervision

Table 3-1 identifies the Worley representatives who supervised each of the phases of the investigation.

Table 3-1: Worley Supervision

Investigation	Personnel	Dates
2024 – Borrow Source Assessment	Jonathan Woods	August 27 to 29, 2024
2024 - Summer Drilling Program	Jeff Gibson	September 14 to 16, 2024
2025 - Spring Drilling Program	Jeff Gibson, Lauren Tagg, Melanie Jones	April 4 to 7, 2025

3.2 2024 Summer Geotechnical Investigation

The 2024 summer geotechnical investigation included a geophysical survey of the proposed community harbour and Borrow Source Location 2, geological site reconnaissance of potential borrow source targets, Borrow source Location 2 terrain mapping and onshore/intertidal geotechnical investigation.

Figure 1-3 provides a location plan showing the location of the proposed community harbour layout and borehole and geophysical survey locations. Figure 1 shows the location of the borrow source targets investigated. The location of the geophysical survey line within Borrow Source Location 2 is shown in the figures within the geophysical survey report (Appendix G).

Further discussion on the various components of the site investigation is detailed below.

3.2.1 Borrow Source Fieldwork

Based on review of 2019 site data and Google Earth Imagery, four locations of interest were selected for assessment during the summer fieldwork program within proposed Borrow Source Location 2, Borrow Source Locations 2A, 2B, 2C, and 2D (Site Plan, Figure 1). Location 2 is a lowland valley extending northwest-southeast located to the northwest of the Grise Fiord community.

A geological site walkover and assessment was undertaken by a Senior Engineering Geologist between August 27 and 29, 2024. The aim of the site walkover was to assess the four locations of interest and identify suitable sized material for use as general rockfill and rock armour for the construction of the proposed community harbour.

The site walkover included:

- Initial assessment and screening of block sizes within Locations 2A to 2D (Site Plan, Figure 1) to confirm locations for follow up detailed assessment. As material specifications indicated a mean diameter (D_{50}) of 1,500 mm for rock armour, the initial assessment used rock size and abundance for initial screening.
- Follow up detailed assessment in areas where suitable quantities of large blocks was identified, including assessing rock type, weathering, and variability within the boulder field.
- At selected sites, completed scanlines to assess representative rock shape, length to thickness (LT) ratio and size and mass of blocks (the results of the scanline assessment are included in Appendix I).
- Collection of representative rock samples for subsequent petrographic examination, durability testing, and ARD testing.
- One seismic refraction survey, refer to Figure 16 of geophysical report by Frontier, which is included in Error! Reference source not found..

3.2.2 Borrow Source Terrain Mapping

After consultation with the GN led to the conclusion that the Borrow Source Location 2 would be the primary target for the summer fieldwork program, a parallel terrain mapping study was performed by Gretchen Minning (GVM Geological Consultants Ltd).

The objective of this study was to perform terrain mapping of the identified moraine area and classify, map and describe the main bedrock and surficial deposits, as well as to delineate the best terrain units within the moraine contained suitable sized for use as armour stone.

Within the study target area, Moraine Deposits (M_p) and Rolling and Ridged Moraine Deposits (M_{mr}) were identified as material that contains boulder sized construction material. With M_{mr} identified as the better source of boulder sized construction of the two mapped units.

The Terrain Mapping Report, which includes the Terrain Maps, is included in Appendix H.

3.2.3 Community Harbour Fieldwork

3.2.3.1 Geotechnical Drilling

A Track Mounted Rotary Drill Rig (CME-850) supplied and operated by Nova Drilling Inc., based out of Halifax, NS, was used to drill all boreholes. The drill rig and support equipment were loaded into one 20 feet (ft.) long sea container, mobilized via truck to Bécancour, QB, and delivered to NEAS for loading onto a sealift vessel that arrived in Grise Fiord on September 14, 2024. Upon arrival, the drill rig and sea container were offloaded to a laydown area located southeast of the proposed harbour.

The drill crew (one site supervisor, one driller, and one helper) and one Worley geotechnical representative mobilized to Grise Fiord on September 13, 2024.

Upon completing a check of the sea container contents, the drill rig was tracked to the first drill location (borehole BH24-03).

Borehole drilling was completed by advancing Heavyweight Thread (HWT) casing (114 mm outer diameter) and utilizing an HQ-sized tube (96 mm outer rod diameter) to drill using water rotary techniques using water rotary techniques. Typical drill setup at the community harbour locations are shown in photographs in Appendix A.

Three boreholes were advanced along the shoreline of harbour design Option 1 (BH24-01 to BH24-03) (see Figure 1-3 for borehole locations). Boreholes were advanced 7.9 m to 9.0 mbgs. Drilling operations took 12 hours per day by one crew for the duration of the drilling program.

Upon completion, the drill rig was tracked to a laydown area close to the airport and winterized to prepare for the spring 2025 drilling program. The sea container was moved near the community's water tanks.

A summary of the borehole locations is provided in Table 3-2.

Table 3-2: 2024 Harbour Borehole Locations

Borehole ID	Area[1]	Location[2] (Easting/Northing UTM)	Elevation[3] (m CD)	Termination Depth (m)
BH24-01	Main Breakwater	N 8,482,828.00 E 449,907.00	0.88	8.10[4]
BH24-02	Laydown Access Road	N 8,482,872.00 E 449,996.00	5.26	7.90

Borehole ID	Area[1]	Location[2] (Easting/Northing UTM)	Elevation[3] (m CD)	Termination Depth (m)
BH24-03	Main Breakwater	N 8,482,785.00 E 449,948.00	3.62	9.00

Notes:

[1]Proposed infrastructure.

[2]Coordinates from handheld GPS.

[3]Elevations in m CD which are based on the Underhill Geomatics 2024 survey.

[4]BH terminated early due to incoming tide, repositioned rig within 1.5 m of initial location.

3.2.3.2 Geophysical Survey

Frontier mobilized to the harbour from September 3 to 6, 2024, and completed the following surveys:

- Multibeam bathymetric survey of the marine harbour area.
- Three seismic refraction and MASW sections; SL24-01, SL24-03, and SL24-04, refer to Figure 1-3.

A description of the methodology, assumptions, and the results are provided in the geophysical report issued by Frontier, which is included in Appendix G.

3.3 2025 Spring Geotechnical Investigation

The 2025 spring geotechnical investigation included an ice survey and geotechnical site investigation within the footprint of the proposed community harbour.

Figure 1-3 provides a location plan showing the location of the proposed community harbour layout, and borehole locations.

Further discussion on the various components of the site investigation is detailed below.

3.3.1 Ice Surveys

Alietum Ice, based out of Yellowknife, Northwest Territories (NWT), was contracted to perform ice thickness measurements within the footprint of the proposed SCH. An ice survey was undertaken on March 25, 2025.

Prior to mobilizing the ice survey crew, or drilling equipment to site, Alietum Ice requested drill rig loads for drilling equipment as well as pull back forces in order to assess the minimum ice thickness requirements. The survey was required to assess ice thickness and integrity along access routes and within the footprint of proposed drill sites to support drilling.

The survey undertaken by Alietum Ice involved ground penetrating radar (GPR) survey using a GPR unit secured in a qamutik (sled) and towed using a skidoo. Confirmatory ice augers were advanced through the sea ice using a 2-inch (in.) ice auger bit.

The ice survey indicated that ice thickness within the footprint of the community harbour ranged from 92 to 153 centimetres (cm), with ice thickness at borehole locations and along access routes ranging from 103 to 153 cm. A minimum ice thickness of 102 cm was recommended by Alietum Ice based on drill rig layouts and pull back forces.

3.3.2 Geotechnical Investigation

3.3.2.1 Site Clearance and Setup

Upon arrival to site, Worley site supervisors completed a site walkover along the proposed access routes and drill locations to verify that there had been no significant change since the ice reconnaissance survey. The access routes and drill locations were delineated by Worley using wooden stakes. The Hamlet provided a front-end loader and operator to clear an access route onto the sea ice and prepared drill pads as directed by Worley representatives. Representative photographs showing access route delineation and pad clearing are provided in Appendix A.

During borehole location and access delineation, the Worley site supervisors and Drilling supervisor visually monitored the ice for any cracking or any other features that may indicate integrity issues. The drill pad and access routes were also monitored frequently for ice cracking.

3.3.2.2 Geotechnical Drilling

Worley completed a total of six geotechnical boreholes in Grise Fiord from April 4 to 7, 2025, within the footprint of the proposed harbour using the drill rig and support equipment that had been stored over winter close to the airport.

The drill crew (one site supervisor, two drillers, and two helpers) and three Worley geotechnical representatives mobilized to Grise Fiord on April 1, 2025. The drill crew with the support of the Hamlet spent 2.5 days preparing for drilling operations, which included shovelling out/thawing the drill rig, construction of a wooden skid mounted drill shack to protect the crew from the elements while out on the sea ice and setting up pumps and hoses as needed. Photographs showing the construction and completion of the drill shack are provided in Appendix A.

Upon construction of the drill shack on the sea ice, the drill rig was tracked to the first drill location (BH25-04) from the laydown area. Access to the drilling locations for work crews was by pick-up trucks, and the drill shack was towed across the sea ice between borehole locations using a pick-up truck as well.

Once setup, the drillers advanced the initial hole through the sea ice using an auger and dipped a measuring tape to the seabed to get an initial depth measurement. A HWT drill casing (114.3 mm outer diameter) was then lowered to within approximately 125 mm to 250 mm (5 in. to 10 in.) above the seabed (as required) and drilling was completed in overburden soils using HQ-sized drill rods (96 mm outer rod diameter). Typical drill setup at the community harbour is shown in photographs in Appendix A.

Boreholes were advanced 5.75 metres below seabed (mbsb) to 15.18 mbsb. Drilling operations were undertaken 24 hours per day by two crews for the duration of the drilling program.

A summary of the borehole locations is provided in Table 3-3.

Table 3-3: 2025 Harbour Borehole Locations

Borehole ID	Area[1]	Location[2] (Easting/Northing UTM)	Elevation[3] (m) CD	Termination Depth (m)	Bedrock Depth (mbsb)
BH25-04	North Breakwater	N 8,482,883.85 E 449,849.79	0.33	15.18	N/A
BH25-05	Dredge Pocket	N 8,482,950.72 E 449,779.06	-0.11	10.10	7.3 (possible Breccia bedrock-inferred)
BH25-06	Main Breakwater	N 8,482,994.89 E 449,857.10	0.14	15.15	N/A
BH25-07	Main Breakwater	N 8,482,944.00 E 449,917.00	0.01	5.75	N/A
BH25-08	Laydown/North Breakwater	N 8,483,065.48 E 449,917.73	0.01	9.80	N/A
BH25-09	Main Breakwater/ Dredge Pocket	N 8,482,929.92 E 449,842.20	-0.25	13.94	N/A

Notes:

[1]Proposed infrastructure.

[2]Coordinates from handheld GPS.

[3]Elevations in m CD based on the Frontier 2024 Survey 024 S.

3.4 Geotechnical Logging

All boreholes were directed and supervised by a Worley representative. Soil and rock samples were logged at the site, in accordance with recommendations of CFEM (2023) and ASTM D2488-17e1.

When drilling in surficial soils at the Harbour boreholes (BH24-01 to BH24-03), standard penetration tests (SPTs) were performed every approximately 1.5 m or as directed, and disturbed soil samples from the SPTs and cores were collected.

Soil logging was completed on samples recovered from split spoons and core. All recovered soil intervals were described, classified, photographed, and packaged. Split spoon samples are shown in photographs in Appendix B. In general, pocket penetrometer and torvane measurements were carried out, where possible, on fine-grained cohesive samples. Samples were logged in the field in accordance with the USCS (ASTM D2487-17) as adopted in CFEM (2023), double bagged, labelled and stored in 5-gallon pails. Any unused soil and rock cuttings were disposed of on site.

Rock core was only encountered in one borehole (BH25-05). Rock core logging commenced on the rock cores as soon as they were extracted from the core barrel into a wooden core box. Rock cores are shown in photographs in Appendix B. Rock core logging consisted of identification of rock type, defect type and spacing, field strength, as well as assessing weathering. Fractured zones within the recovered bedrock often resulted in gravel to cobble sized fragments being loosely retrieved in the liners. In such cases, the recovered core pieces were reasonably reconstructed prior to core measurements being taken. Select diamond cored rock samples were also collected for laboratory testing.

It should be noted that soil and rock classifications, including material strengths, have been reviewed based upon the results of the laboratory testing. Wherever the field description did not match the laboratory result, then the test result and the relevant section of core was reviewed (typically in the core photo) and the field description was amended, if deemed appropriate. Rock strength classifications provided on the logs are based on the strength classification system described in the explanatory notes provided in Appendix E, which uses Uniaxial Compressive Strength (UCS) as the primary strength classification. UCS is estimated in the field based on qualitative field tests described Appendix D, and confirmed based upon actual UCS tests where available, and/or Point Load Strength Index results.

Soil and rock samples were shipped as cargo to the designated laboratory for subsequent testing.

3.5 General

3.5.1 Survey Control

3.5.1.1 Horizontal Control

Borehole locations were located through a phone mapping app (Avenza) connected to a handheld Bad Elf GPS Pro (accuracy ±2.5 m) and confirmed by handheld Garmin GPS units.

3.5.1.2 Vertical Control

The ground surface elevation of each borehole was determined in 2024 using an RTK GPS set on a survey tripod operated by an Underhill site representative. Boreholes BH24-02 and BH24-03 were marked “X” with white spray paint and were identified by the drill crew.

In 2025, the elevation of the seabed at each borehole location was assessed by measurements taken from the sea ice prior to commencement of drilling. The first stage was to auger the sea ice and measure the freeboard (distance measured from the ice surface to the stationary water in the hole), which was typically 50 to 680 mm. Once the freeboard was measured, the distance from the top of sea ice to seabed was measured by lowering a weighted tape through the augured hole deployed from the sea ice. The water depth was calculated by subtracting the freeboard from the total depth from top of sea ice to seabed.

The seabed elevation (SE) relative to CD was then determined by correcting water depth (WD) for tide level (TL) based on updated predicted tidal information from the Canadian Tide and Current Tables, Volume 4 (DFO 2025), such that:

$$SE = TL - WD$$

The key inputs to assessing seabed elevation included tidal data, GPS location and multibeam bathymetry (Frontier 2024).

3.5.2 Laboratory Testing

Representative soil and rock samples were selected for laboratory testing by a qualified Worley geotechnical engineer and/or engineering geologist.

The following laboratories were utilized for testing:

- Solum Consultants Ltd., Calgary, AB (Solum) - Soil and rock samples being tested for engineering parameters (proposed harbour and borrow source targets).
- Vancouver Petrographics Ltd., Vancouver, BC - Petrological analysis (proposed borrow source targets).
- SGS, Burnaby, BC - ARD/Metal Leaching (ML) testing and X-Ray diffraction (proposed borrow source targets).

A summary of the test types, methods, and number of tests is included in Appendix F.

Geotechnical laboratory test results in accordance with the test suite listed in Table 3-4 and Table 3-5 are included within Appendix F. The petrological analysis X-ray Diffraction and ARD laboratory reports are also provided in Appendix F.

Table 3-4: 2024 Laboratory Testing Summary

Test Suite	Laboratory	Test Type	ASTM/(Other Standard or Reference)	Number of Tests
Soil Classification/Strength Testing (Harbour)				
1	Solum	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass	D2216-19	4
	Solum	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	D4318-17	4
	Solum	Standard Tests Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis and Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis	D6913M-17 and D7928-21	13

Test Suite	Laboratory	Test Type	ASTM / (Other Standard or Reference)	Number of Tests
Rock Durability Testing (Borrow Source Location 2)				
2	Solum	Riprap Test Suite (Including Specific Gravity, Absorption, and Durability Index)	(CT206 and CT229)	1
	Solum	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate	C88M-24	1
	Solum	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine	C131M-20	1
Petrological Analysis (Borrow Source Location 2)				
3	Vancouver Petrographics	Petrological Analysis	N/A	1
ARD / ML Geochemical Testing (Borrow Source Location 2)				
4	SGS	Acid Base Accounting (ABA)	(Sobek et. al. 1978)	1
	SGS	Sulphur (S) Speciation	D2492-02	1
	SGS	X-Ray Diffraction	(EMXDF[1], 2023)	1

Note 1: Electron Microbeam/X-ray Diffraction Facility, the University of British Columbia.

Table 3-5: 2025 Laboratory Testing Summary

Test Suite	Laboratory	Test Type	ASTM / (Other Standard or Reference)	Number of Tests
Soil Classification / Strength Testing (Harbour)				
1	Solum	Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass	D2216-19	19
	Solum	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	D4318-17	14
	Solum	Standard Tests Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis and Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis	D6913M-17 and D7928-21	24

3.5.3 Field Standards

All fieldwork was performed in accordance with the Worley Geotechnical Field Manual with guidance from the applicable American Society for Testing and Materials (ASTM) standards presented in Table 3-6, and other recognized standards including CFEM (2023).

Table 3-6: Applicable ASTM Standards

Applicable Standards	ASTM Designation
Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)	D2487-17

Applicable Standards	ASTM Designation
Standard Practice for Description and Identification of Soils (Visual – Manual Procedure)	D2488-17e1
Standard Practices for Preserving and Transporting Soil Samples	D4220-14

3.5.4 Health, Safety, and Sustainability Management Plan

All drilling related studies were carried out with due care to the health and safety of all site personnel and the environment. Work activities were undertaken in accordance with a comprehensive health, safety, and environmental management plan (HSEMP), reviewed and approved by Worley management. The plan was regularly assessed, and individual work procedures were updated based upon any lessons learned during execution of the work.

3.5.5 Local Support

Worley utilized local support for a number of activities, including wildlife monitors, vehicles, and heavy equipment as needed.

4. Subsurface Conditions

This section provides a summary of the findings of the geotechnical investigations, based on the data collected during fieldwork. Details of the subsurface conditions are also presented on borehole logs attached in Appendix D.

The soil descriptions provided in this report are based on accepted standard methods of visual classification and identification as outlined in the USCS and CFEM (2023). The stratigraphic boundaries shown on the borehole logs are inferred from non-continuous sampling, and observations during borehole drilling. These boundaries represent transitions between soil types rather than exact planes of geological change. Subsurface conditions may vary both with depth and laterally between individual borehole locations.

Occasional high SPT N values could be artificially high due to the SPT sampler striking coarse gravel, cobbles and/or boulders within the soil matrix.

Descriptions of soils encountered during the investigation are discussed in the following section.

4.1 Engineering Geological Units

The geological subsurface materials encountered during the geotechnical investigations at the community harbour and borrow source locations are outlined briefly below.

At the proposed harbour, the encountered subsurface conditions onshore typically consisted of compact to very dense, well to poorly graded gravel with sand, overlying silty sand/sandy silt. Permafrost was encountered at approximately 1 metre below ground surface (mbgs) in the nearshore boreholes (borehole BH24-02 and BH24-03). In the marine area, the subsurface conditions typically consisted of very dense gravel with sand and silt overlying at locations dense silty sand/sandy silt, and at locations stiff to hard sandy lean clay. In one borehole location (BH25-06), stiff to hard sandy lean clay was encountered from the seabed. All boreholes except for one (BH25-05) terminated in soil. Borehole BH25-05 encountered bedrock at approximately 7.3 metres below seabed (mbsb) comprising carbonate breccia.

At the proposed borrow source the encountered moraine deposits and rolling and ridged moraine deposits comprise mainly cobbles and boulders of weakly foliated granite to gneiss, slightly weathered, very strong to extremely strong (R5-R6 based on the International Society for Rock Mechanics [ISRM 1981]), blocky, with varying amounts of gravelly soils. Refer to Section 4 for more details of the borrow source materials.

Photos of all encountered geomaterials are included in Appendix B.

4.1.1 Granular Deposits (Unit 1)

Granular deposits were encountered from ground surface in BH24-02 and BH24-03 (onshore) and at seabed in BH24-01 (intertidal zone) and BH25-05, BH25-07, BH25-08 (at the community harbour nearshore area). At BH25-04 it was encountered at a depth of 1.4 m and at BH25-09 it was encountered at a depth of 1.05 m underlying sandy silt. This unit generally consisted of well to poorly graded gravel with sand/silt, light grey to black; fine to coarse grained sand, fine to coarse sub angular to angular gravel comprised of various rock types. This unit was encountered in all boreholes, except for BH25-06, and ranged from 1.6 to 4.55 m in thickness. The uncorrected SPT N values ranged from 27 to Refusal (average of 48). Unit 1 can be characterized as GC in accordance with the USCS.

4.1.2 Silty Sand/Sandy Silt (Unit 2)

Silty sand was encountered below Unit 1 in borehole locations BH24-01 (intertidal),BH24-02, BH24-03 (onshore), BH25-04, BH25-05, and BH25-07 (nearshore). At BH25-09, it was encountered at seabed and underlying the gravel with sand. This unit generally consisted of silty sand/silty sand, fine to coarse grained, light grey to dark grey, with trace to some fine to medium subrounded to subangular gravel, trace to some clay with minor amounts of shell fragments. Unit 2 ranged in thickness from approximately 1.4 to 6.0 m, and the uncorrected SPT N values ranged from 35 to Refusal (average of 52), indicative of dense to very dense sediments. A total of nine particle size analyses were undertaken in Unit 2. Results indicate that the sand content ranged from 8% to 50% and silt ranged between 10% to 80% with less than 10% clay and up to 60% gravel. Unit 2 can be characterized as SM/ML in accordance with the USCS.

4.1.3 Lean Clay (Unit 3)

Unit 3 was encountered below Unit 1 at borehole location BH25-08 (nearshore), below Unit 2 at borehole location BH24-01 (intertidal), BH25-04, and BH25-09 (nearshore), and for the full drilling depth at borehole location BH25-06 (nearshore). This unit generally consisted of reddish brownish grey to black, sandy silty clay, of low to medium plasticity, with fine to medium grained sand, trace gravel. A thin layer of lean clay with sand was encountered in borehole BH25-07.

Unit 3 has been divided into Unit 3a and Unit 3b based on differences in the in-situ consistency. Unit 3a was encountered in the upper 2.8 m in borehole BH25-06, which was drilled closer to the shoreline (under the west end of the proposed main breakwater), and typically had lower SPT N values than Unit 3b. Unit 3 can be characterized as CL in accordance with the USCS.

4.1.3.1 Unit 3a

Unit 3a is present only at borehole BH25-06 (which is situated under the west end of the proposed main breakwater). Unit 3a has approximate thickness of 2.8 m and the uncorrected SPT N values ranged from 12 to 17, indicative of stiff to very stiff sediments. One particle size analysis was undertaken in Unit 3a. Results indicate gravel content of 19%, sand content of 23%, silt content of 48% with 9% clay. One Atterberg limits test was undertaken in Unit 3a. The Liquid Limit (LL) and Plasticity Index (PI) was 34% and 17%, respectively.

4.1.3.2 Unit 3b

Unit 3b ranged in thickness from approximately 2.5 to 15.15 m. The uncorrected SPT N values ranged from 23 to Refusal based on 24 SPT tests, with an average value of 49. A total of 13 particle size analysis and 12 Atterberg limits tests were undertaken in Unit 3b. Results indicate that the clay content ranged from 9% to 20%, silt ranged between 47% to 77%, sand between 8% to 40% with less than 10% gravel. The LL and PI ranged from 20% to 49% and 8% to 27%, respectively.

The undrained shear strength of Unit 3b measured using pocket penetrometer ranged from 300 to 450 kPa. The SPT N values and undrained shear strength values indicate that Unit 3b is typically hard.

4.1.4 Carbonate Breccia Bedrock (Unit 4)

At borehole BH25-05, from a depth of 7.3 m to the end a layer of gravel and cobbles was encountered, fine to coarse, subrounded to angular, grey, moist, very dense. It is inferred that the gravel and cobbles are part of weathered carbonate breccia bedrock.

4.2 Permafrost

Frozen ground conditions were encountered in the two onshore boreholes (BH24-02 and BH24-03). Visible ice ranged from individual ice inclusions to stratified ice formations. Visible ice was not encountered to the depths drilled in marine boreholes (BH24-01 and BH25-04 to BH25-09) which indicates that it is unlikely that subsea permafrost is present within the depths drilled. Ice crystals were noted in the split spoon sample undertaken at seabed surface in borehole BH25-04; however, this is due to sea ice grounding.

5. Closure

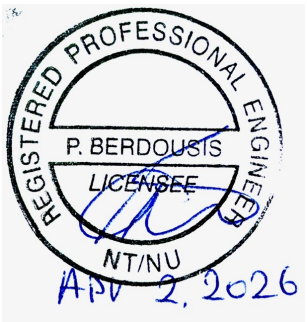
We trust that this report satisfies your current requirements and provides suitable documentation for your records. If you have any questions or require further details, please contact the undersigned at any time.

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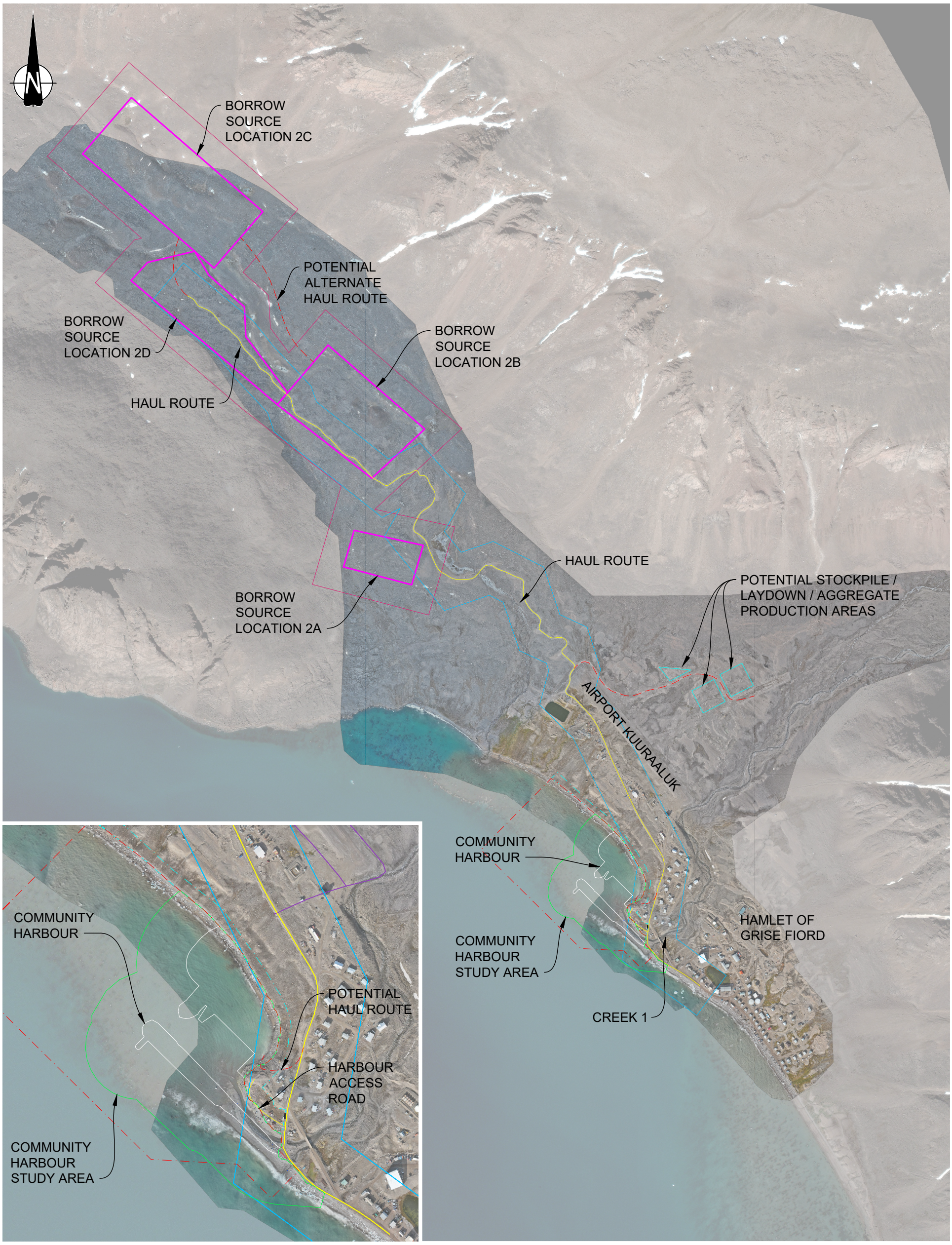
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Figures

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SAVE DATE & TIME: 13/3/2026 12:04:10 PM
USER NAME: jennifer.coppendale
ISSUING OFFICE: VANCOUVER, B.C.



INSET PLAN
1:7500

PLAN
1:15000

LEGEND

- HAUL ROAD ON EXISTING ROAD/TRACK
- ALTERNATE/ADDITIONAL HAUL ROUTE
- COMMUNITY STUDY AREA
- QUARRIES STUDY AREA
- EXISTING ROAD STUDY AREA
- STOCKPILE/LAYDOWN AREA
- QUARRY

m 0 100 200 300 400 m

1:7500

m 0 100 500 1000m

1:15000

GOVERNMENT OF NUNAVUT
GRISE FIORD COMMUNITY
HARBOUR DEVELOPMENT

PROJECT COMPONENTS
(BORROW SOURCE, HAUL ROAD, COMMUNITY HARBOUR)

Date:	Drawn by:	Edited by:	App'd by:
13-MAR-26	JLC	JLC	CM

Worley Project Number: 317086-54170

DRG No: 1

REV: 0

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Appendix A. Representative Site Photos from the 2024/2025 Investigation

Grise Fiord Community Harbour Development Project



Photo 01: Sea ice cleared in preparation for drilling; looking out towards bay (April 2025)



Photo 02: Access road out onto sea ice (April 2025)

Notes:

					Figure Name			Client	
					Representative Photos at the Proposed Community Harbour - Photos 1 & 2			Canada Nunavut	worley consulting
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**		
NA	27-Mar-26	TW	JG	CM	317086-54170	1	0		

Grise Fiord Community Harbour Development Project



Photo 03: Existing bridge near borehole locations on sea ice (April 2025)



Photo 04: Existing bridge, looking northeast

Notes:

					Figure Name		**Client**
					Representative Photos at the Proposed Community Harbour - Photos 3 & 4		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	CM	317086-54170	2	0

worley consulting

Grise Fiord Community Harbour Development Project



Photo 05: Drill rig at laydown (April 2025)

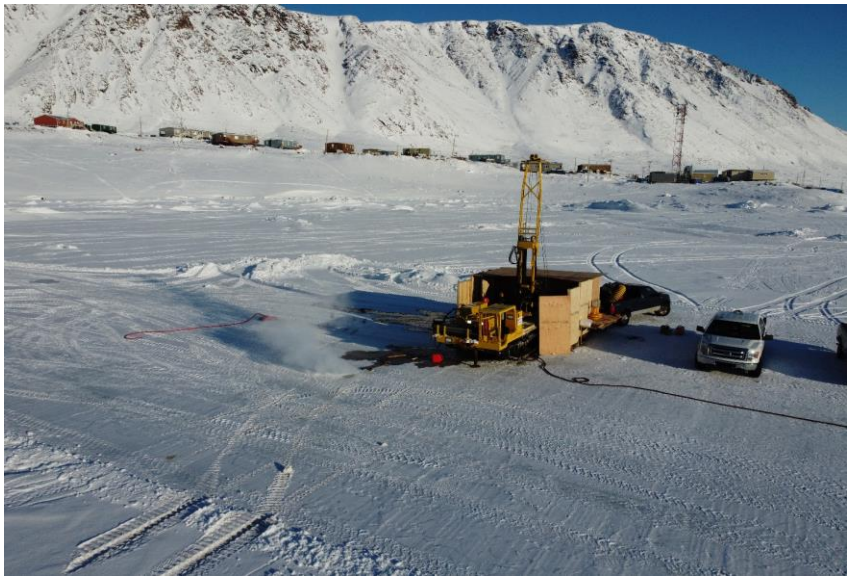


Photo 06: Drill rig general setup(April 2025)

Notes:

					Figure Name Representative Photos at the Proposed Community Harbour - Photos 5 & 6		**Client**
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	CM	317086-54170	3	0

Grise Fiord Community Harbour Development Project



Photo 07: Wooden materials for shack built for drill rig (April 2025)

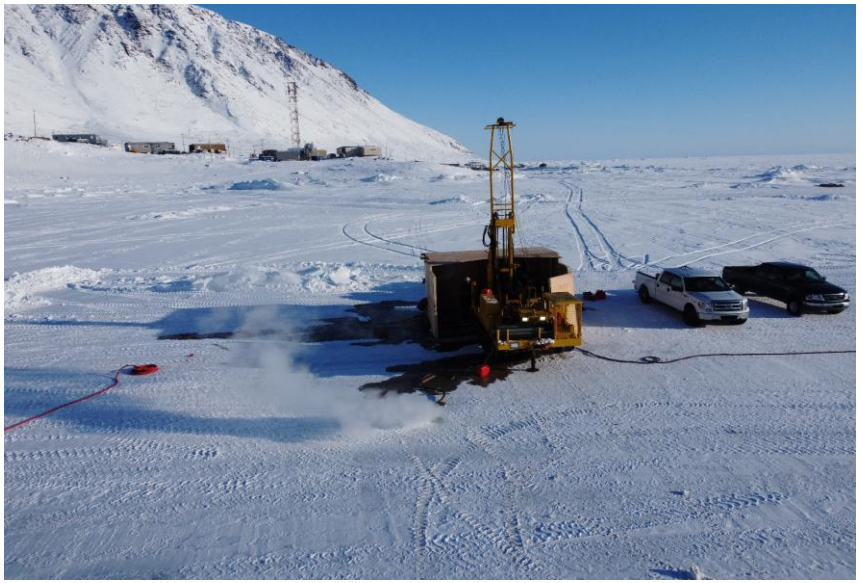


Photo 08: Wooden shack built for drill rig (April 2025)

Notes:

					Figure Name		**Client**
					Representative Photos at the Proposed Community Harbour - Photos 7 & 8		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	CM	317086-54170	4	0

worley consulting

Grise Fiord Community Harbour Development Project

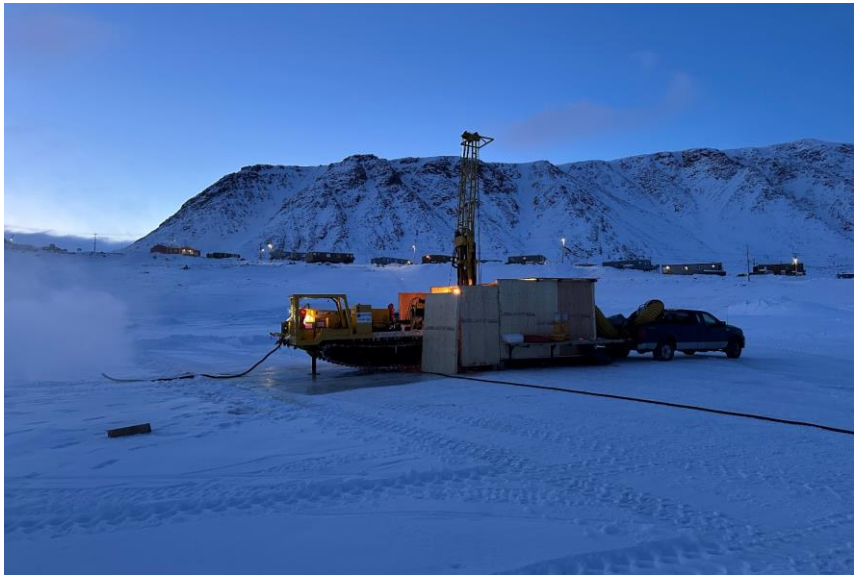


Photo 09: Drilling operations with sea container at BH25-07 (April 2025)



Photo 10: Drill rig setup planview at BH25-08 (April 2025)

Notes:

					Figure Name			Client
					Representative Photos at the Proposed Community Harbour - Photos 9 & 10			Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	
NA	27-Mar-26	TW	JG	CM	317086-54170	5	0	

Grise Fiord Community Harbour Development Project



Photo 11: Typicall onshore drill rig setup (BH24-02, September 2025)



Photo 12: Typicall drill rig setup on sea ice (BH25-07, April 2025)

Notes:

					Figure Name			Client	
					Representative Photos at the Proposed Community Harbour - Photos 11 & 12			Canada Nunavut	worley consulting
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**		
NA	27-Mar-26	TW	JG	CM	317086-54170	6	0		

Grise Fiord Community Harbour Development Project

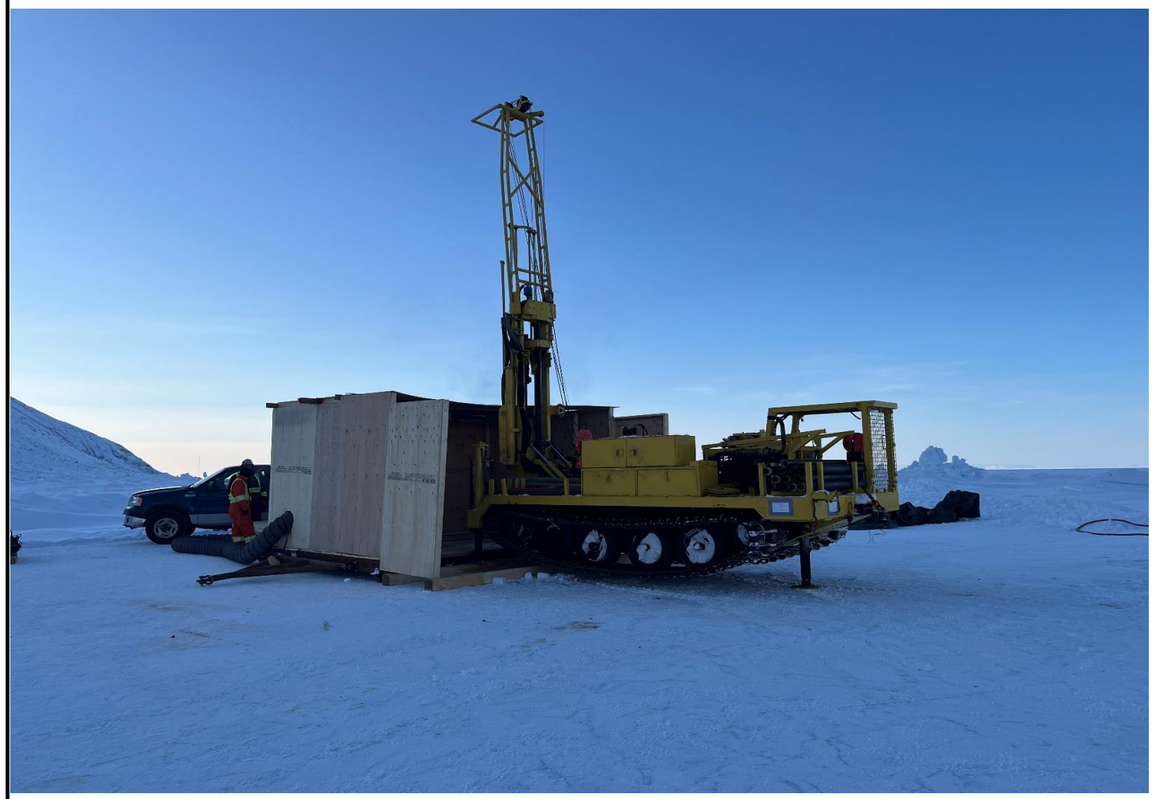


Photo 13: Typicall drill rig setup on sea ice (BH25-04, April 2025)



Photo 14: View inside drill setup

Notes:

					Figure Name		**Client**
					Representative Photos at the Proposed Community Harbour - Photos 13 & 14		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	CM	317086-54170	7	0

worley consulting

Appendix B. Soil and Rock Photos from the 2024/2025 Investigation

Grise Fiord Community Harbour Project



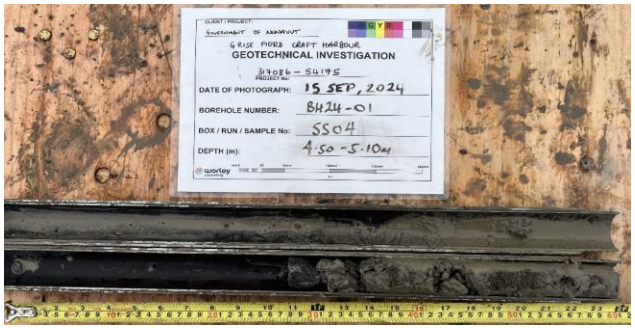
SS01 : 0.00 to 0.45 m



SS02 : 1.50 to 1.80 m



SS03 : 3.00 to 3.60 m



SS04 : 4.50 to 5.10 m



SS05 : 6.00 to 6.60 m



SS06 : 7.50 to 8.10 m E.O.H

Notes:

					Figure Name		Client
					Borehole BH24-01		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	JG	JW	PB	317086-54170	1	0

worley consulting

Grise Fiord Community Harbour Project



RUN 01 : 1.80 to 3.30 m



RUN 02 : 3.30 to 4.90 m

Notes:

					Figure Name			Client
					Borehole BH24-02 - (1 of 2)			Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	
NA	27-Mar-26	JG	JW	PB	317086-54170	2	0	

worley consulting

Grise Fiord Community Harbour Project



RUN 03 : 4.90 to 6.40 m



RUN 04 : 6.40 to 7.90 m E.O.H

Notes:

					Figure Name		**Client**
					Borehole BH24-02 - (2 of 2)		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	JG	JW	PB	317086-54170	3	0

Grise Fiord Community Harbour Project



RUN 01 : 3.00 to 4.50 m



RUN 02 : 4.50 to 6.00 m

Notes:

					Figure Name		**Client**
					Borehole BH24-03 - (1 of 2)		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	JG	JW	PB	317086-54170	4	0

worley consulting

Grise Fiord Community Harbour Project



RUN 03 : 6.00 to 7.50 m



RUN 04 : 7.50 to 9.00 m E.O.H

Notes:

					Figure Name		**Client**
					Borehole BH24-03 - (2 of 2)		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	JG	JW	PB	317086-54170	5	0

worley consulting

Grise Fiord Community Harbour Project



SS01 : 0.00 to 0.40 m



SS02 : 1.40 to 2.00 m



SS04 : 4.20 to 4.80 m



SS05 : 5.77 to 6.37 m



SS06 : 8.25 to 8.70 m



SS08 : 10.20 to 10.45 m

Notes:

					Figure Name			Client
					Borehole BH25-04 - (1 of 2)			Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	worley consulting
NA	27-Mar-26	TW	JG	PB	317086-54170	6	0	

Grise Fiord Community Harbour Project



SS09 : 11.35 to 11.75 m



SS10 : 13.20 to 13.65 m



SS11 : 14.75 to 15.18 m

Notes:

					Figure Name			Client
					Borehole BH25-04 - (2 of 2)			Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	
NA	27-Mar-26	TW	JG	PB	317086-54170	7	0	

worley consulting

Grise Fiord Community Harbour Project



SS01: 0.00 to 0.12 m



SS02: 1.19 to 1.69 m



SS03: 2.58 to 3.10 m



SS04: 3.88 to 4.48 m



SS05: 4.96 to 5.56 m



SS06: 6.19 to 6.30 m



RUN 07 & 08 : 7.40 to 10.10 m E.O.H

Notes:

					Figure Name		Client
					Borehole BH25-05		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	PB	317086-54170	8	0

worley consulting

Grise Fiord Community Harbour Project



SS01: 0.00 to 0.60 m



SS02: 1.06 to 1.66 m



SS03: 2.78 to 3.38 m



SS04: 4.52 to 5.12 m



SS06: 5.64 to 6.24 m



SS07: 7.04 to 7.64 m

Notes:

					Figure Name			Client
					Borehole BH25-06 - (1 of 4)			Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	
NA	27-Mar-26	TW	JG	PB	317086-54170	9	0	

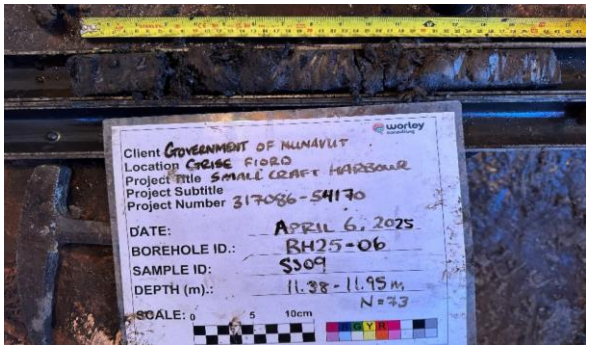
Grise Fiord Community Harbour Project



SS07: 8.39 to 8.99 m



SS08: 9.87 to 10.47 m



SS09: 11.38 to 11.95 m



SS10: 12.94 to 13.36 m



SS11: 14.55 to 15.15 m

Notes:

					Figure Name		Client
					Borehole BH25-06 - (2 of 4)		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	PB	317086-54170	10	0

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Grise Fiord Community Harbour Project



RUN 03: 2.78 to 4.52 m



RUN 04: 4.52 to 5.64 m



RUN 05: 5.64 to 7.04 m



RUN 06: 7.04 to 8.39 m



RUN 07: 8.39 to 9.87 m



RUN 08 : 9.87 to 11.38 m

Notes:

					Figure Name			Client
					Borehole BH25-06 - (3 of 4)			Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	
NA	27-Mar-26	TW	JG	PB	317086-54170	11	0	

worley consulting

Grise Fiord Community Harbour Project



RUN 09: 11.38 to 12.94 m

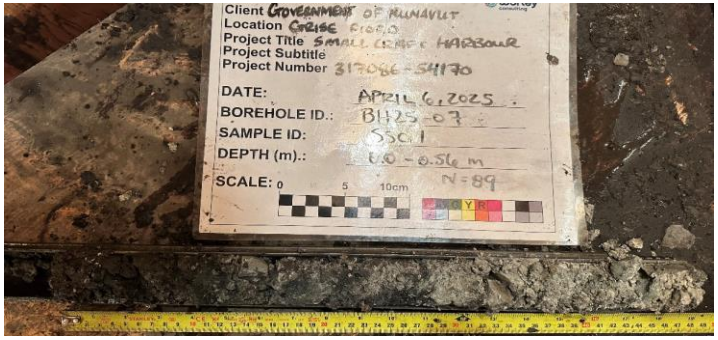


RUN 10: 12.94 to 14.55 m E.O.H.

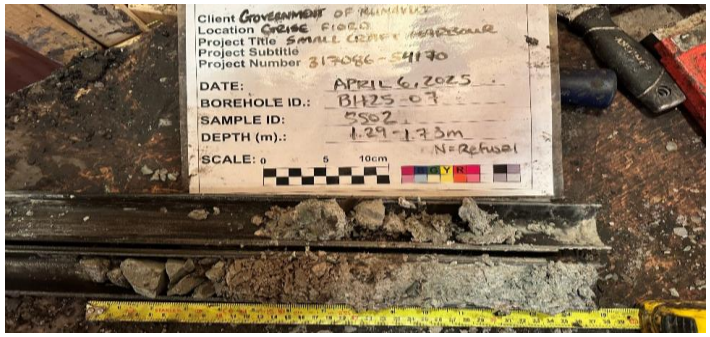
Notes:

					Figure Name			Client
					Borehole BH25-06 - (4 of 4)			Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	worley consulting
NA	27-Mar-26	TW	JG	PB	317086-54170	12	0	

Grise Fiord Community Harbour Project



SS01: 0.00 to 0.54 m



SS02: 1.29 to 1.73 m



SS03: 2.51 to 2.94 m



SS04: 3.89 to 4.49 m



SS05: 5.22 to 5.75 m

Notes:

					Figure Name		Client
					Borehole BH25-07 - (1 of 2)		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	PB	317086-54170	13	0

Grise Fiord Community Harbour Project



RUN 02: 1.29 to 2.51 m



RUN 03: 2.94 to 3.89 m



RUN 04: 3.89 to 5.22 m

Notes:

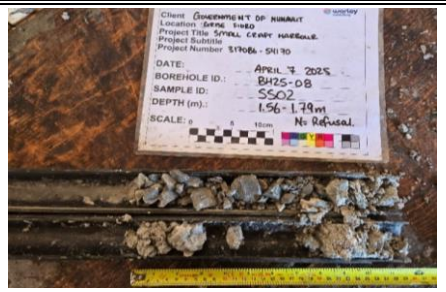
					Figure Name			Client
					Borehole BH25-07 - (2 of 2)			Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	
NA	27-Mar-26	TW	JG	PB	317086-54170	14	0	

worley consulting

Grise Fiord Community Harbour Project



SS01: 0.00 to 0.41 m



SS02: 1.56 to 1.79 m



SS03: 3.15 to 3.30 m



SS04: 4.70 to 4.80 m



SS05: 6.40 to 6.49 m



SS06: 8.00 to 8.21 m



SS07: 9.70 to 9.73 m

Notes:

					Figure Name		Client
					Borehole BH25-08 - (1 of 2)		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	PB	317086-54170	15	0

worley consulting

Grise Fiord Community Harbour Project



RUN 03: 3.15 to 4.70 m



RUN 05: 4.70 to 6.40 m



RUN 06: 6.40 to 8.00 m



RUN 07: 8.00 to 9.70 m

Notes:

					Figure Name		**Client**
					Borehole BH25-08 - (2 of 2)		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	PB	317086-54170	16	0

worley consulting

Grise Fiord Community Harbour Project



SS01 : 0.00 to 0.15 m



SS02 : 1.10 to 1.70 m



SS03 : 2.59 to 3.19 m



SS04 : 4.07 to 4.32 m



SS05 : 5.57 to 5.66 m



SS06 : 6.37 to 6.67 m

Notes:

					Figure Name		Client
					Borehole BH25-09 - (1 of 2)		Canada Nunavut
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	27-Mar-26	TW	JG	PB	317086-54170	17	0

Grise Fiord Community Harbour Project



RUN 05 : 5.57 to 6.57 m



RUN 06 : 6.57 to 7.96 m



RUN 07 : 7.96 to 9.45 m



RUN 08 : 9.45 to 10.91 m



RUN 09 : 10.91 to 12.41 m



RUN 10 : 12.41 to 13.94 m

Notes:

					Figure Name			**Client**	
					Borehole BH25-09 - (2 of 2)			Canada Nunavut	worley consulting
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**		
NA	27-Mar-26	TW	JG	PB	317086-54170	18	0		

Appendix C. Select Photographs from the 2019 Site Reconnaissance

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SAVE DATE & TIME: 13/12/2019 10:35:18 AM ISSUING OFFICE: BURNABY GIS

Photo-09
Photo-08
Photo-07
Photo-06
Sample 2
Photo-01, 02, 03, 04, 05
Location 1
Sample 1
Location 2
Approx. 0.5km from runway
(see inset)
Photo-52
Photo-53
Airport
Photo-51
Photo-50
Photo-49
Photo-48
Photo-47
Photo-46
Hamlet
Photo-45
Photo-44
Photo-43
Photo-42
Photo-41
Photo-39, 40
Photo-38
Photo-37
Photo-36
Photo-34, 35
Location 4
Photo-33
Photo-32
Photo-31
Photo-30
Photo-29
Location 3
Photo-20
Photo-21, 22
Sample 3
Photo-23, 24, 25, 26

Photo-14, 15
Photo-12, 13
Photo-16
Photo-17
Photo-11
Photo-18, 19
Photo-10
Photo-09
Photo-08
Photo-07
Photo-06
Sample 2
Photo-01, 02, 03, 04, 05
Sample 1
Location 2

Legend

- Potential Small Craft Harbour Study Area
- Potential Quarry
- Potential Haul Road - Existing Road/Track
- Potential Haul Road - Construct New Road
- Sample Location
- Photo Location

0 100 200 400 Metres

N

Aerial Image: CHS July 2016.
Locations approximate.

DEPARTMENT OF FISHERIES AND OCEANS
GRISE FIORD HARBOUR DEVELOPMENT

GRISE FIORD
POTENTIAL QUARRY LOCATIONS AND HAUL ROAD ROUTES

Date: 13-DEC-19	Drawn by: KR	Edited by: KR	App'd by: JG

Fisheries and Oceans Canada

Advisian Worley Group

Project No. 307071-01306

FIG No 1

REV 0

"This drawing is prepared solely for the use of our customers as specified in the accompanying report.
Worley Canada Services Ltd. assumes no liability to any other party for any representations contained in this drawing."

Grise Fiord - Representative Site Photographs (9 to 16)



Photo: 09



Photo: 10



Photo: 11



Photo: 12



Photo: 13



Photo: 14



Photo: 15



Photo: 16

Notes:

					Figure Name			Client
					Grise Fiord - Representative Site Photographs (9 to 16)			Fisheries and Oceans Canada / Pêches et Océans Canada
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	Advisian Worley Group
NA	29-Sep-19	JRG	JW	HK	307071-01306	2	0	

Grise Fiord - Representative Site Photographs (17 to 24)



Photo: 17



Photo: 18



Photo: 19



Photo: 20



Photo: 21



Photo: 22



Photo: 23



Photo: 24

Notes:

					Figure Name			**Client**	
					Grise Fiord - Representative Site Photographs (17 to 24)			Fisheries and Oceans Canada / Pêches et Océans Canada	Advisian Worley Group
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**		
NA	29-Sep-19	JRG	JW	HK	307071-01306	3	0		

Grise Fiord - Representative Site Photographs (33 to 40)



Photo: 33



Photo: 34



Photo: 35



Photo: 36



Photo: 37



Photo: 38



Photo: 39



Photo: 40

Notes:

					Figure Name			Client
					Grise Fiord - Representative Site Photographs (33 to 40)			Fisheries and Oceans Canada / Pêches et Océans Canada
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**	Advisian Worley Group
NA	29-Sep-19	JRG	JW	HK	307071-01306	5	0	

Grise Fiord - Representative Site Photographs (41 to 48)



Photo: 41



Photo: 42



Photo: 43



Photo: 44



Photo: 45



Photo: 46



Photo: 47



Photo: 48

Notes:

					Figure Name			Client	
					Grise Fiord - Representative Site Photographs (41 to 48)			Fisheries and Oceans Canada / Pêches et Océans Canada	Advisian Worley Group
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**		
NA	29-Sep-19	JRG	JW	HK	307071-01306	6	0		

Grise Fiord - Representative Site Photographs (49 to 53)



Photo: 49



Photo: 50



Photo: 51



Photo: 52



Photo: 53

Notes:

					Figure Name	**Client**	
					Grise Fiord - Representative Site Photographs (49 to 53)	Fisheries and Oceans Canada / Pêches et Océans Canada	Advisian Worley Group
Phase	**Date**	**Originator**	**Checker**	**Approver**	**Project Number**	**Figure Number**	**REV**
NA	29-Sep-19	JRG	JW	HK	307071-01306	7	0

Appendix D. 2024/2025 Investigation Borehole Logs

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.	Borehole Number: **BH24-01**
Client: Government of Nunavut	Equipment: CME 850	Project Number: 317086-54170
Coordinates (UTM): N 8,482,828.00 E 449,907.00	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A Elevation: 0.88 mCD

Sample Type: Shelby Tube (ST); Coring; SPT Sample (SS); Grab Sample (GB); Bulk Sample (BS); Vane Shear (VST)

Well Details: Bentonite; Peltonite; Sand; Grout; Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
0 / 1	HWT	Alluvial		Well Graded GRAVEL with Sand (GW) - fine to coarse grained sand, fine to coarse sub-angular to sub-rounded gravel of various lithologies; trace silt and clay; trace shell fragments, grey, moist, compact		SS01	55		28 (2-12-16)	Sample Temperature = 2.6°C to 3.1°C
-1 / 2				...below 1.5 m, dense		SS02	100		>> 31 (29-31)	PSA: Gravel: 66.9%, Sand: 29.0%, Silt: 2.6%, Clay: 1.5%
				...from 2.4 to 2.7 m boulder						
-2 / 3				Silty, Clayey SAND with Gravel (SC-SM) - fine grained sand, fine to medium sub-rounded to sub-angular gravel; non-plastic to low plasticity fines, grey, moist, dense		GB01				Grab sample: 2.90 to 3.0 m; PSA: Gravel: 26.9%, Sand: 19.1%, Silt: 42.5%, Clay: 11.5%
						SS03	100		38 (15-18-20-28)	Sample Temperature = 1.7°C
-3 / 4				...from 3.0 to 4.5 m recovered a boulder						
-4 / 5	Open Hole			...from 4.5 m sand is fine to medium grained, some fine to coarse, predominantly fine to medium, sub-rounded to sub-angular gravel, grey brown		SS04	50	11.4 (12 21)	45 (9-17-28-19)	Sample Temperature = 2.6°C to 3.0°C; PSA: Gravel: 22.8%, Sand: 38.3%, Silt: 29.8%, Clay: 9.1%; Liquid Limit: 21%, Plastic Limit: 12%, Plastic Index: 9%
		Marine		Lean CLAY (CL) - medium plasticity; few fine grained sand, trace fine gravel; dark grey to black, moist, hard						Driller notes a change in colour in cuttings / returns from grey to dark brown / black
-5 / 6						SS05	83	26.9 (24 46)	37 (9-14-23-30)	>> 220 PP = >4.5 kg/cm²; PSA: Gravel: 1.3%, Sand: 13.9%, Silt: 71.4%, Clay: 13.4%; Liquid Limit: 46%, Plastic Limit: 24%, Plastic Index: 22%
-6 / 7										
-7 / 8						SS06	92	23.7 (21 40)	54 (9-19-35-36)	PSA: Gravel: 0.0%, Sand: 7.8%, Silt: 77.0%, Clay: 15.2%; Liquid Limit: 40%, Plastic Limit: 21%, Plastic Index: 19%

End of Hole at a depth of 8.10 m
Borehole drilled to 1.50 mbsb and first SPT (SS01) advanced from 1.50 to 1.80 mbsb. Borehole terminated due to incoming tide. Drill rig positioned to within 1.5m of initial borehole location and advanced to 1.50 m and recommenced drilling. Borehole terminated at 8.0 mbsb due to incoming tide.

Drilling method: driller advanced HWT casing with water to 1.50 mbsb. HQ drilling using water rotary method. Borehole backfilled using cuttings.

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Logged By: Jeff Gibson	Completion Depth: 8.10 m
Reviewed By: Jon Woods	Drilled on: 15/9/2024
Groundwater Depth: Not Applicable	Page 1 of 1

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.		Borehole Number: **BH24-02**
Client: Government of Nunavut	Equipment: CME 850		Project Number: 317086-54170
Coordinates (UTM): N 8,482,872.00 E 449,996.00	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A	Elevation: 5.26 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) / Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
0 / 5.26	HWT			Poorly Graded GRAVEL with Sand (GP) - fine to coarse grained sand, fine to coarse sub-angular to sub-rounded gravel of various lithologies; trace silt; trace organics, grey, moist, very dense						When advancing HQ to 1.80 m core barrel returned sub-rounded to sub-angular gravel with some cobbles. Sand and silt likely washed out during drilling process.
1 / 4						SS01	0		10 (>>) 10	SS01: 1.80 m, 10 blows / hammer bouncing
2 / 3				...from 2.10 to 2.50 m boulder						
2.50 / 2.76				Silty SAND with Gravel (SM) - fine to coarse grained sand, fine to medium, sub-rounded to sub-angular gravel; trace clay, trace shell fragments, dark grey, frozen ground, pockets and lenses of ice, very dense		GB01				Grab sample: 2.80 to 3.0 m; PSA: Gravel: 25.3%, Sand: 38.3%, Silt: 32.3%, Clay: 4.1%
3 / 2		Marine		SILT with Sand (ML) - fine to medium sand; trace clay, frozen, pockets and lenses of ice, dark grey, very dense						
3.75 / 1.51				... from 3.75 to 4.0 m Silty SAND: fine to medium grained, trace fine, sub-rounded to sub-angular gravel, grey, moist						
4 / 1				... from 4.40 to 4.80 m Gravelly SAND: fine to coarse grained, fine to coarse, sub-rounded to sub-angular gravel, grey, moist						Sample Temperature = -2.2°C to -3.0°C
4.70 / 0.56	Open Hole					GB02				Grab sample: 4.70 to 4.90 m; PSA: Gravel: 0.0%, Sand: 25.2%, Silt: 70.1%, Clay: 4.7%
5 / 0						GB03				Grab sample: 5.80 to 6.0 m
6 / -1				... from 6.40 to 6.70 m Silty SAND/ sandy SILT: fine grained, trace clay, low plastic to non-plastic, grey, moist		GB04				Grab sample: 6.40 to 6.50 m
7 / -2						GB05				Grab sample: 7.70 to 7.90 m
7.90 / -2.64				End of Hole at a depth of 7.90 m Drilling method: driller advanced HWT casing with water to 1.50 mbgs. HQ drilling using water rotary method. Borehole backfilled using cuttings.						

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Logged By: Jeff Gibson		Completion Depth: 7.90 m
Reviewed By: Jon Woods		Drilled on: 15/9/2024
Groundwater Depth: Not Applicable		Page 1 of 1

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.		Borehole Number: **BH24-03**
Client: Government of Nunavut	Equipment: CME 850		Project Number: 317086-54170
Coordinates (UTM): N 8,482,785.00 E 449,948.00	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A	Elevation: 3.62 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
3 / 1	HWT	Alluvial		Well-graded GRAVEL with Sand (GW) - fine to coarse, sub-rounded to sub-angular gravel of various lithologies, medium to coarse grained sand, trace to some sub-rounded to sub-angular cobbles, moist, very dense						
2 / 2					SS	SS01	0		20 / 20	SS01: 1.50 to 1.60 m, 20 blows / hammer bouncing
1 / 3					SS	SS02	0		20 / 20	SS02: 3.0 to 3.025 m, 20 blows / hammer bouncing
0 / 4				Silty SAND with Gravel (SW) - predominantly fine to medium grained sand, fine to coarse, sub-rounded to sub-angular gravel; trace clay, trace to some cobbles, grey brown, frozen, ice crystals present throughout matrix, very dense						
				...from 3.0 to 4.50 m recovered a boulder and coarse gravel	GB	GB01				Grab sample: 4.0 to 4.10 m Sample Temperature = -1.2°C to -1.6°C
-1 / 5										Sample Temperature = -2.0°C to -3.0°C
				...from 4.50 m recovered a boulder, cobbles and gravel in a silty sand matrix	GB	GB02				Grab sample: 5.0 to 5.10 m
-2 / 6	Open Hole	Marine		...from 6.5 to 7.0 m boulder	GB	GB03		6.6		Grab sample: 6.0 to 6.10 m; PSA: Gravel: 26.0%, Sand: 46.6%, Silt: 23.3%, Clay: 4.1% Sample Temperature = -1.2°C to -2.0°C
-3 / 7				...from 7.1 to 7.30 m cobble	GB	GB04				Grab sample: 7.0 to 7.10 m
-4 / 8				...from 8.25 to 8.55m boulder						
-5 / 9				...from 8.8 m, few clay	GB	GB05				Grab sample: 8.8 to 9.0 m; PSA: Gravel: 24.3%, Sand: 32.0%, Silt: 33.9%, Clay: 9.8% Sample Temperature = -2.0°C to -2.10°C

End of Hole at a depth of 9.00 m
Drilling method: driller advanced HWT casing with water to 3.0 mbgs. HQ drilling using water rotary method. Borehole backfilled using cuttings.

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

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Logged By: Jeff Gibson		Completion Depth: 9.00 m
Reviewed By: Jon Woods		Drilled on: 14/9/2024
Groundwater Depth: Not Applicable		Page 1 of 1

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.	Borehole Number: **BH25-04**
Client: Government of Nunavut	Equipment: CME 850	Project Number: 317086-54170
Coordinates (UTM): N 8,482,883.85 E 449,849.79	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A Elevation: 0.33 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
0				Silty SAND with Gravel (SM) - fine to medium grained sand, fine to coarse, subrounded to angular, lithic gravel, ice crystals evident, black, wet, very dense		SS01	50	9.5	71 >> 4-21-50	PSA: Gravel: 37.9%, Sand: 46.6%, Silt: 12.1%, Clay: 3.4%
1										Run 01: 0.5 m recovered as coarse gravel and cobbles
-1		Alluvial		Poorly Graded GRAVEL with Silt and Sand (GP-GM) - medium to coarse grained, medium to coarse, subrounded to angular, subangular cobbles; trace clay, grey, wet, very dense		SS02	63	8	58 25-29-29-27	PSA: Gravel: 62.5%, Sand: 29.9%, Silt: 6.1%, Clay: 1.5%
2										
-2										
3				...below 3.0 m, dense		SS03	0		44 23-20-24-24	at 3.2 m, noted change in drilling, much smoother
-3										
4										
-4						SS04	100		42 10-24-18-18	
5	HWT			...at approximately 4.7 m, beginning to transition into sandy silt						
-5										
6		Marine		Sandy SILT (ML) - fine grained, trace coarse gravel, grey, moist, hard		SS05	75	21.1	35 8-14-21-25	PSA: Gravel: 3.6%, Sand: 46.2%, Silt: 40.7%, Clay: 9.5%
-6										Run 05: 5.77 - 7.25 m, recovered 0.14 m
7										
-7				...at 7.3 m, evidence of bedding/laminations, millimeter scale		SS06	100		R >> 25-40-R	
-8										Run 06: 7.25 - 8.7 m, recovered ~0.5 m of sandy silt and cobbles
-8						SS07	0		R >> R	
-9										
-9				...from 9.6 to 9.9 m, boulder. Less sandy						

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Logged By: Lauren Tagg/Melanie Jones		Completion Depth: 15.18 m
Reviewed By: Jeff Gibson		Drilled on: 5/4/2025
Groundwater Depth: Not Applicable		Page 1 of 2

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.	Borehole Number: **BH25-04**
Client: Government of Nunavut	Equipment: CME 850	Project Number: 317086-54170
Coordinates (UTM): N 8,482,883.85 E 449,849.79	Method: Water Rotary / HQ Drilling	Dip: -90° / Azimuth: N/A / Elevation: 0.33 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
10 / -10	HWT	Marine		Sandy SILT (ML) - fine grained, trace coarse gravel, grey, moist, hard		GB01				Grab sample: 9.90 to 10.20 m; PSA: Gravel: 0.0%, Sand: 8.6%, Silt: 80.6%, Clay: 10.8%
						SS08	100		R >> 23-R	
11 / -11				Lean Clay (CL) - fine grained, little medium grained sand, trace fine gravel, grey, moist, hard		SS09	100	17.1 (17 – 34)	R >> 25-43-R	PSA: Gravel: 1.6%, Sand: 12.4%, Silt: 72.0%, Clay: 14.0%; Liquid Limit: 34%, Plastic Limit: 17%, Plastic Index: 17%
12 / -12										
13 / -13						SS10	89		R >> 17-34-R	
14 / -14										
15				...at 14.75 m, evidence of laminations/bedding (millimeter scale)/ varved. More sandy		SS11	100	20.6 (15 – 30)	R >> 15-32-R	PSA: Gravel: 0.0%, Sand: 41.7%, Silt: 47.0%, Clay: 11.3%; Liquid Limit: 30%, Plastic Limit: 15%, Plastic Index: 15%

End of Hole at a depth of 15.18 m
Drilling method: driller advanced HWT casing with water. HQ drilling using water rotary method. Borehole left to collapse in. Borehole terminated at 15.18 m below seabed.

Seabed Elev. = +0.33 mCD
Ice Thickness = 1.3 m

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Logged By: Lauren Tagg/Melanie Jones	Completion Depth: 15.18 m
Reviewed By: Jeff Gibson	Drilled on: 5/4/2025
Groundwater Depth: Not Applicable	Page 2 of 2

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.	Borehole Number: **BH25-05**
Client: Government of Nunavut	Equipment: CME 850	Project Number: 317086-54170
Coordinates (UTM): N 8,482,950.72 E 449,779.06	Method: Water Rotary / HQ Drilling	Dip: -90° / Azimuth: N/A / Elevation: -0.11 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
0 / 0				Well-Graded GRAVEL with Sand (GW) - fine to medium, subrounded to angular (<30mm diameter) gravel, lithics, fine to coarse grained sand, trace silt and clay, grey, moist, very dense		SS01	100		R >> R	Run 01: sand washed out, fine to coarse gravel (<90 mm) in core barrel
-1 / 1				...at 1.2 m, compact		SS02	40	6.1	27 (13-15-12-11)	PSA: Gravel: 82.7%, Sand: 16.1%, Silt: 0.9%, Clay: 0.3%
-2 / 2										Run 02: sand washed out, fine to coarse gravel (<80 mm)
-3 / 3						SS03	58		49 (16-29-20-R)	PSA: Gravel: 50.6%, Sand: 42.1%, Silt: 5.6%, Clay: 1.7%
										Run 03: sand washed out, fine to coarse gravel and cobbles (<200 mm in diameter)
-4 / 4	HWT	Alluvial		Silty SAND with Gravel (SM) - fine to coarse grained sand, fine to medium, subrounded to angular gravel, trace clay, brown grey, moist, very dense		SS04	53		51 (34-27-24-45)	
										Run 04: sand washed out, fine to coarse gravel and cobbles (<130 mm in diameter)
-5 / 5						SS05	65	8.3	65 (17-32-33-39)	PSA: Gravel: 61.3%, Sand: 30.7%, Silt: 7.0%, Clay: 1.0%
-6 / 6										Run 05: poor recovery, minor gravel
						SS06	64		R >> R	
-7 / 7				GRAVEL and COBBLES - fine to coarse, subrounded to angular, up to 160 mm in size gravel, grey, moist, very dense		SS07	0		R >> R	at 7.6 m, barrel plugged and cleaned out. recovered fine to coarse gravel, possible breccia.
-8										

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Logged By: Melanie Jones/Lauren Tagg	Completion Depth: 10.10 m
Reviewed By: Jeff Gibson	Drilled on: 6/4/2025
Groundwater Depth: Not Applicable	Page 1 of 2

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.	Borehole Number: **BH25-05**
Client: Government of Nunavut	Equipment: CME 850	Project Number: 317086-54170
Coordinates (UTM): N 8,482,950.72 E 449,779.06	Method: Water Rotary / HQ Drilling	Dip: -90° / Azimuth: N/A / Elevation: -0.11 mCD

Sample Type: Shelby Tube (ST); Coring; SPT Sample (SS); Grab Sample (GB); Bulk Sample (BS); Vane Shear (VST)

Well Details: Bentonite; Peltonite; Sand; Grout; Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60) / Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80) / Vane Shear Test (VST) / Remoulded VST / Pocket Penetrometer (PP/2) / Field Torvane / Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
-9 / 9	HWT	Alluvial		GRAVEL and COBBLES - fine to coarse, subrounded to angular, up to 160 mm in size gravel, grey, moist, very dense					
				...from 9.0 to 9.4 m, boulder or possible weathered bedrock		SS08	0	>> R R	at 9.0 m, run plugged twice. material recovered as gravel and cobbles up to 160 mm.
-10 / 10				End of Hole at a depth of 10.10 m Drilling method: driller advanced HWT casing with water. HQ drilling using water rotary method. Borehole left to collapse in. Borehole terminated at 10.1 m below seabed. Seabed Elev. = -0.11 mCD Ice Thickness = 1.2 m					Material recovered in end of drill bit is same as above, possible that material recovered here and in previous run is a boulder over 1 m in diameter or weathered bedrock.

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

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Logged By: Melanie Jones/Lauren Tagg	Completion Depth: 10.10 m	
Reviewed By: Jeff Gibson	Drilled on: 6/4/2025	
Groundwater Depth: Not Applicable		

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.	Borehole Number: **BH25-06**
Client: Government of Nunavut	Equipment: CME 850	Project Number: 317086-54170
Coordinates (UTM): N 8,482,994.89 E 449,857.10	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A Elevation: 0.14 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) / Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
0 / 0				Sandy Lean CLAY with Gravel (CL) - low plasticity, fine grained sand, fine angular gravel, trace shell fragments, black, moist, very stiff		SS01	50	24.1 (17 – 34)	17 (19-11-6-6)	PSA: Gravel: 19.3%, Sand: 23.6%, Silt: 48.1%, Clay: 9.0%; Liquid Limit: 34%, Plastic Limit: 17%, Plastic Index: 17%
1 / -1				...below 1.2 m, stiff		SS02	100		12 (HW-3-9-12)	SS02: weight of hammer for 0.23 m, 3 blows for 0.07 m, 9 blows for 0.15 m, 12 blows for 0.15 m
2 / -2										
3 / -3				Lean CLAY with Sand (CL) - low plasticity, fine grained sand, black, moist, hard		SS03	83	17.1 (17 – 42)	36 (11-15-21-27)	PSA: Gravel: 0.7%, Sand: 15.1%, Silt: 67.9%, Clay: 16.3%; Liquid Limit: 42%, Plastic Limit: 17%, Plastic Index: 25%
4 / -4						GB01	100			Grab sample: 4.0 to 4.30 m
5 / -5	HWT	Marine				SS04	83	19.4 (19 – 45)	35 (7-13-22-26); 392 kPa	SS04: PP values from 392 to 441 kPa; PSA: Gravel: 0.5%, Sand: 17.7%, Silt: 73.2%, Clay: 8.6%; Liquid Limit: 45%, Plastic Limit: 19%, Plastic Index: 26%
6 / -6						SS05	83		43 (15-17-26-37)	
7 / -7						SS06	67		39 (13-16-23-34)	
8 / -8						SS07	92	17 (17 – 36)	54 (16-22-32-47)	PSA: Gravel: 4.3%, Sand: 18.2%, Silt: 64.3%, Clay: 13.2%; Liquid Limit: 36%, Plastic Limit: 17%, Plastic Index: 19%
9 / -9										

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Logged By: Melanie Jones/Lauren Tagg | Completion Depth: 15.15 m

Reviewed By: Jeff Gibson | Drilled on: 6/4/2025

Groundwater Depth: Not Applicable

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.	Borehole Number: **BH25-06**
Client: Government of Nunavut	Equipment: CME 850	Project Number: 317086-54170
Coordinates (UTM): N 8,482,994.89 E 449,857.10	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A Elevation: 0.14 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
10 / -10	HWT	Marine		Lean CLAY with Sand (CL) - low plasticity, fine grained sand, black, moist, hard						
				...at 9.87 m, gravel fragments, medium, angular		SS08	77		54 (19-21-33-50)	
11 / -11										
						SS09	79		73 (>> 16-34-39-R)	
12 / -12										
13 / -13						SS10	95		R (>> 30-44-R)	
14 / -14										
15 / -15						SS11	83	19.7 — 22 — 49	64 (17-30-34-50)	PSA: Gravel: 3.4%, Sand: 18.0%, Silt: 67.6%, Clay: 11.0%; Liquid Limit: 49%, Plastic Limit: 22%, Plastic Index: 27%

End of Hole at a depth of 15.15 m
Drilling method: driller advanced HWT casing with water. HQ drilling using water rotary method.
Borehole left to collapse in. Borehole terminated at 15.15 m below seabed.

Seabed Elev. = 0.14 mCD
Ice Thickness = 1.2 m

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

worley consulting

Logged By: Melanie Jones/Lauren Tagg	Completion Depth: 15.15 m
Reviewed By: Jeff Gibson	Drilled on: 6/4/2025
Groundwater Depth: Not Applicable	Page 2 of 2

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.		Borehole Number: **BH25-07**
Client: Government of Nunavut	Equipment: CME 850		Project Number: 317086-54170
Coordinates (UTM): N 8,482,944.00 E 449,917.00	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A	Elevation: 0.01 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) / Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
0 / 0	HWT	Alluvial		Silty GRAVEL with Sand (GM) - medium to coarse grained sand, fine to medium, subangular to angular gravel, lithics, dark grey-black top 0.15 m to light grey, moist, very dense		SS01	88		80 >> 14-40-40-R	PSA: Gravel: 40.0%, Sand: 36.4%, Silt: 18.0%, Clay: 5.6%
1 / -1				Clayey GRAVEL with Sand (GC) - fine to coarse grained sand, fine to coarse, subangular to angular gravel, cobbles (silt matrix with common gravel/cobbles), light grey, moist, very dense		SS02	84	8.4 (12 21)	R >> 24-26-R	PSA: Gravel: 44.2%, Sand: 30.5%, Silt: 21.7%, Clay: 3.6%; Liquid Limit: 21%, Plastic Limit: 12%, Plastic Index: 9%
2 / -2						GB01	100	9.9 (13 22)		Grab sample: 2.10 to 2.50 m; PSA: Gravel: 38.5%, Sand: 27.1%, Silt: 28.0%, Clay: 6.4%; Liquid Limit: 22%, Plastic Limit: 13%, Plastic Index: 9%
3 / -3						SS03	100		R >> 18-20-R	
4 / -4		Marine		Lean CLAY with Sand (CL) - low plasticity, very fine grained sand, silty clay laminations throughout, reddish brown and light grey mottled/banded, moist, very stiff		SS04	87	14.8 (16 30)	23 7-9-14-15	PSA: Gravel: 3.7%, Sand: 20.0%, Silt: 62.7%, Clay: 13.6%; Liquid Limit: 30%, Plastic Limit: 16%, Plastic Index: 14%
5 / -5				Sandy SILT with Gravel (CL) - non-plastic, fine to coarse, subangular to angular gravel and cobbles, light grey with pinkish clasts, moist, hard		SS05	85		74 >> 25-39-35-R	

End of Hole at a depth of 5.75 m
Drilling method: driller advanced HWT casing with water. HQ drilling using water rotary method. Borehole left to collapse in. Borehole terminated at 5.75 m below seabed.

Seabed Elev. = 0.01 mCD
Ice Thickness = 1.15 m

worley consulting	Logged By: Melanie Jones	Completion Depth: 5.75 m
	Reviewed By: Jeff Gibson	Drilled on: 7/4/2025
	Groundwater Depth: Not Applicable	Page 1 of 1

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.		Borehole Number: **BH25-08**
Client: Government of Nunavut	Equipment: CME 850		Project Number: 317086-54170
Coordinates (UTM): N 8,483,065.48 E 449,917.73	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A	Elevation: 0.01 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) / Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
0 / 0				Clayey GRAVEL with Sand (GC) - non-plastic, fine grained sand, little silt, few clay, light blue grey/white, moist, very dense		SS01	98	12.7; 12; 20	R; >>■ 15-43-R	PSA: Gravel: 32.1%, Sand: 30.9%, Silt: 28.9%, Clay: 8.1%; Liquid Limit: 20%, Plastic Limit: 12%, Plastic Index: 8%
1 / -1										
						SS02	52		R; >>■ 34-R	
2 / -2		Alluvial								
						SS03	67		R; >>■; R	
3 / -3										
4 / -4	HWT			...at 4.1 m, water returns brown, minor oxidation on soil						
				Sandy Lean CLAY (CL) - low plasticity, few gravel, hard		GB01	100	13.2; 14; 26	R; >>■; R	Grab sample: 4.55 to 4.60 m; PSA: Gravel: 7.5%, Sand: 31.0%, Silt: 49.1%, Clay: 12.4%; Liquid Limit: 26%, Plastic Limit: 14%, Plastic Index: 12%
						SS04	100			
5 / -5										
6 / -6		Marine								
						SS05	100		R; >>■; R	
7 / -7										

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

worley consulting

Logged By: Lauren Tagg	Completion Depth: 9.80 m
Reviewed By: Jeff Gibson	Drilled on: 7/4/2025
Groundwater Depth: Not Applicable	Page 1 of 2

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.	Borehole Number: **BH25-08**
Client: Government of Nunavut	Equipment: CME 850	Project Number: 317086-54170
Coordinates (UTM): N 8,483,065.48 E 449,917.73	Method: Water Rotary / HQ Drilling	Dip: -90° / Azimuth: N/A / Elevation: 0.01 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
0 0				Sandy Lean CLAY (CL) - low plasticity, few gravel, hard						
	HWT			...at 8.0 m, brown with grey green white mottling, some clay, low plasticity		SS06	100	14.8 16 29	R >> 30-R	PSA: Gravel: 3.2%, Sand: 26.8%, Silt: 50.3%, Clay: 19.7%; Liquid Limit: 29%, Plastic Limit: 16%, Plastic Index: 13%
9 -9		Marine								
						SS07	29		R >> R	

End of Hole at a depth of 9.80 m
Drilling method: driller advanced HWT casing with water. HQ drilling using water rotary method.
Borehole left to collapse in. Borehole terminated at 9.8 m below seabed.

Seabed Elev. = 0.01 mCD
Ice Thickness = 1.25 m

worley consulting

Logged By: Lauren Tagg	Completion Depth: 9.80 m
Reviewed By: Jeff Gibson	Drilled on: 7/4/2025
Groundwater Depth: Not Applicable	Page 2 of 2

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.		Borehole Number: **BH25-09**
Client: Government of Nunavut	Equipment: CME 850		Project Number: 317086-54170
Coordinates (UTM): N 8,482,929.92 E 449,842.20	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A	Elevation: -0.25 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
0				Sandy SILT (ML) - low plasticity, trace fine, angular to subrounded gravel, trace to some clay, black, moist, hard		SS01	67		R	
-1										
1				Poorly graded GRAVEL with Sand (GP-GM) - fine to coarse, angular to subrounded gravel, medium to coarse grained sand, trace silt and clay, some subrounded cobbles, grey, moist, very dense		SS02	50		72 (14-40-32-22)	PSA: Gravel: 64.0%, Sand: 30.0%, Silt: 4.5%, Clay: 1.5%
-2										
2										
-3		Alluvial		...at 2.59 m, dense		SS03	67		38 (15-16-22-43)	
3										
-4										
4				...at 4.07 m, light grey, trace silt Silty SAND with Gravel (SM) - medium to coarse grained, fine to coarse, angular to subrounded gravel, few silt, trace low plasticity clay, some subrounded cobbles, grey, moist, very dense		SS04	80		R 40-R	PSA: Gravel: 34.3%, Sand: 51.3%, Silt: 12.7%, Clay: 1.7%
-5										
5	HWT									
-6				Sandy Lean CLAY (CL) - low plasticity, fine grained sand, few fine to coarse, subangular to angular gravel, trace cobbles, light grey, moist, very dense		SS05	100		R	
6						GB01	100	12 12 21		Grab sample: 6.30 to 6.50 m; PSA: Gravel: 5.4%, Sand: 25.2%, Silt: 53.8%, Clay: 15.6%; Liquid Limit: 21%, Plastic Limit: 12%, Plastic Index: 9%
-7						SS06	100		R	
7										
-8		Marine								
8				...at 7.96 m, 600 mm diameter fragmented boulder		SS07	0		R	
-9										
9										
-10				...from 9.45 to 10.91 m, recovered as silty sand matrix with fine to medium gravel, angular		SS08	0		R	

worley consulting

Logged By: Lauren Tagg/Melanie Jones	Completion Depth: 13.94 m
Reviewed By: Jeff Gibson	Drilled on: 7/4/2025
Groundwater Depth: Not Applicable	Page 1 of 2

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

Project: Grise Fiord Harbour Development Project	Contractor: Nova Drilling Inc.		Borehole Number: **BH25-09**
Client: Government of Nunavut	Equipment: CME 850		Project Number: 317086-54170
Coordinates (UTM): N 8,482,929.92 E 449,842.20	Method: Water Rotary / HQ Drilling	Dip: -90° Azimuth: N/A	Elevation: -0.25 mCD

Sample Type: Shelby Tube (ST) | Coring | SPT Sample (SS) | Grab Sample (GB) | Bulk Sample (BS) | Vane Shear (VST)

Well Details: Bentonite | Peltonite | Sand | Grout | Slough

Depth (m) Elevation (m)	Casing Type	Geological Unit	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Recovery (%)	Plastic MC Liquid (10 20 30 40 50 60)	Uncorrected / Field SPT Blow Counts per 0.3m (20 40 60 80); Vane Shear Test (VST); Remoulded VST; Pocket Penetrometer (PP/2); Field Torvane; Undrained Shear Strength (kPa) (40 80 120 160)	Other Data
-11 / 11	HWT	Marine		Sandy Lean CLAY (CL) - low plasticity, fine grained sand, few fine to coarse, subangular to angular gravel, trace cobbles, light grey, moist, very dense *(continued)*						
				...from 10.91 to 12.41 m, recovered as fragmented gravel, angular, and cobbles (90 mm diameter)		GB02	100			Grab sample: 10.80 to 10.90 m
-12 / 12										
				...from 12.41 to 13.94 m, recovered as fine to coarse, angular to subangular gravel (less than 70 mm in diameter)		SS09	0		R >> R	
-13 / 13										
-14										

End of Hole at a depth of 13.94 m
Drilling method: driller advanced HWT casing with water. HQ drilling using water rotary method. Borehole left to collapse in. Borehole terminated at 13.94 m below seabed.

Seabed Elev. = -0.25 mCD
Ice Thickness = 1.4 m

worley consulting	Logged By: Lauren Tagg/Melanie Jones	Completion Depth: 13.94 m
	Reviewed By: Jeff Gibson	Drilled on: 7/4/2025
	Groundwater Depth: Not Applicable	Page 2 of 2

SOIL LOG TEMPLATE GRISE FIORD.GPJ AURORA LNG_DIGBYISLAND_2016-2014_COMBINED.GPJ 27/10/25

Appendix E. Geotechnical Explanatory Notes

EXPLANATORY NOTES FOR ROCK DESCRIPTION AND CLASSIFICATION

Geotechnical logging is carried out in general accordance with Canadian Foundation Engineering Manual, 2023 (Identification and Classification of Soil and Rock). The terminology used by Worley Consulting to describe the condition of rocks and associated materials for logging purposes is summarized below.

WEATHERING CLASSIFICATION

Term	Symbol	Definition
Residual Soil	RS/W6	The rock is completely changed to a soil in which the original rock texture has been completely destroyed.
Completely Weathered Rock	XW/W5	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.
Highly Weathered Rock	HW/W4	More than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discoloured rock is present either as a discontinuous framework or as corestones.
Moderately Weathered Rock	MW/W3	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discoloured rock is present either as a discontinuous framework or as corestones.
Slightly Weathered Rock	SW/W2	Discolouration indicates weathering of rock material on discontinuity surfaces. All the rock material may be discoloured by weathering and may be somewhat weaker than in its fresh condition.
Fresh Rock	FR/W1	No visible sign of rock material weathering; perhaps slight discolouration on major discontinuity surfaces.

Notes:

1. Rock weathering classification (data from ISRM 2007)

ROCK MATERIAL STRENGTH

Grade[a]	Term	Uniaxial Comp. Strength (MPa)[b]	Point Load Index (MPa)	Field Estimate of Strength	Field Estimate of Strength
R6	Extremely strong	> 250	> 10	Specimen can only be chipped with a geological hammer	Fresh basalt, chert, diabase, gneiss, granite, quartzite
R5	Very strong	>100-250	>4-10	Specimen requires many blows of a geological hammer to fracture it	Amphibolite, sandstone, basalt, gabbro, gneiss, granodiorite, peridotite, rhyolite, tuff
R4	Strong	>50-100	>2-4	Specimen requires more than one blow of a geological hammer to fracture it	Limestone, marble, sandstone, schist
R3	Medium strong	>25-50	1-2	Cannot be scraped or peeled with a pocked knife, specimen can be fractured with a single blow from a geological hammer	Concrete, phyllilte, schist, siltstone
R2	Weak	>5-25	*c*	Can be peeled with a pocket knife with difficulty, shallow indentation made by a firm blow with the point of a geological hammer	Chalk, claystone, potash, marl, siltstone, shale, rocksalt
R1	Very weak	>1-5	*c*	Crumbles under firm blows with point of a geological hammer, can be peeled with a pocket knife	Highly weathered or altered rock, shale
R0	Extremely weak	0.25-1	*c*	Indented by thumbnail	Stiff fault gouge

Notes:

a. Based on Classification of Rock with Respect to Strength (after Marinos and Hoek, 2001). Grade according to ISRM (2007).

b. All rock types exhibit a broad range of uniaxial compressive strength reflecting heterogeneity in composition and anisotropy in structure. Strong rocks are characterized by well-interlocked crystal fabric at few voids.

c. Rocks with uniaxial compressive strength below 25 MPa are likely to yield highly ambiguous results under point load testing.

CEMENTATION CLASSIFICATION

Term	Symbol	Definition
Uncemented	Uc	Clean grains exhibiting soil properties
Very weakly cemented	Vwk	Cement on some grains, collapsing feel under very light finger pressure
Weakly cemented	Wk	Cement on many grains, collapsing feel under finger pressure, breaks down to individual grains
Moderately weakly cemented	Mwk	Cement on most grains, breaks down to lumps under finger pressure, can crush to individual grains under knife blade
Moderately cemented	Mo	Cement on most grains, can break fragments off by hand and crush to small lumps under knife blade
Well cemented	We	Practically all grains cemented together, cannot break fragments off by hand, dull sound under hammer
Very well cemented	Vwe	Most primary pores filled with cement, requires firm blow with hammer to break off fragments, rings when struck

Note:

1. The above field classification system uses terms commonly adopted by geotechnical engineering practice.

DEFECT SPACING

Term	Symbol	Spacing width (m)
Extremely Wide	Ew	>6.0
Very Wide	Vw	2.0 to 6.0
Wide	W	0.6 to <2.0
Moderately close	M	0.20 to <0.6
Close	C	0.06 to <0.20
Very Close	Vc	0.02 to <0.06
Extremely Close	Ec	<0.02

Note:

1. Classification of rock with respect to discontinuity spacing (data from ISRM 2007).

ROCK MASS WEATHERING

Weathering of the rock mass in relation to the distribution of weathered materials and the effect of defects is described below.

Grade	Description
I	No visible sign of weathering except perhaps staining on defect surfaces
II	Almost all rock is discolored by slight weathering
III	Less than half of the material is moderately to extremely weathered, some residual boulders/corestones may be present
IV	More than half of the material is moderately to extremely weathered, occasional corestones may be present
V	The material is extremely weathered with mass structure largely intact
VI	Refer to soil classification system

Note:

1. The above weathering grades apply to relatively large scale exposures. For boreholes, weathering terms discussed previously apply.
2. Defect persistence (areal extent) and aperture (openness) to be recorded where appropriate.

ROCK MASS BLOCK SHAPE

Blocky	Equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greater than cross section

AN AID TO THE FIELD CLASSIFICATION OF ROCKS FOR ENGINEERING PURPOSES

GRAIN SIZE (mm)	BEDDED ROCKS (MOSTLY SEDIMENTARY)							OBVIOUSLY FOLATED ROCKS (MOSTLY METAMORPHIC)		ROCKS WITH MASSIVE STRUCTURE AND CRYSTALLINE TEXTURE (MOSTLY IGNEOUS)					
More than 20	GRAIN SIZE DESCRIPTION			AT LEAST 50% OF GRAINS ARE OF CARBONATE		AT LEAST 50% OF GRAINS ARE OF FINE GRAINED VOLCANIC ROCK		GRAIN SIZE DESCRIPTION			GRAIN SIZE DESCRIPTION	Pegmatite			Pyroxenite
20	RUDACEOUS		**CONGLOMERATE** Rounded boulders, cobbles and gravel cemented in a finer matrix Breccia Irregular rock fragments in a finer matrix	LIMESTONE AND DOLOMITE (undifferentiated)	Calcirudite	Fragments of volcanic ejecta in a finer matrix Rounded grains **AGGLOMERATE** Angular grains **VOLCANIC BRECCIA**	SALINE ROCKS Halite Anhydrite Gypsum	COARSE	**GNEISS** Well developed but often widely spaced foliation, sometimes with schistose bands Migmatite Irregularly foliated, mixed schists and gneisses	**MARBLE** **QUARTZITE** Granulite **HORNFELS** Amphibolite Serpentinite	COARSE	**GRANITE**[1]	Diorite[1,2]	**GABBRO**[3]	Peridotite
6												These rocks are sometimes porphyritic and are then described, for example, as as porphyritic granite			
2	ARENACEOUS Coarse		**SANDSTONE** Angular or rounded grains, commonly cemented by clay, calcitic or iron minerals		Calcarenite	Cemented volcanic ash **TUFF**		MEDIUM	**SCHIST** Well developed undulose foliation, generally much mica		MEDIUM	Microgranite[1]	Microdiorite[1,2]	Dolerite[3,4]	
0.6	ARENACEOUS Medium		Quartzite Quartz grains and siliceous cement Arkose Many feldspar grains									These rocks are sometimes porphyritic and are then described as porphyries			
0.2	ARENACEOUS Fine		Greywacke Many rock chips												
0.06	ARGILLACEOUS	**MUDSTONE**	**SILTSTONE** Mostly silt	Calcareous mudstone	Calcisiltite	**CHALK** Fine grained **TUFF**		FINE	**PHYLLITE** Slightly undulose foliation, sometimes spotted **SLATE** Well developed plane cleavage (foliation)		FINE	**RHYOLITE**[4,5]	**ANDESITE**[4,5]	**BASALT**[4,5]	
0.002		**SHALE** Fissile	**CLAYSTONE** Mostly clay		Calcilutite	Very fine grained **TUFF**						These rocks are sometimes porphyritic and are then described as porphyries			
Less than 0.002															
Amorphous or crypto-crystalline		Flint: occurs as bands of nodules in chalk Chert: occurs as nodules and beds in limestone and calcareous sandstone					COAL LIGNITE		Mylonite Found in fault zones, mainly in igneous and metamorphic areas			Obsidian[5]	Volcanic glass		
		Granular cemented - except amorphous						CRYSTALLINE				color: Pale ← — — — — — → Dark			
		SILICEOUS		CALCAREOUS		SILICEOUS	CARBON-ACEOUS	SILICEOUS		Mainly SILICEOUS		ACID Much quartz	INTERMEDIATE Some quartz	BASIC Little or no quartz	ULTRA BASIC

SEDIMENTARY ROCKS
Granular cemented rocks vary greatly in strength, some sandstones are stronger than igneous rocks. Bedding may not show in hand specimens and is best seen in outcrop. Only sedimentary rocks, and some metamorphic rocks derived from then, contain fossils.

Calcareous rocks contain calcite (calcium carbonate) which effervesces with dilute hydrochloric acid.

METAMORPHIC ROCKS
Most metamorphic rocks are distinguished by foliation which may impart fissility. Foliation in gneisses is best observed in outcrop. Non-foliated metamorphics are difficult to recognise except by association. Any rock baked by contact metamorphism is described as a 'hornfels' and is generally somewhat stronger than the parent rock. Most fresh metamorphic rocks are strong although perhaps fissile.

IGNEOUS ROCKS
Composed of closely interlocking mineral grains. Strong when fresh and non-porous.

Mode of occurrence: 1 Batholiths; 2 Laccoliths; 3 Sills; 4 Dykes; 5 Lava flows; 6 Veins.

SOURCE: Table 6, AS 1726-1993

KEY TO DEFECT DESCRIPTIVE TERMS USED ON CORED BOREHOLE LOGS

DEFECT DESCRIPTORS

a **Type:**

FR - Fracture
J - Joint
F - Fault
Fo - Foliation
C - Cleavage
B - Bedding
M - Mylonite
Ca - Cavities

} See Rockmass Discontinuity Description (Sheet 5)

b Dip of fracture surface measured relative to a plane parallel to core axis (beta angle to be provided if core oriented)

c **Planarity:**

Un - Undulating, wavy surface
Pl - Planar, no variation in orientation
St - Stepped, well defined steps present
Ir - Irregular, many changes in orientation

d **Roughness:**

Slk - Slickensided, visual evidence of striations
S - Smooth, surface appears and feels smooth
SR - Slightly rough, asperities on the defect surface are distinguishable and can be felt
R - Rough, some ridges and angle steps are evident, asperities are clearly visible and surface feels abrasive
VR - Very rough, near right angle steps and ridges occur on the defect surface

e **Type of Infilling:**

Cl - Clay
Ca - Calcite
Ch - Chlorite
Fe - Iron oxide
Grap - Graphite
Gy - Gypsum
H - Healed
Mn - Manganese oxide
Mic - Mica
Gr - Gravel
Py - Pyrite
Sul - Sulphides
Qz - Quartz
Sd - Sand
CA - Calcrete
Si - Silt
Uk - Unknown

f **Amount of Infilling:**

Cn - Clean, no visible coating or infilling
Su - Surface Stain, no visible coating or infilling but surfaces are discolored
Vn - Veneer, a visible coating or infilling too thin to measure, may be patchy
Co - Coating, visible coating or infilling up to 1mm thick
Fi - Filled, coating or infilling greater than 1mm thick with amount in millimetres. Thick soil infilling to be described as seams if boundaries roughly parallel, or crushed seams if composed of rock fragments e.g. brecciated

Notes:

1. Cores with defect spacings in the range extremely close to close can be collectively denoted as "highly fractured" where considered appropriate

2. NR - not recorded NA - not applicable

Rockmass Discontinuity Descriptions

Discontinuity	Definition	Characteristics
Fracture	A seperation in the rockmass, a break	Signifies joints, faults, slickensides, foliations and cleavage
Joint	A fracture along which there has been no observable relative movement	Most common defect encountered. Present in most formations in some geometric pattern related to rock type and stress field. Open joints allow free movement of water, increasing decomposition rate of mass. Tight joints resist weathering and the mass decomposes uniformly.
Faults	A fracture along which there has been an observable amount of displacement and may contain gouge infill.	Faults usually consist of crushed and sheared rock within a fracture (gouge) through which water may move relatively freely, increasing weathering. Faults generally occur as parallel to sub-parallel sets of fractures (fault zones) along which movement has taken place to a greater or lesser degree.
Slickensides	Pre-existing shear surface: from faulting, landslides or expansion.	Shiny, polished surfaces with striations (slickenlines). Often the weakest elements in a mass when sheared parallel to slickenlines, where strength is near residual.
Foliation planes	Continuous planar surface results from planar orientation of mineral grains during metamorphism or igneous cooling processes.	Can be present as open joints or preferential mineral orientations without openings. Strength and deformation relate to the orientation of applied stress to the foliations.
Cleavage	A type of foliation that develops due to deformation and metamorphism (e.g., diagenesis, folding) that may form open fractures.	Generally found in fine-grained rocks (e.g., shales and slates); usually very closely spaced.
Bedding planes	Contacts between depositional layers of sedimentary or igneous rocks of various nature.	May form zones containing weak materials such as lignite or montmorillonite clays.
Mylonite	Rock that has undergone intense ductile shear.	Fine-grained metamorphic rock with strong laminations: original mineral constituents and fabric crushed and pulverized. May contain large mineral grains such as porphyroclasts.
Veins	Healed fractures that have been infilled with solidified hydrothermal fluids.	Can occur in any host rock and be composed of different minerals. Strength of vein and effect on rock mass strength depends on vein thickness, infill mineralogy, and strength of surrounding intact rock (wall rock).
Cavities	Openings in soluble rocks resulting from groundwater movement, or in igneous rocks from gas pockets	In limestone, range from caverns to tubes (karst). In rhyolite and other igneous rocks, range from vacuoles of various sizes to tubes.

Notes:

1. Based on rock mass discontinuity descriptions (data from Hunt 1986; Passchier and Trouw 2005; Day 2016).

CASING AND DRILL ROD SIZES

Size	Outside Diameter (mm)	Inside Diameter (mm)
HQ3	88.9	77.8
HW	114.3	101.6
PW	139.7	127.0

COMMONLY USED TERMINOLOGY / SYMBOLS

TCA - To Core Axis

RQD - Rock Quality Designation

UCS - Unconfined Compressive Strength

BTS - Brazilian Tensile Strength

PLI - Point Load Index
- -Axial Test (A)
- -Diametral Test (D)
- -Annotated with "v" for failures involving a healed joint, incipient fracture or preferential to foliation

———— - Denotes certain boundaries

– – – – – - Denotes gradational or approximate boundaries

EXPLANATORY NOTES FOR SOIL DESCRIPTION AND CLASSIFICATION

The geotechnical soil descriptions and classifications presented in these records have been performed in general accordance with ASTM D2487 and Worley Consulting's Field Manual unless otherwise specified. The terminology used by Worley Consulting to describe the soil condition and classification has been summarized in these explanatory notes for convenience. For more information on the soil description and classification, the reader should refer to ASTM D2487 and the Canadian Foundation Engineering Manual (5th Edition, 2023).

1. Coarse-Grained vs Fine-Grained Description

(a) Particle Size Distribution

Soil Constituent	Size (mm)	Particle Size Description
Boulders	>300	-
Cobbles	75 to 300	-
Gravel	19 – 75	Coarse
	4.75 – 19	Fine
Sand	2.00 – 4.75	Coarse
	0.425 – 2.00	Medium
	0.075 – 0.425	Fine
Silt and Clay	<0.075	-

Cobbles and boulders are added to the soil group name as "with cobbles", "with boulders", or "with cobbles and boulders" if present in the field sample. If possible by the investigation technique (e.g. test pit excavation, ODEX drilling, coring, exposures), the percentage of cobbles or boulders, or both (by volume) is provided and the particle angularity, shape, and maximum particle size or dimension found in the sample is provided. Rock type is provided if known. Cobbles and boulders are not included in estimates of the soil fraction (i.e. soil fraction is <75 mm).

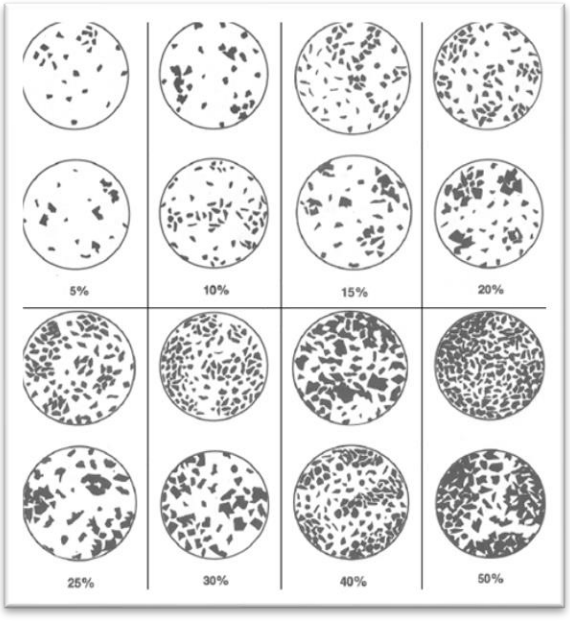
(b) Estimates of Soil Fraction (<75 mm)

Field Visual-Manual Procedure where a gradation analysis (particle size distribution) is not available, the visual-manual procedure may be used to estimate the amount of fines, sand, and gravel to the nearest 5% (by dry weight).

Of the fraction <75 mm, the percentage of gravel, sand, fines, and organic matter or construction debris is estimated to the closest 5% (by weight). The total must equal 100%.

Rather than stating percentages, the following terms may be used:

Description	Percent
Trace	<5
Few	5 to 12
Little	>12 to <30
Some	≥30 to <50
Mostly	≥50



Continued...

2. Coarse-Grained Description

(a) Angularity

- **ROUNDED:** Smooth curved sides with no edges
- **SUBROUNDED:** Planar sides with well-rounded edges
- **SUBANGULAR:** Planar sides with partially rounded edges
- **ANGULAR:** Plane side and sharp edges

(b) Shape *(typically only for gravel)*

- **FLAT:** Width to thickness ratio greater than 3.
- **ELONGATED:** Length to width ratio greater than 3
- **FLAT AND ELONGATED:** Particles meet criteria for both flat & elongated.

(c) Grading

- **WELL-GRADED:** Wide range of particle sizes
- **POORLY GRADED:** Limited range of particle sizes
- **GAP GRADED:** Poorly graded but missing some sizes

(d) Field Moisture Condition

Term	Description
Dry	Moisture absent, dusty
Moist	Damp
Wet	Visible water

(e) Compactness & Relative Density

Density	SPT N-Value	Relative Density (%)
Very Loose	0–4	<15
Loose	4–10	15 to <35
Compact	10–30	35 to <65
Dense	30–50	65 to <85
Very Dense	>50	85 to 100

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays, the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

3. Fine-Grained Description

Field Determination of Fine-Grained Constituents by Behaviour *(replaced by laboratory testing of Atterberg Limits where available)*

Dry Strength	Dilatancy	Toughness and Plasticity	Group Symbol	Group Name
None to low	Slow to rapid	Low or thread cannot be formed	ML	Silt
Medium to high	None to slow	Medium	CL	Lean Clay
Low to medium	None to slow	Low to medium	MH	Elastic Silt
High to very high	None	High	CH	Fat Clay

(a) Consistency

Consistency	Undrained Shear Strength (kPa)	SPT N-Value
Very Soft	<12	<2
Soft	12 to <25	2 to <4
Firm	25 to <50	4 to <8
Stiff	50 to <100	8 to <15
Very Stiff	100 to <200	15 to <30
Hard	>200	>30

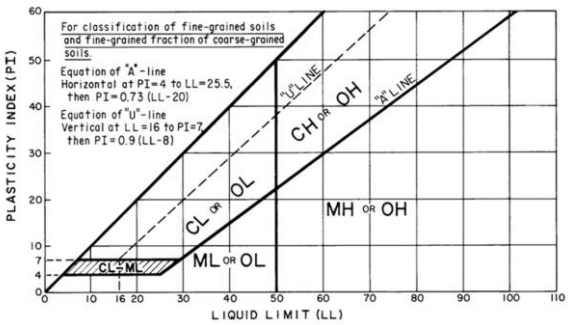
(b) Water Content (*cohesive soils only*)

Term	Field Identification
w < PL	Estimated to be drier than PL
w ~ PL	Estimated to be close to PL
w > PL	Estimated to be wetter than PL

Where PL = Plastic Limit; w<PL (thread cannot be rolled to 4 mm diameter); w ~ PL (thread can be rolled between 2 and 4 mm); w > PL (thread rolled to a diameter of less than 2 mm).

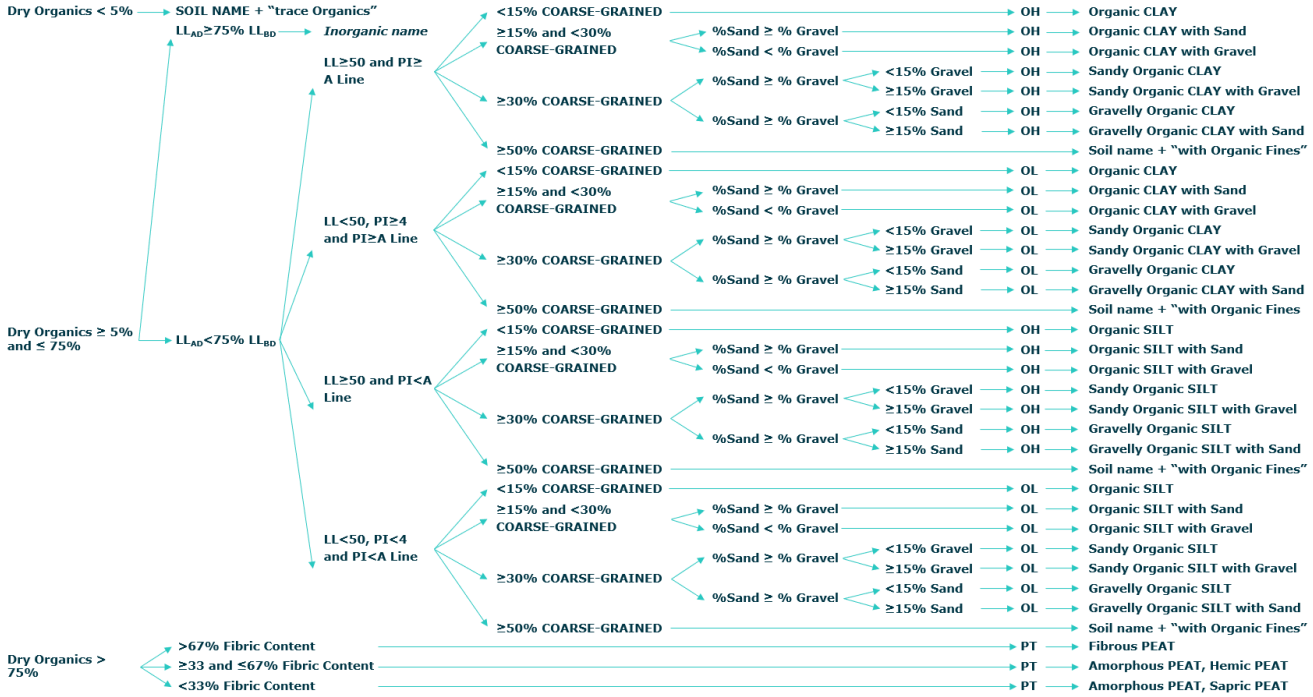
(c) Sensitivity *(cohesive soils only)*

Sensitivity	Ratio of Intact to Remoulded Undrained Shear Strength
Low	<8
Medium	8-30
High	>30

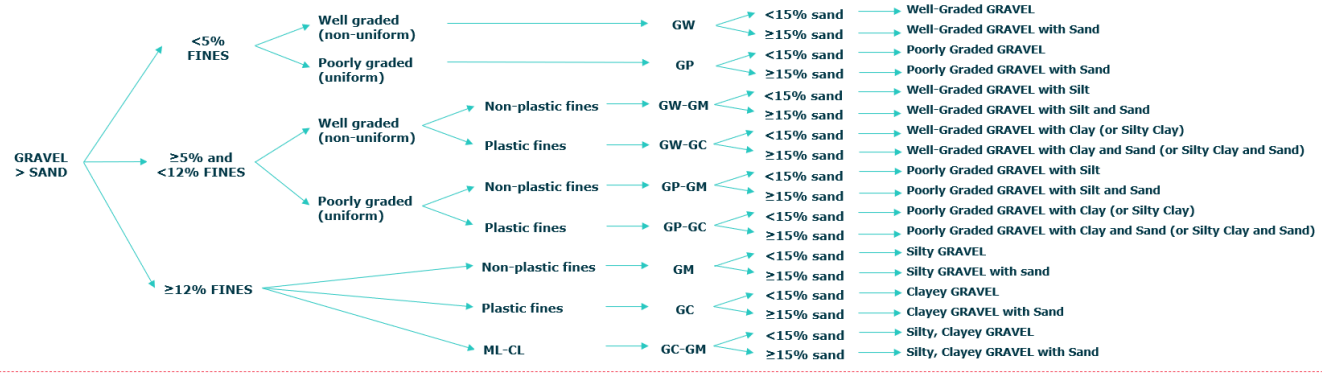


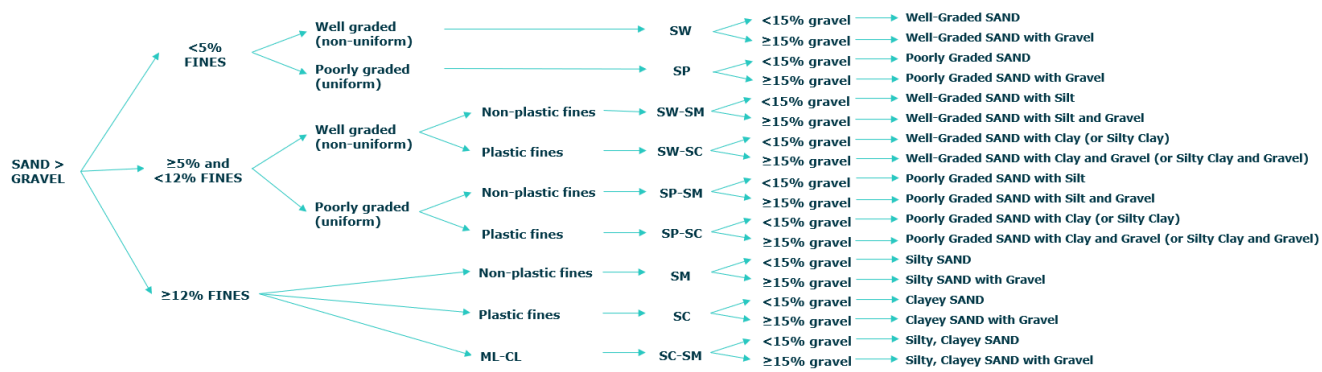
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4. Classification of Organic Soil:



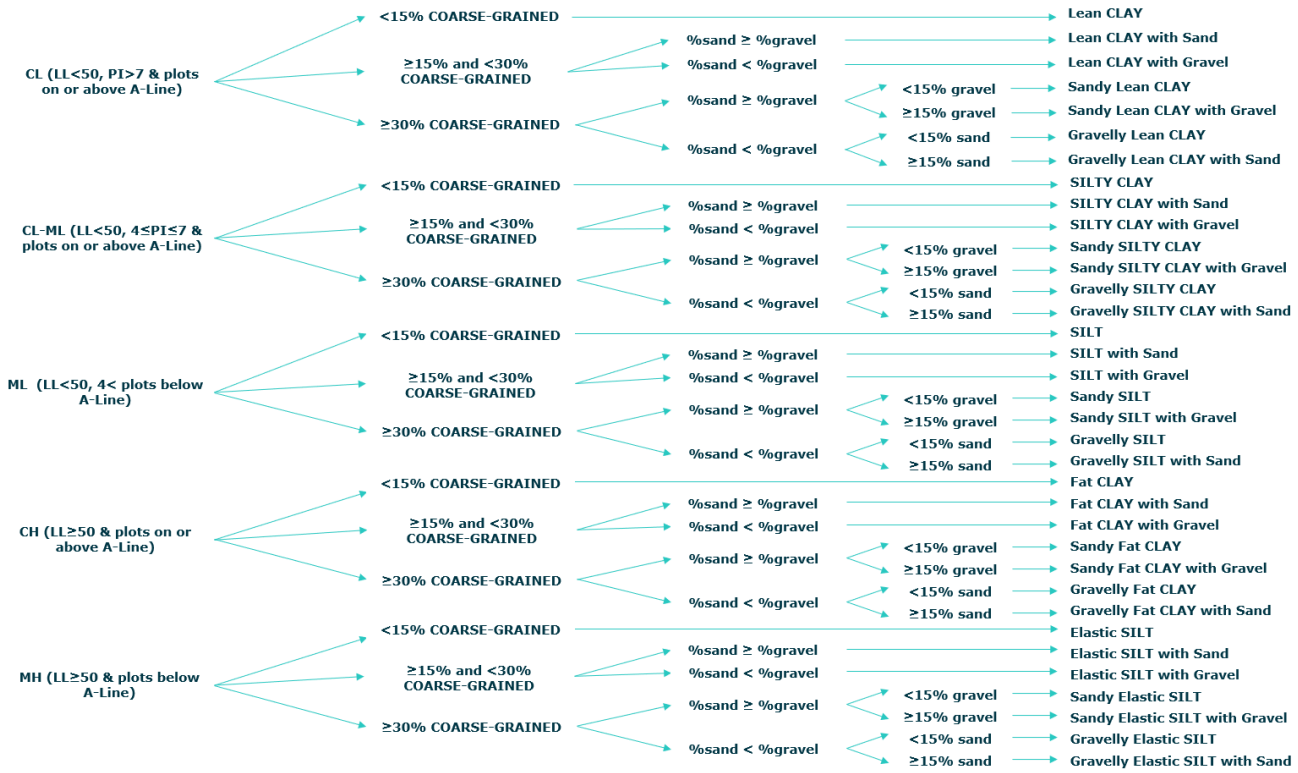
5. Classification of Coarse-Grained Soil:





Continued...

6. Classification of Fine-Grained Soil:



7. Sample/Testing Descriptions

Sample/Test	
Details of field testing (and samples retrieved) including the following:	
BL	Block sample
BS	Bulk Sample
DCP	Dynamic Cone Penetrometer (blows per 150 mm)
DD	Diamond Drilling
DS	Denison-Type Sample (note size)
GB	Grab Sample
PP	Pocket Penetrometer Test
SS	Split-spoon from SPT (blows per 150 mm and N-value) - NOTE HB: Hammer Bouncing; RW: Rod Weight, HW: Hammer Weight
ST	Thin-Walled Tube Sample (note size)
TV	Torvane Test
☒	Disturbed Sample Interval (laboratory test result can be provided or alternatively type of test indicated X)

Continued...

8. Bedding and Layering

Term	Description
Repeating Layers or Laminations	
Laminated (0 to 20 mm)	Closely spaced, alternating layers of differing soils and/or differing colours or shades of soils of similar gradation, usually arranged in a regular sequence. • Thinly laminated – spacing under 6 mm • Thickly laminated – spacing between 6 mm and 20 mm
Stratified or Layered (20 mm to >2m)	Differing soils, rock or visible variations in soil constituents or colour arranged in layers, generally but not necessarily parallel to one another. • Very thinly bedded – 20 mm to 60 mm • Thinly bedded – 60 mm to 200 mm • Medium bedded – 200 mm to 600 mm • Thickly bedded – 600 mm to 2 m • Very thickly bedded – over 2 m
Discrete Layers or Features	
Lens	An inclusion of a different soil type within the soil mass, which thins out laterally (horizontally) and may not be continuous over any significant distance. Typically identified by test pits or correlation between boreholes.
Pocket	A soil of very limited thickness or lateral extent (a small lens) within the overall soil mass; typically identified by a test pit excavation.
Seam	A soil layer of considerable extent but with a thickness of less than about 10 mm. Typically identified by correlation between boreholes or test pits.
Parting	A paper-thin separation of one soil type by another; usually applied to fine grained soils.
Varved	A laminated soil consisting of two distinct soils (usually clay and silt) occurring in regularly repeating patterns; usually resulting from seasonal sediment load variations in lacustrine environments.
Other Features or Terms	
Fissured	Generally applied to dried or overconsolidated fine-grained soils (silts and clays) containing cracks or physical discontinuities which can be vertical, horizontal, or inclined. Described as highly (10 mm spacing), moderately (two or more occurrences per 150 mm length), and slightly fissured (only random or infrequent fissures consistently greater than 75 mm).
Friable, blocky, or platy	Cohesive soil that breaks into small (friable), larger (blocky), or thin, plate-like (platy) fragments with little effort.
Slickensided	Polished or striated surfaces that are often an indication of an existing failure or slip surface. If continuous slickensided shear zones are found an estimate should be made of their angle in relation to the horizontal plane

Continued…

9. Penetration Resistance

Standard Penetration Resistance (SPT); "N": The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT): An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (qt), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); "Nd": The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

10. Groundwater

"Groundwater not observed": Whether present or not, groundwater was not observed or could not be observed due to drilling fluids, borehole/test excavation collapse, surface seepage or other.

"Groundwater not encountered": The borehole/test excavation was dry upon or soon after completion (*note, groundwater could be present in low permeability strata if borehole/test excavation was left open for a longer period*).

Appendix F. 2024/2025 Investigation Laboratory Testing Results

SOLUM™
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GEOTECHNICAL & MATERIAL
TESTING LABORATORY

Geo-Lab Report (Part 1)

Revision # 0

Report Date:	*February 2, 2025*
Client:	*Worley Canada Services Ltd.*
Address:	*Suite 200, 2930 Virtual Way, Vancouver, BC V5M 0A5*
Attn:	*Jeff Gibson*
Project No:	*317086-54170*
Project Name:	*Grise Fiord*
Solum Job No.:	*00101241218(456)*

Sample Received Date: October 24, 2024

Sample Quantity: 7 pails

Test	Quantity	Destination
WATER CONTENT	4	D2216
ATTERBERG LIMITS	4	D4318
PARTICLE-SIZE ANALYSIS (FULL GRADATION)	13	D6913 & D7928
LA ABRASION TEST (Aggregates < 1.5")	1	C131
RIPRAP TEST SUITE (INCL. GS, ABSORPTION & DURABILITY INDEX)	1	CT206 & CT229
SOUNDNESS FOR COARSE AGGREGATES	1	C88



President: Saad Farag

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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Laboratory Analysis Summary Sheet

Project Info: *317086-54170 / Grise Fiord*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101241218(456)*

Reviewed *S. F.*



* Note: Soil classification is for material less than 0.425 mm (material used for Atterberg Limits), this includes the fine sand, silt and clay fraction of the sample.

** Note: Soil classification is for the whole sample. Soil classification uses the Atterberg Limits results and the percent fines, percent sand and percent gravel as described in ASTM D2487.

Borehole ID	Sample ID	Depth (m)	MC as Received (%)	Atterberg Limits				Particle Size Analysis					Soil Classification** Group Symbols
				Liquid Limit(%)	Plastic Limit(%)	Plastic Index(%)	Classification* (USCS)	Cobble Size (%) (75-300mm)	Gravel Size (%) (4.75-75mm)	Sand Size (%) (0.075-4.5mm)	Silt Size (%) (0.002-0.075 mm)	Clay Size (%) (<0.002mm)	
BH24-01	SS02	1.5-1.8	---	---	---	---	---	0.0	66.9	29.0	2.6	1.5	---
BH24-01	SS04	4.5-5.1	11.4	21	12	9	CL-ML	0.0	22.8	38.3	29.8	9.1	SC-SM
BH24-01	SS05	6.0-6.6	26.9	46	24	22	CL	0.0	1.3	13.9	71.4	13.4	CL
BH24-01	SS06	7.5-8.1	23.7	40	21	19	CL	0.0	0.0	7.8	77.0	15.2	CL
BH24-01	GB01	2.9-3.0	---	---	---	---	---	0.0	26.9	19.1	42.5	11.5	---
BH24-02	GB01	2.8-3.0	---	---	---	---	---	0.0	25.3	38.3	32.3	4.1	---
BH24-02	GB02	4.7-4.9	---	---	---	---	---	0.0	0.0	25.2	70.1	4.7	---
BH24-03	GB03	6.0-6.1	6.6	---	---	---	NP	0.0	26.0	46.6	23.3	4.1	SM
BH24-03	GB05	8.8-9.0	---	---	---	---	---	0.0	24.3	32.0	33.9	9.8	---
GF-LS4-01	---	---	---	---	---	---	---	0.0	80.7	18.8	0.5	0.0	---
GF-LS4-02	---	---	---	---	---	---	---	0.0	65.0	27.3	6.6	1.1	---
GF-LS4-03	---	---	---	---	---	---	---	0.0	54.2	43.3	2.1	0.4	---
GF-LS4-04	---	---	---	---	---	---	---	0.0	73.2	23.4	2.7	0.7	---

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Atterberg Limits (ASTM D4318 - Method A)

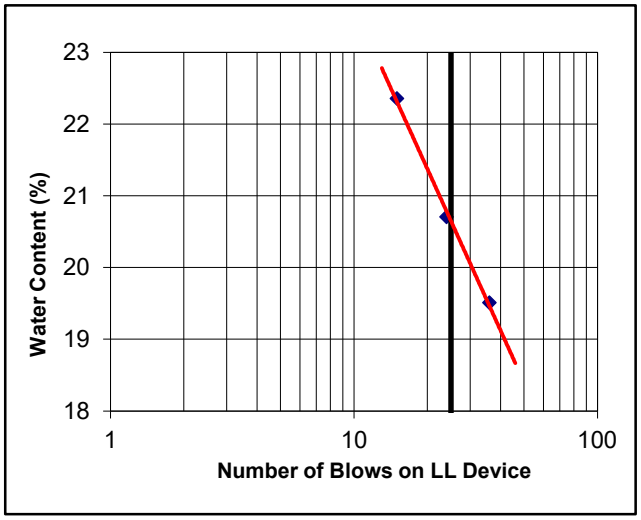
Project Info: 317086-54170 / Grise Fiord
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101241218(456)
Sample Info: ***BH24-01 SS04 4.5-5.1 m***

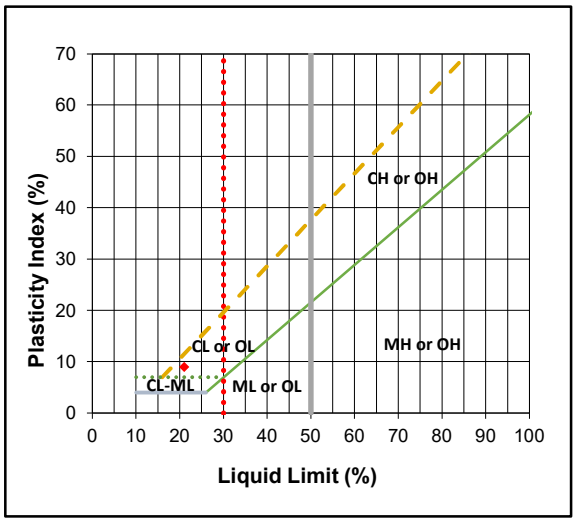
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	15	24	36		
$W_{Wet\ Soil}$ + Tare (g)	32.24	35.38	35.90		
$W_{Dry\ Soil}$ + Tare (g)	27.38	30.27	30.96		
W_{Water} (g)	4.86	5.11	4.94		
Tare (g)	5.64	5.59	5.64		
$W_{Dry\ Soil}$ (g)	21.74	24.68	25.32	**Water Content (%)**	11.4
Water Content (%)	22.4	20.7	19.5		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	27.91	24.91
$W_{Dry\ Soil}$ + Tare (g)	25.47	22.78
W_{Water} (g)	2.44	2.13
Tare (g)	5.65	5.62
$W_{Dry\ Soil}$ (g)	19.82	17.16
Water Content (%)	12.3	12.4
Average Mc (%)	12.4	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
21	**12**	**9**	**CL-ML**





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Atterberg Limits (ASTM D4318 - Method A)

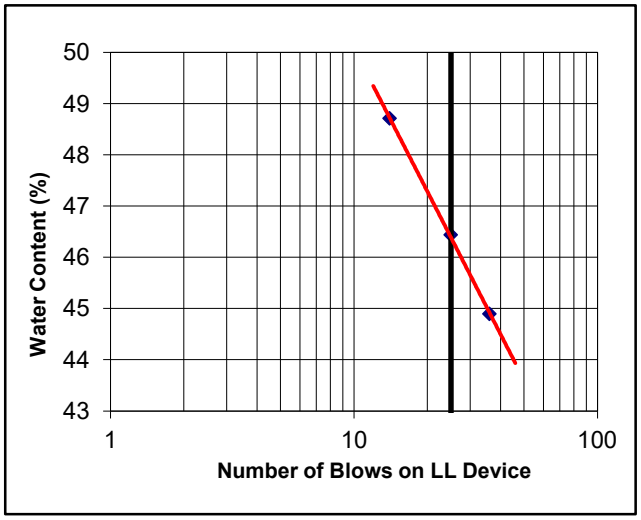
Project Info:	*317086-54170 / Grise Fiord*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101241218(456)*		
Sample Info:	***BH24-01 SS05 6.0-6.6 m***		

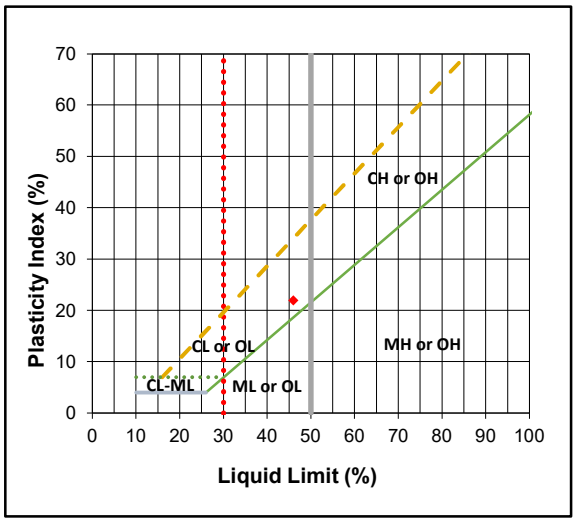
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	14	25	36		
$W_{Wet\ Soil}$ + Tare (g)	31.20	26.87	27.34		
$W_{Dry\ Soil}$ + Tare (g)	22.89	20.16	20.61		
W_{Water} (g)	8.31	6.71	6.73		
Tare (g)	5.83	5.71	5.62		
$W_{Dry\ Soil}$ (g)	17.06	14.45	14.99	**Water Content (%)**	26.9
Water Content (%)	48.7	46.4	44.9		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	17.00	20.02
$W_{Dry\ Soil}$ + Tare (g)	14.84	17.26
W_{Water} (g)	2.16	2.76
Tare (g)	5.66	5.61
$W_{Dry\ Soil}$ (g)	9.18	11.65
Water Content (%)	23.5	23.7
Average Mc (%)	23.6	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
46	**24**	**22**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

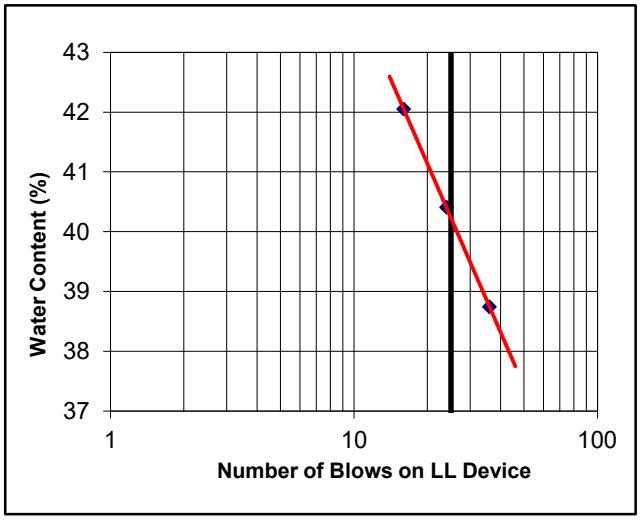
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Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101241218(456)
Sample Info: ***BH24-01*** ***SS06*** ***7.5-8.1 m***

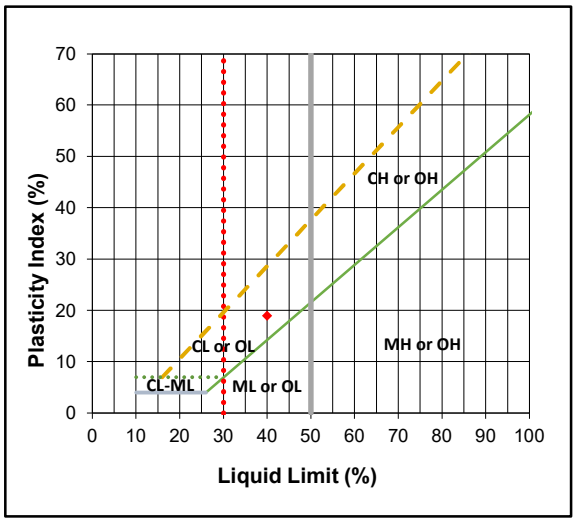
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	16	24	36		
$W_{Wet\ Soil}$ + Tare (g)	22.97	26.82	27.52		
$W_{Dry\ Soil}$ + Tare (g)	17.84	20.71	21.41		
W_{Water} (g)	5.13	6.11	6.11		
Tare (g)	5.64	5.59	5.64		
$W_{Dry\ Soil}$ (g)	12.20	15.12	15.77	**Water Content (%)**	23.7
Water Content (%)	42.0	40.4	38.7		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	25.87	24.21
$W_{Dry\ Soil}$ + Tare (g)	22.30	20.96
W_{Water} (g)	3.57	3.25
Tare (g)	5.65	5.62
$W_{Dry\ Soil}$ (g)	16.65	15.34
Water Content (%)	21.4	21.2
Average Mc (%)	21.3	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
40	**21**	**19**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

Project Info: *317086-54170 / Grise Fiord* *Reviewed by:* *S. F.*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101241218(456)*

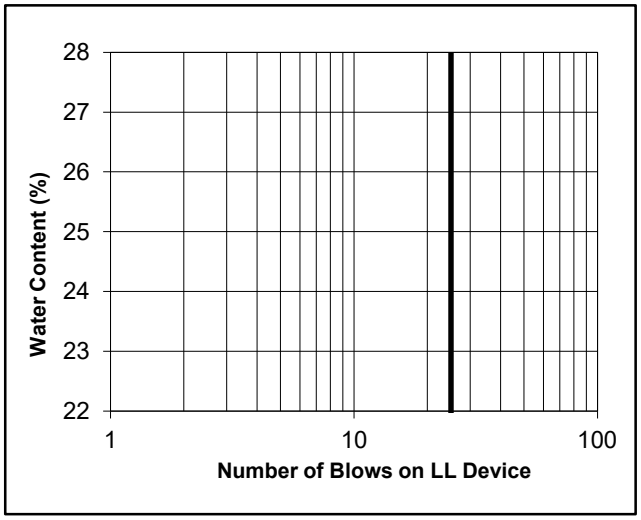
Sample Info: ***BH24-03*** ***GB03*** ***6.0-6.1 m***

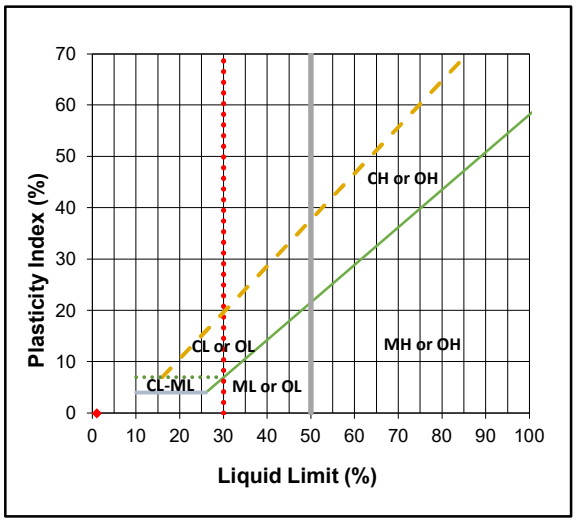
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows					
$W_{Wet\ Soil}$ + Tare (g)					
$W_{Dry\ Soil}$ + Tare (g)					
W_{Water} (g)					
Tare (g)					
$W_{Dry\ Soil}$ (g)				Water Content (%)	6.6
Water Content (%)					

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)		
$W_{Dry\ Soil}$ + Tare (g)		
W_{Water} (g)		
Tare (g)		
$W_{Dry\ Soil}$ (g)		
Water Content (%)		
Average Mc (%)		

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
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Particle Size Analysis (ASTM D6913 & D7928)

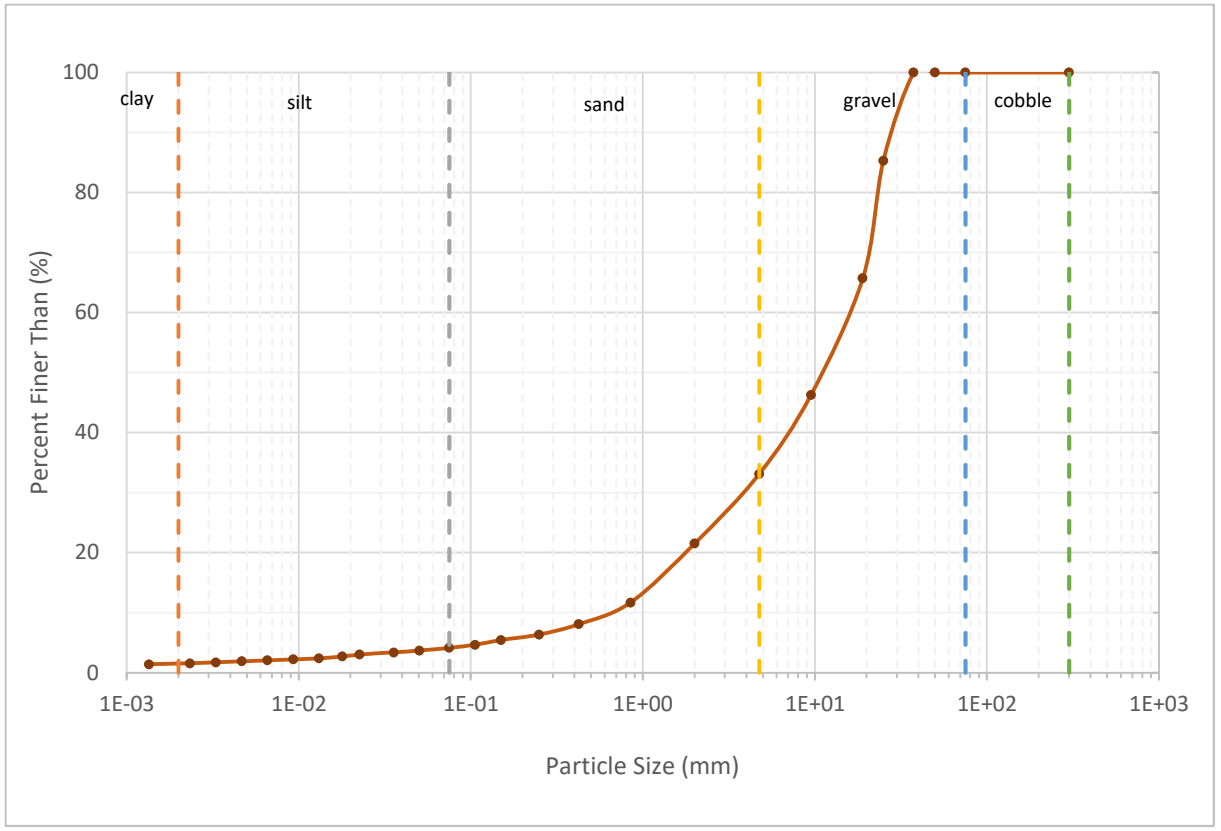
Project Info: 317086-54170 / Grise Fiord
Client: Worley Canada Services Ltd.
Solum Job No.: 00101241218(456)
Reviewed by S. F.

Sample Info: ***BH24-01*** ***SS02*** ***1.5-1.8 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	85.31
	19.000	65.77
	9.500	46.31
	4.750	33.13
SAND	2.000	21.54
	0.850	11.70
	0.425	8.12
	0.250	6.37
	0.150	5.46
	0.106	4.68
	0.075	4.17
HYDROMETER	0.0503	3.71
	0.0357	3.38
	0.0226	3.06
	0.0180	2.73
	0.0131	2.40
	0.0093	2.24
	0.0066	2.08
	0.0047	1.91
	0.0033	1.75
	0.0023	1.58
	0.0014	1.42

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**66.9**	**29.0**	**2.6**	**1.5**



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Particle Size Analysis (ASTM D6913 & D7928)

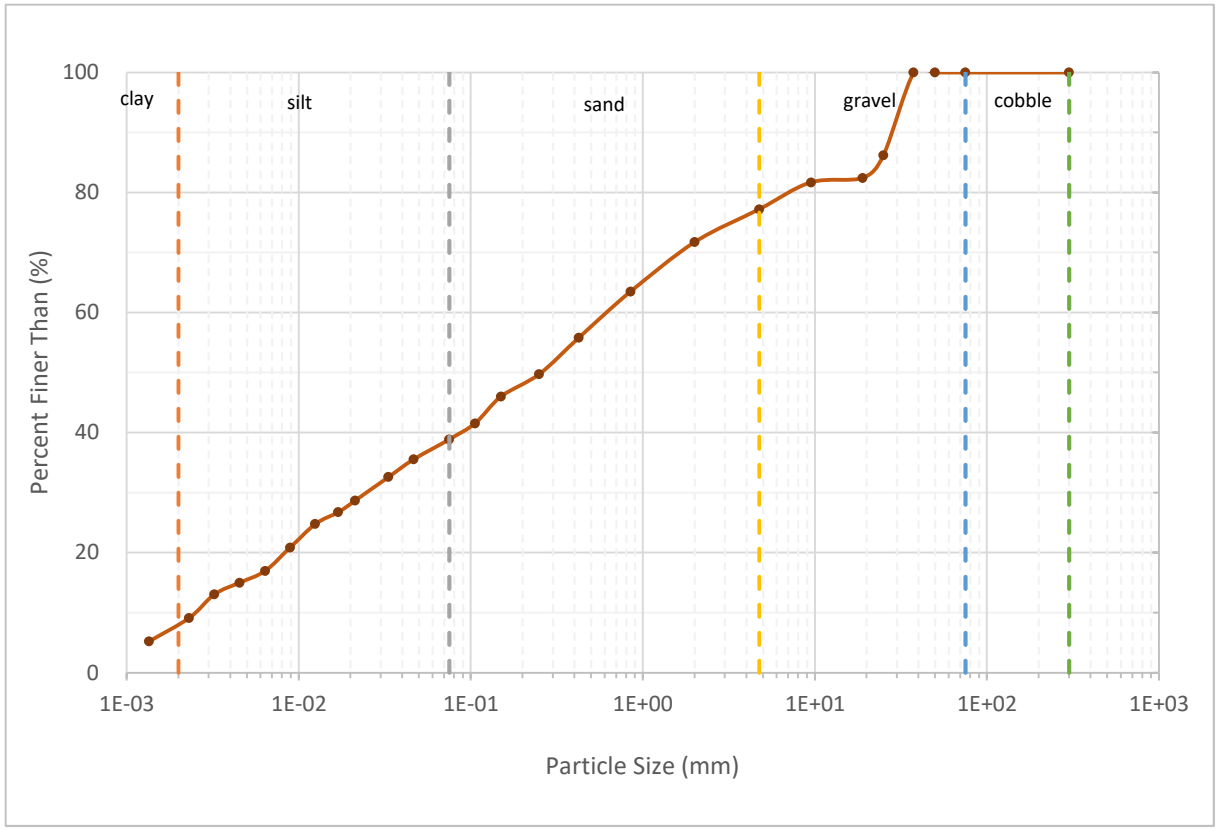
Project Info: 317086-54170 / Grise Fiord
Client: Worley Canada Services Ltd.
Solum Job No.: 00101241218(456)
Reviewed by S. F.

Sample Info: ***BH24-01*** ***SS04*** ***4.5-5.1 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	86.19
	19.000	82.45
	9.500	81.71
	4.750	77.22
SAND	2.000	71.75
	0.850	63.51
	0.425	55.84
	0.250	49.76
	0.150	46.04
	0.106	41.56
	0.075	38.90
HYDROMETER	0.0466	35.56
	0.0333	32.63
	0.0213	28.71
	0.0170	26.76
	0.0125	24.80
	0.0089	20.89
	0.0064	16.97
	0.0045	15.02
	0.0032	13.06
	0.0023	9.15
	0.0013	5.23

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**22.8**	**38.3**	**29.8**	**9.1**



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Particle Size Analysis (ASTM D6913 & D7928)

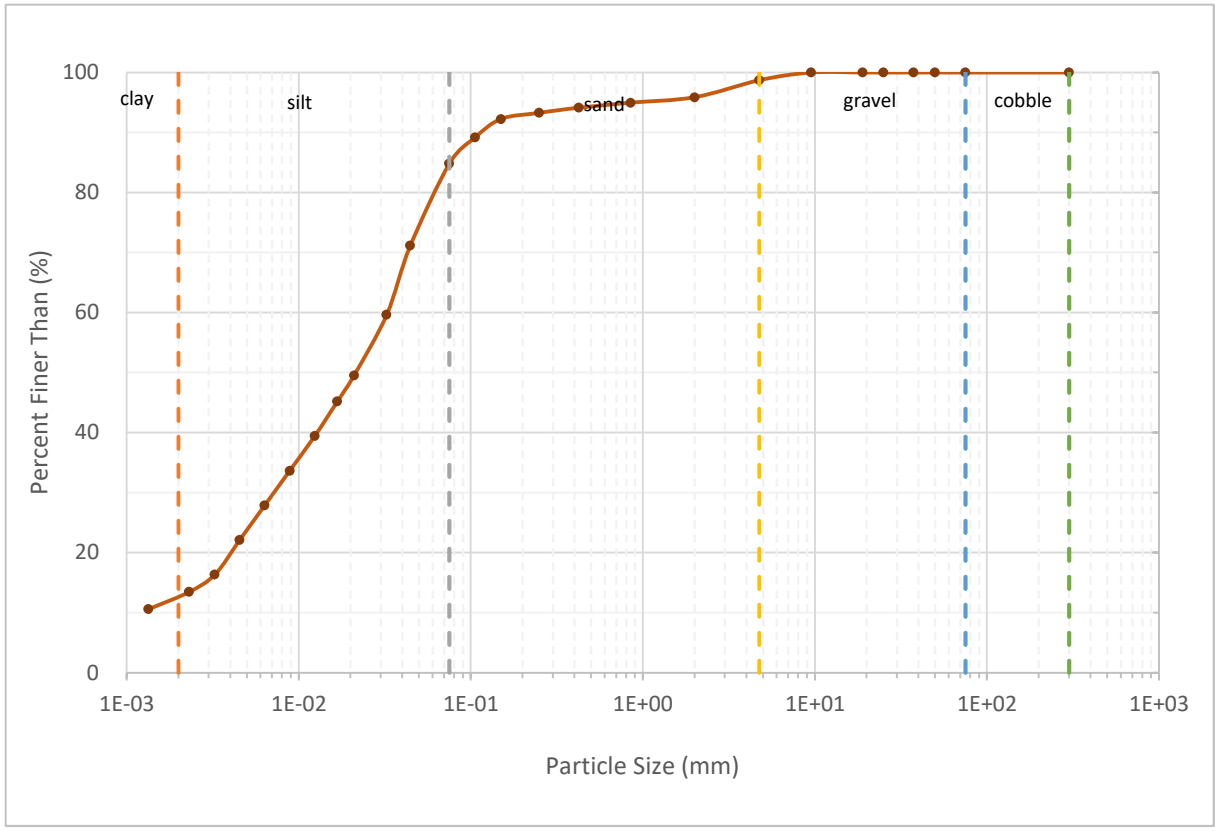
Project Info: *317086-54170 / Grise Fiord*
Client: *Worley Canada Services Ltd.*
Solum Job No.: *00101241218(456)*
Reviewed by *S. F.*

Sample Info: ***BH24-01*** ***SS05*** ***6.0-6.6 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	98.73
SAND	2.000	95.87
	0.850	94.97
	0.425	94.13
	0.250	93.30
	0.150	92.26
	0.106	89.20
	0.075	84.85
HYDROMETER	0.0446	71.19
	0.0324	59.65
	0.0210	49.55
	0.0168	45.22
	0.0124	39.45
	0.0089	33.68
	0.0063	27.91
	0.0045	22.14
	0.0032	16.37
	0.0023	13.49
	0.0013	10.60

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**1.3**	**13.9**	**71.4**	**13.4**



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Particle Size Analysis (ASTM D6913 & D7928)

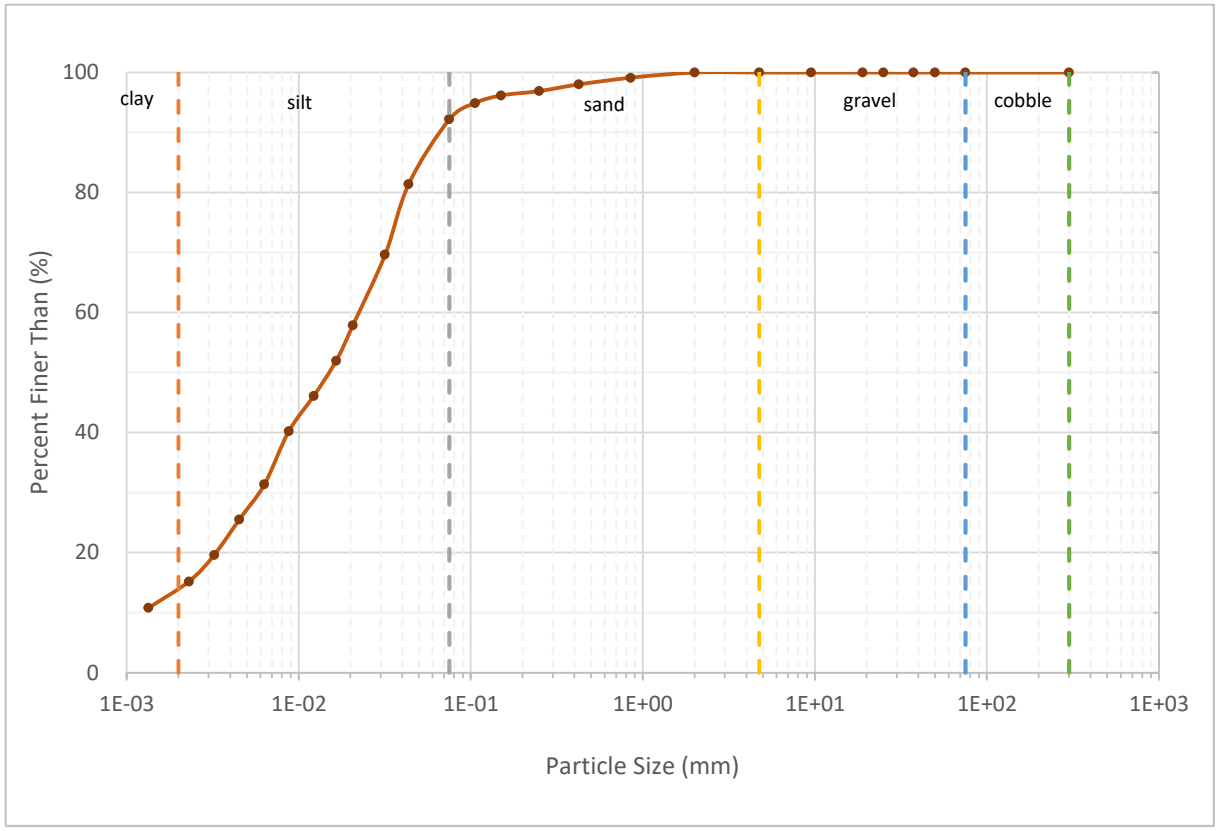
Project Info: *317086-54170 / Grise Fiord*
Client: *Worley Canada Services Ltd.*
Solum Job No.: *00101241218(456)*
Reviewed by *S. F.*

Sample Info: ***BH24-01*** ***SS06*** ***7.5-8.1 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	100.00
SAND	2.000	100.00
	0.850	99.12
	0.425	98.03
	0.250	96.91
	0.150	96.17
	0.106	94.91
	0.075	92.23
HYDROMETER	0.0436	81.44
	0.0317	69.67
	0.0206	57.90
	0.0165	52.02
	0.0122	46.13
	0.0088	40.24
	0.0063	31.42
	0.0045	25.53
	0.0032	19.64
	0.0023	15.23
	0.0013	10.82

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**0.0**	**7.8**	**77.0**	**15.2**



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Particle Size Analysis (ASTM D6913 & D7928)

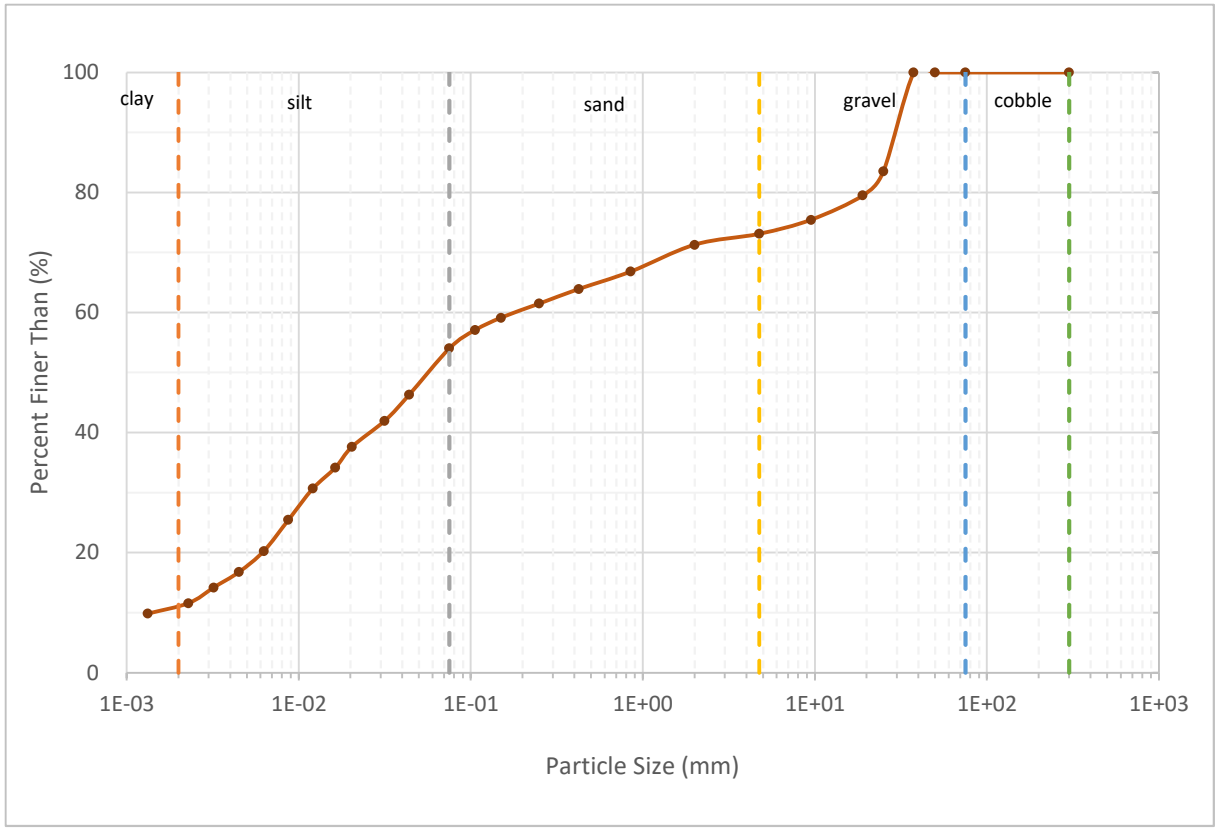
Project Info: 317086-54170 / Grise Fiord
Client: Worley Canada Services Ltd.
Solum Job No.: 00101241218(456)
Reviewed by S. F.

Sample Info: ***BH24-01*** ***GB01*** ***2.9-3.0 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	83.53
	19.000	79.54
	9.500	75.46
	4.750	73.13
SAND	2.000	71.32
	0.850	66.85
	0.425	63.93
	0.250	61.52
	0.150	59.16
	0.106	57.11
	0.075	54.05
HYDROMETER	0.0439	46.33
	0.0316	41.99
	0.0204	37.65
	0.0163	34.17
	0.0121	30.70
	0.0087	25.49
	0.0063	20.28
	0.0045	16.80
	0.0032	14.20
	0.0023	11.59
	0.0013	9.86

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**26.9**	**19.1**	**42.5**	**11.5**



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Particle Size Analysis (ASTM D6913 & D7928)

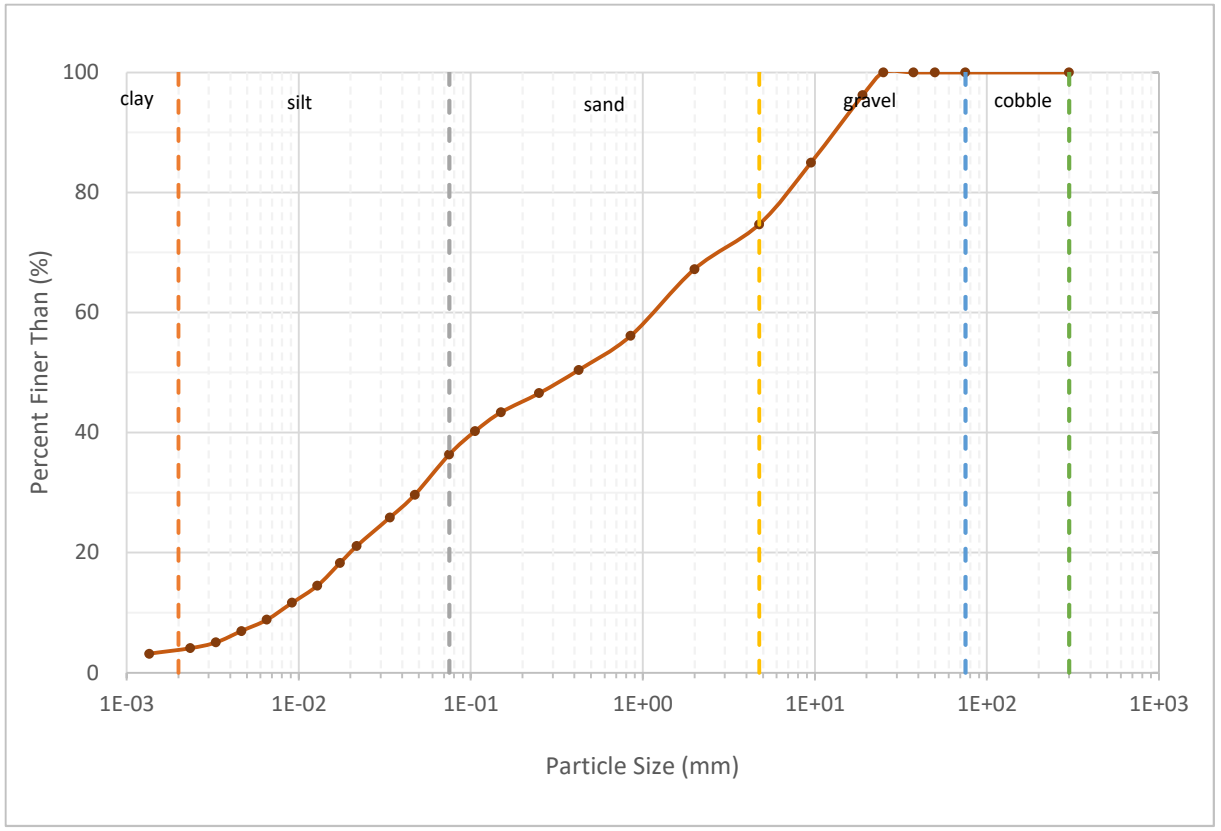
Project Info: 317086-54170 / Grise Fiord
Client: Worley Canada Services Ltd.
Solum Job No.: 00101241218(456)
Reviewed by S. F.

Sample Info: ***BH24-02*** ***GB01*** ***2.8-3.0 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	96.25
	9.500	85.00
	4.750	74.72
SAND	2.000	67.25
	0.850	56.14
	0.425	50.46
	0.250	46.58
	0.150	43.40
	0.106	40.24
	0.075	36.38
HYDROMETER	0.0474	29.67
	0.0339	25.89
	0.0218	21.15
	0.0174	18.31
	0.0129	14.53
	0.0092	11.69
	0.0065	8.85
	0.0046	6.96
	0.0033	5.06
	0.0023	4.12
	0.0014	3.17

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**25.3**	**38.3**	**32.3**	**4.1**



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Particle Size Analysis (ASTM D6913 & D7928)

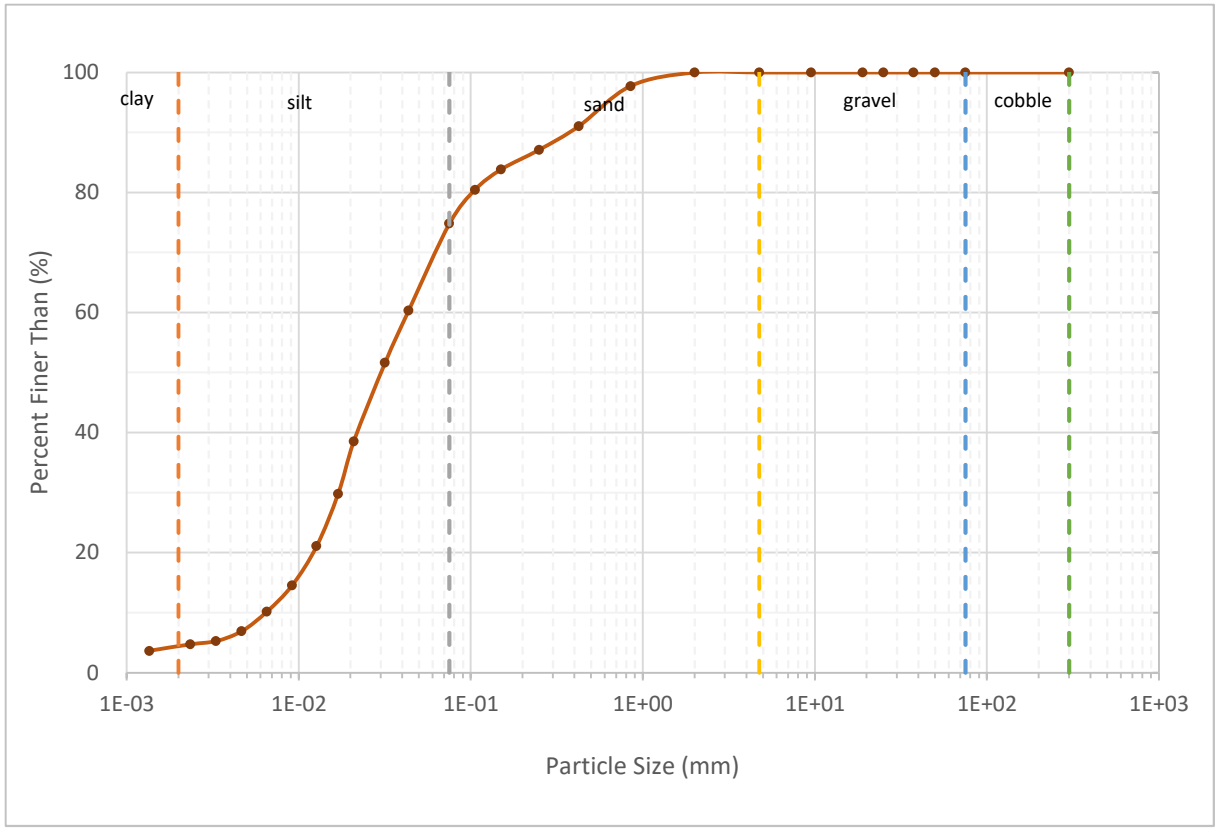
Project Info: *317086-54170 / Grise Fiord*
Client: *Worley Canada Services Ltd.*
Solum Job No.: *00101241218(456)*
Reviewed by *S. F.*

Sample Info: ***BH24-02*** ***GB02*** ***4.7-4.9 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	100.00
SAND	2.000	100.00
	0.850	97.75
	0.425	91.08
	0.250	87.13
	0.150	83.85
	0.106	80.47
	0.075	74.84
HYDROMETER	0.0436	60.39
	0.0317	51.66
	0.0209	38.57
	0.0170	29.84
	0.0127	21.11
	0.0091	14.56
	0.0065	10.20
	0.0047	6.93
	0.0033	5.29
	0.0023	4.75
	0.0014	3.65

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**0.0**	**25.2**	**70.1**	**4.7**



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Particle Size Analysis (ASTM D6913 & D7928)

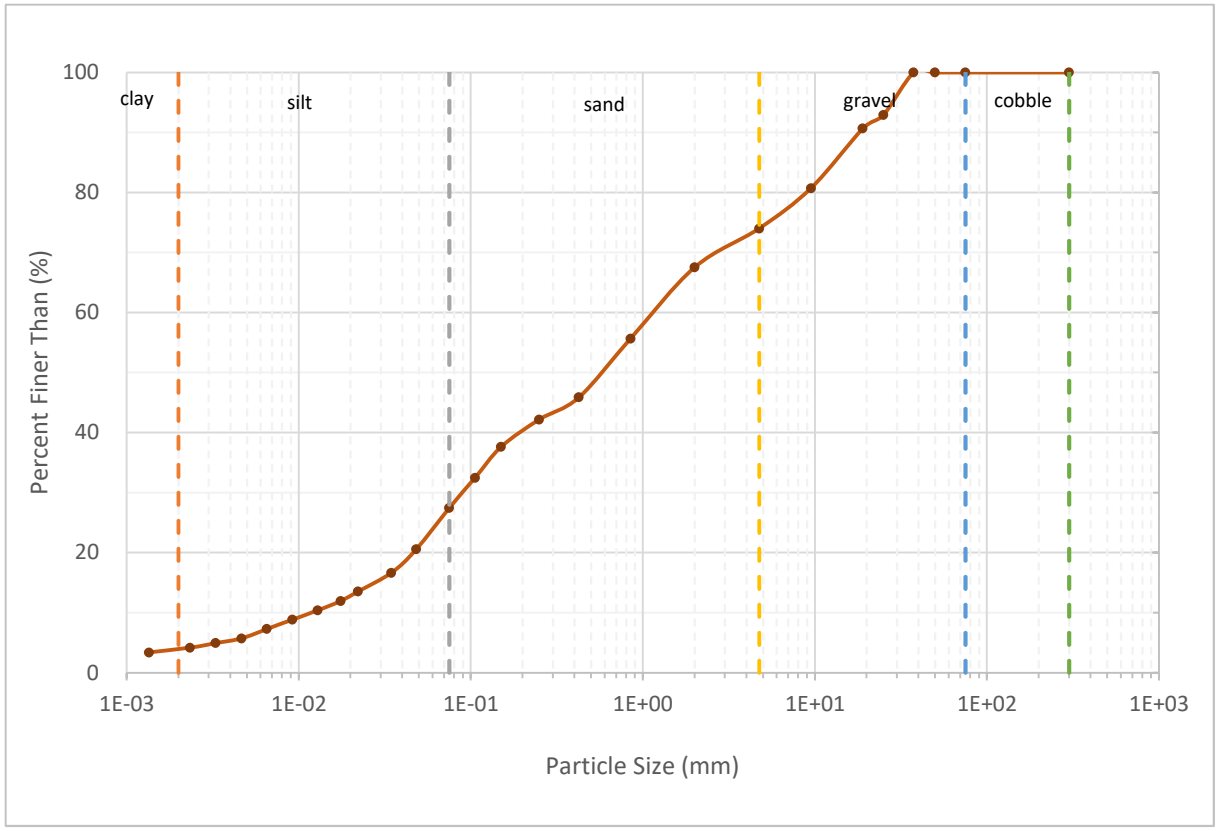
Project Info: 317086-54170 / Grise Fiord
Client: Worley Canada Services Ltd.
Solum Job No.: 00101241218(456)
Reviewed by S. F.

Sample Info: ***BH24-03*** ***GB03*** ***6.0-6.1 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	92.92
	19.000	90.69
	9.500	80.75
	4.750	74.04
SAND	2.000	67.54
	0.850	55.69
	0.425	45.90
	0.250	42.19
	0.150	37.64
	0.106	32.49
	0.075	27.48
HYDROMETER	0.0481	20.57
	0.0346	16.67
	0.0221	13.54
	0.0176	11.98
	0.0129	10.42
	0.0092	8.86
	0.0065	7.30
	0.0046	5.74
	0.0033	4.96
	0.0023	4.18
	0.0014	3.40

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**26.0**	**46.6**	**23.3**	**4.1**



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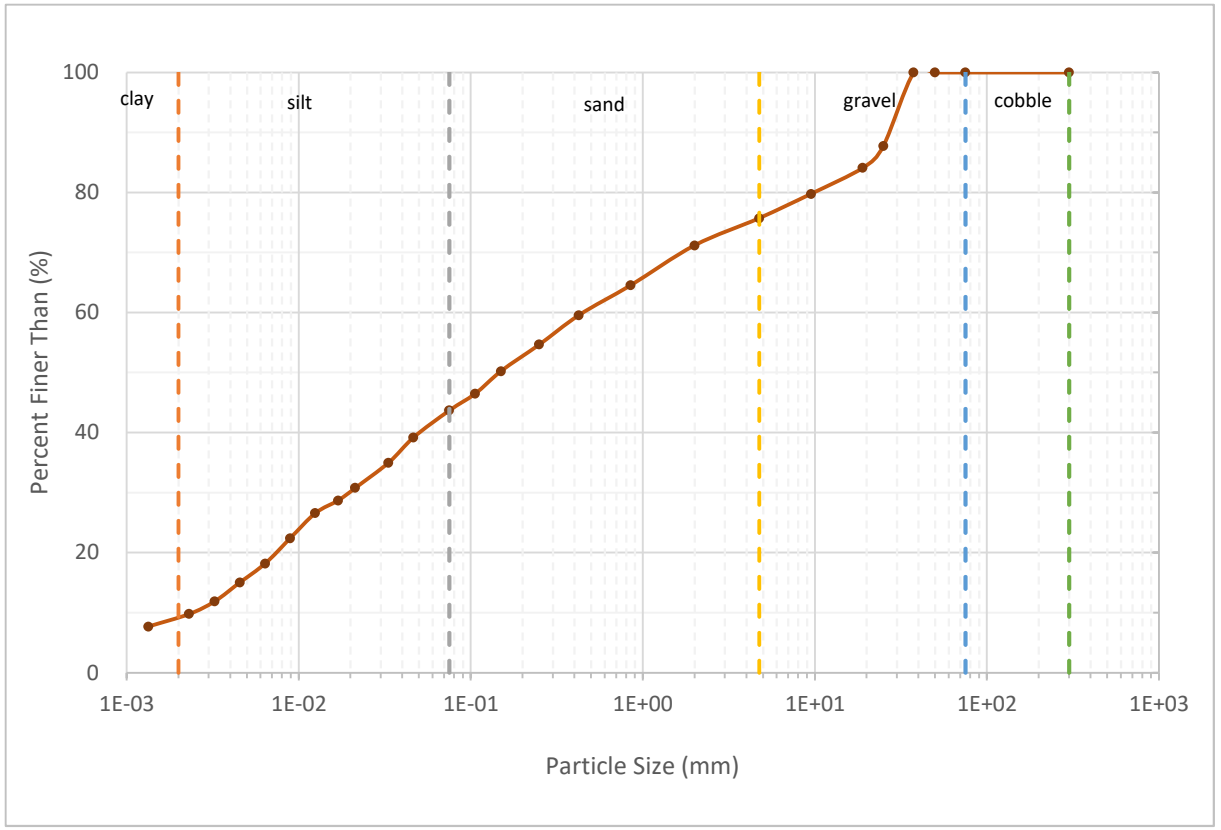
Project Info: 317086-54170 / Grise Fiord
Client: Worley Canada Services Ltd.
Solum Job No.: 00101241218(456)
Reviewed by S. F.

Sample Info: ***BH24-03*** ***GB05*** ***8.8-9.0 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	87.76
	19.000	84.14
	9.500	79.79
	4.750	75.73
SAND	2.000	71.19
	0.850	64.56
	0.425	59.58
	0.250	54.69
	0.150	50.26
	0.106	46.48
	0.075	43.71
HYDROMETER	0.0465	39.21
	0.0333	35.01
	0.0213	30.81
	0.0170	28.71
	0.0125	26.61
	0.0089	22.41
	0.0064	18.21
	0.0046	15.06
	0.0032	11.91
	0.0023	9.82
	0.0013	7.72

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**24.3**	**32.0**	**33.9**	**9.8**



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Particle Size Analysis (ASTM D6913 & D7928)

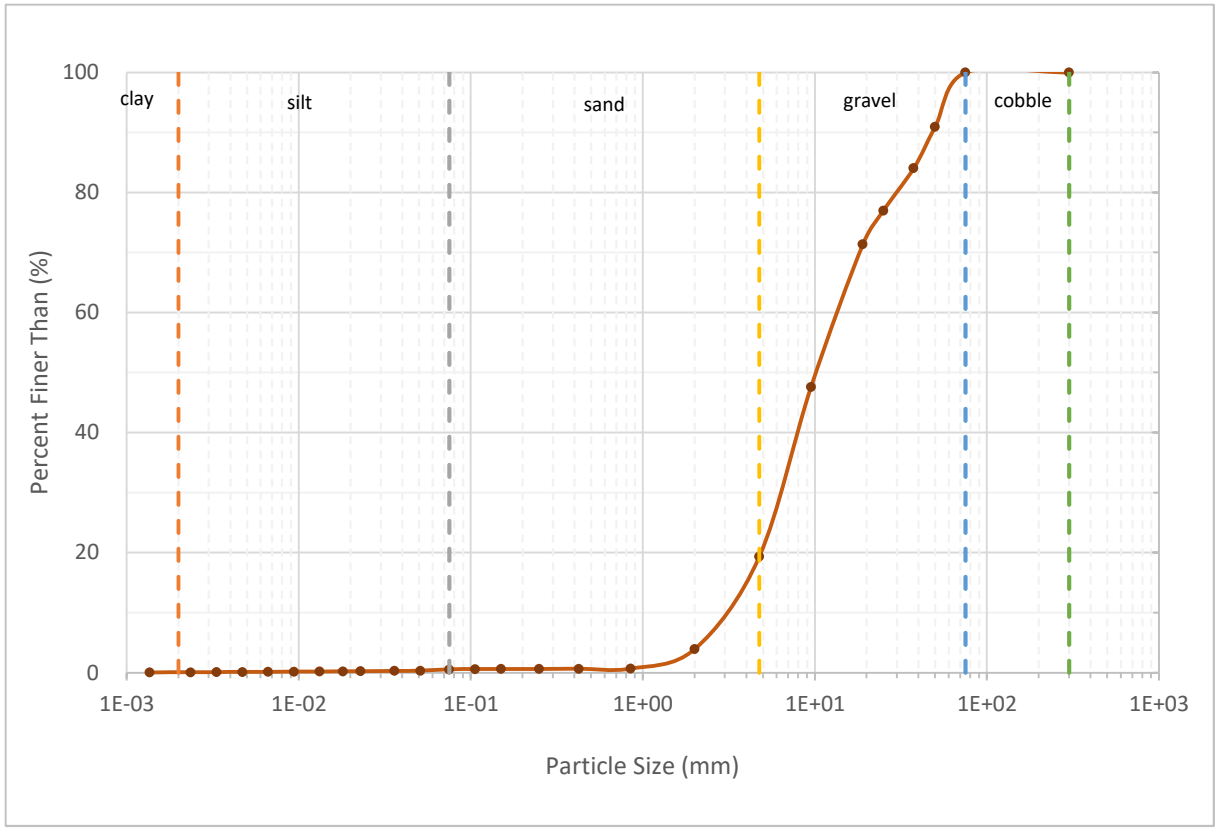
Project Info: *317086-54170 / Grise Fiord*
Client: *Worley Canada Services Ltd.*
Solum Job No.: *00101241218(456)*
Reviewed by *S. F.*

Sample Info: ***GF-LS24-01***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	90.96
	37.500	84.08
	25.000	76.97
	19.000	71.40
	9.500	47.65
	4.750	19.35
SAND	2.000	3.95
	0.850	0.70
	0.425	0.67
	0.250	0.65
	0.150	0.65
	0.106	0.63
	0.075	0.57
HYDROMETER	0.0509	0.36
	0.0361	0.32
	0.0229	0.27
	0.0181	0.24
	0.0133	0.22
	0.0094	0.19
	0.0066	0.17
	0.0047	0.14
	0.0033	0.12
	0.0024	0.09
	0.0014	0.07

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**80.7**	**18.8**	**0.5**	**0.0**



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Particle Size Analysis (ASTM D6913 & D7928)

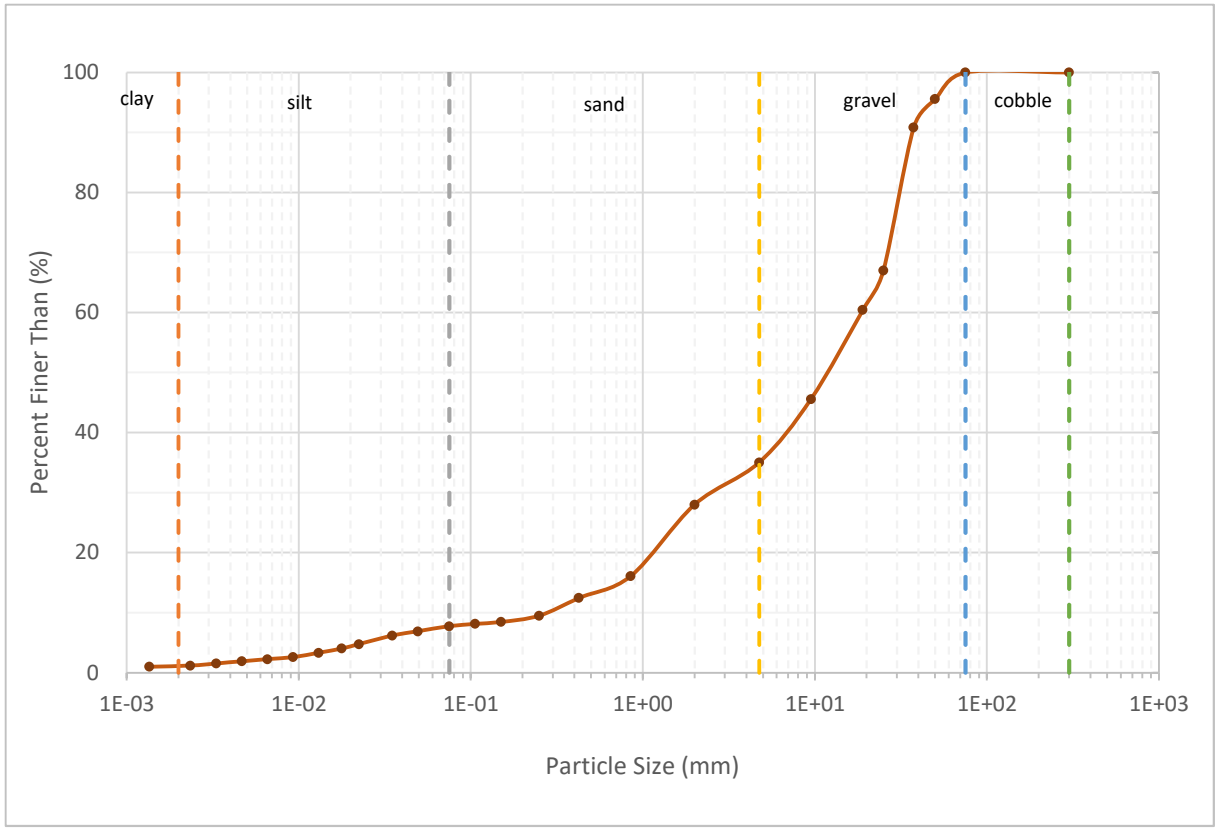
Project Info: *317086-54170 / Grise Fiord*
Client: *Worley Canada Services Ltd.*
Solum Job No.: *00101241218(456)*
Reviewed by *S. F.*

Sample Info: ***GF-LS24-02***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	95.58
	37.500	90.88
	25.000	67.02
	19.000	60.47
	9.500	45.61
	4.750	35.04
SAND	2.000	28.01
	0.850	16.10
	0.425	12.47
	0.250	9.51
	0.150	8.47
	0.106	8.16
	0.075	7.75
HYDROMETER	0.0492	6.92
	0.0350	6.20
	0.0224	4.77
	0.0178	4.06
	0.0131	3.34
	0.0093	2.63
	0.0066	2.27
	0.0047	1.91
	0.0033	1.56
	0.0023	1.20
	0.0014	1.02

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**65.0**	**27.3**	**6.6**	**1.1**



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Particle Size Analysis (ASTM D6913 & D7928)

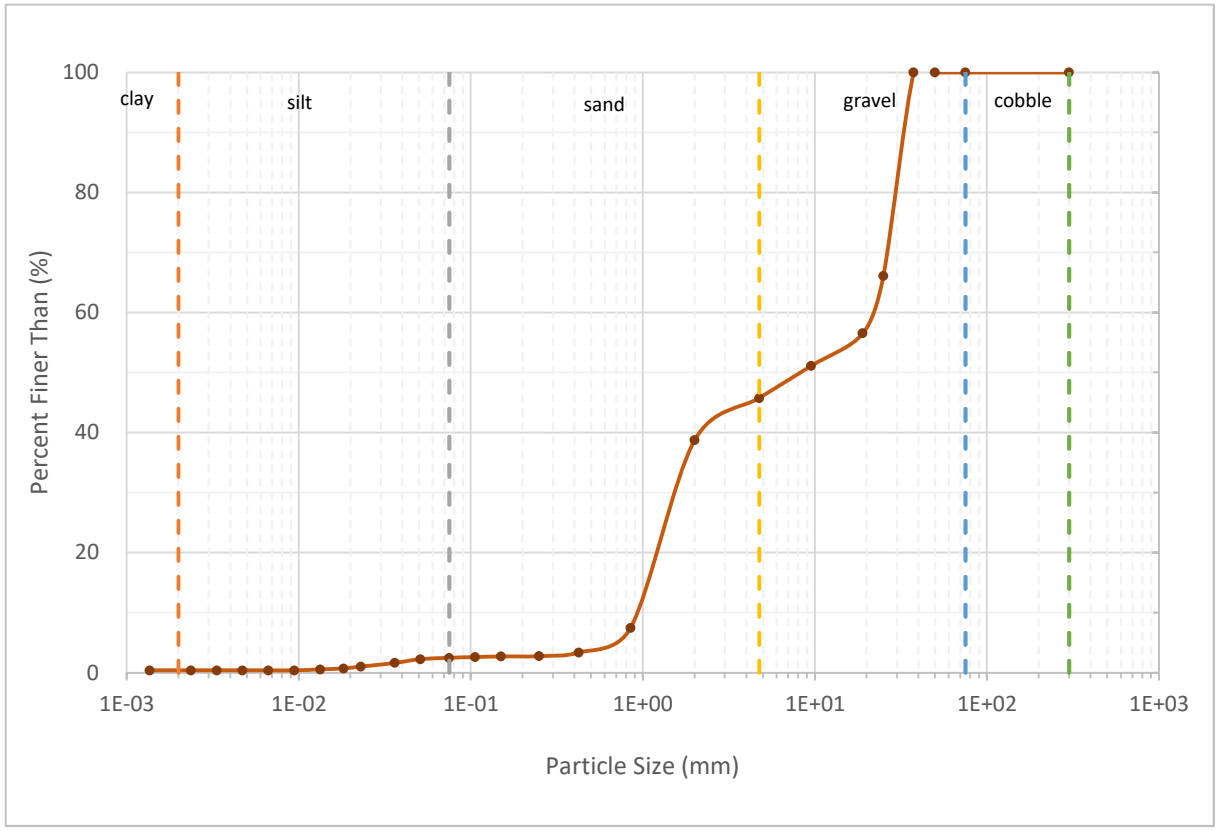
Project Info: *317086-54170 / Grise Fiord*
Client: *Worley Canada Services Ltd.*
Solum Job No.: *00101241218(456)*
Reviewed by *S. F.*

Sample Info: ***GF-LS24-03***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	66.13
	19.000	56.57
	9.500	51.12
	4.750	45.76
SAND	2.000	38.76
	0.850	7.49
	0.425	3.39
	0.250	2.79
	0.150	2.72
	0.106	2.62
	0.075	2.49
HYDROMETER	0.0509	2.26
	0.0362	1.65
	0.0230	1.03
	0.0183	0.72
	0.0133	0.57
	0.0095	0.42
	0.0067	0.42
	0.0047	0.42
	0.0033	0.42
	0.0024	0.42
	0.0014	0.42

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**54.2**	**43.3**	**2.1**	**0.4**



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Particle Size Analysis (ASTM D6913 & D7928)

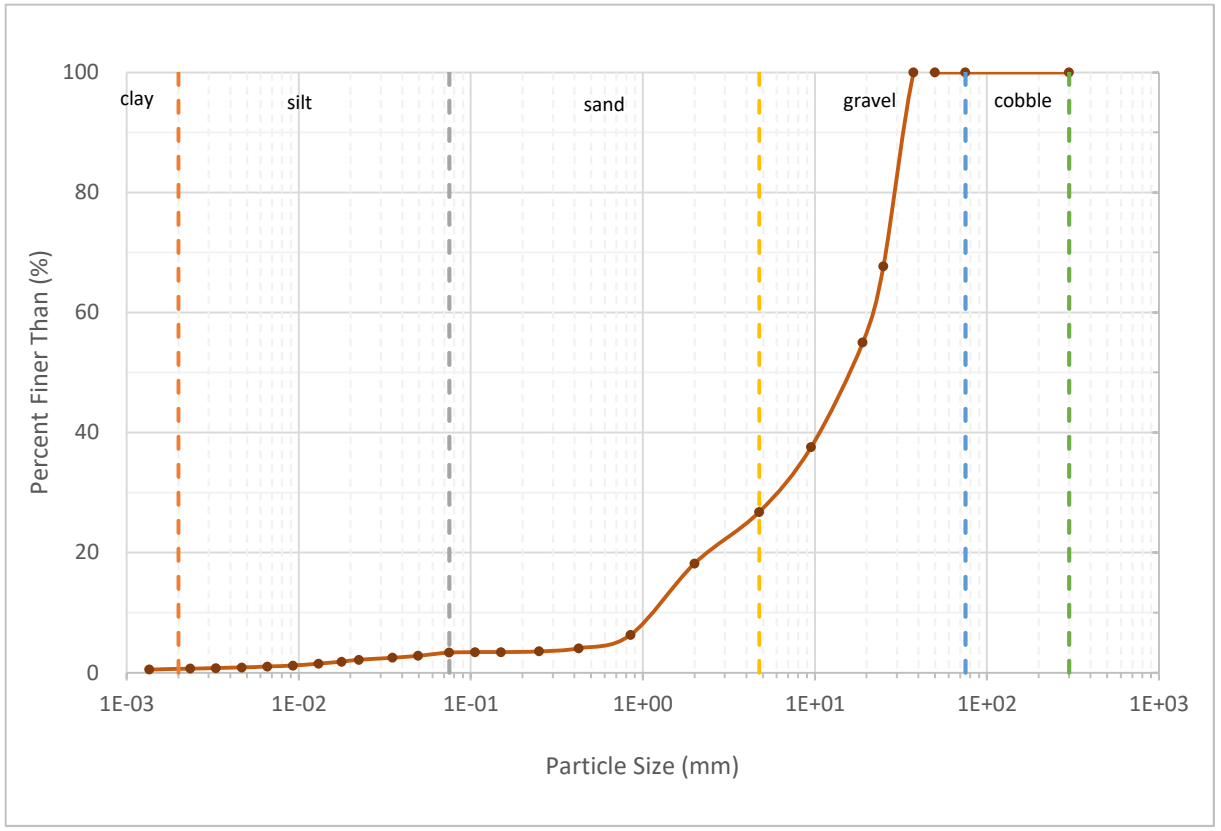
Project Info: *317086-54170 / Grise Fiord*
Client: *Worley Canada Services Ltd.*
Solum Job No.: *00101241218(456)*
Reviewed by *S. F.*

Sample Info: ***GF-LS24-04***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	67.71
	19.000	55.04
	9.500	37.58
	4.750	26.79
SAND	2.000	18.22
	0.850	6.32
	0.425	4.09
	0.250	3.57
	0.150	3.46
	0.106	3.43
	0.075	3.38
HYDROMETER	0.0495	2.83
	0.0352	2.50
	0.0224	2.18
	0.0178	1.85
	0.0131	1.52
	0.0093	1.20
	0.0066	1.04
	0.0047	0.87
	0.0033	0.79
	0.0023	0.71
	0.0014	0.55

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**73.2**	**23.4**	**2.7**	**0.7**



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Specific Gravity / Absorption Test (CT #206) & Durability Index (CT #229)

Project Info:	*317086-54170 / Grise Fiord*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101241218(456)*		
Sample ID:	*Moraine*		

Test Results for Gs & Absorption %

Oven-Dried Sample mass (g), A	1910
Saturated, Surface-Dried Sample mass(g), B	1912
Saturated Sample mass immersed in water (g), C	1188
Bulk Specific Gravity (Apparent)	2.64
Percent Absorption	0.1

Test Result Durability Index

Agitator Specs	Reciprocal 285 cpm, stroke length 1.75"		
Agitation Duration	10 min		
Procedure	A		
Total Tested Aggregates dry mass (g)	2550.0		
Durability Index	85		

Tested Rip Rap Properties

	AT Section 10 Requirement	Test Results	Compliant
Specific Gravity	>2.6	2.64	Yes
Absportion %	<2.0	0.1	Yes
Durability Index (DI)	>52	85	Yes
Durability Absorption Ratio (DAR)	>23	77	Yes

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GEOTECHNICAL & MATERIAL TESTING LABORATORY

LA Abrasion Test (ASTM C131)

Project Info: 317086-54170 / Grise Fiord
Client: Worley Canada Services Ltd.
Solum Job No.: 00101241218(456)
Reviewed by: S. F.

Sample ID:

Test Information

Grading Designation	X	*A*
		B
		C
		D
Revolution Number:	500	
Speed (r/min):	30	
Sphere Numbers:	X	12
		11
		8
		6

Test Results

Passing	*Retained*	*Mass Before (g)*	**Mass After (g)*	*Loss (g)*	*LA Abrasion Hardness*
38 / 1.5"	25 / 1"	1258.1	1010.1	248.0	**9**
25 / 1"	19 / 3/4"	1263.9	917.5	346.4	
19 / 3/4"	12.5 / 1/2"	1247.2	826.4	420.8	
12.5 / 1/2"	9.5 / 3/8"	1232.3	815.6	416.7	
9.5 / 3/8"	6.3 / 1/4"				
6.3 / 1/4"	4.75 / #4				
4.75 / #4	2.36 / #8				
2.36 / #8	1.68 / #12		971.0		
Subtotal		5001.5	4540.6	460.9	

*Note: This is the final intact mass retained on #12 sieve after washing and oven dry.

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Geo-Lab Report (Part 2)

Revision # 0

Report Date:	*February 10, 2025*
Client:	*Worley Canada Services Ltd.*
Address:	*Suite 200, 2930 Virtual Way, Vancouver, BC V5M 0A5*
Attn:	*Jeff Gibson*
Project No:	*317086-54170*
Project Name:	*Grise Fiord*
Solum Job No.:	*00101241218(456)*

Sample Received Date: October 24, 2024

Sample Quantity: 7 pails

Test	Quantity	Destination
WATER CONTENT	3	D2216
ATTERBERG LIMITS	4	D4318
PARTICLE-SIZE ANALYSIS (FULL GRADATION)	13	D6913 & D7928
LA ABRASION TEST (Aggregates < 1.5")	1	C131
RIPRAP TEST SUITE (INCL. GS, ABSORPTION & DURABILITY INDEX)	1	CT206 & CT229
SOUNDNESS FOR COARSE AGGREGATES	1	C88

President: Saad Farag

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SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Sulphate Soundness Test of Coarse Aggregates (ASTM C 88)

Project Info:	*317086-54170 / Grise Fiord*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101241218(456)*		
Sample ID:	*Moraine*		
Visual Description:	*boulders. Crushed specimens were tested.*		

Solution: Magnesium Sulphate, freshly prepared Cycle Numbers : **5**

Test Results

Sieve Size	Target Mass (g)	Grading of Original Sample, % (a)	Weight of Test Fractions Before Test, g (b)	Weight Fractions After Test, g (c)	Percentage Passing Designated Sieve After Test, % (d) d=(b-c)/b	Weighted Percentage Loss, % (e) (e=a x d)
100 mm(4 in) to 90 mm (3½ in)	7000	---	---	---	---	---
90 mm(3½ in) to 75 mm (3 in)	7000	---	---	---	---	---
75 mm(3 in) to 63 mm (2½ in)	7000	---	---	---	---	---
63 mm(2½ in) to 37.5 mm (1½ in)	5000	32.1	5057.4	5056	0.0	0.0
37.5 mm(1½ in) to 19.0 mm (¾ in)	1500	59.2	1624	1623	0.1	0.0
19.0 mm(3/4 in) to 9.5 mm (3/8 in)	1000	6.2	489	487	0.4	0.0
9.5 mm(3/8 in) to 4.75 mm(No.4)	300	2.5	112	110	1.8	0.0
< 4.75 mm(No.4)	---	0.0	---	---	---	---
Totals		100.0				**0.1**

SOLUM™
CONSULTANTS LTD.

GEOTECHNICAL & MATERIAL
TESTING LABORATORY

STANDARD LABORATORY TERMS AND CONDITIONS

1.0 Description of Services to be Performed by Solum Consultants Ltd. (Solum)

Solum shall provide geotechnical and material laboratory testing services on samples in accordance with these terms and conditions and executed Laboratory Testing Request Forms. Solum shall perform its work in accordance with accepted laboratory standards, such as ASTM, CSA or client's specific specs, as well as accepted standard operating procedures. Solum reserves the right to modify methods as necessary based upon experience and/or current scientific literature. If the Client requests a manner of analysis that varies from standard operating or recommended procedures, the Client shall not hold Solum responsible for the results. Such variations of analysis will be noted on the reports. Solum reserves the right to subcontract laboratory testing if a particular test cannot be performed by Solum.

2.0 Reports, Confidentiality and Third Parties

Laboratory reports provided by Solum will be composed of a cover page, tables and figures if applicable. Reports will be e-mailed in PDF format to the individual(s) specified on the Laboratory Testing Request Forms. Laboratory reports may also be faxed or mailed to the Client upon request. Except as required by law, Solum shall not disclose testing results or reports to any party other than the Client, unless the Client, in writing, requests information to be provided to a third party. Solum shall abide by any additional confidentiality requirements requested by the Client provided that such requirements are provided to Solum at or before execution of the testing.

Information provided by Solum is intended for Client use only. Any use by a third party, of reports or documents authored by Solum, or any reliance on or decisions made by a third party based on the findings described in said documents, are the sole responsibility of such third parities, and Solum accepts no responsibility of damages suffered by any third party as a result of decisions made or actions conducted.

3.0 Laboratory Testing Request Form (Chain of Custody)

The laboratory testing request form must be completed by the Client and be accompanied with the samples. Other form of COC may be accepted; however, the condition of Solum COC is still applied. Testing will not commence until the laboratory testing request form has been completed. If requested by the Client, Solum shall provide a copy of the laboratory testing request form with the report.

No persons other than the designated representatives for each Laboratory Testing Request Form are authorized to act regarding changes to the testing request form. Any changes or amendments of the laboratory testing request form must be in writing and be completed by the originator.

4.0 Acceptance, Contamination and Disposal of Samples

Loss or damages to samples remains the responsibility of the Client until Solum representatives acceptance of samples by notation on the laboratory testing request form.

As to any samples that are suspected of containing hazardous substances, the Client will specify the suspected or known substance and level of contamination. This information is to be stated on the laboratory testing request form and be accompanied with the samples before testing can commence. Solum may refuse acceptance of samples if it determines they present a risk to health and safety.

Samples accepted by Solum shall remain the property and liability of the Client while in the custody of Solum. Solum will discard all non-contaminated samples after two weeks of submitting lab report or a month from the date of receiving the samples without additional retention period at a fixed disposal charge, or if requested by the Client, samples may be returned to the Client at no cost to Solum. If requested by client, Solum will store samples provided the client agrees to pay for the storage charge. Contaminated material may be returned/shipped to the Client at the Client's expense or Solum will discard samples with disposal rates varying for samples containing higher levels of contamination, refer to price list.

Soil samples requested to be stored will be stored inside the lab up to the expiration of storage period. Soil samples will be discarded upon the expiration date of the storage period unless client requests either extending storage period or return samples back to client at no cost to Solum.

5.0 Indemnification/Hold Harmless

Solum shall protect, indemnify and save harmless Client, and its directors, officers, employees, agents, representatives, invitees and subcontractors, and at Client's request, investigate and defend such entities form and against all claims, demands and causes of action, of every kind and character, without limitation, arising in favour of or made by third parties, on account of bodily injury, death or damage to or loss of their property resulting from any negligent act or wilful misconduct of Solum.

The Client shall protect, indemnify and save harmless Solum, and its directors, officers, employees, agents, representatives, invitees and subcontractors, and at Solum's request, investigate and defend such entities form and against all claims, demands and causes of action, of every kind and character, without limitation, arising in favour of or made by third parties, on account of bodily injury, death or damage to or loss of their property resulting from any negligent act or wilful misconduct of Client.

6.0 Limitation of Liability

The total liability of Solum or its staff whether based in contract or tort, will be limited to the lesser of the fees paid or actual damages incurred by the Client. Solum will not be responsible for any consequential or indirect damages even if caused by negligence of Solum. Solum will only be liable for damages resulting form negligence of Solum. All claims by the Client shall be deemed relinquished if not made within one year after the testing date. No warranty is either expressed or implied, or intended by any agreement or by furnishing oral or written reports or findings.

7.0 Termination of Testing Work Order

The Client may order work suspended or terminated upon seven days advance written notice. If work is suspended, Solum shall receive, upon resumption, an adjustment in the cost of services to compensate for additional costs incurred due to the interruption of services. Upon suspension or termination, Solum shall preserve samples provided that the Client agrees to pay the sample storage charge.

8.0 Pricing, Payments and Invoicing

Invoices will be based on most current Solum laboratory testing rates; rates may change without notice. Solum invoices shall be paid within thirty (30) days of receipt of the invoice. Amounts not paid when due shall bear interest at the rate of 18% per annum from the date due until the date of payment.

SOLUM CONSULTANTS LTD.

GEOTECHNICAL & MATERIAL TESTING LABORATORY

Geo-Lab Report

Revision # 0

Report Date:	*June 5, 2025*
Client:	*Worley Canada Services Ltd.*
Address:	*49 Quarry Park Blvd SE, Calgary, AB T2C 5H9*
Attn:	*Denise Falk*
Project No:	*317086-54170*
Project Name:	*Grise Fiord , Nunavut*
Solum Job No.:	*00101250516(185)*

Sample Received Date: May 16, 2025

Sample Quantity: 2 pails

Test	Quantity	Destination
WATER CONTENT	19	D2216
ATTERBERG LIMITS	14	D4318
PARTICLE-SIZE ANALYSIS (FULL GRADATION)	24	D6913 & D7928



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SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Laboratory Analysis Summary Sheet

Project Info: *317086-54170 / Grise Fiord , Nunavut*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

Reviewed *S. F.*



* Note: Soil classification is for material less than 0.425 mm (material used for Atterberg Limits), this includes the fine sand, silt and clay fraction of the sample.

** Note: Soil classification is for the whole sample. Soil classification uses the Atterberg Limits results and the percent fines, percent sand and percent gravel as described in ASTM D2487.

Borehole ID	Sample ID	Depth (m)	Atterberg Limits				Particle Size Analysis					Soil Classification** Group Symbols
			Liquid Limit(%)	Plastic Limit(%)	Plastic Index(%)	Classification* (USCS)	Cobble Size (%) (75-300mm)	Gravel Size (%) (4.75-75mm)	Sand Size (%) (0.075-4.5mm)	Silt Size (%) (0.002-0.075 mm)	Clay Size (%) (<0.002mm)	
BH25-04	SS01	0.00-0.40	---	---	---	---	0.0	37.9	46.6	12.1	3.4	---
BH25-04	SS02	1.40-2.00	---	---	---	---	0.0	62.5	29.9	6.1	1.5	---
BH25-04	SS05	5.77-6.37	---	---	---	---	0.0	3.6	46.2	40.7	9.5	---
BH25-04	GB01	9.90-10.20	---	---	---	---	0.0	0.0	8.6	80.6	10.8	---
BH25-04	SS09	11.35-11.75	34	17	17	CL	0.0	1.6	12.4	72.0	14.0	CL
BH25-04	SS11	14.35-15.18	30	15	15	CL	0.0	0.0	41.7	47.0	11.3	CL
BH25-05	SS02	1.19-1.79	---	---	---	---	0.0	82.7	16.1	0.9	0.3	---
BH25-05	SS03	2.58-3.10	---	---	---	---	0.0	50.6	42.1	5.6	1.7	---
BH25-05	SS05	4.96-5.56	---	---	---	---	0.0	61.3	30.7	7.0	1.0	---
BH25-06	SS01	0.00-0.60	34	17	17	CL	0.0	19.3	23.6	48.1	9.0	CL
BH25-06	SS03	2.78-3.38	42	17	25	CL	0.0	0.7	15.1	67.9	16.3	CL
BH25-06	SS04	4.52-5.12	45	19	26	CL	0.0	0.5	17.7	73.2	8.6	CL
BH25-06	SS07	8.39-9.87	36	17	19	CL	0.0	4.3	18.2	64.3	13.2	CL

SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Laboratory Analysis Summary Sheet

Project Info: *317086-54170 / Grise Fiord , Nunavut*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

Reviewed *S. F.*



* Note: Soil classification is for material less than 0.425 mm (material used for Atterberg Limits), this includes the fine sand, silt and clay fraction of the sample.

** Note: Soil classification is for the whole sample. Soil classification uses the Atterberg Limits results and the percent fines, percent sand and percent gravel as described in ASTM D2487.

Borehole ID	Sample ID	Depth (m)	Atterberg Limits				Particle Size Analysis					Soil Classification** Group Symbols
			Liquid Limit(%)	Plastic Limit(%)	Plastic Index(%)	Classification* (USCS)	Cobble Size (%) (75-300mm)	Gravel Size (%) (4.75-75mm)	Sand Size (%) (0.075-4.5mm)	Silt Size (%) (0.002-0.075 mm)	Clay Size (%) (<0.002mm)	
BH25-06	SS11	14.55-15.15	49	22	27	CL	0.0	3.4	18.0	67.6	11.0	CL
BH25-07	SS01	0.00-0.56	---	---	---	---	0.0	40.0	36.4	18.0	5.6	---
BH25-07	SS02	1.29-1.73	21	12	9	CL	0.0	44.2	30.5	21.7	3.6	GC
BH25-07	GB01	2.10-2.50	22	13	9	CL	0.0	38.5	27.1	28.0	6.4	GC
BH25-07	SS04	3.89-4.49	30	16	14	CL	0.0	3.7	20.0	62.7	13.6	CL
BH25-08	SS01	0.00-1.41	20	12	8	CL	0.0	32.1	30.9	28.9	8.1	GC
BH25-08	GB01	4.55-4.70	26	14	12	CL	0.0	7.5	31.0	49.1	12.4	CL
BH25-08	SS06	8.00-8.21	29	16	13	CL	0.0	3.2	26.8	50.3	19.7	CL
BH-25-09	SS02	1.10-1.70	---	---	---	---	0.0	64.0	30.0	4.5	1.5	---
BH-25-09	SS04	4.10-4.30	---	---	---	---	0.0	34.3	51.3	12.7	1.7	---
BH-25-09	GB01	6.30-6.50	21	12	9	CL	0.0	5.4	25.2	53.8	15.6	CL

SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Water (Moisture) Content (ASTM D2216)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed b* *S. F.*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

Borehole ID	Sample ID	Test No.	Wet soil wt + Tare (g)	Dry soil wt + Tare (g)	Wt of water (g)	Tare (g)	Dry soil weight (g)	MC
BH 25-04	SS01	1	81.11	75.01	6.10	10.63	64.38	**9.5**
BH 25-04	SS02	2	94.60	88.42	6.18	11.20	77.22	**8.0**
BH 25-04	SS05	3	81.57	69.29	12.28	11.15	58.14	**21.1**
BH 25-04	SS09	4	89.06	77.64	11.42	10.71	66.93	**17.1**
BH 25-04	SS11	5	97.08	82.37	14.71	10.91	71.46	**20.6**
BH 25-05	SS02	6	60.48	57.64	2.84	10.79	46.85	**6.1**
BH 25-05	SS05	7	89.22	83.20	6.02	10.73	72.47	**8.3**
BH 25-06	SS01	8	69.69	58.28	11.41	10.99	47.29	**24.1**
BH 25-06	SS03	9	77.42	67.70	9.72	10.83	56.87	**17.1**
BH 25-06	SS04	10	86.23	74.02	12.21	11.17	62.85	**19.4**
BH 25-06	SS07	11	88.74	77.29	11.45	10.03	67.26	**17.0**
BH 25-06	SS11	12	74.63	64.13	10.50	10.85	53.28	**19.7**
BH 25-07	SS02	13	78.21	72.98	5.23	10.59	62.39	**8.4**
BH 25-07	GB01	14	105.41	96.92	8.49	10.93	85.99	**9.9**
BH 25-07	SS04	15	82.55	73.30	9.25	11.01	62.29	**14.8**
BH 25-08	SS01	16	100.67	90.55	10.12	10.85	79.70	**12.7**
BH 25-08	GB01	17	72.03	64.90	7.13	10.98	53.92	**13.2**
BH 25-08	SS06	18	86.09	76.41	9.68	10.80	65.61	**14.8**
BH 25-09	GB01	19	80.48	73.01	7.47	10.92	62.09	**12.0**

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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Atterberg Limits (ASTM D4318 - Method A)

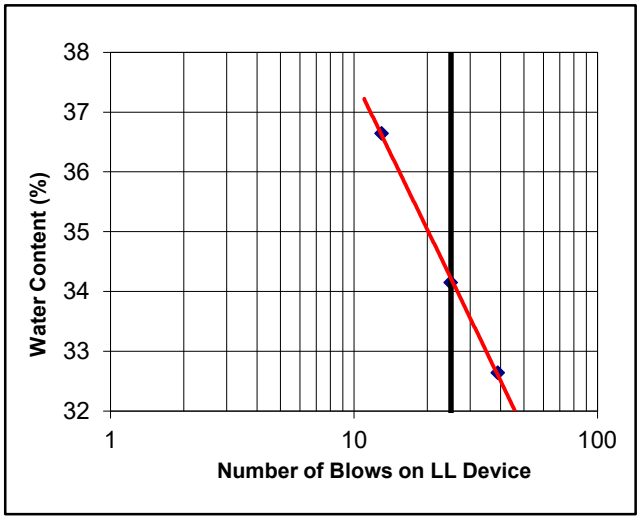
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-04 SS09 11.35-11.75 m***

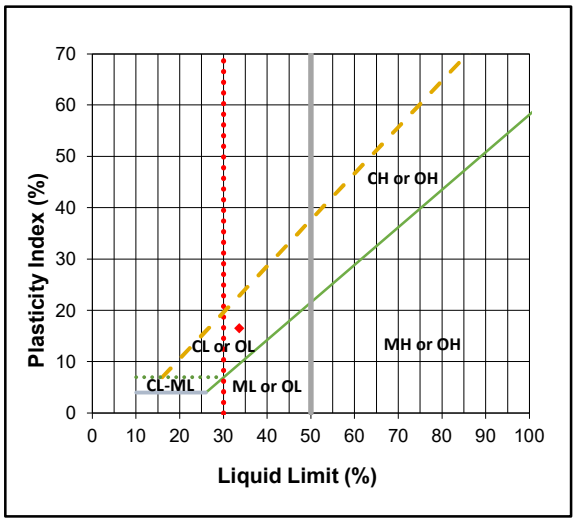
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	13	25	39		
$W_{Wet\ Soil}$ + Tare (g)	34.78	36.81	35.00		
$W_{Dry\ Soil}$ + Tare (g)	26.96	28.87	27.77		
W_{Water} (g)	7.82	7.94	7.23		
Tare (g)	5.62	5.62	5.62		
$W_{Dry\ Soil}$ (g)	21.34	23.25	22.15	**Water Content (%)**	17.1
Water Content (%)	36.6	34.2	32.6		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	22.17	19.59
$W_{Dry\ Soil}$ + Tare (g)	19.75	17.56
W_{Water} (g)	2.42	2.03
Tare (g)	5.69	5.60
$W_{Dry\ Soil}$ (g)	14.06	11.96
Water Content (%)	17.2	17.0
Average Mc (%)	17.1	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
34	**17**	**17**	**CL**





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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Atterberg Limits (ASTM D4318 - Method A)

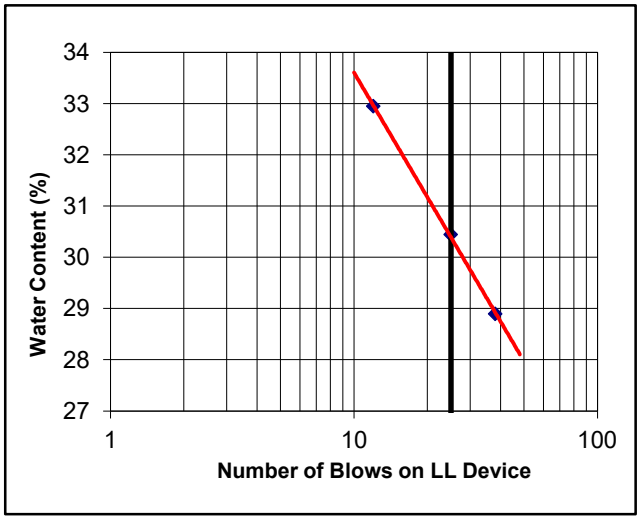
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-04 SS11 14.35-15.18 m***		

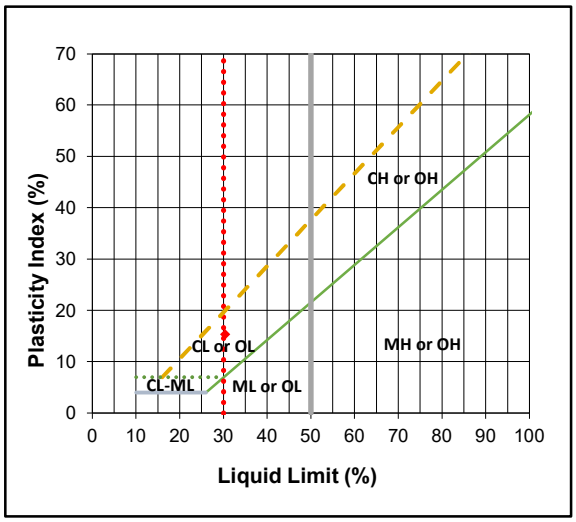
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	12	25	38		
$W_{Wet\ Soil}$ + Tare (g)	33.67	32.11	34.45		
$W_{Dry\ Soil}$ + Tare (g)	26.76	25.93	27.98		
W_{Water} (g)	6.91	6.18	6.47		
Tare (g)	5.79	5.63	5.59		
$W_{Dry\ Soil}$ (g)	20.97	20.30	22.39	**Water Content (%)**	20.6
Water Content (%)	33.0	30.4	28.9		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	21.18	21.85
$W_{Dry\ Soil}$ + Tare (g)	19.22	19.79
W_{Water} (g)	1.96	2.06
Tare (g)	5.79	5.59
$W_{Dry\ Soil}$ (g)	13.43	14.20
Water Content (%)	14.6	14.5
Average Mc (%)	14.6	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
30	**15**	**15**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

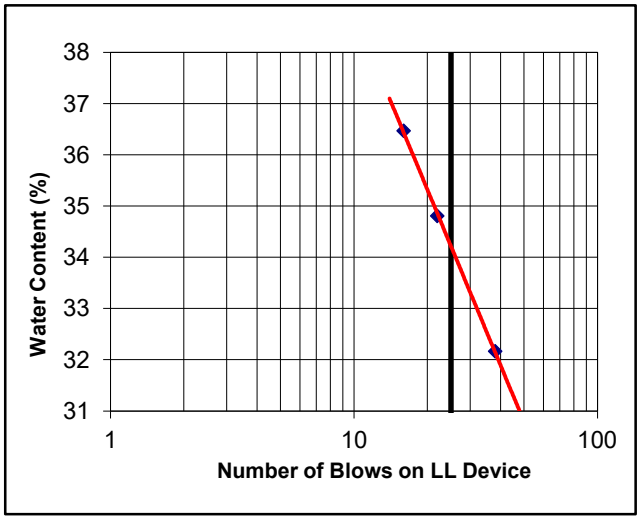
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-06 SS01 0.00-0.60 m***

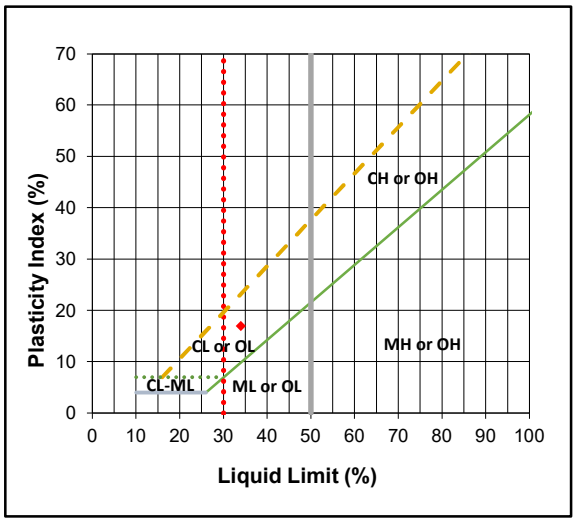
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	16	22	38		
$W_{Wet\ Soil}$ + Tare (g)	29.15	36.04	30.59		
$W_{Dry\ Soil}$ + Tare (g)	22.87	28.18	24.53		
W_{Water} (g)	6.28	7.86	6.06		
Tare (g)	5.65	5.60	5.69		
$W_{Dry\ Soil}$ (g)	17.22	22.58	18.84	**Water Content (%)**	24.1
Water Content (%)	36.5	34.8	32.2		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	24.45	20.50
$W_{Dry\ Soil}$ + Tare (g)	21.67	18.36
W_{Water} (g)	2.78	2.14
Tare (g)	5.62	5.64
$W_{Dry\ Soil}$ (g)	16.05	12.72
Water Content (%)	17.3	16.8
Average Mc (%)	17.1	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
34	**17**	**17**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

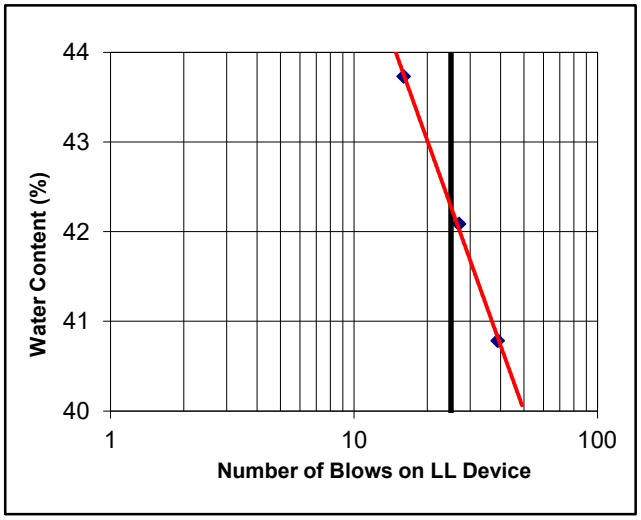
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-06 SS03 2.78-3.38 m***		

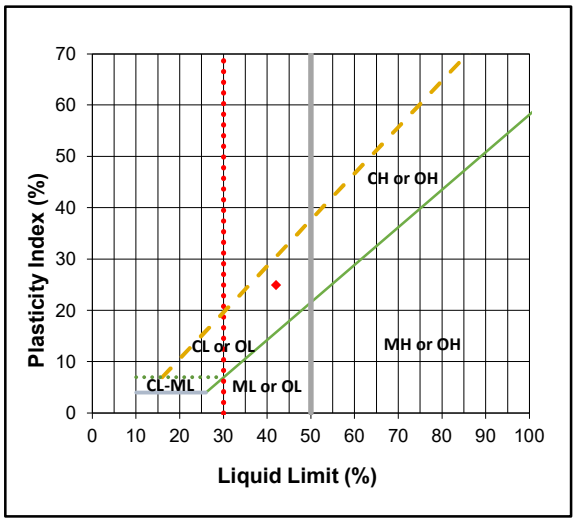
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	16	27	39		
$W_{Wet\ Soil}$ + Tare (g)	30.02	25.94	28.98		
$W_{Dry\ Soil}$ + Tare (g)	22.59	19.93	22.21		
W_{Water} (g)	7.43	6.01	6.77		
Tare (g)	5.60	5.65	5.61		
$W_{Dry\ Soil}$ (g)	16.99	14.28	16.60	**Water Content (%)**	17.1
Water Content (%)	43.7	42.1	40.8		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	14.55	16.94
$W_{Dry\ Soil}$ + Tare (g)	13.28	15.33
W_{Water} (g)	1.27	1.61
Tare (g)	5.64	5.64
$W_{Dry\ Soil}$ (g)	7.64	9.69
Water Content (%)	16.6	16.6
Average Mc (%)	16.6	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
42	**17**	**25**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

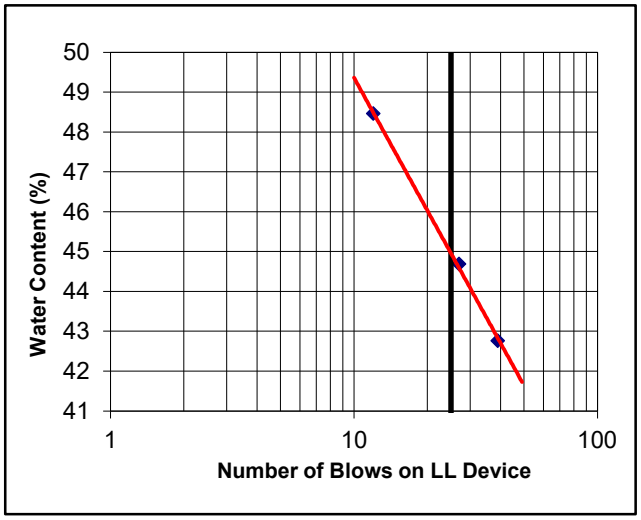
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-06 SS04 4.52-5.12 m***		

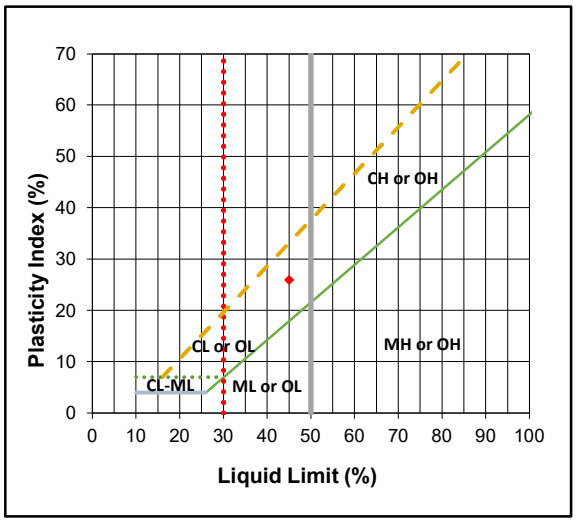
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	12	27	39		
$W_{Wet\ Soil}$ + Tare (g)	33.62	22.65	33.13		
$W_{Dry\ Soil}$ + Tare (g)	24.48	17.39	24.89		
W_{Water} (g)	9.14	5.26	8.24		
Tare (g)	5.62	5.62	5.62		
$W_{Dry\ Soil}$ (g)	18.86	11.77	19.27	**Water Content (%)**	19.4
Water Content (%)	48.5	44.7	42.8		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	20.67	17.88
$W_{Dry\ Soil}$ + Tare (g)	18.25	15.90
W_{Water} (g)	2.42	1.98
Tare (g)	5.69	5.60
$W_{Dry\ Soil}$ (g)	12.56	10.30
Water Content (%)	19.3	19.2
Average Mc (%)	19.2	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
45	**19**	**26**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

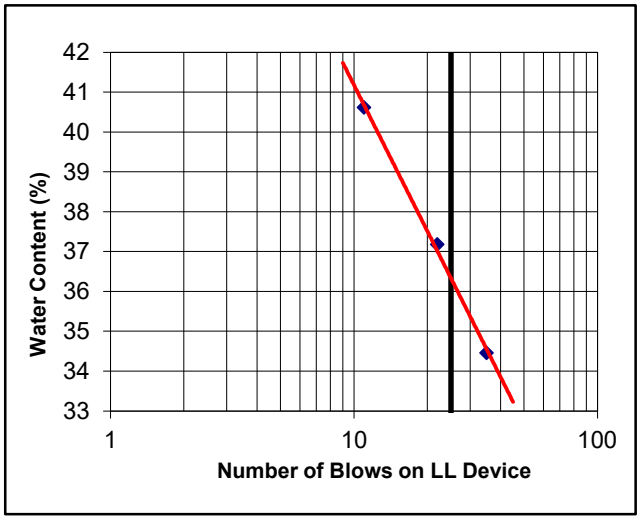
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-06 SS07 8.39-9.87 m***

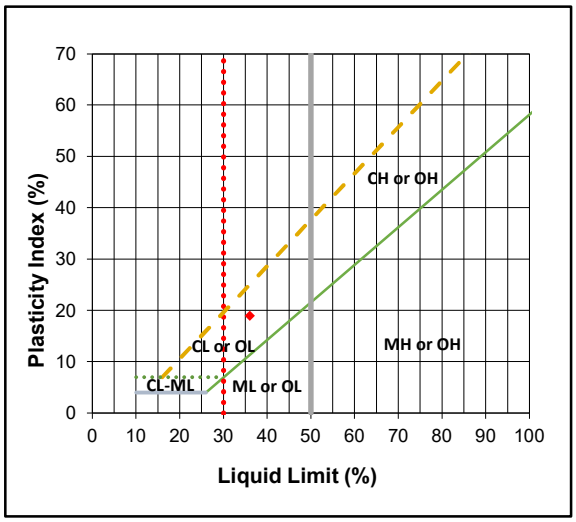
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	11	22	35		
$W_{Wet\ Soil}$ + Tare (g)	29.15	35.01	31.62		
$W_{Dry\ Soil}$ + Tare (g)	22.40	27.09	25.00		
W_{Water} (g)	6.75	7.92	6.62		
Tare (g)	5.78	5.79	5.79		
$W_{Dry\ Soil}$ (g)	16.62	21.30	19.21	**Water Content (%)**	17.0
Water Content (%)	40.6	37.2	34.5		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	19.86	20.53
$W_{Dry\ Soil}$ + Tare (g)	17.74	18.37
W_{Water} (g)	2.12	2.16
Tare (g)	5.64	5.60
$W_{Dry\ Soil}$ (g)	12.10	12.77
Water Content (%)	17.5	16.9
Average Mc (%)	17.2	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
36	**17**	**19**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

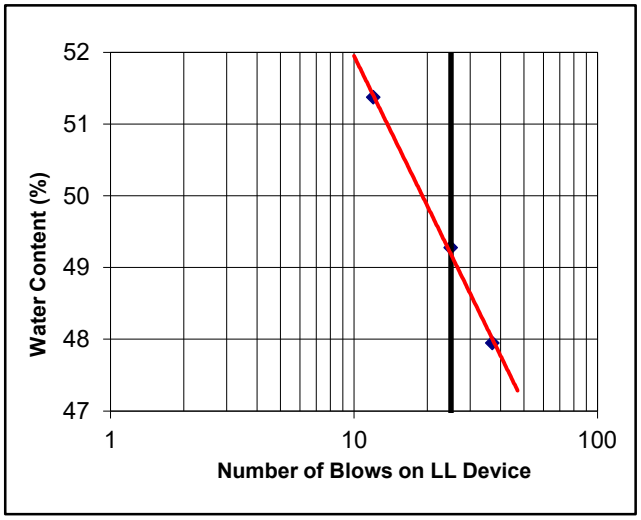
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-06 SS11 14.55-15.15 m***		

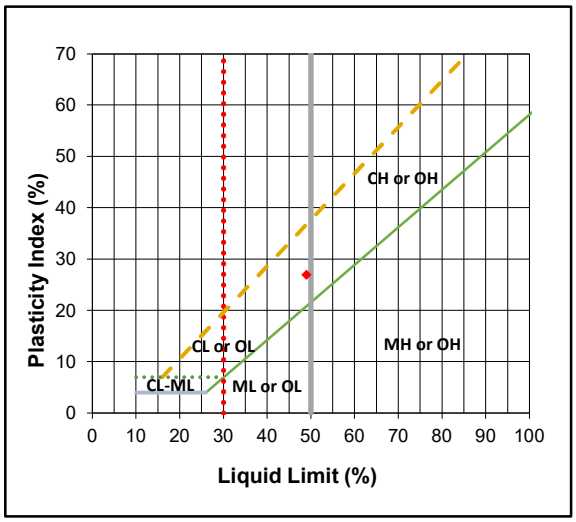
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	12	25	37		
$W_{Wet\ Soil}$ + Tare (g)	26.74	37.68	36.97		
$W_{Dry\ Soil}$ + Tare (g)	19.63	27.10	26.80		
W_{Water} (g)	7.11	10.58	10.17		
Tare (g)	5.79	5.63	5.59		
$W_{Dry\ Soil}$ (g)	13.84	21.47	21.21	**Water Content (%)**	19.7
Water Content (%)	51.4	49.3	47.9		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	23.02	21.03
$W_{Dry\ Soil}$ + Tare (g)	19.93	18.22
W_{Water} (g)	3.09	2.81
Tare (g)	5.79	5.59
$W_{Dry\ Soil}$ (g)	14.14	12.63
Water Content (%)	21.9	22.2
Average Mc (%)	22.1	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
49	**22**	**27**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

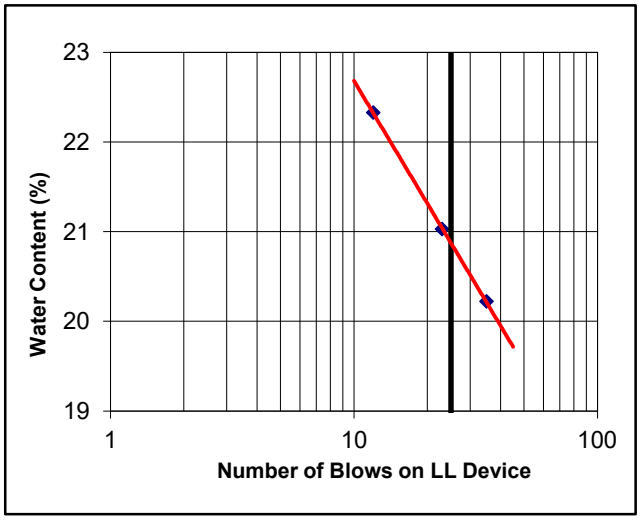
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-07 SS02 1.29-1.73 m***		

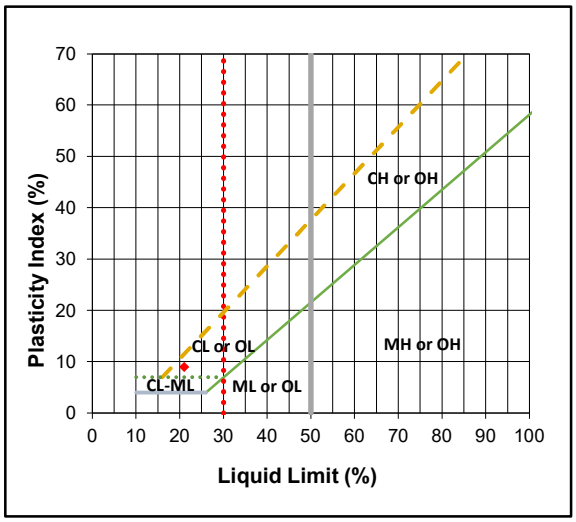
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	12	23	35		
$W_{Wet\ Soil}$ + Tare (g)	37.43	36.73	22.91		
$W_{Dry\ Soil}$ + Tare (g)	31.62	31.33	20.00		
W_{Water} (g)	5.81	5.40	2.91		
Tare (g)	5.60	5.65	5.61		
$W_{Dry\ Soil}$ (g)	26.02	25.68	14.39	**Water Content (%)**	8.4
Water Content (%)	22.3	21.0	20.2		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	21.53	18.90
$W_{Dry\ Soil}$ + Tare (g)	19.83	17.43
W_{Water} (g)	1.70	1.47
Tare (g)	5.64	5.64
$W_{Dry\ Soil}$ (g)	14.19	11.79
Water Content (%)	12.0	12.5
Average Mc (%)	12.2	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
21	**12**	**9**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

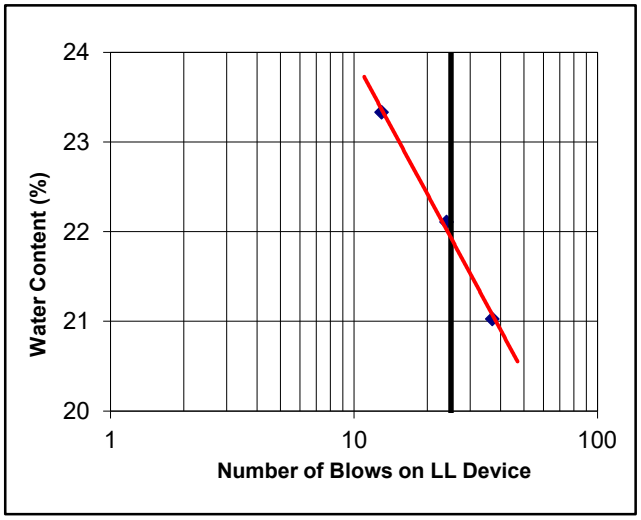
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-07 GB01 2.10-2.50 m***

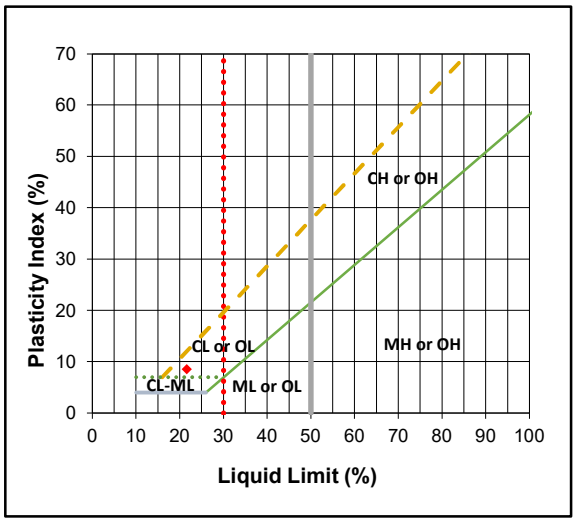
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	13	24	37		
$W_{Wet\ Soil}$ + Tare (g)	36.86	34.93	37.22		
$W_{Dry\ Soil}$ + Tare (g)	30.99	29.64	31.73		
W_{Water} (g)	5.87	5.29	5.49		
Tare (g)	5.83	5.71	5.62		
$W_{Dry\ Soil}$ (g)	25.16	23.93	26.11	**Water Content (%)**	9.9
Water Content (%)	23.3	22.1	21.0		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	29.98	24.35
$W_{Dry\ Soil}$ + Tare (g)	27.19	22.26
W_{Water} (g)	2.79	2.09
Tare (g)	5.66	5.61
$W_{Dry\ Soil}$ (g)	21.53	16.65
Water Content (%)	13.0	12.6
Average Mc (%)	12.8	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
22	**13**	**9**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by:* *S. F.*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

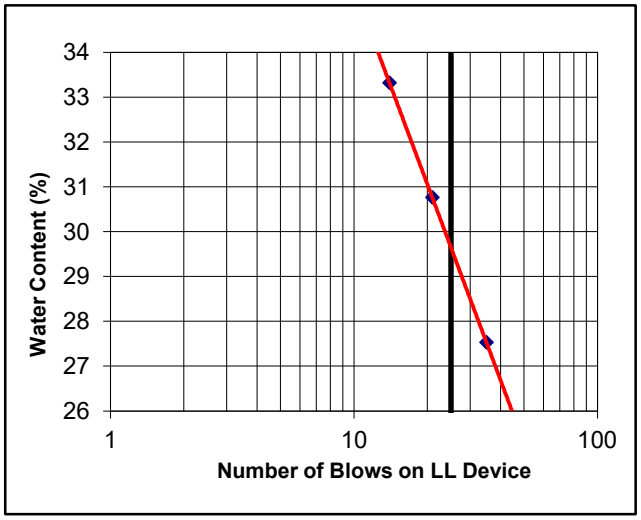
Sample Info: ***BH25-07*** ***SS04*** ***3.89-4.49 m***

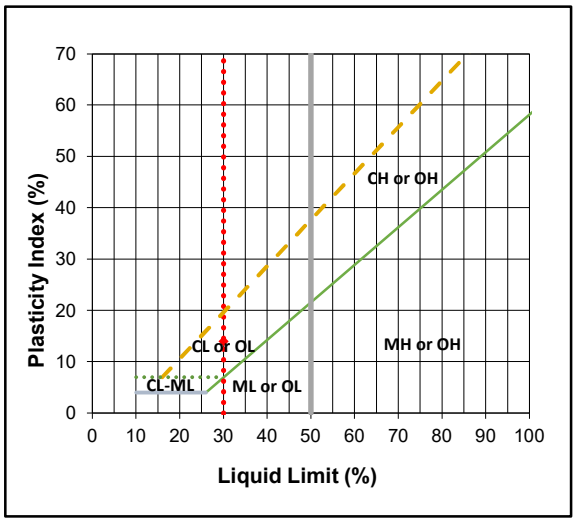
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	14	21	35		
$W_{Wet\ Soil}$ + Tare (g)	33.88	33.68	38.00		
$W_{Dry\ Soil}$ + Tare (g)	26.87	27.10	31.01		
W_{Water} (g)	7.01	6.58	6.99		
Tare (g)	5.83	5.71	5.62		
$W_{Dry\ Soil}$ (g)	21.04	21.39	25.39	**Water Content (%)**	14.8
Water Content (%)	33.3	30.8	27.5		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	24.34	25.07
$W_{Dry\ Soil}$ + Tare (g)	21.79	22.36
W_{Water} (g)	2.55	2.71
Tare (g)	5.66	5.61
$W_{Dry\ Soil}$ (g)	16.13	16.75
Water Content (%)	15.8	16.2
Average Mc (%)	16.0	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
30	**16**	**14**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

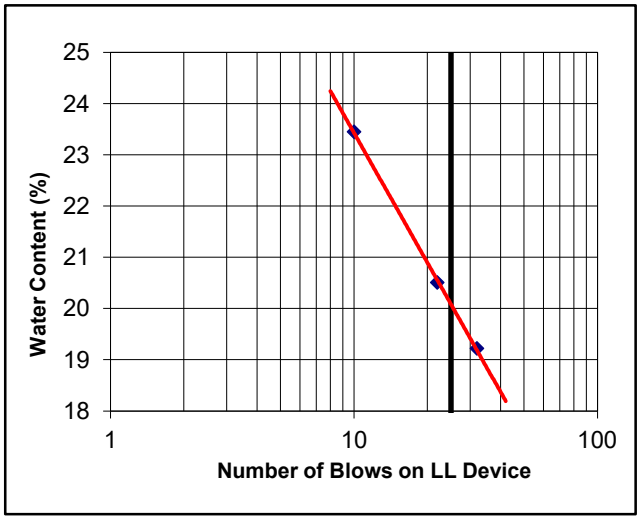
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-08 SS01 0.00-0.41 m***		

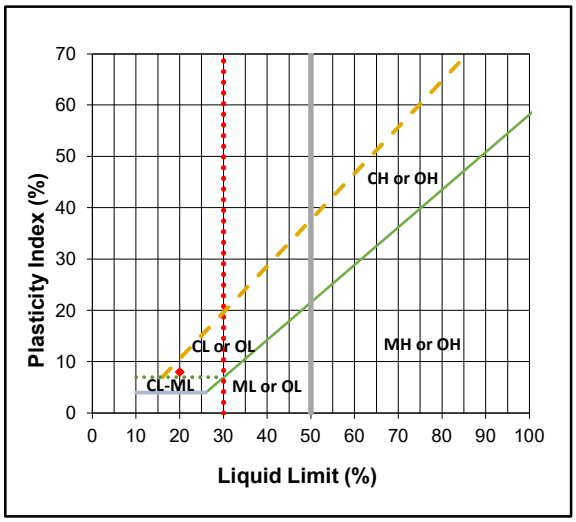
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	10	22	32		
$W_{Wet\ Soil}$ + Tare (g)	37.58	34.17	34.14		
$W_{Dry\ Soil}$ + Tare (g)	31.54	29.34	29.57		
W_{Water} (g)	6.04	4.83	4.57		
Tare (g)	5.78	5.79	5.79		
$W_{Dry\ Soil}$ (g)	25.76	23.55	23.78	**Water Content (%)**	12.7
Water Content (%)	23.4	20.5	19.2		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	20.81	19.83
$W_{Dry\ Soil}$ + Tare (g)	19.15	18.25
W_{Water} (g)	1.66	1.58
Tare (g)	5.64	5.60
$W_{Dry\ Soil}$ (g)	13.51	12.65
Water Content (%)	12.3	12.5
Average Mc (%)	12.4	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
20	**12**	**8**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

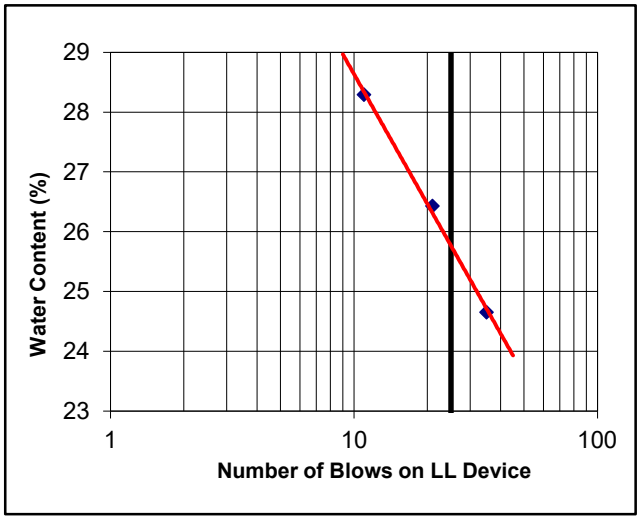
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-08 GB01 4.55-4.70 m***

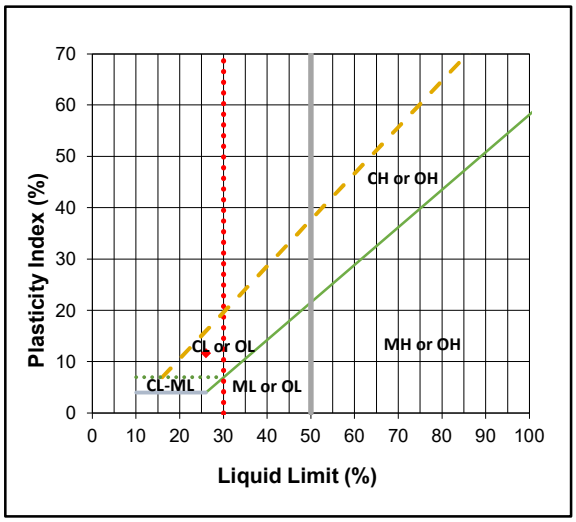
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	11	21	35		
$W_{Wet\ Soil}$ + Tare (g)	37.71	35.02	39.87		
$W_{Dry\ Soil}$ + Tare (g)	30.64	28.87	33.11		
W_{Water} (g)	7.07	6.15	6.76		
Tare (g)	5.65	5.60	5.69		
$W_{Dry\ Soil}$ (g)	24.99	23.27	27.42	**Water Content (%)**	13.2
Water Content (%)	28.3	26.4	24.7		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	23.56	25.06
$W_{Dry\ Soil}$ + Tare (g)	21.38	22.68
W_{Water} (g)	2.18	2.38
Tare (g)	5.62	5.64
$W_{Dry\ Soil}$ (g)	15.76	17.04
Water Content (%)	13.8	14.0
Average Mc (%)	13.9	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
26	**14**	**12**	**CL**





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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Atterberg Limits (ASTM D4318 - Method A)

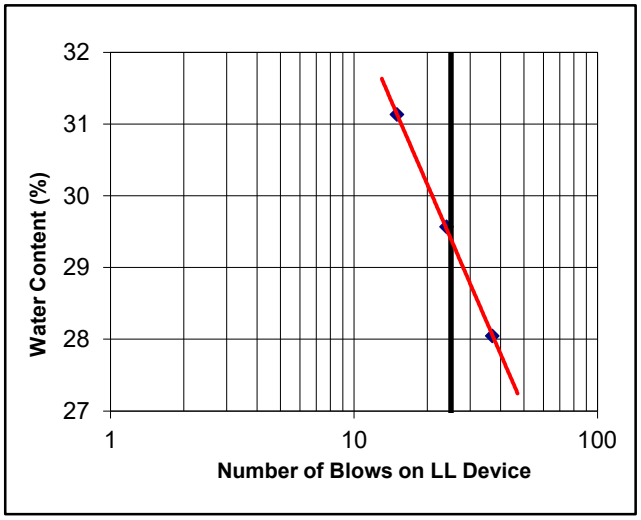
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-08 SS06 8.00-8.21 m***		

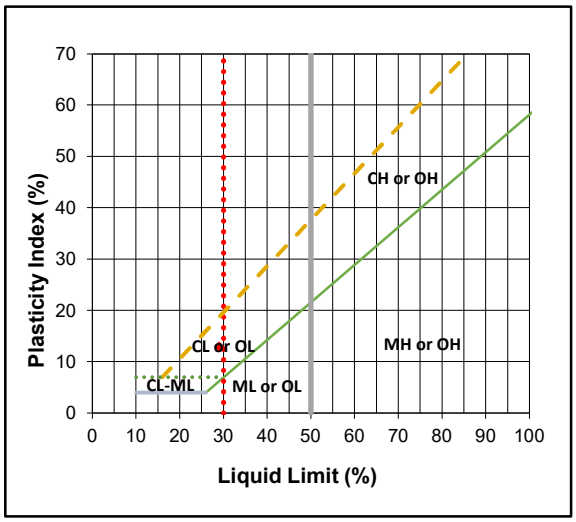
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	15	24	37		
$W_{Wet\ Soil}$ + Tare (g)	22.32	38.50	33.58		
$W_{Dry\ Soil}$ + Tare (g)	18.36	30.99	27.46		
W_{Water} (g)	3.96	7.51	6.12		
Tare (g)	5.64	5.59	5.64		
$W_{Dry\ Soil}$ (g)	12.72	25.40	21.82	**Water Content (%)**	14.8
Water Content (%)	31.1	29.6	28.0		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	23.85	21.27
$W_{Dry\ Soil}$ + Tare (g)	21.38	19.13
W_{Water} (g)	2.47	2.14
Tare (g)	5.65	5.62
$W_{Dry\ Soil}$ (g)	15.73	13.51
Water Content (%)	15.7	15.8
Average Mc (%)	15.8	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
29	**16**	**13**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

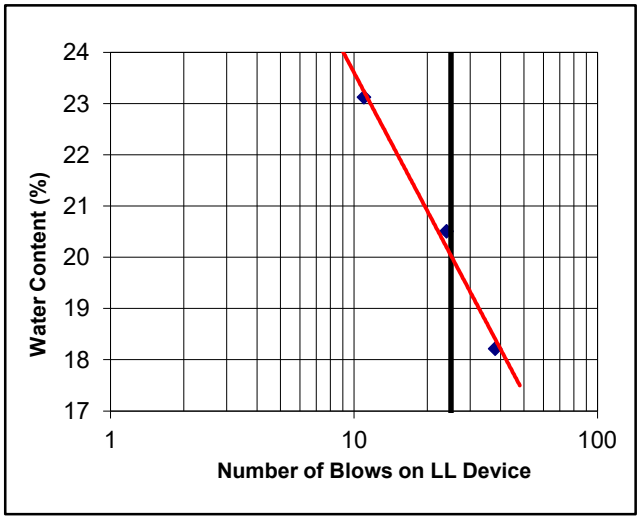
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-09 GB01 6.30-6.50 m***		

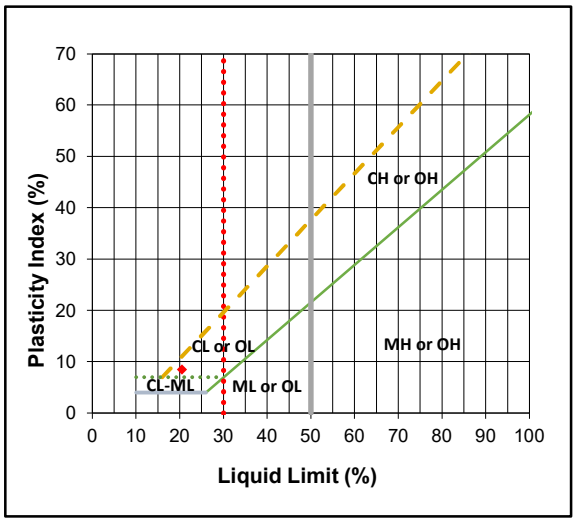
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	11	24	38		
$W_{Wet\ Soil}$ + Tare (g)	40.62	43.32	37.18		
$W_{Dry\ Soil}$ + Tare (g)	34.05	36.90	32.32		
W_{Water} (g)	6.57	6.42	4.86		
Tare (g)	5.64	5.59	5.64		
$W_{Dry\ Soil}$ (g)	28.41	31.31	26.68	**Water Content (%)**	12.0
Water Content (%)	23.1	20.5	18.2		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	20.96	20.70
$W_{Dry\ Soil}$ + Tare (g)	19.32	19.05
W_{Water} (g)	1.64	1.65
Tare (g)	5.65	5.62
$W_{Dry\ Soil}$ (g)	13.67	13.43
Water Content (%)	12.0	12.3
Average Mc (%)	12.1	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
21	**12**	**9**	**CL**





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Particle Size Analysis (ASTM D6913 & D7928)

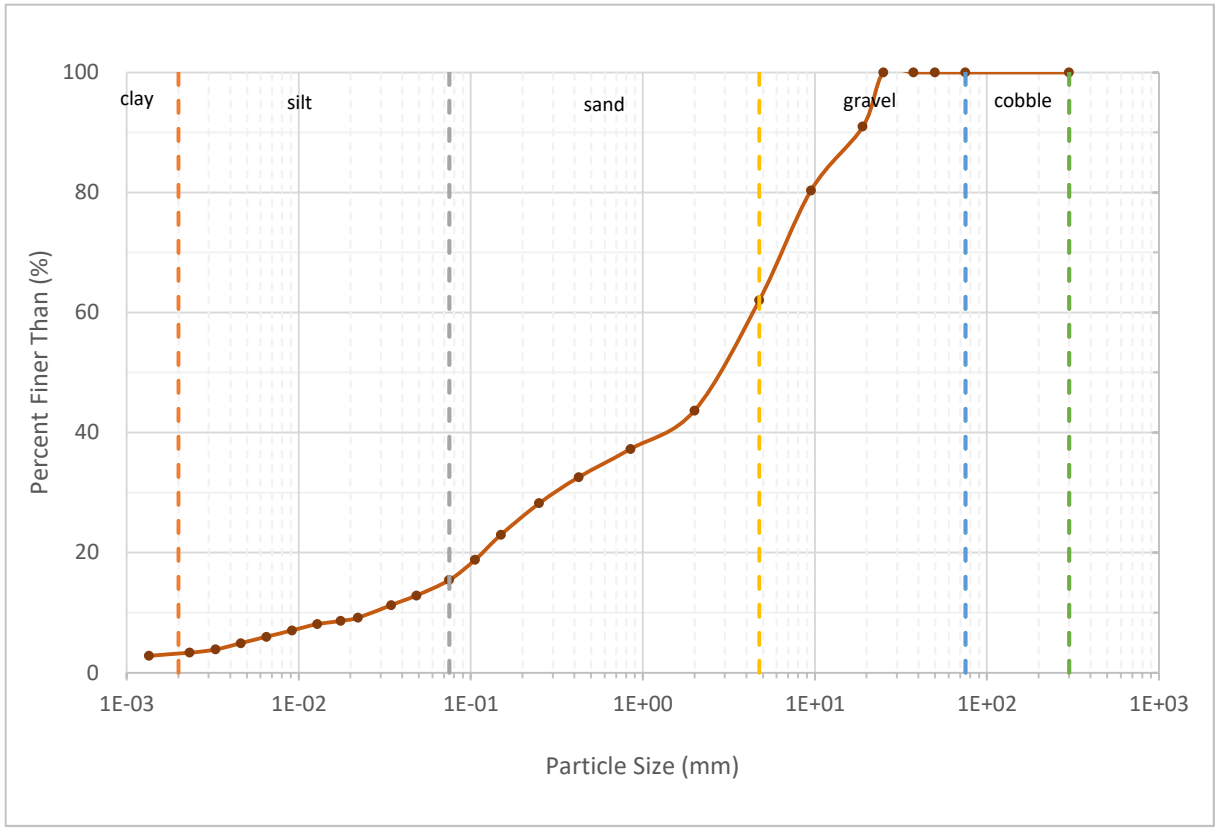
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-04*** ***SS01*** ***0.00-0.40 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	91.01
	9.500	80.36
	4.750	62.06
SAND	2.000	43.68
	0.850	37.28
	0.425	32.62
	0.250	28.26
	0.150	23.02
	0.106	18.83
	0.075	15.46
HYDROMETER	0.0484	12.88
	0.0346	11.29
	0.0221	9.18
	0.0175	8.65
	0.0129	8.12
	0.0091	7.06
	0.0065	6.00
	0.0046	4.95
	0.0033	3.89
	0.0023	3.36
	0.0013	2.83

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**37.9**	**46.6**	**12.1**	**3.4**



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Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

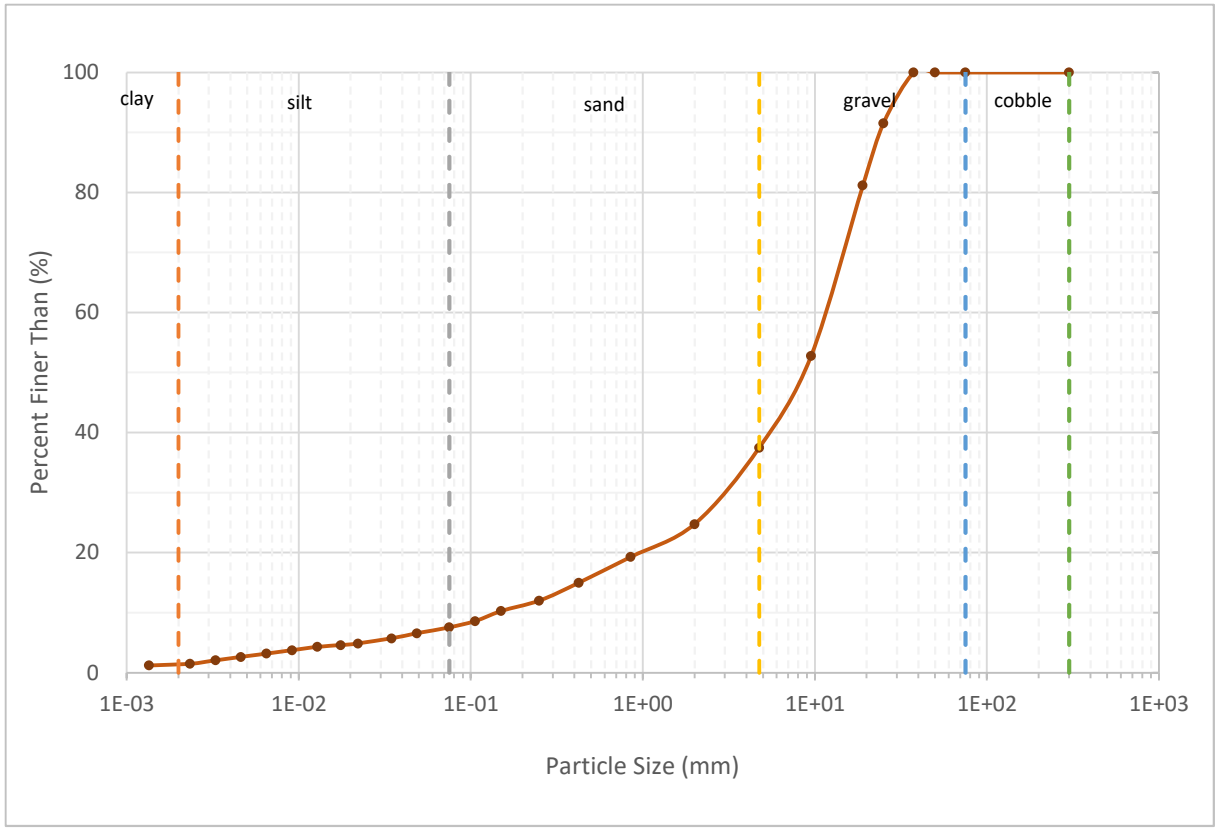
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-04*** ***SS02*** ***1.40-2.00 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	91.53
	19.000	81.20
	9.500	52.78
	4.750	37.50
SAND	2.000	24.77
	0.850	19.29
	0.425	15.02
	0.250	12.02
	0.150	10.28
	0.106	8.62
	0.075	7.57
HYDROMETER	0.0486	6.59
	0.0347	5.74
	0.0221	4.90
	0.0175	4.61
	0.0129	4.33
	0.0091	3.77
	0.0065	3.20
	0.0046	2.64
	0.0033	2.07
	0.0023	1.51
	0.0014	1.23

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**62.5**	**29.9**	**6.1**	**1.5**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

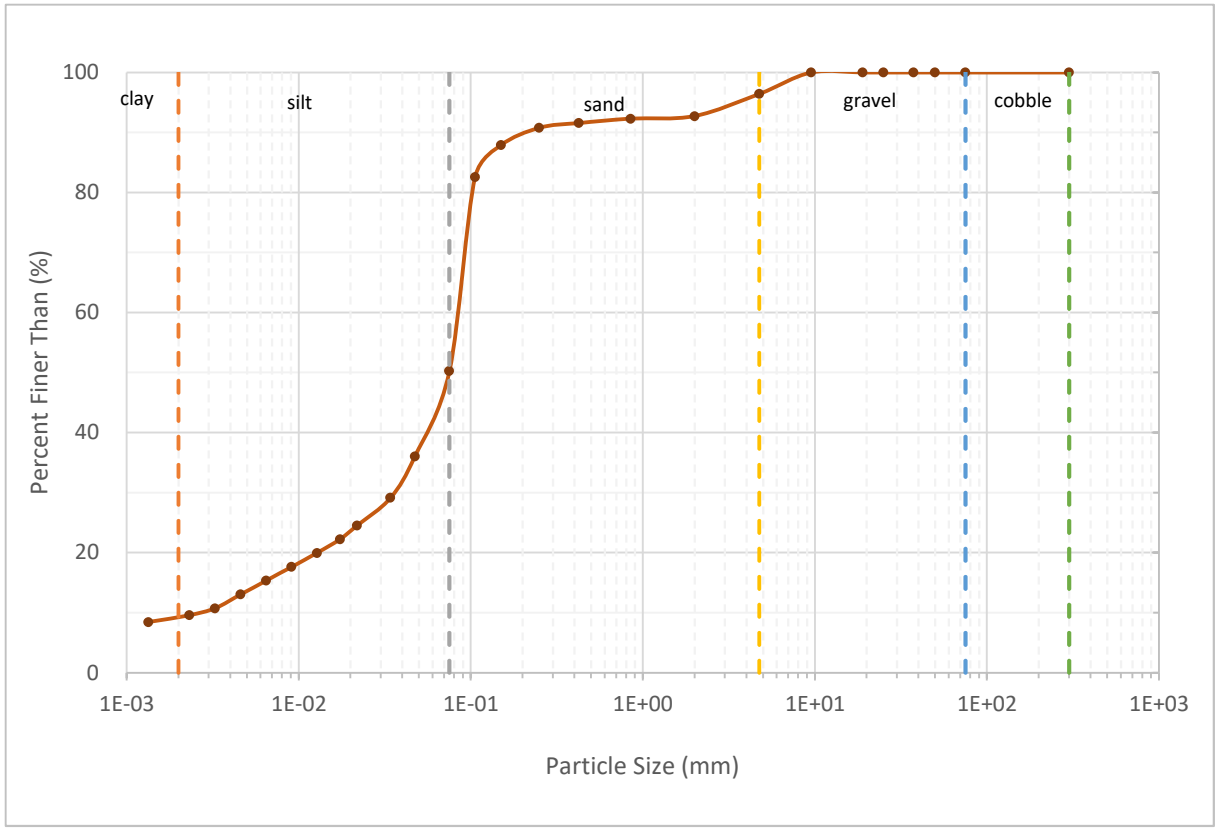
Reviewed by *S. F.*

Sample Info: ***BH25-04*** ***SS05*** ***5.77-6.37 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	96.45
SAND	2.000	92.74
	0.850	92.30
	0.425	91.59
	0.250	90.79
	0.150	87.91
	0.106	82.62
	0.075	50.27
HYDROMETER	0.0474	36.06
	0.0342	29.16
	0.0219	24.56
	0.0174	22.26
	0.0128	19.96
	0.0091	17.66
	0.0065	15.36
	0.0046	13.06
	0.0033	10.76
	0.0023	9.61
	0.0013	8.46

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**3.6**	**46.2**	**40.7**	**9.5**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

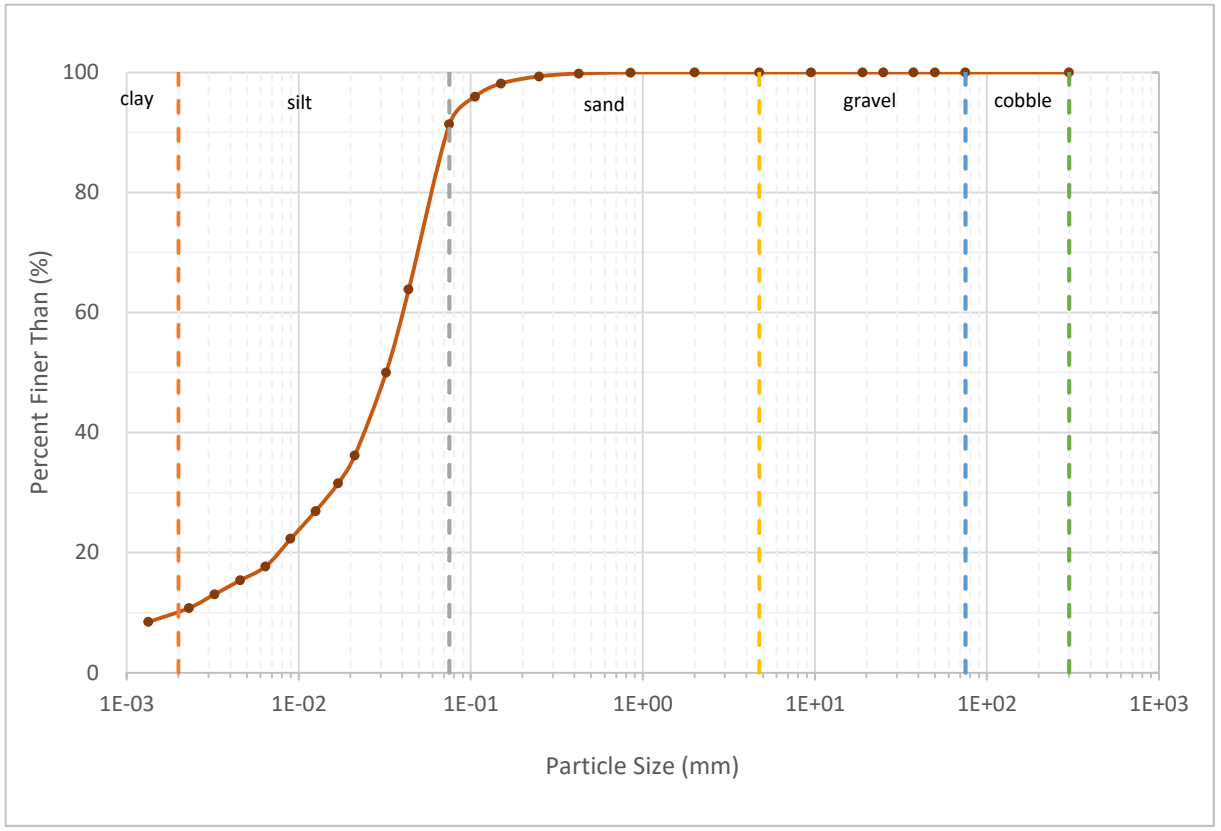
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-04*** ***GB01*** ***9.90-10.20 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	100.00
SAND	2.000	100.00
	0.850	99.98
	0.425	99.82
	0.250	99.35
	0.150	98.18
	0.106	95.98
	0.075	91.41
HYDROMETER	0.0436	63.90
	0.0322	50.05
	0.0212	36.19
	0.0170	31.57
	0.0125	26.96
	0.0090	22.34
	0.0064	17.72
	0.0046	15.41
	0.0032	13.10
	0.0023	10.79
	0.0013	8.49

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**0.0**	**8.6**	**80.6**	**10.8**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

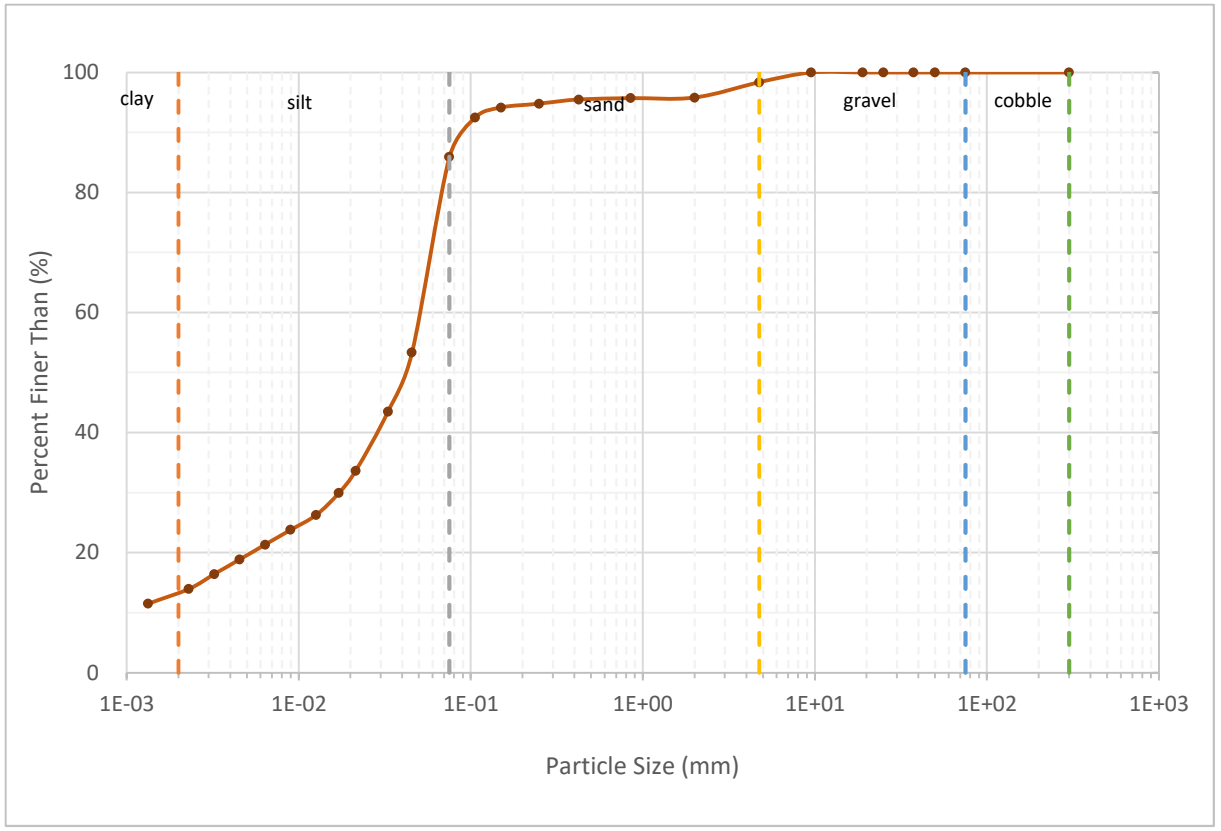
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-04*** ***SS09*** ***11.35-11.75 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	98.37
SAND	2.000	95.81
	0.850	95.74
	0.425	95.49
	0.250	94.80
	0.150	94.16
	0.106	92.49
	0.075	85.94
HYDROMETER	0.0455	53.37
	0.0331	43.52
	0.0215	33.67
	0.0171	29.98
	0.0126	26.29
	0.0090	23.82
	0.0064	21.36
	0.0045	18.90
	0.0032	16.44
	0.0023	13.97
	0.0013	11.51

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**1.6**	**12.4**	**72.0**	**14.0**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

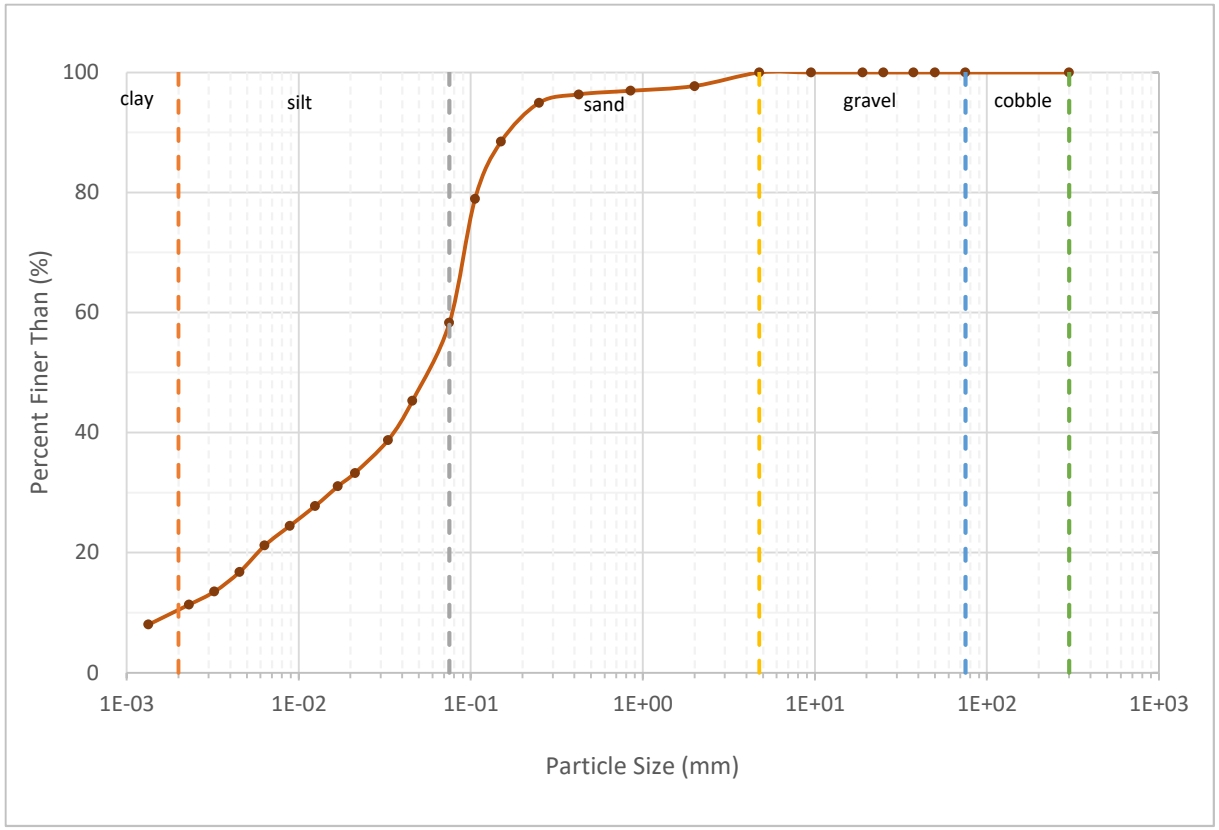
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-04*** ***SS11*** ***14.35-15.18 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	100.00
SAND	2.000	97.75
	0.850	96.96
	0.425	96.35
	0.250	94.97
	0.150	88.50
	0.106	78.98
	0.075	58.32
HYDROMETER	0.0458	45.35
	0.0331	38.77
	0.0213	33.28
	0.0169	31.09
	0.0125	27.80
	0.0089	24.51
	0.0063	21.22
	0.0045	16.83
	0.0032	13.54
	0.0023	11.35
	0.0013	8.06

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**0.0**	**41.7**	**47.0**	**11.3**



Particle Size Analysis
(ASTM D6913 & D7928)

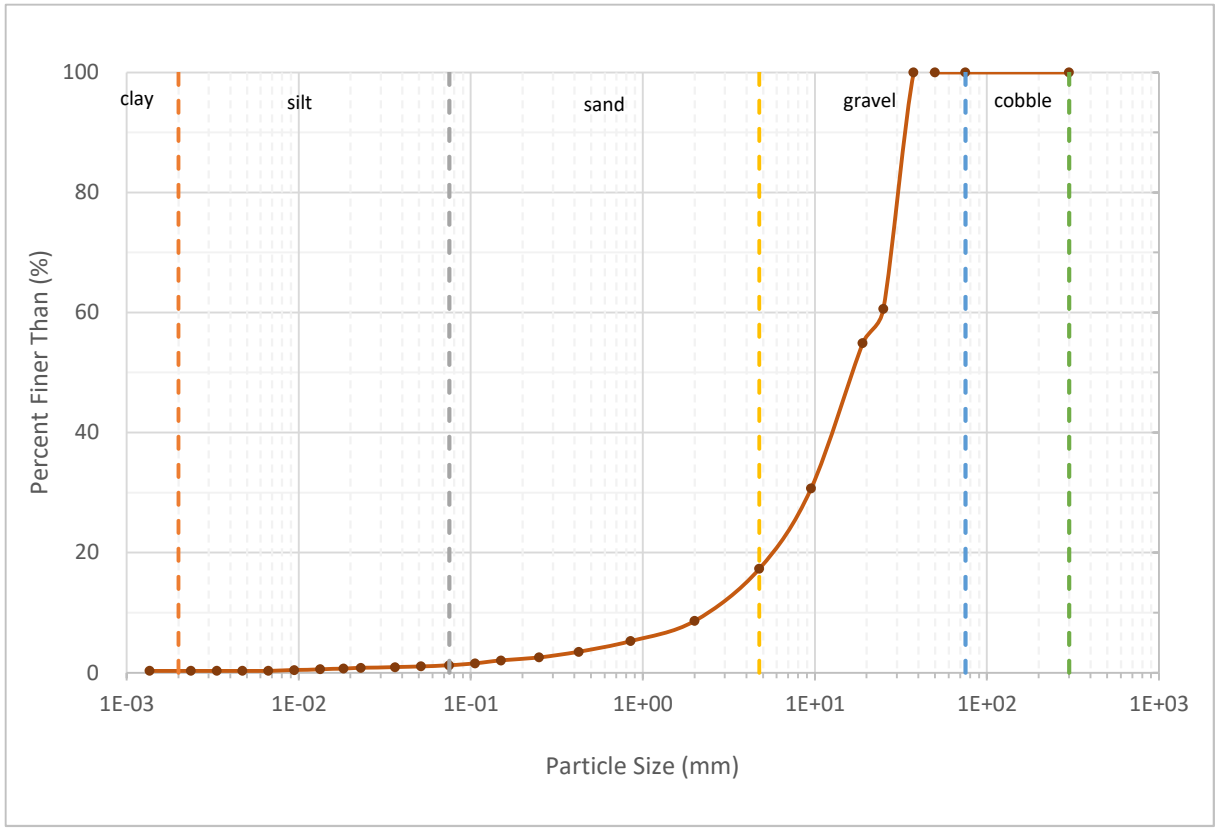
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		

Sample Info: ***BH25-05*** ***SS02*** ***1.19-1.79 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	60.64
	19.000	54.95
	9.500	30.70
	4.750	17.32
SAND	2.000	8.63
	0.850	5.29
	0.425	3.51
	0.250	2.57
	0.150	2.06
	0.106	1.59
	0.075	1.25
HYDROMETER	0.0513	1.07
	0.0364	0.95
	0.0230	0.83
	0.0182	0.70
	0.0133	0.58
	0.0094	0.46
	0.0067	0.33
	0.0047	0.33
	0.0033	0.33
	0.0024	0.33
	0.0014	0.33

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**82.7**	**16.1**	**0.9**	**0.3**



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Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

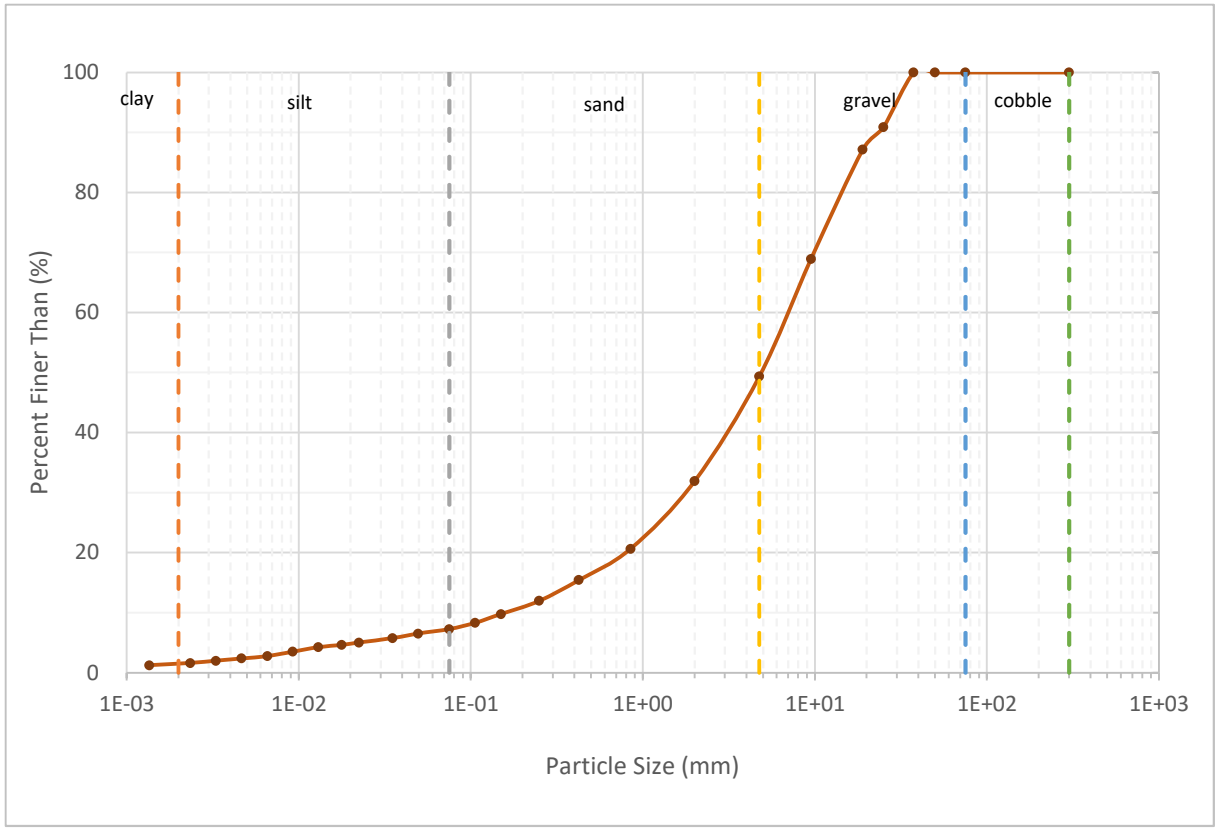
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-05*** ***SS03*** ***2.58-3.10 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	90.89
	19.000	87.18
	9.500	68.95
	4.750	49.36
SAND	2.000	31.93
	0.850	20.66
	0.425	15.47
	0.250	11.99
	0.150	9.80
	0.106	8.33
	0.075	7.29
HYDROMETER	0.0495	6.54
	0.0352	5.79
	0.0224	5.03
	0.0177	4.65
	0.0130	4.28
	0.0092	3.52
	0.0066	2.77
	0.0047	2.39
	0.0033	2.02
	0.0023	1.64
	0.0014	1.26

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**50.6**	**42.1**	**5.6**	**1.7**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

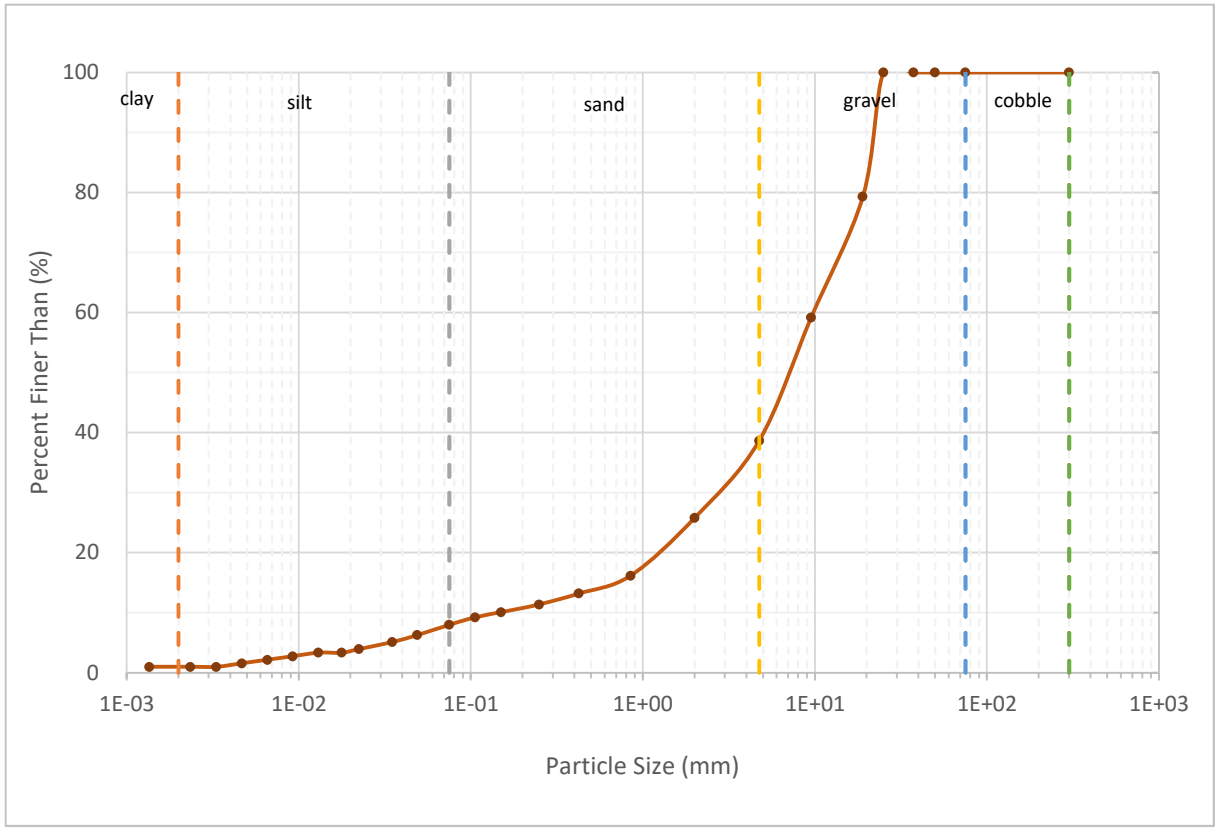
Reviewed by *S. F.*

Sample Info: ***BH25-05*** ***SS05*** ***4.96-5.56 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	79.36
	9.500	59.17
	4.750	38.67
SAND	2.000	25.81
	0.850	16.18
	0.425	13.24
	0.250	11.39
	0.150	10.11
	0.106	9.24
	0.075	8.01
HYDROMETER	0.0489	6.31
	0.0350	5.12
	0.0224	3.94
	0.0178	3.35
	0.0130	3.35
	0.0092	2.76
	0.0066	2.17
	0.0047	1.58
	0.0033	0.99
	0.0023	0.99
	0.0014	0.99

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**61.3**	**30.7**	**7.0**	**1.0**



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Particle Size Analysis (ASTM D6913 & D7928)

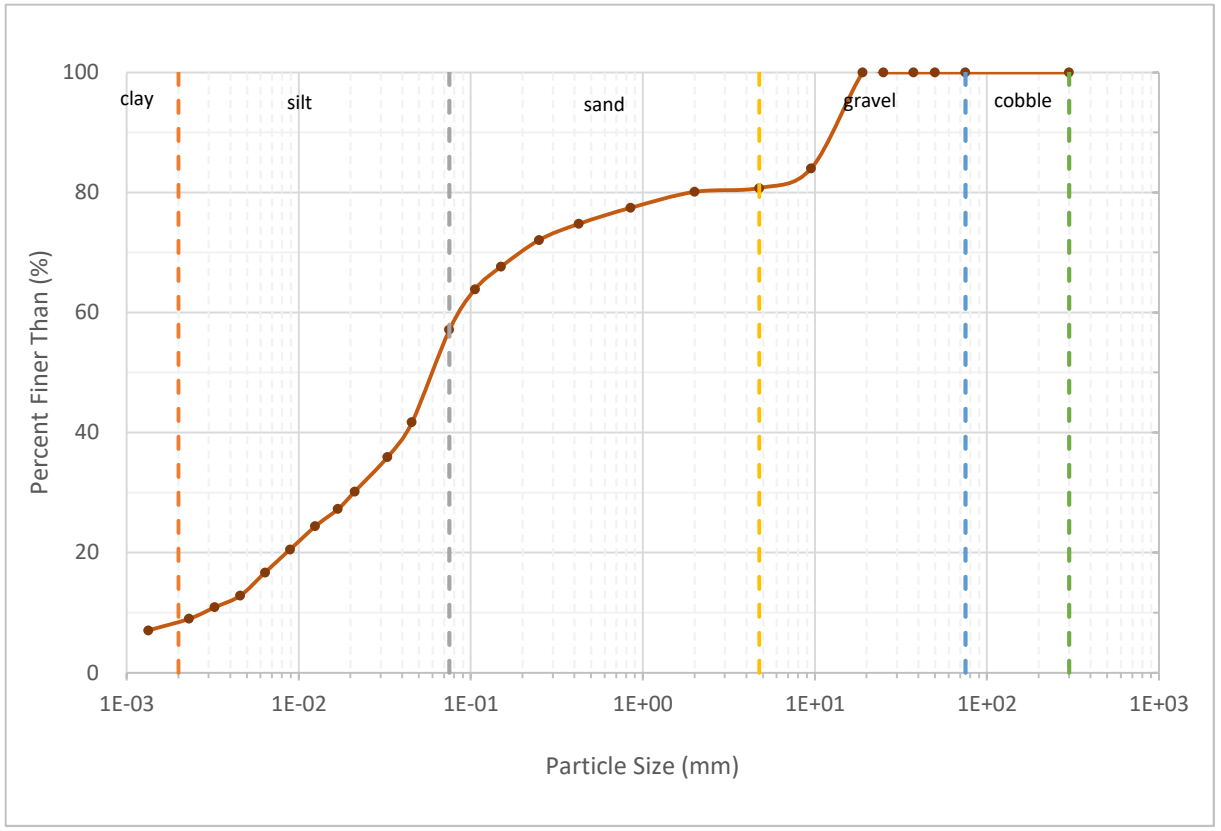
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-06*** ***SS01*** ***0.00-0.60 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	84.02
	4.750	80.74
SAND	2.000	80.12
	0.850	77.47
	0.425	74.81
	0.250	72.09
	0.150	67.66
	0.106	63.91
	0.075	57.15
HYDROMETER	0.0455	41.75
	0.0329	35.97
	0.0212	30.19
	0.0169	27.30
	0.0125	24.41
	0.0089	20.56
	0.0064	16.71
	0.0046	12.86
	0.0032	10.93
	0.0023	9.00
	0.0013	7.08

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**19.3**	**23.6**	**48.1**	**9.0**



SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

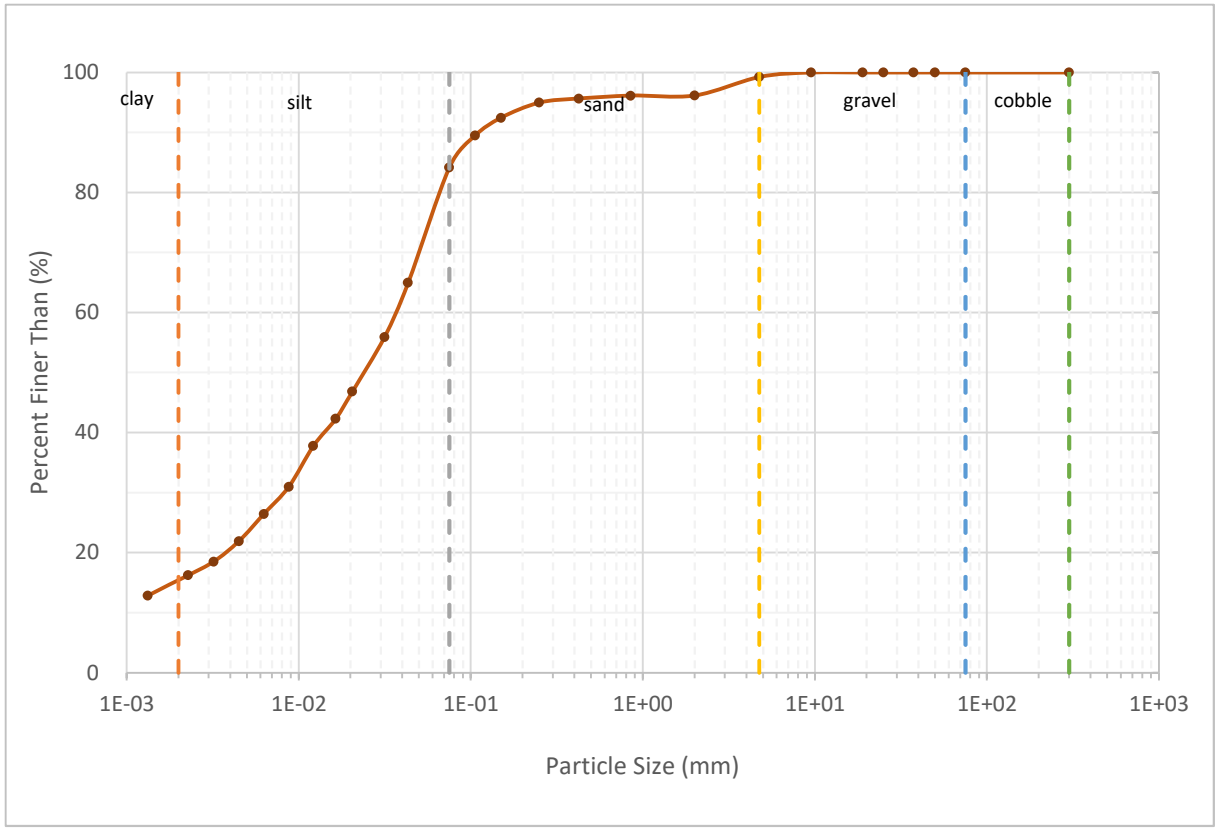
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-06*** ***SS03*** ***2.78-3.38 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	99.27
SAND	2.000	96.18
	0.850	96.15
	0.425	95.65
	0.250	95.00
	0.150	92.46
	0.106	89.51
	0.075	84.21
HYDROMETER	0.0432	65.00
	0.0315	55.93
	0.0205	46.86
	0.0164	42.33
	0.0122	37.80
	0.0088	31.00
	0.0063	26.46
	0.0045	21.93
	0.0032	18.53
	0.0023	16.26
	0.0013	12.86

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**0.7**	**15.1**	**67.9**	**16.3**



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Particle Size Analysis (ASTM D6913 & D7928)

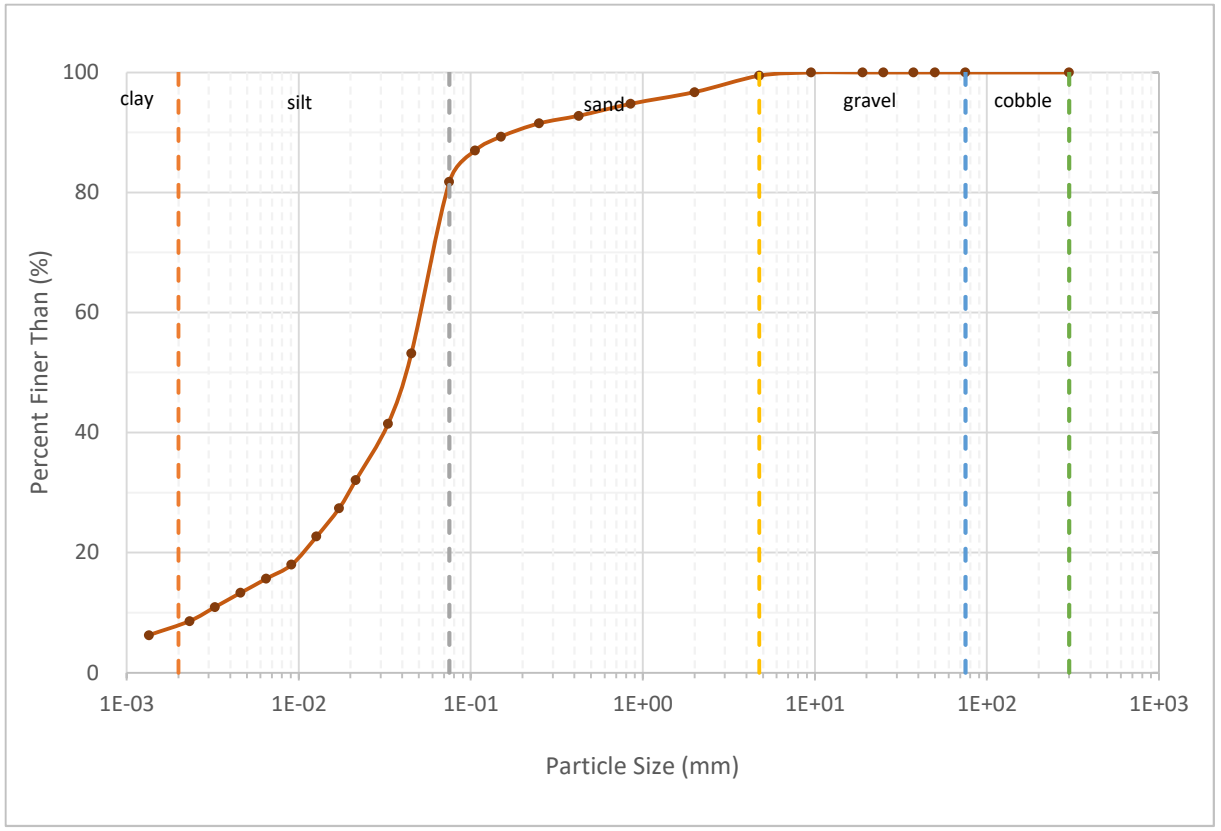
Project Info: *317086-54170 / Grise Fiord , Nunavut*
Client: *Worley Canada Services Ltd.*
Solum Job No.: *00101250516(185)*
Reviewed by *S. F.*

Sample Info: ***BH25-06*** ***SS04*** ***4.52-5.12 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	99.47
SAND	2.000	96.73
	0.850	94.78
	0.425	92.79
	0.250	91.54
	0.150	89.31
	0.106	87.01
	0.075	81.80
HYDROMETER	0.0452	53.22
	0.0331	41.49
	0.0215	32.10
	0.0172	27.40
	0.0127	22.71
	0.0091	18.02
	0.0065	15.67
	0.0046	13.32
	0.0033	10.97
	0.0023	8.63
	0.0013	6.28

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**0.5**	**17.7**	**73.2**	**8.6**



SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

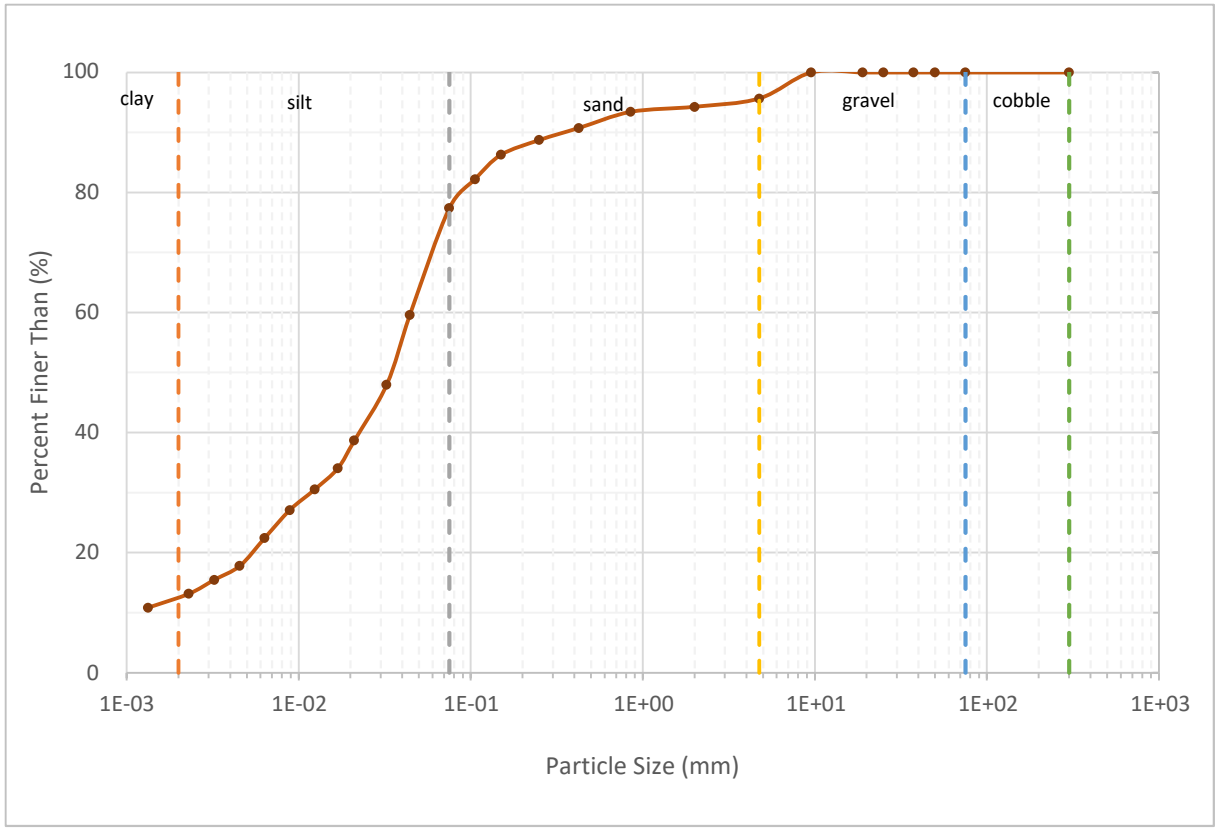
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-06*** ***SS07*** ***8.39-9.87 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	95.67
SAND	2.000	94.29
	0.850	93.45
	0.425	90.76
	0.250	88.76
	0.150	86.30
	0.106	82.24
	0.075	77.43
HYDROMETER	0.0442	59.61
	0.0324	48.00
	0.0211	38.71
	0.0169	34.07
	0.0124	30.59
	0.0089	27.11
	0.0063	22.46
	0.0045	17.82
	0.0032	15.50
	0.0023	13.18
	0.0013	10.85

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**4.3**	**18.2**	**64.3**	**13.2**



SOLUM CONSULTANTS LTD.
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Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

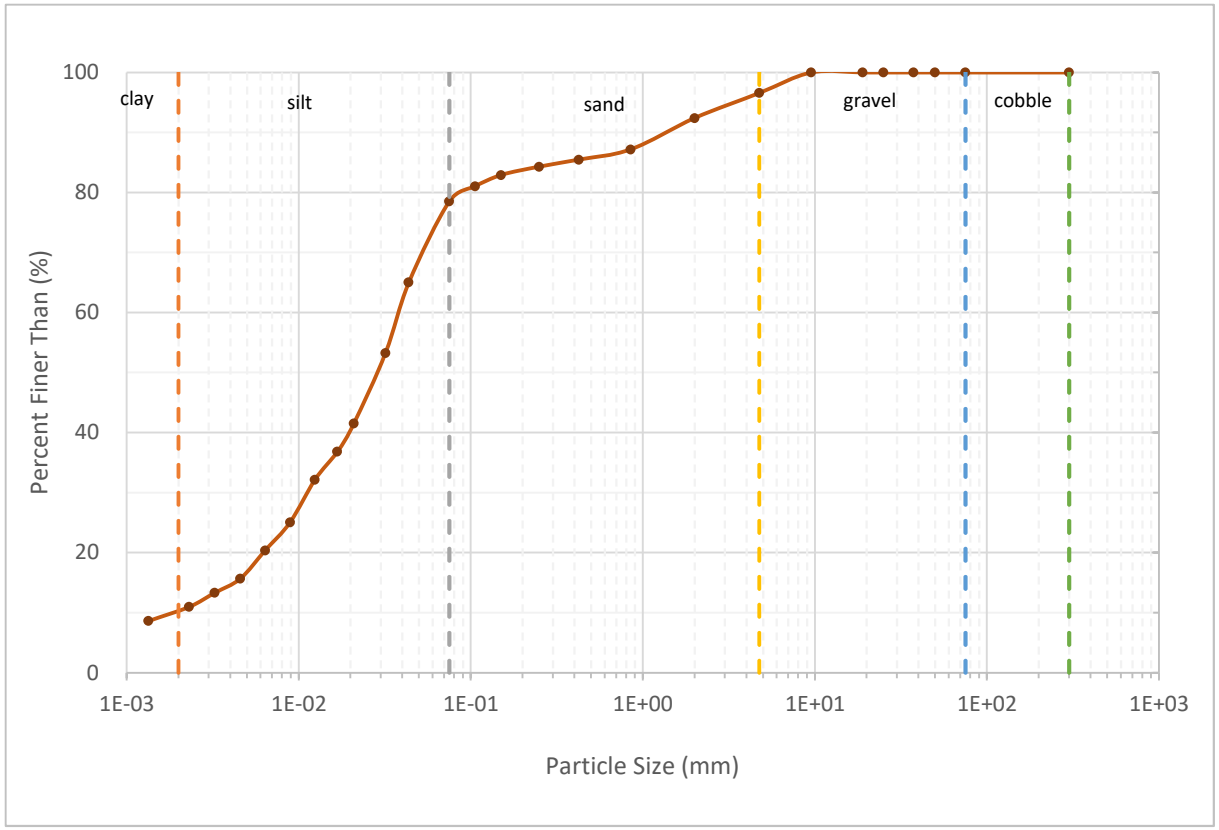
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-06*** ***SS11*** ***14.55-15.15 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	96.59
SAND	2.000	92.41
	0.850	87.19
	0.425	85.47
	0.250	84.30
	0.150	82.91
	0.106	81.06
	0.075	78.54
HYDROMETER	0.0436	65.04
	0.0320	53.29
	0.0209	41.54
	0.0168	36.84
	0.0124	32.14
	0.0089	25.09
	0.0064	20.39
	0.0046	15.69
	0.0032	13.34
	0.0023	10.99
	0.0013	8.64

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**3.4**	**18.0**	**67.6**	**11.0**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

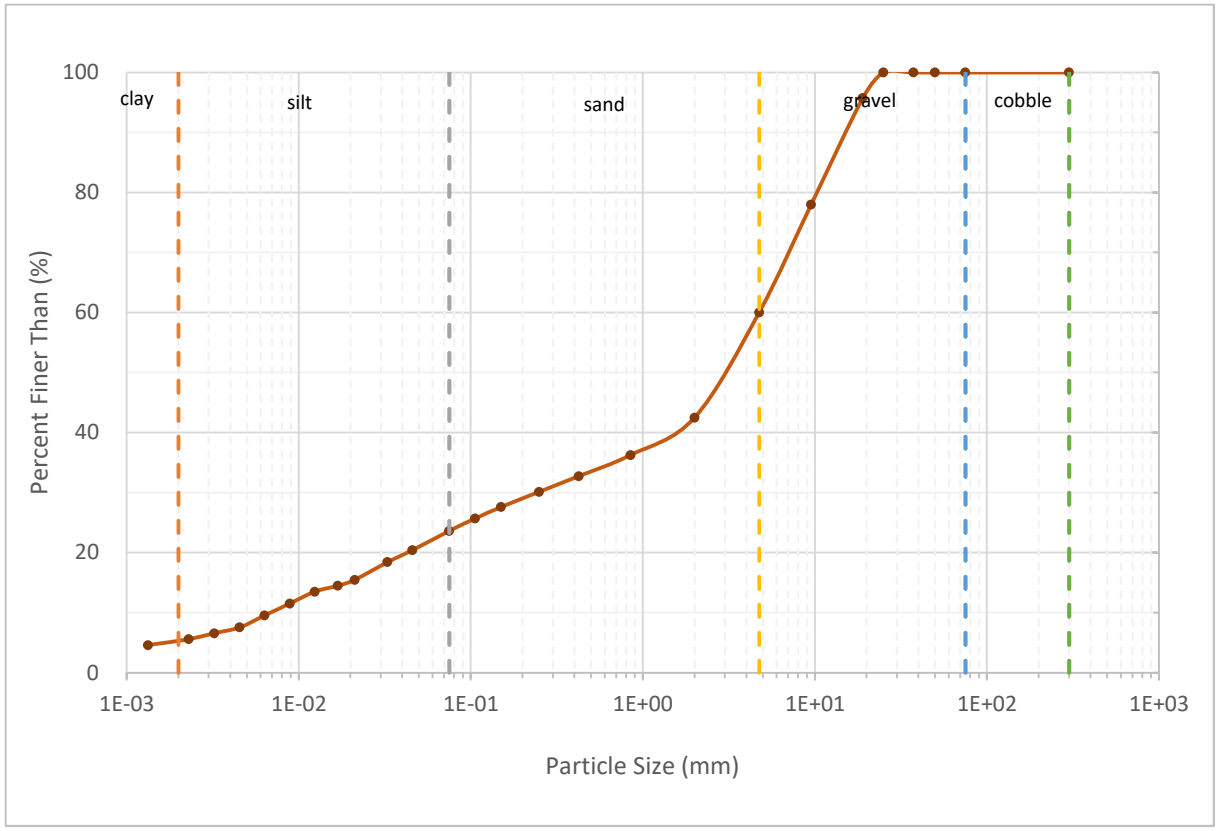
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-07*** ***SS01*** ***0.00-0.56 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	95.77
	9.500	77.99
	4.750	60.05
SAND	2.000	42.50
	0.850	36.29
	0.425	32.76
	0.250	30.16
	0.150	27.63
	0.106	25.70
	0.075	23.63
HYDROMETER	0.0458	20.44
	0.0329	18.46
	0.0212	15.49
	0.0169	14.51
	0.0124	13.52
	0.0089	11.54
	0.0063	9.56
	0.0045	7.59
	0.0032	6.60
	0.0023	5.61
	0.0013	4.62

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**40.0**	**36.4**	**18.0**	**5.6**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

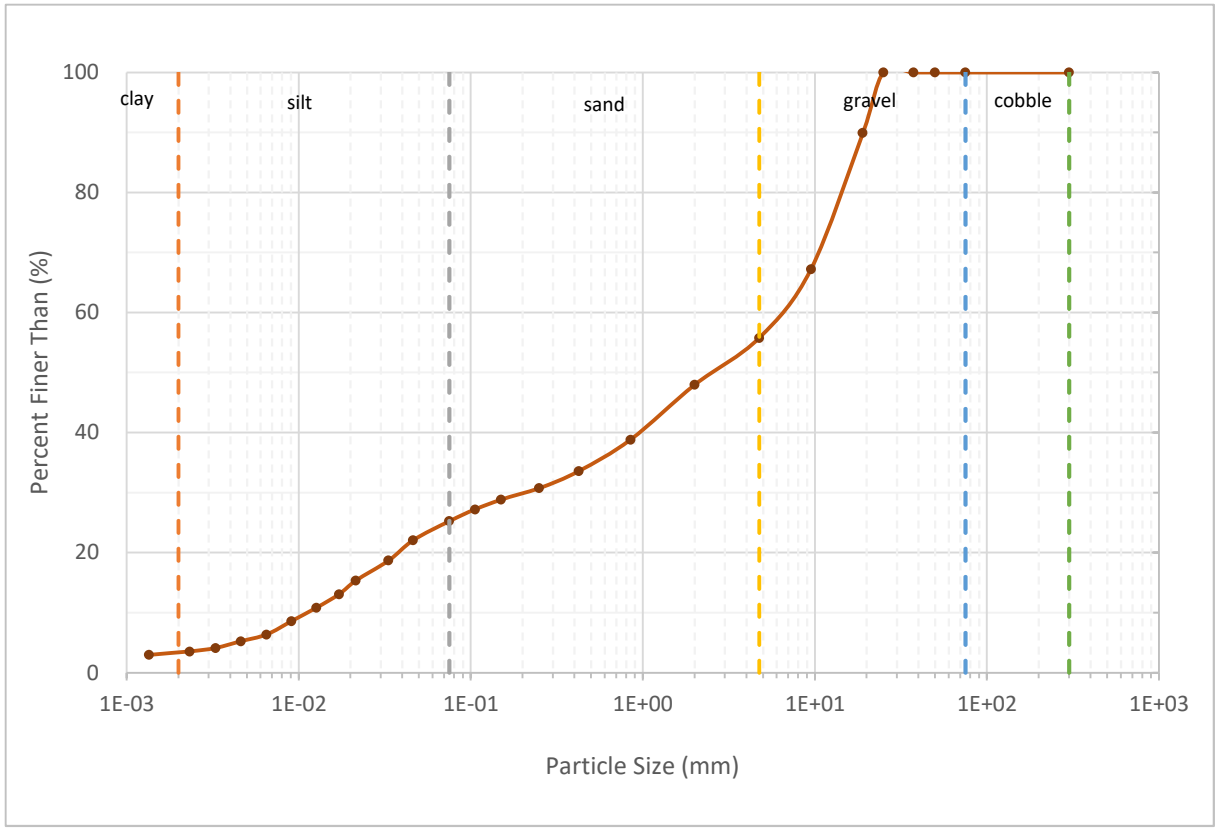
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-07*** ***SS02*** ***1.29-1.73 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	89.95
	9.500	67.26
	4.750	55.78
SAND	2.000	47.99
	0.850	38.84
	0.425	33.61
	0.250	30.77
	0.150	28.85
	0.106	27.23
	0.075	25.26
HYDROMETER	0.0462	22.08
	0.0333	18.71
	0.0215	15.35
	0.0172	13.10
	0.0127	10.86
	0.0091	8.61
	0.0065	6.37
	0.0046	5.25
	0.0033	4.12
	0.0023	3.56
	0.0013	3.00

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**44.2**	**30.5**	**21.7**	**3.6**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

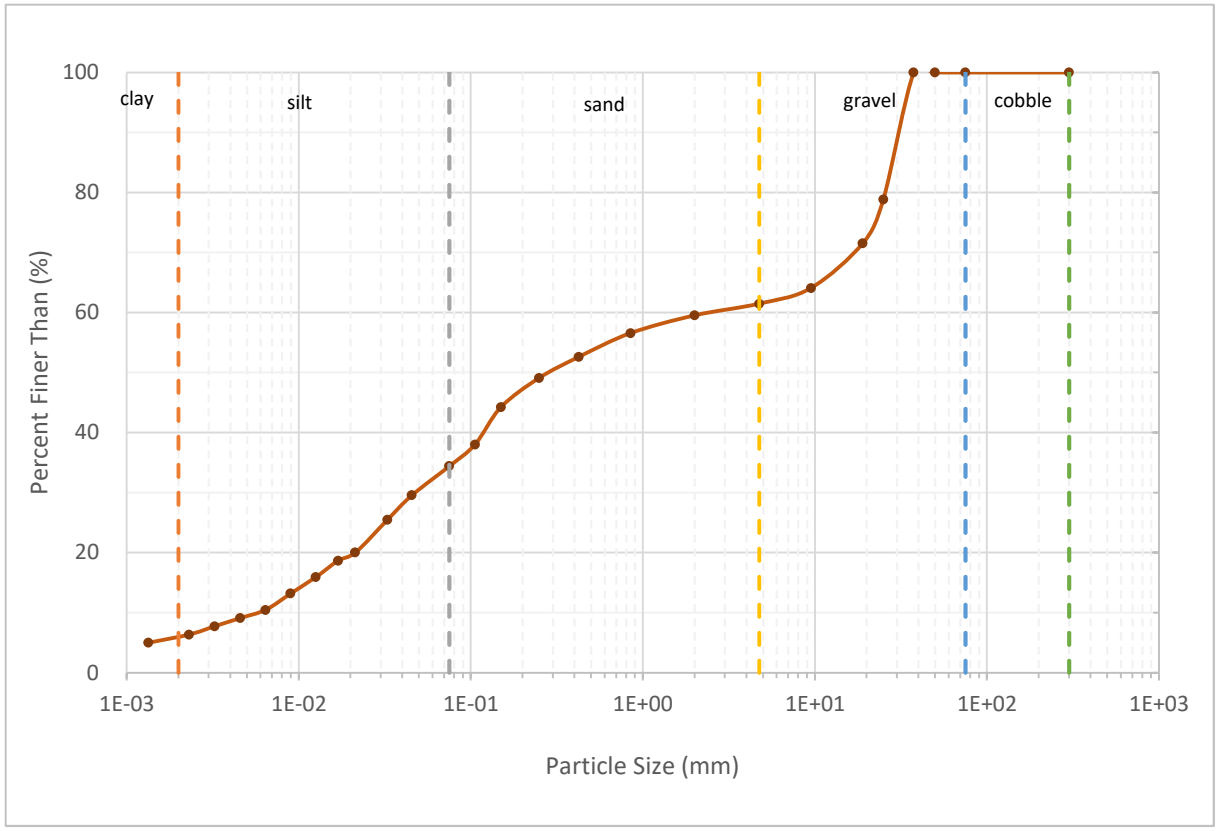
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-07*** ***GB01*** ***2.10-2.50 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	78.86
	19.000	71.57
	9.500	64.11
	4.750	61.49
SAND	2.000	59.55
	0.850	56.58
	0.425	52.64
	0.250	49.14
	0.150	44.28
	0.106	38.05
	0.075	34.43
HYDROMETER	0.0455	29.60
	0.0329	25.51
	0.0213	20.04
	0.0170	18.68
	0.0125	15.95
	0.0090	13.21
	0.0064	10.48
	0.0046	9.12
	0.0032	7.75
	0.0023	6.38
	0.0013	5.02

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**38.5**	**27.1**	**28.0**	**6.4**



SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

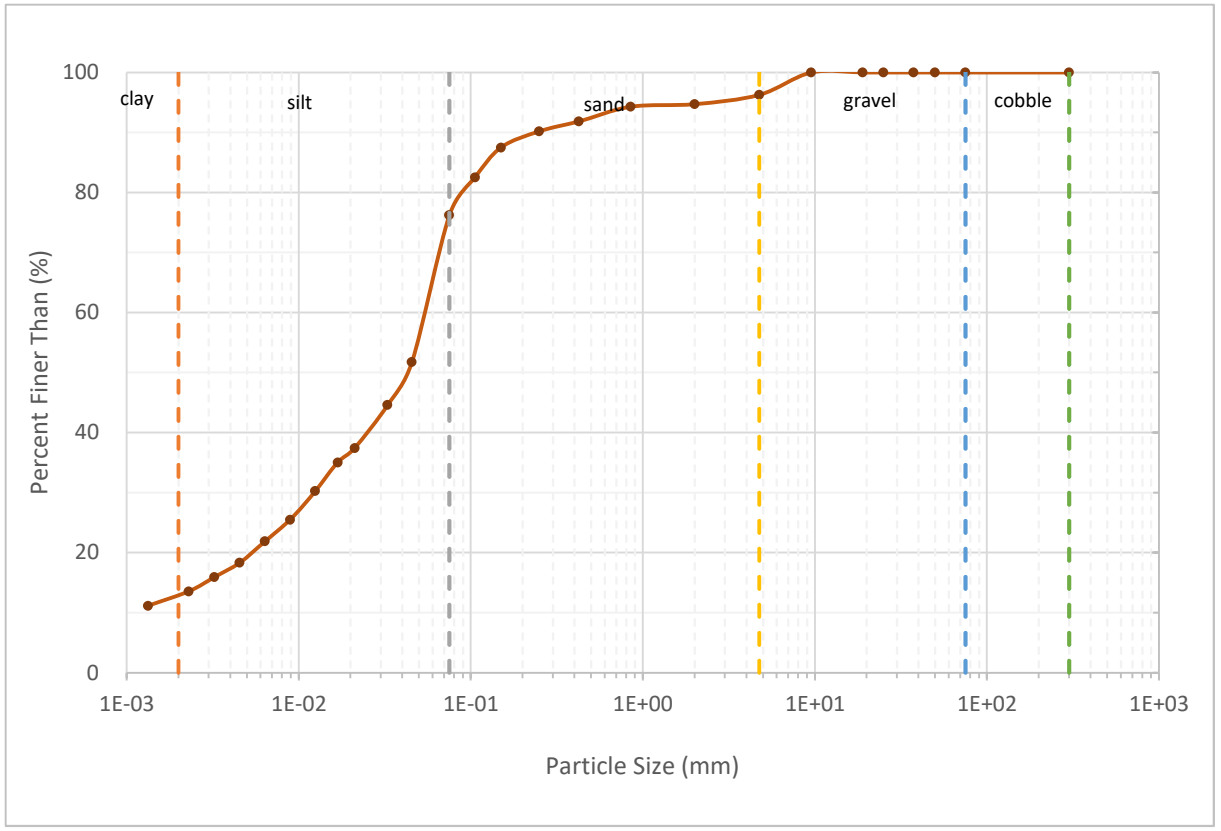
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-07*** ***SS04*** ***3.89-4.49 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	96.27
SAND	2.000	94.73
	0.850	94.30
	0.425	91.86
	0.250	90.21
	0.150	87.51
	0.106	82.56
	0.075	76.25
HYDROMETER	0.0455	51.80
	0.0329	44.63
	0.0212	37.46
	0.0169	35.07
	0.0125	30.29
	0.0089	25.51
	0.0064	21.93
	0.0045	18.34
	0.0032	15.95
	0.0023	13.56
	0.0013	11.17

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**3.7**	**20.0**	**62.7**	**13.6**



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Particle Size Analysis (ASTM D6913 & D7928)

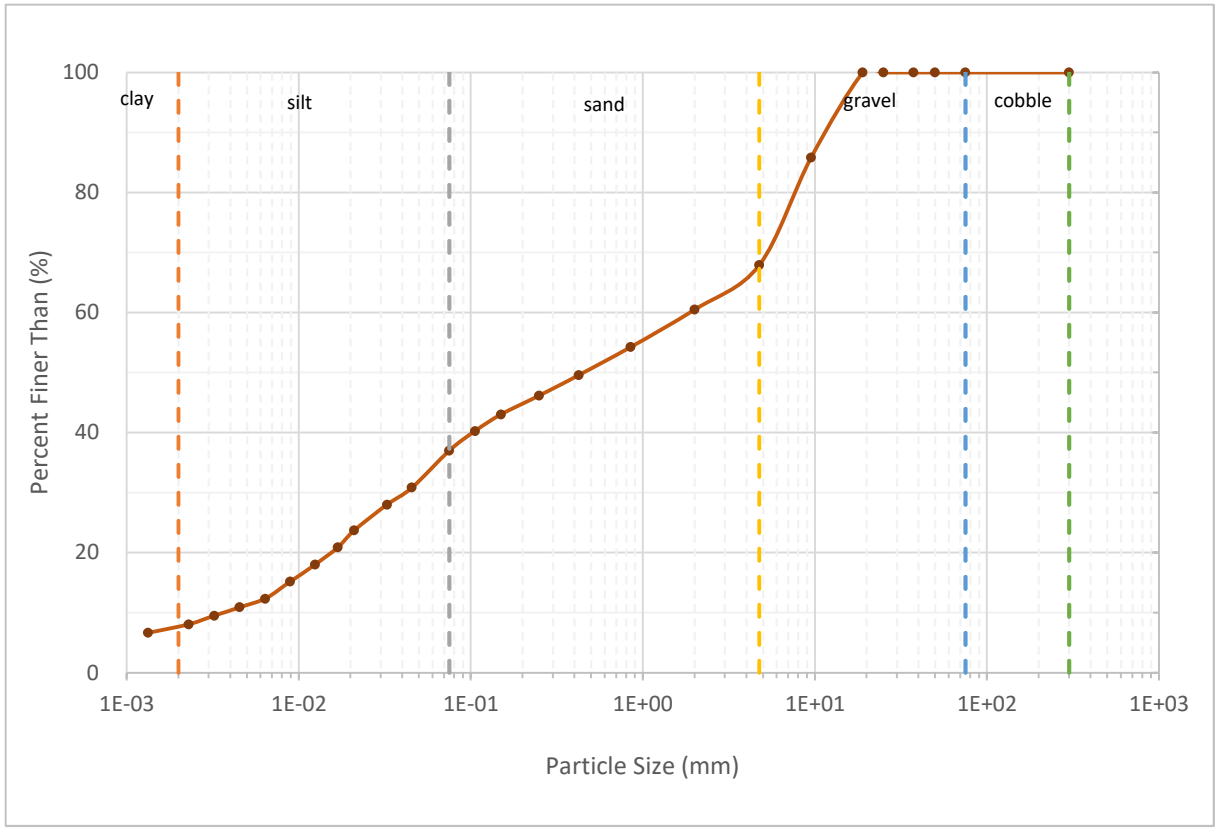
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-08*** ***SS01*** ***0.00-0.41 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	85.84
	4.750	67.93
SAND	2.000	60.51
	0.850	54.26
	0.425	49.60
	0.250	46.19
	0.150	43.05
	0.106	40.28
	0.075	37.01
HYDROMETER	0.0455	30.87
	0.0326	28.02
	0.0211	23.75
	0.0169	20.90
	0.0125	18.05
	0.0089	15.20
	0.0064	12.35
	0.0045	10.93
	0.0032	9.51
	0.0023	8.08
	0.0013	6.66

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**32.1**	**30.9**	**28.9**	**8.1**



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Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

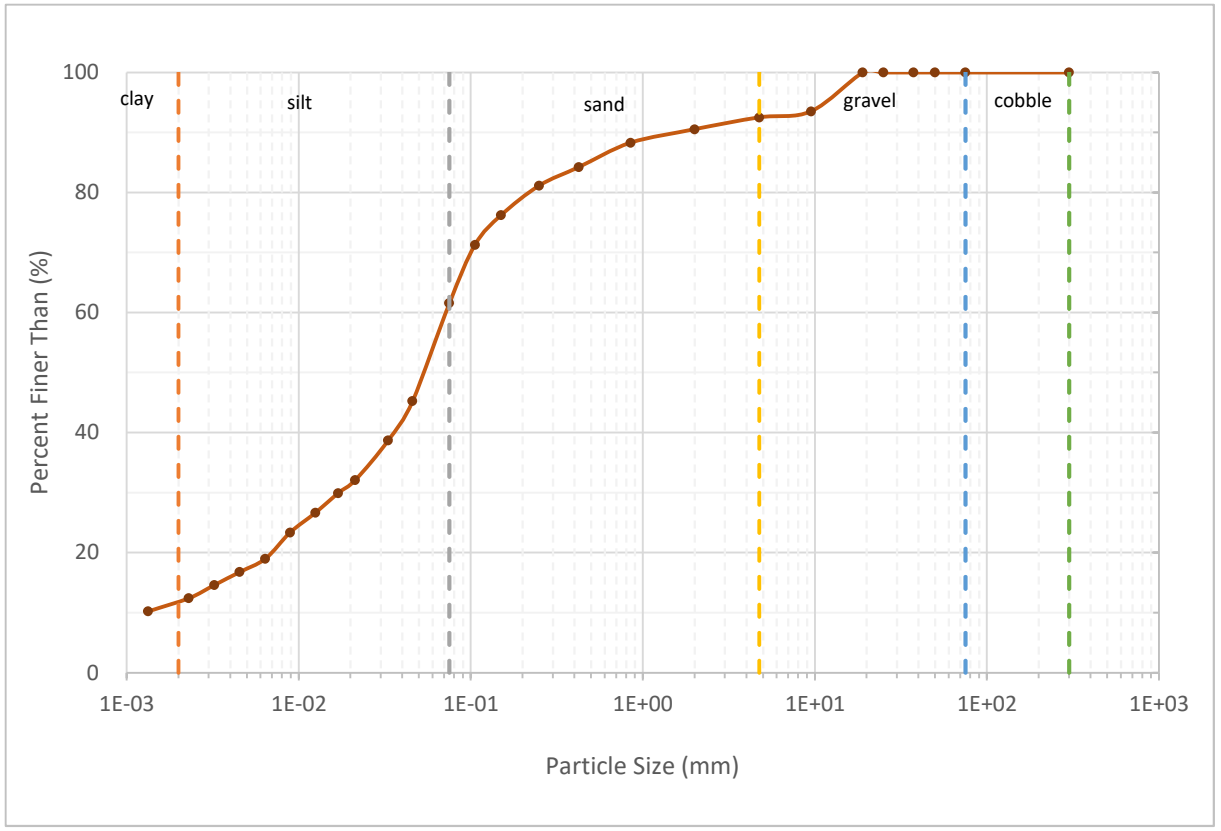
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-08*** ***GB01*** ***4.55-4.70 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	93.53
	4.750	92.53
SAND	2.000	90.54
	0.850	88.30
	0.425	84.25
	0.250	81.17
	0.150	76.24
	0.106	71.31
	0.075	61.57
HYDROMETER	0.0458	45.27
	0.0331	38.70
	0.0213	32.13
	0.0170	29.94
	0.0125	26.66
	0.0089	23.37
	0.0064	18.99
	0.0045	16.80
	0.0032	14.62
	0.0023	12.43
	0.0013	10.24

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**7.5**	**31.0**	**49.1**	**12.4**



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Particle Size Analysis (ASTM D6913 & D7928)

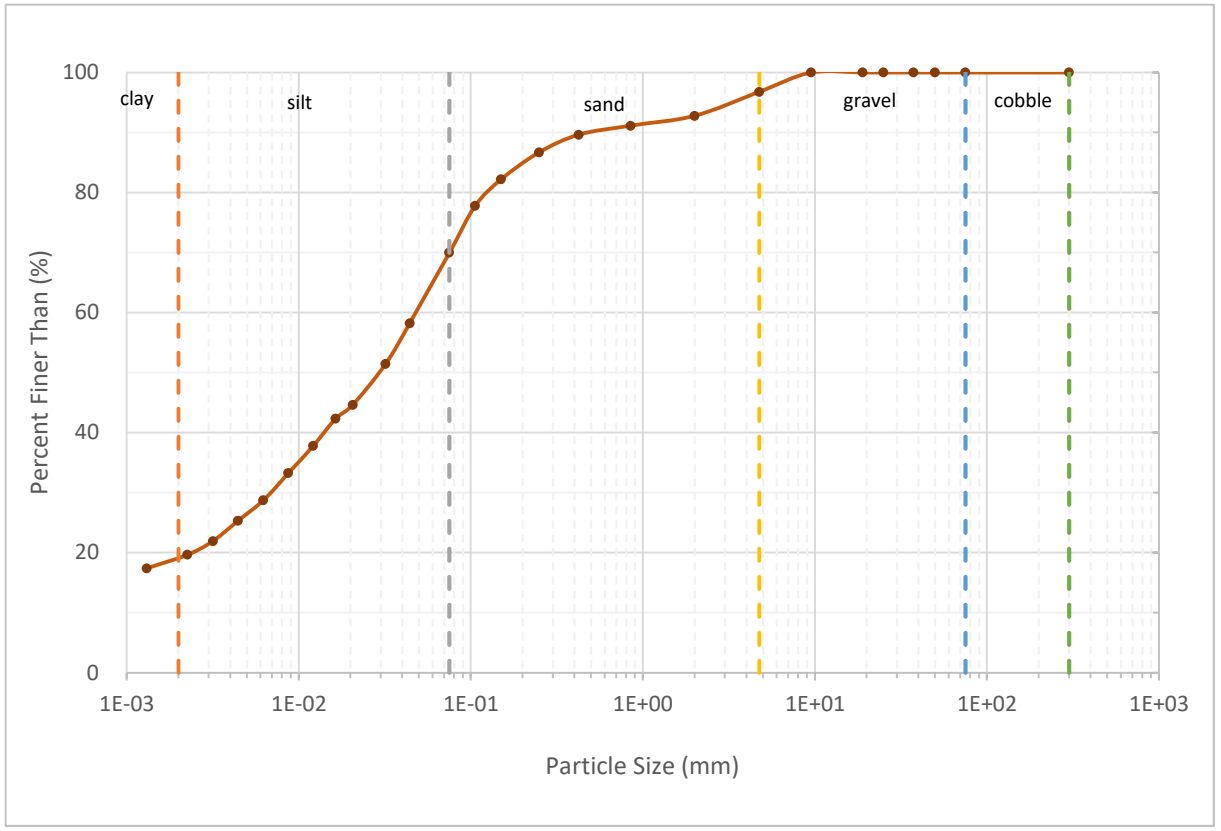
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-08*** ***SS06*** ***8.00-8.21 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	96.78
SAND	2.000	92.79
	0.850	91.14
	0.425	89.64
	0.250	86.71
	0.150	82.20
	0.106	77.77
	0.075	69.99
HYDROMETER	0.0442	58.25
	0.0320	51.44
	0.0206	44.64
	0.0164	42.37
	0.0122	37.83
	0.0087	33.29
	0.0062	28.76
	0.0044	25.35
	0.0032	21.95
	0.0023	19.68
	0.0013	17.41

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**3.2**	**26.8**	**50.3**	**19.7**



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Particle Size Analysis (ASTM D6913 & D7928)

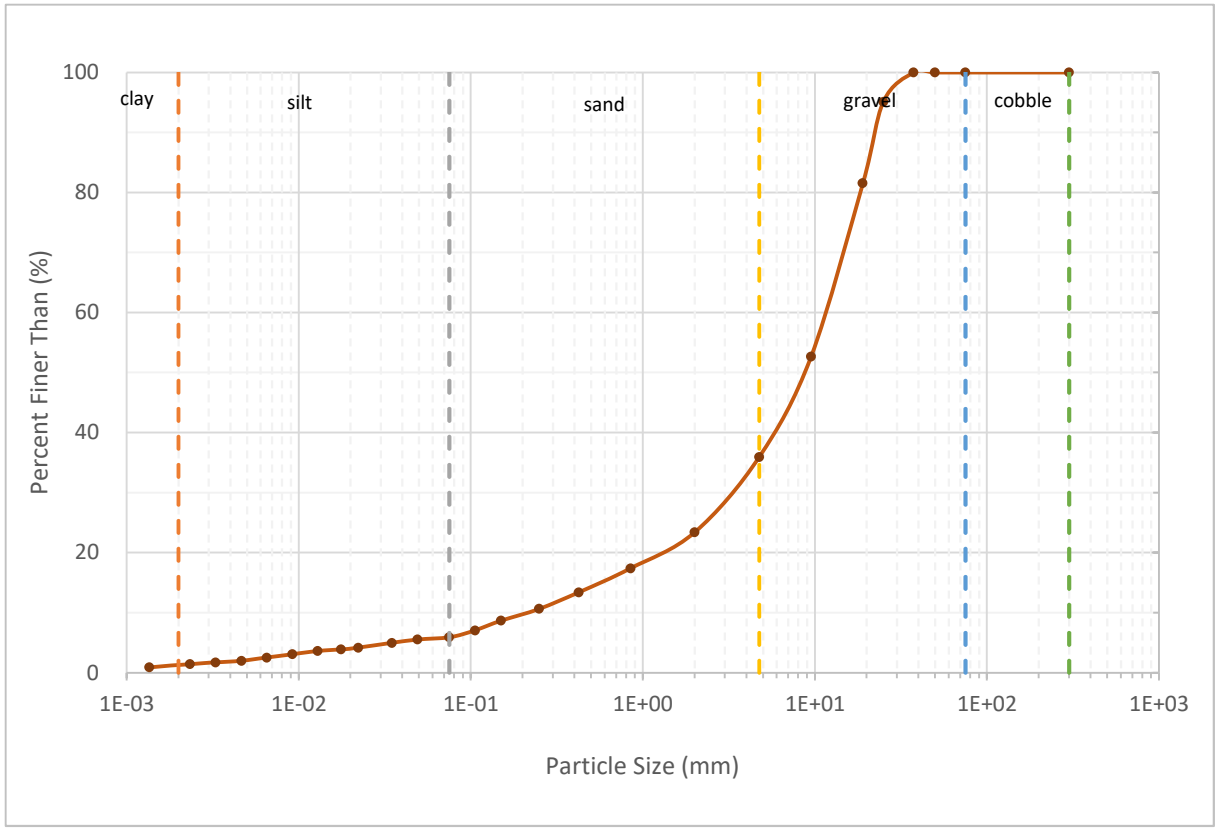
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-09*** ***SS02*** ***1.10-1.70 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	95.14
	19.000	81.57
	9.500	52.69
	4.750	35.95
SAND	2.000	23.41
	0.850	17.40
	0.425	13.41
	0.250	10.66
	0.150	8.68
	0.106	7.08
	0.075	5.93
HYDROMETER	0.0490	5.54
	0.0349	5.00
	0.0223	4.18
	0.0176	3.91
	0.0129	3.63
	0.0092	3.09
	0.0065	2.55
	0.0046	2.00
	0.0033	1.73
	0.0023	1.46
	0.0014	0.91

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**64.0**	**30.0**	**4.5**	**1.5**



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Particle Size Analysis (ASTM D6913 & D7928)

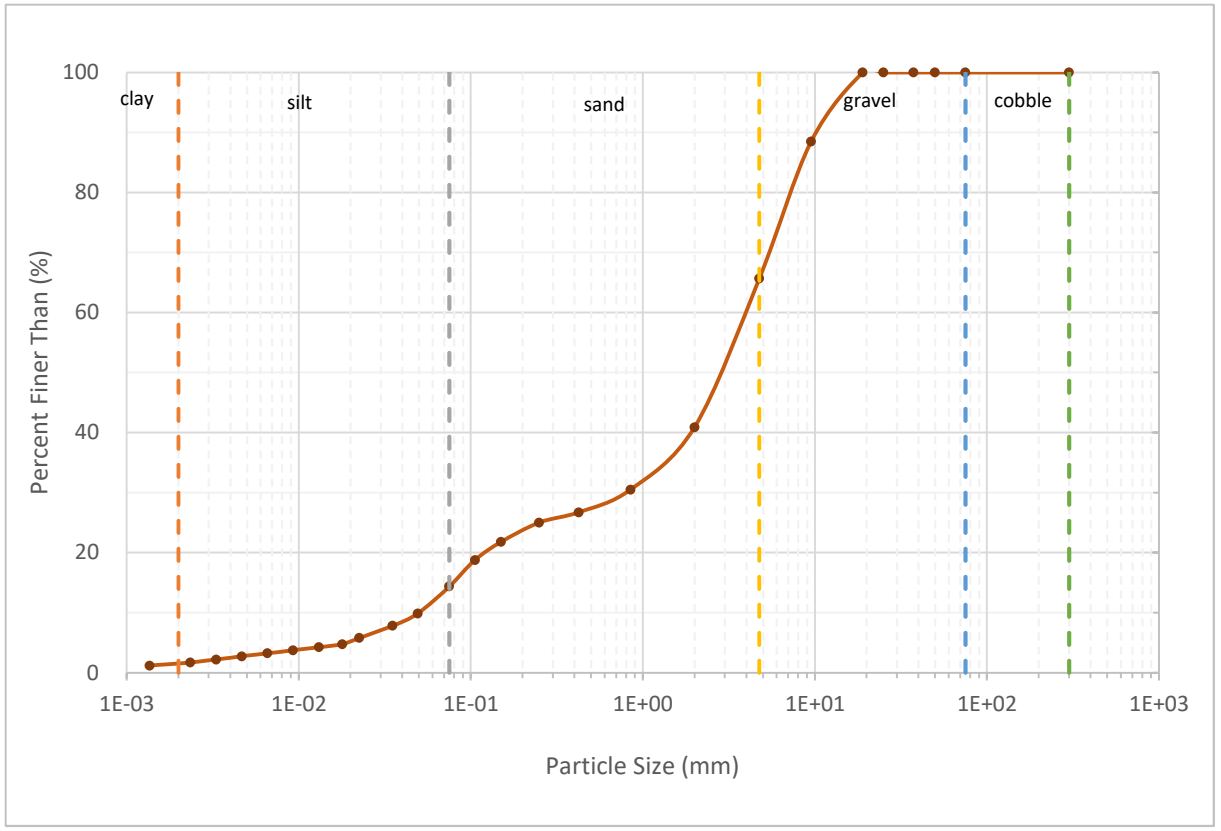
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-09*** ***SS04*** ***4.10-4.30 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	88.50
	4.750	65.68
SAND	2.000	40.92
	0.850	30.53
	0.425	26.75
	0.250	25.02
	0.150	21.82
	0.106	18.80
	0.075	14.39
HYDROMETER	0.0492	9.90
	0.0352	7.85
	0.0225	5.81
	0.0179	4.78
	0.0131	4.27
	0.0093	3.76
	0.0066	3.25
	0.0047	2.74
	0.0033	2.22
	0.0023	1.71
	0.0014	1.20

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**34.3**	**51.3**	**12.7**	**1.7**



SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

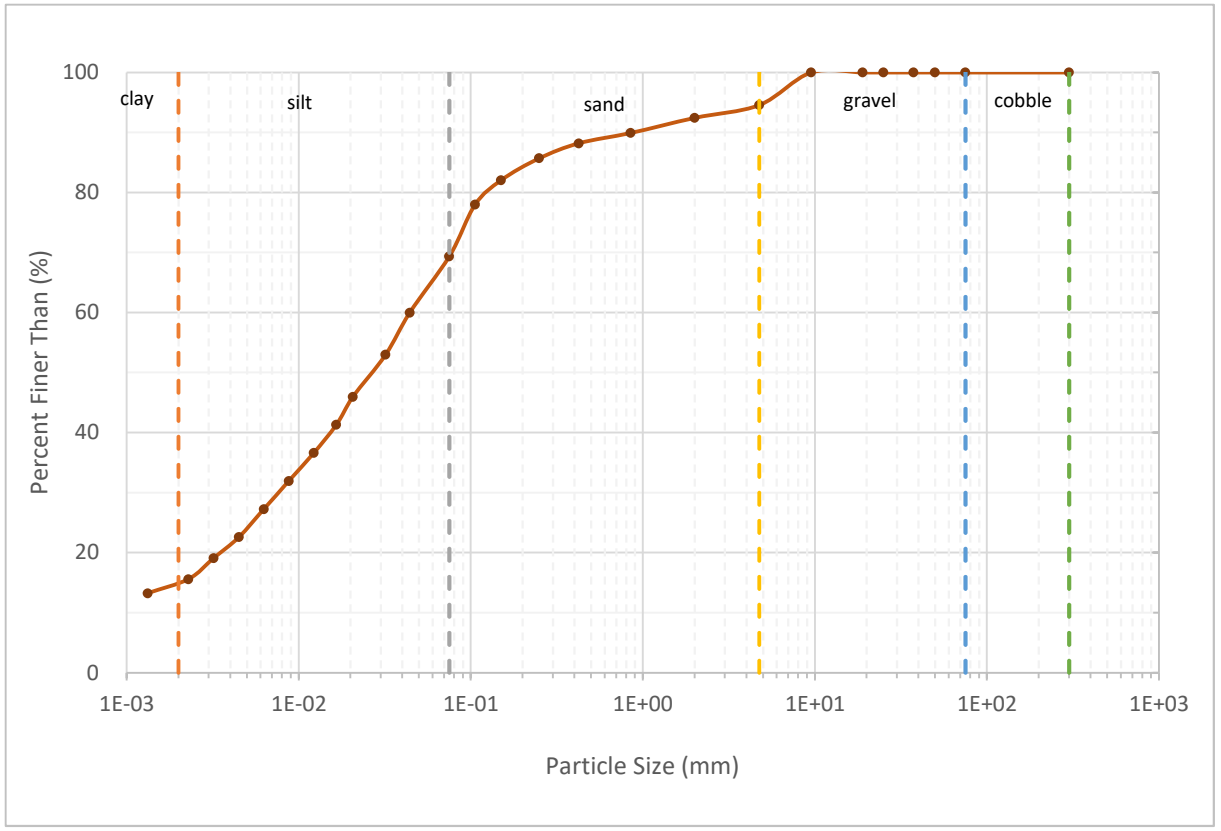
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-09*** ***GB01*** ***6.30-6.50 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	94.58
SAND	2.000	92.43
	0.850	89.93
	0.425	88.20
	0.250	85.72
	0.150	82.05
	0.106	77.99
	0.075	69.39
HYDROMETER	0.0442	60.00
	0.0320	52.99
	0.0206	45.98
	0.0165	41.31
	0.0122	36.63
	0.0088	31.96
	0.0063	27.28
	0.0045	22.61
	0.0032	19.11
	0.0023	15.60
	0.0013	13.26

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**5.4**	**25.2**	**53.8**	**15.6**



SOLUM™
CONSULTANTS LTD.

GEOTECHNICAL & MATERIAL
TESTING LABORATORY

STANDARD LABORATORY TERMS AND CONDITIONS

1.0 Description of Services to be Performed by Solum Consultants Ltd. (Solum)

Solum shall provide geotechnical and material laboratory testing services on samples in accordance with these terms and conditions and executed Laboratory Testing Request Forms. Solum shall perform its work in accordance with accepted laboratory standards, such as ASTM, CSA or client's specific specs, as well as accepted standard operating procedures. Solum reserves the right to modify methods as necessary based upon experience and/or current scientific literature. If the Client requests a manner of analysis that varies from standard operating or recommended procedures, the Client shall not hold Solum responsible for the results. Such variations of analysis will be noted on the reports. Solum reserves the right to subcontract laboratory testing if a particular test cannot be performed by Solum.

2.0 Reports, Confidentiality and Third Parties

Laboratory reports provided by Solum will be composed of a cover page, tables and figures if applicable. Reports will be e-mailed in PDF format to the individual(s) specified on the Laboratory Testing Request Forms. Laboratory reports may also be faxed or mailed to the Client upon request. Except as required by law, Solum shall not disclose testing results or reports to any party other than the Client, unless the Client, in writing, requests information to be provided to a third party. Solum shall abide by any additional confidentiality requirements requested by the Client provided that such requirements are provided to Solum at or before execution of the testing.

Information provided by Solum is intended for Client use only. Any use by a third party, of reports or documents authored by Solum, or any reliance on or decisions made by a third party based on the findings described in said documents, are the sole responsibility of such third parities, and Solum accepts no responsibility of damages suffered by any third party as a result of decisions made or actions conducted.

3.0 Laboratory Testing Request Form (Chain of Custody)

The laboratory testing request form must be completed by the Client and be accompanied with the samples. Other form of COC may be accepted; however, the condition of Solum COC is still applied. Testing will not commence until the laboratory testing request form has been completed. If requested by the Client, Solum shall provide a copy of the laboratory testing request form with the report.

No persons other than the designated representatives for each Laboratory Testing Request Form are authorized to act regarding changes to the testing request form. Any changes or amendments of the laboratory testing request form must be in writing and be completed by the originator.

4.0 Acceptance, Contamination and Disposal of Samples

Loss or damages to samples remains the responsibility of the Client until Solum representatives acceptance of samples by notation on the laboratory testing request form.

As to any samples that are suspected of containing hazardous substances, the Client will specify the suspected or known substance and level of contamination. This information is to be stated on the laboratory testing request form and be accompanied with the samples before testing can commence. Solum may refuse acceptance of samples if it determines they present a risk to health and safety.

Samples accepted by Solum shall remain the property and liability of the Client while in the custody of Solum. Solum will discard all non-contaminated samples after two weeks of submitting lab report or a month from the date of receiving the samples without additional retention period at a fixed disposal charge, or if requested by the Client, samples may be returned to the Client at no cost to Solum. If requested by client, Solum will store samples provided the client agrees to pay for the storage charge. Contaminated material may be returned/shipped to the Client at the Client's expense or Solum will discard samples with disposal rates varying for samples containing higher levels of contamination, refer to price list.

Soil samples requested to be stored will be stored inside the lab up to the expiration of storage period. Soil samples will be discarded upon the expiration date of the storage period unless client requests either extending storage period or return samples back to client at no cost to Solum.

5.0 Indemnification/Hold Harmless

Solum shall protect, indemnify and save harmless Client, and its directors, officers, employees, agents, representatives, invitees and subcontractors, and at Client's request, investigate and defend such entities form and against all claims, demands and causes of action, of every kind and character, without limitation, arising in favour of or made by third parties, on account of bodily injury, death or damage to or loss of their property resulting from any negligent act or wilful misconduct of Solum.

The Client shall protect, indemnify and save harmless Solum, and its directors, officers, employees, agents, representatives, invitees and subcontractors, and at Solum's request, investigate and defend such entities form and against all claims, demands and causes of action, of every kind and character, without limitation, arising in favour of or made by third parties, on account of bodily injury, death or damage to or loss of their property resulting from any negligent act or wilful misconduct of Client.

6.0 Limitation of Liability

The total liability of Solum or its staff whether based in contract or tort, will be limited to the lesser of the fees paid or actual damages incurred by the Client. Solum will not be responsible for any consequential or indirect damages even if caused by negligence of Solum. Solum will only be liable for damages resulting form negligence of Solum. All claims by the Client shall be deemed relinquished if not made within one year after the testing date. No warranty is either expressed or implied, or intended by any agreement or by furnishing oral or written reports or findings.

7.0 Termination of Testing Work Order

The Client may order work suspended or terminated upon seven days advance written notice. If work is suspended, Solum shall receive, upon resumption, an adjustment in the cost of services to compensate for additional costs incurred due to the interruption of services. Upon suspension or termination, Solum shall preserve samples provided that the Client agrees to pay the sample storage charge.

8.0 Pricing, Payments and Invoicing

Invoices will be based on most current Solum laboratory testing rates; rates may change without notice. Solum invoices shall be paid within thirty (30) days of receipt of the invoice. Amounts not paid when due shall bear interest at the rate of 18% per annum from the date due until the date of payment.

SOLUM CONSULTANTS LTD.

GEOTECHNICAL & MATERIAL TESTING LABORATORY

Geo-Lab Report

Revision # 0

Report Date:	*June 5, 2025*
Client:	*Worley Canada Services Ltd.*
Address:	*49 Quarry Park Blvd SE, Calgary, AB T2C 5H9*
Attn:	*Denise Falk*
Project No:	*317086-54170*
Project Name:	*Grise Fiord , Nunavut*
Solum Job No.:	*00101250516(185)*

Sample Received Date: May 16, 2025

Sample Quantity: 2 pails

Test	Quantity	Destination
WATER CONTENT	19	D2216
ATTERBERG LIMITS	14	D4318
PARTICLE-SIZE ANALYSIS (FULL GRADATION)	24	D6913 & D7928



President: Saad Farag

#9, 3620 29 ST NE, Calgary, AB T1Y 5Z8

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SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Laboratory Analysis Summary Sheet

Project Info: *317086-54170 / Grise Fiord , Nunavut*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

Reviewed *S. F.*



* Note: Soil classification is for material less than 0.425 mm (material used for Atterberg Limits), this includes the fine sand, silt and clay fraction of the sample.

** Note: Soil classification is for the whole sample. Soil classification uses the Atterberg Limits results and the percent fines, percent sand and percent gravel as described in ASTM D2487.

Borehole ID	Sample ID	Depth (m)	Atterberg Limits				Particle Size Analysis					Soil Classification** Group Symbols
			Liquid Limit(%)	Plastic Limit(%)	Plastic Index(%)	Classification* (USCS)	Cobble Size (%) (75-300mm)	Gravel Size (%) (4.75-75mm)	Sand Size (%) (0.075-4.5mm)	Silt Size (%) (0.002-0.075 mm)	Clay Size (%) (<0.002mm)	
BH25-04	SS01	0.00-0.40	---	---	---	---	0.0	37.9	46.6	12.1	3.4	---
BH25-04	SS02	1.40-2.00	---	---	---	---	0.0	62.5	29.9	6.1	1.5	---
BH25-04	SS05	5.77-6.37	---	---	---	---	0.0	3.6	46.2	40.7	9.5	---
BH25-04	GB01	9.90-10.20	---	---	---	---	0.0	0.0	8.6	80.6	10.8	---
BH25-04	SS09	11.35-11.75	34	17	17	CL	0.0	1.6	12.4	72.0	14.0	CL
BH25-04	SS11	14.35-15.18	30	15	15	CL	0.0	0.0	41.7	47.0	11.3	CL
BH25-05	SS02	1.19-1.79	---	---	---	---	0.0	82.7	16.1	0.9	0.3	---
BH25-05	SS03	2.58-3.10	---	---	---	---	0.0	50.6	42.1	5.6	1.7	---
BH25-05	SS05	4.96-5.56	---	---	---	---	0.0	61.3	30.7	7.0	1.0	---
BH25-06	SS01	0.00-0.60	34	17	17	CL	0.0	19.3	23.6	48.1	9.0	CL
BH25-06	SS03	2.78-3.38	42	17	25	CL	0.0	0.7	15.1	67.9	16.3	CL
BH25-06	SS04	4.52-5.12	45	19	26	CL	0.0	0.5	17.7	73.2	8.6	CL
BH25-06	SS07	8.39-9.87	36	17	19	CL	0.0	4.3	18.2	64.3	13.2	CL

SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Laboratory Analysis Summary Sheet

Project Info: *317086-54170 / Grise Fiord , Nunavut*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

Reviewed *S. F.*



* Note: Soil classification is for material less than 0.425 mm (material used for Atterberg Limits), this includes the fine sand, silt and clay fraction of the sample.

** Note: Soil classification is for the whole sample. Soil classification uses the Atterberg Limits results and the percent fines, percent sand and percent gravel as described in ASTM D2487.

Borehole ID	Sample ID	Depth (m)	Atterberg Limits				Particle Size Analysis					Soil Classification** Group Symbols
			Liquid Limit(%)	Plastic Limit(%)	Plastic Index(%)	Classification* (USCS)	Cobble Size (%) (75-300mm)	Gravel Size (%) (4.75-75mm)	Sand Size (%) (0.075-4.5mm)	Silt Size (%) (0.002-0.075 mm)	Clay Size (%) (<0.002mm)	
BH25-06	SS11	14.55-15.15	49	22	27	CL	0.0	3.4	18.0	67.6	11.0	CL
BH25-07	SS01	0.00-0.56	---	---	---	---	0.0	40.0	36.4	18.0	5.6	---
BH25-07	SS02	1.29-1.73	21	12	9	CL	0.0	44.2	30.5	21.7	3.6	GC
BH25-07	GB01	2.10-2.50	22	13	9	CL	0.0	38.5	27.1	28.0	6.4	GC
BH25-07	SS04	3.89-4.49	30	16	14	CL	0.0	3.7	20.0	62.7	13.6	CL
BH25-08	SS01	0.00-1.41	20	12	8	CL	0.0	32.1	30.9	28.9	8.1	GC
BH25-08	GB01	4.55-4.70	26	14	12	CL	0.0	7.5	31.0	49.1	12.4	CL
BH25-08	SS06	8.00-8.21	29	16	13	CL	0.0	3.2	26.8	50.3	19.7	CL
BH-25-09	SS02	1.10-1.70	---	---	---	---	0.0	64.0	30.0	4.5	1.5	---
BH-25-09	SS04	4.10-4.30	---	---	---	---	0.0	34.3	51.3	12.7	1.7	---
BH-25-09	GB01	6.30-6.50	21	12	9	CL	0.0	5.4	25.2	53.8	15.6	CL

SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Water (Moisture) Content (ASTM D2216)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed b* *S. F.*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

Borehole ID	Sample ID	Test No.	Wet soil wt + Tare (g)	Dry soil wt + Tare (g)	Wt of water (g)	Tare (g)	Dry soil weight (g)	MC
BH 25-04	SS01	1	81.11	75.01	6.10	10.63	64.38	**9.5**
BH 25-04	SS02	2	94.60	88.42	6.18	11.20	77.22	**8.0**
BH 25-04	SS05	3	81.57	69.29	12.28	11.15	58.14	**21.1**
BH 25-04	SS09	4	89.06	77.64	11.42	10.71	66.93	**17.1**
BH 25-04	SS11	5	97.08	82.37	14.71	10.91	71.46	**20.6**
BH 25-05	SS02	6	60.48	57.64	2.84	10.79	46.85	**6.1**
BH 25-05	SS05	7	89.22	83.20	6.02	10.73	72.47	**8.3**
BH 25-06	SS01	8	69.69	58.28	11.41	10.99	47.29	**24.1**
BH 25-06	SS03	9	77.42	67.70	9.72	10.83	56.87	**17.1**
BH 25-06	SS04	10	86.23	74.02	12.21	11.17	62.85	**19.4**
BH 25-06	SS07	11	88.74	77.29	11.45	10.03	67.26	**17.0**
BH 25-06	SS11	12	74.63	64.13	10.50	10.85	53.28	**19.7**
BH 25-07	SS02	13	78.21	72.98	5.23	10.59	62.39	**8.4**
BH 25-07	GB01	14	105.41	96.92	8.49	10.93	85.99	**9.9**
BH 25-07	SS04	15	82.55	73.30	9.25	11.01	62.29	**14.8**
BH 25-08	SS01	16	100.67	90.55	10.12	10.85	79.70	**12.7**
BH 25-08	GB01	17	72.03	64.90	7.13	10.98	53.92	**13.2**
BH 25-08	SS06	18	86.09	76.41	9.68	10.80	65.61	**14.8**
BH 25-09	GB01	19	80.48	73.01	7.47	10.92	62.09	**12.0**

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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Atterberg Limits (ASTM D4318 - Method A)

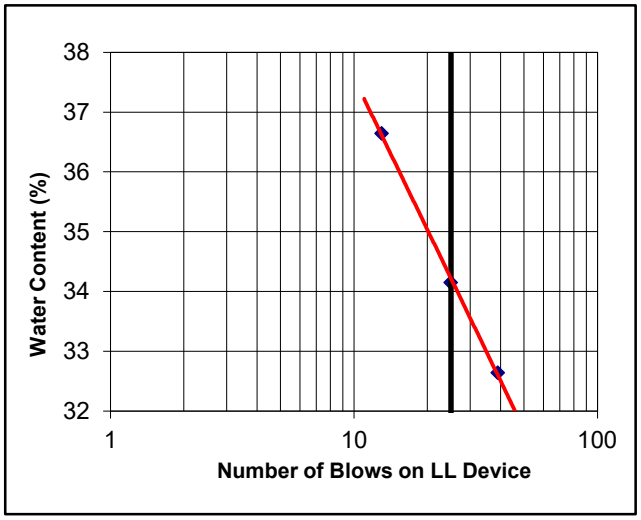
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-04 SS09 11.35-11.75 m***

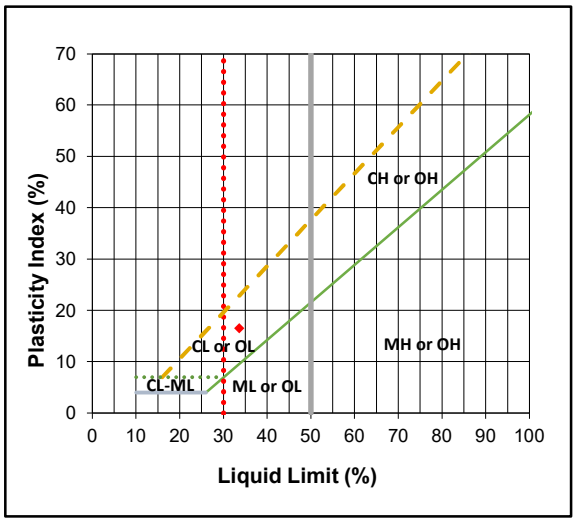
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	13	25	39		
$W_{Wet\ Soil}$ + Tare (g)	34.78	36.81	35.00		
$W_{Dry\ Soil}$ + Tare (g)	26.96	28.87	27.77		
W_{Water} (g)	7.82	7.94	7.23		
Tare (g)	5.62	5.62	5.62		
$W_{Dry\ Soil}$ (g)	21.34	23.25	22.15	**Water Content (%)**	17.1
Water Content (%)	36.6	34.2	32.6		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	22.17	19.59
$W_{Dry\ Soil}$ + Tare (g)	19.75	17.56
W_{Water} (g)	2.42	2.03
Tare (g)	5.69	5.60
$W_{Dry\ Soil}$ (g)	14.06	11.96
Water Content (%)	17.2	17.0
Average Mc (%)	17.1	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
34	**17**	**17**	**CL**





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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Atterberg Limits (ASTM D4318 - Method A)

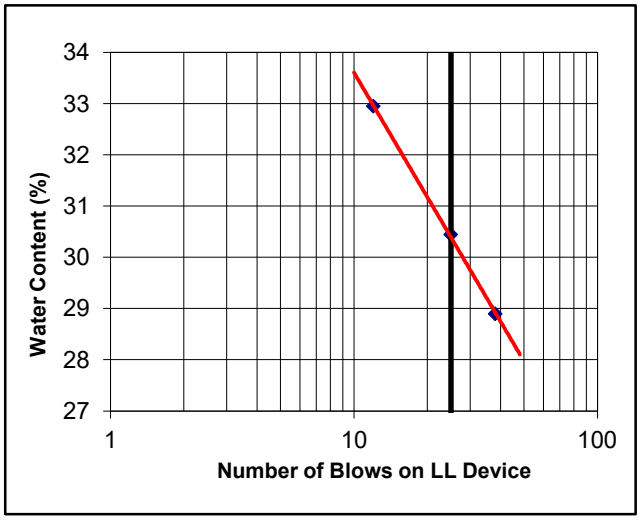
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-04 SS11 14.35-15.18 m***		

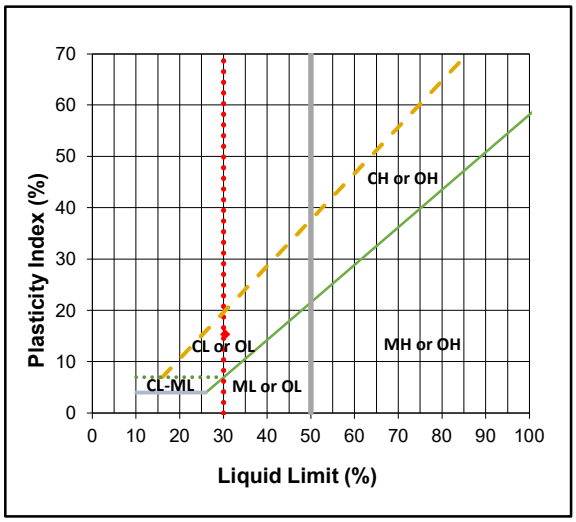
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	12	25	38		
$W_{Wet\ Soil}$ + Tare (g)	33.67	32.11	34.45		
$W_{Dry\ Soil}$ + Tare (g)	26.76	25.93	27.98		
W_{Water} (g)	6.91	6.18	6.47		
Tare (g)	5.79	5.63	5.59		
$W_{Dry\ Soil}$ (g)	20.97	20.30	22.39	**Water Content (%)**	20.6
Water Content (%)	33.0	30.4	28.9		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	21.18	21.85
$W_{Dry\ Soil}$ + Tare (g)	19.22	19.79
W_{Water} (g)	1.96	2.06
Tare (g)	5.79	5.59
$W_{Dry\ Soil}$ (g)	13.43	14.20
Water Content (%)	14.6	14.5
Average Mc (%)	14.6	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
30	**15**	**15**	**CL**





SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Atterberg Limits (ASTM D4318 - Method A)

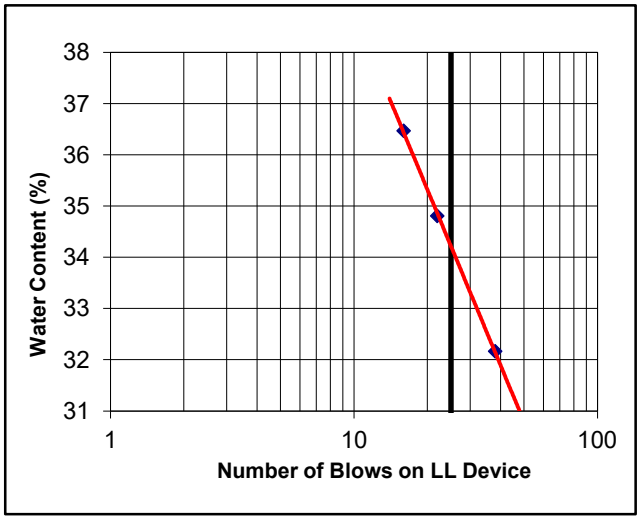
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-06 SS01 0.00-0.60 m***

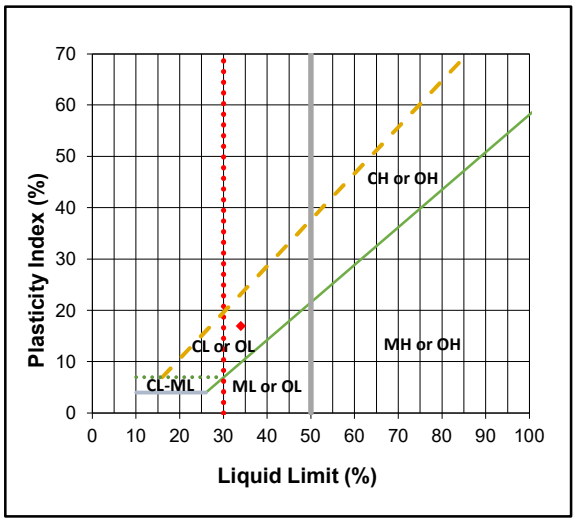
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	16	22	38		
$W_{Wet\ Soil}$ + Tare (g)	29.15	36.04	30.59		
$W_{Dry\ Soil}$ + Tare (g)	22.87	28.18	24.53		
W_{Water} (g)	6.28	7.86	6.06		
Tare (g)	5.65	5.60	5.69		
$W_{Dry\ Soil}$ (g)	17.22	22.58	18.84	**Water Content (%)**	24.1
Water Content (%)	36.5	34.8	32.2		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	24.45	20.50
$W_{Dry\ Soil}$ + Tare (g)	21.67	18.36
W_{Water} (g)	2.78	2.14
Tare (g)	5.62	5.64
$W_{Dry\ Soil}$ (g)	16.05	12.72
Water Content (%)	17.3	16.8
Average Mc (%)	17.1	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
34	**17**	**17**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

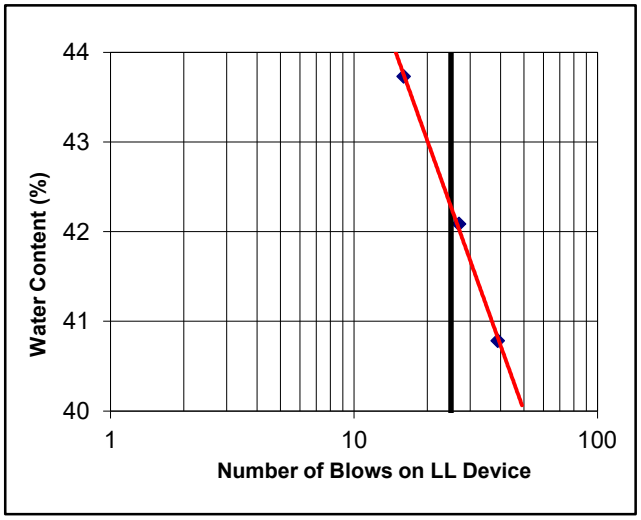
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-06 SS03 2.78-3.38 m***		

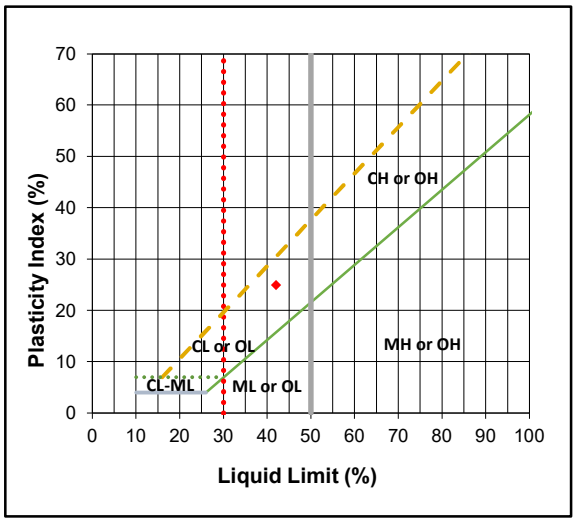
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	16	27	39		
$W_{Wet\ Soil}$ + Tare (g)	30.02	25.94	28.98		
$W_{Dry\ Soil}$ + Tare (g)	22.59	19.93	22.21		
W_{Water} (g)	7.43	6.01	6.77		
Tare (g)	5.60	5.65	5.61		
$W_{Dry\ Soil}$ (g)	16.99	14.28	16.60	**Water Content (%)**	17.1
Water Content (%)	43.7	42.1	40.8		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	14.55	16.94
$W_{Dry\ Soil}$ + Tare (g)	13.28	15.33
W_{Water} (g)	1.27	1.61
Tare (g)	5.64	5.64
$W_{Dry\ Soil}$ (g)	7.64	9.69
Water Content (%)	16.6	16.6
Average Mc (%)	16.6	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
42	**17**	**25**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

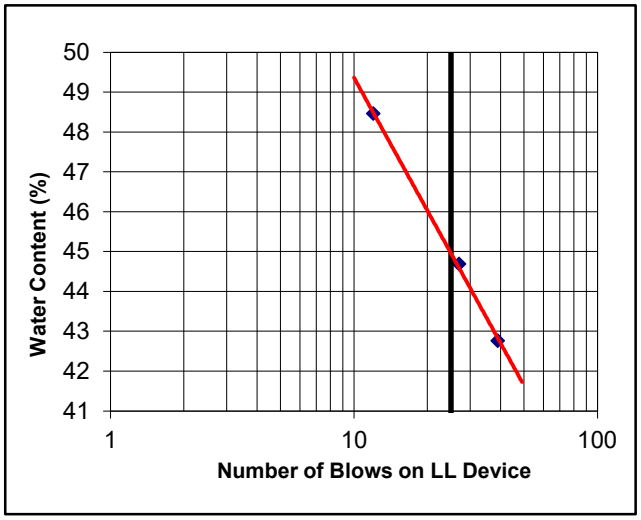
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-06 SS04 4.52-5.12 m***		

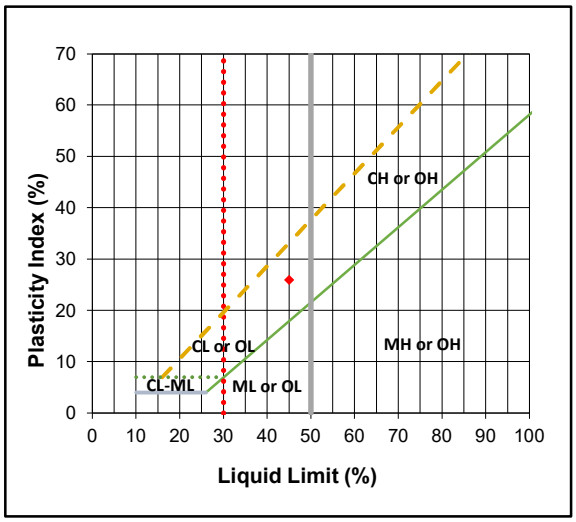
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	12	27	39		
$W_{Wet\ Soil}$ + Tare (g)	33.62	22.65	33.13		
$W_{Dry\ Soil}$ + Tare (g)	24.48	17.39	24.89		
W_{Water} (g)	9.14	5.26	8.24		
Tare (g)	5.62	5.62	5.62		
$W_{Dry\ Soil}$ (g)	18.86	11.77	19.27	**Water Content (%)**	19.4
Water Content (%)	48.5	44.7	42.8		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	20.67	17.88
$W_{Dry\ Soil}$ + Tare (g)	18.25	15.90
W_{Water} (g)	2.42	1.98
Tare (g)	5.69	5.60
$W_{Dry\ Soil}$ (g)	12.56	10.30
Water Content (%)	19.3	19.2
Average Mc (%)	19.2	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
45	**19**	**26**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

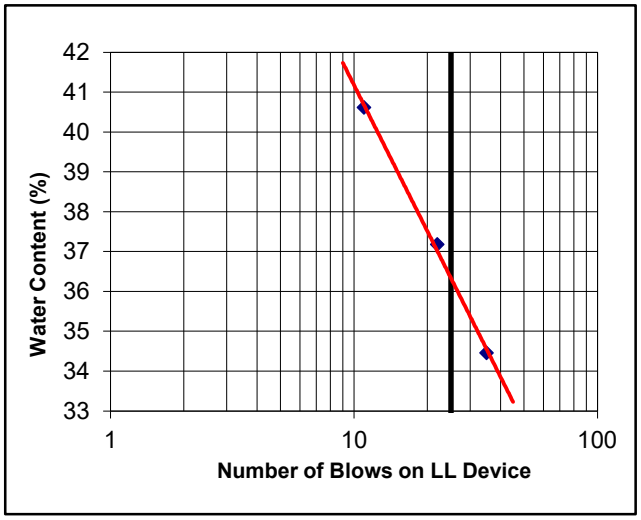
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-06 SS07 8.39-9.87 m***

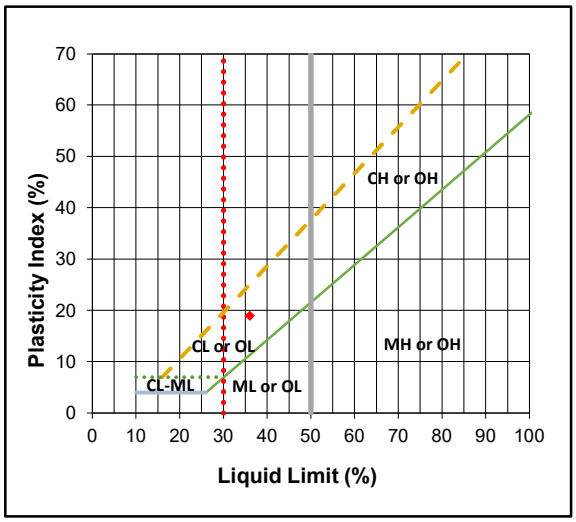
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	11	22	35		
$W_{Wet\ Soil}$ + Tare (g)	29.15	35.01	31.62		
$W_{Dry\ Soil}$ + Tare (g)	22.40	27.09	25.00		
W_{Water} (g)	6.75	7.92	6.62		
Tare (g)	5.78	5.79	5.79		
$W_{Dry\ Soil}$ (g)	16.62	21.30	19.21	**Water Content (%)**	17.0
Water Content (%)	40.6	37.2	34.5		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	19.86	20.53
$W_{Dry\ Soil}$ + Tare (g)	17.74	18.37
W_{Water} (g)	2.12	2.16
Tare (g)	5.64	5.60
$W_{Dry\ Soil}$ (g)	12.10	12.77
Water Content (%)	17.5	16.9
Average Mc (%)	17.2	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
36	**17**	**19**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

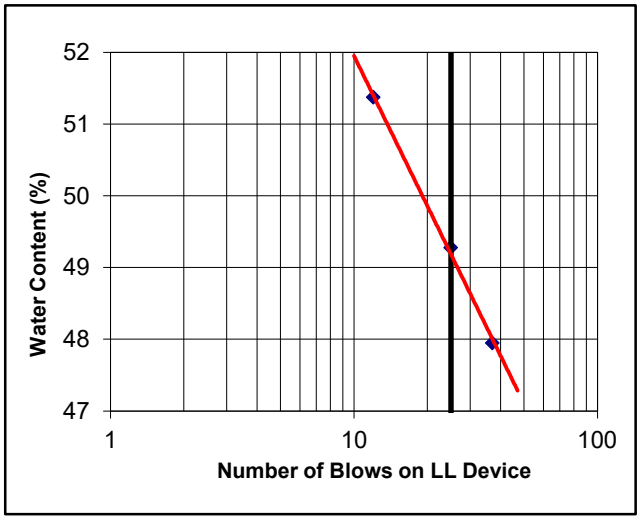
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-06 SS11 14.55-15.15 m***		

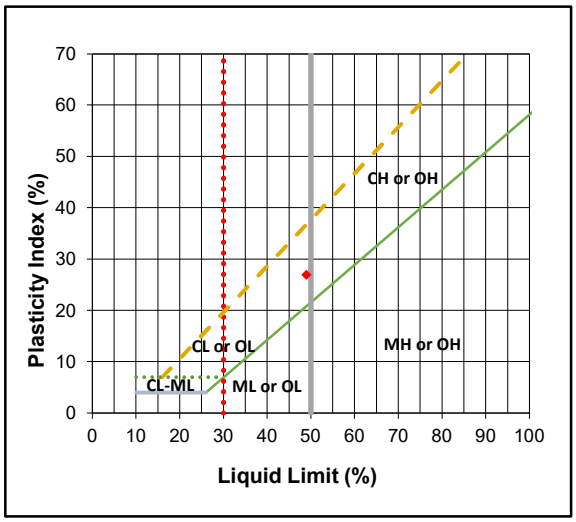
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	12	25	37		
$W_{Wet\ Soil}$ + Tare (g)	26.74	37.68	36.97		
$W_{Dry\ Soil}$ + Tare (g)	19.63	27.10	26.80		
W_{Water} (g)	7.11	10.58	10.17		
Tare (g)	5.79	5.63	5.59		
$W_{Dry\ Soil}$ (g)	13.84	21.47	21.21	**Water Content (%)**	19.7
Water Content (%)	51.4	49.3	47.9		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	23.02	21.03
$W_{Dry\ Soil}$ + Tare (g)	19.93	18.22
W_{Water} (g)	3.09	2.81
Tare (g)	5.79	5.59
$W_{Dry\ Soil}$ (g)	14.14	12.63
Water Content (%)	21.9	22.2
Average Mc (%)	22.1	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
49	**22**	**27**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

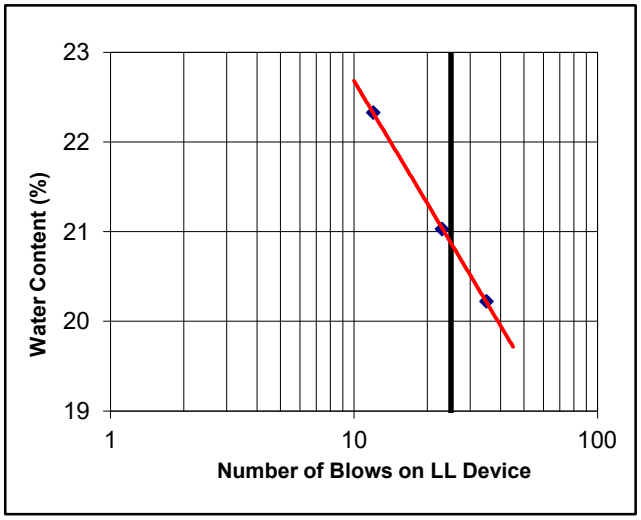
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-07 SS02 1.29-1.73 m***		

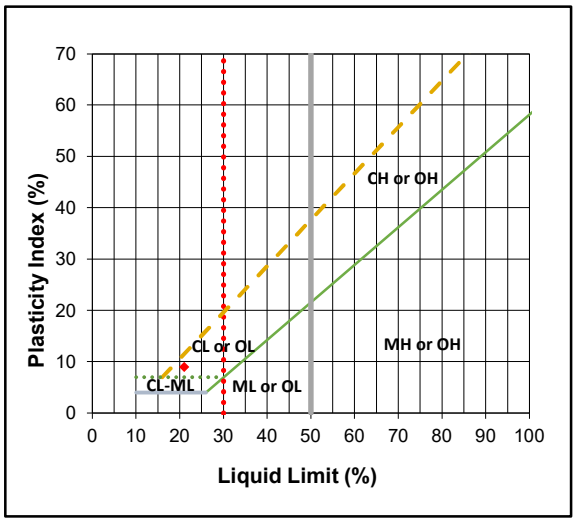
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	12	23	35		
$W_{Wet\ Soil}$ + Tare (g)	37.43	36.73	22.91		
$W_{Dry\ Soil}$ + Tare (g)	31.62	31.33	20.00		
W_{Water} (g)	5.81	5.40	2.91		
Tare (g)	5.60	5.65	5.61		
$W_{Dry\ Soil}$ (g)	26.02	25.68	14.39	**Water Content (%)**	8.4
Water Content (%)	22.3	21.0	20.2		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	21.53	18.90
$W_{Dry\ Soil}$ + Tare (g)	19.83	17.43
W_{Water} (g)	1.70	1.47
Tare (g)	5.64	5.64
$W_{Dry\ Soil}$ (g)	14.19	11.79
Water Content (%)	12.0	12.5
Average Mc (%)	12.2	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
21	**12**	**9**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

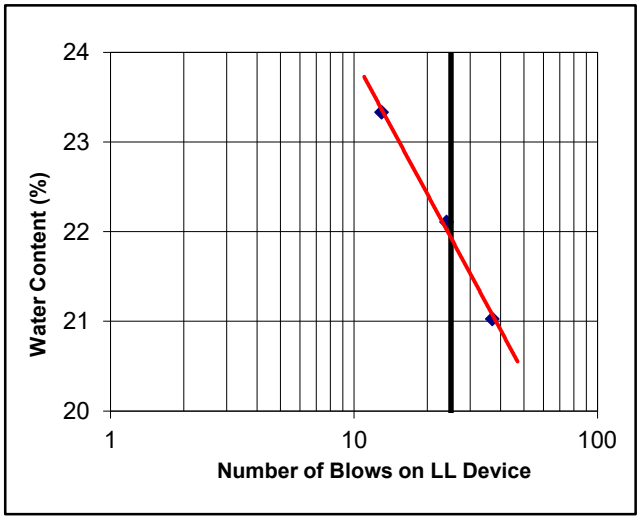
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-07 GB01 2.10-2.50 m***

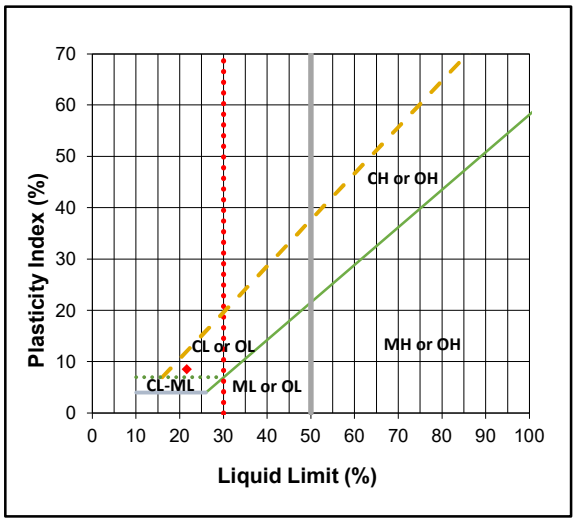
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	13	24	37		
$W_{Wet\ Soil}$ + Tare (g)	36.86	34.93	37.22		
$W_{Dry\ Soil}$ + Tare (g)	30.99	29.64	31.73		
W_{Water} (g)	5.87	5.29	5.49		
Tare (g)	5.83	5.71	5.62		
$W_{Dry\ Soil}$ (g)	25.16	23.93	26.11	**Water Content (%)**	9.9
Water Content (%)	23.3	22.1	21.0		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	29.98	24.35
$W_{Dry\ Soil}$ + Tare (g)	27.19	22.26
W_{Water} (g)	2.79	2.09
Tare (g)	5.66	5.61
$W_{Dry\ Soil}$ (g)	21.53	16.65
Water Content (%)	13.0	12.6
Average Mc (%)	12.8	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
22	**13**	**9**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by:* *S. F.*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

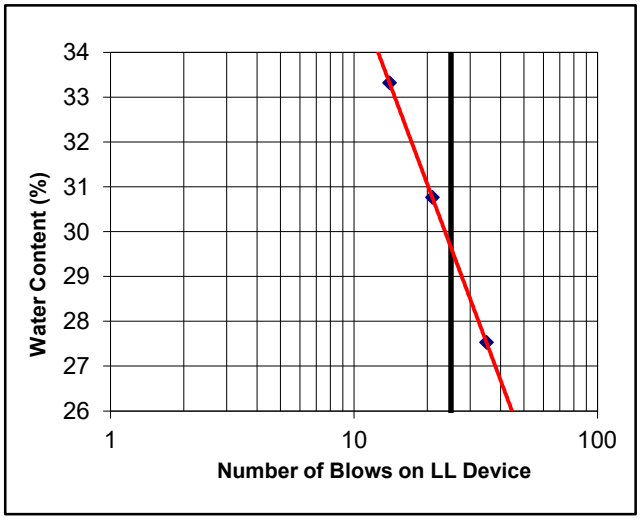
Sample Info: ***BH25-07*** ***SS04*** ***3.89-4.49 m***

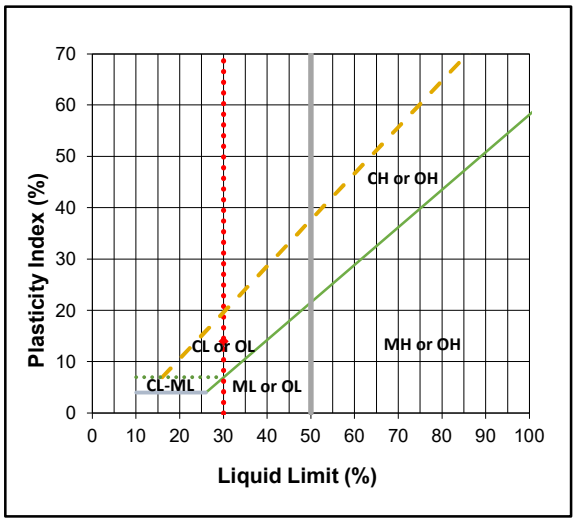
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	14	21	35		
$W_{Wet\ Soil}$ + Tare (g)	33.88	33.68	38.00		
$W_{Dry\ Soil}$ + Tare (g)	26.87	27.10	31.01		
W_{Water} (g)	7.01	6.58	6.99		
Tare (g)	5.83	5.71	5.62		
$W_{Dry\ Soil}$ (g)	21.04	21.39	25.39	**Water Content (%)**	14.8
Water Content (%)	33.3	30.8	27.5		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	24.34	25.07
$W_{Dry\ Soil}$ + Tare (g)	21.79	22.36
W_{Water} (g)	2.55	2.71
Tare (g)	5.66	5.61
$W_{Dry\ Soil}$ (g)	16.13	16.75
Water Content (%)	15.8	16.2
Average Mc (%)	16.0	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
30	**16**	**14**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by:* *S. F.*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

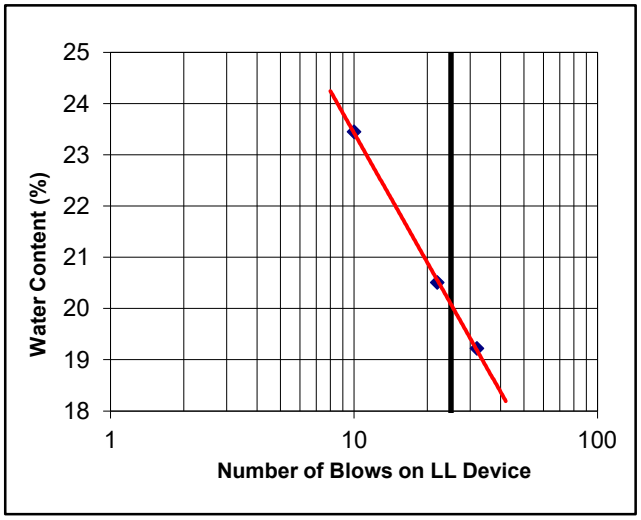
Sample Info: ***BH25-08*** ***SS01*** ***0.00-0.41 m***

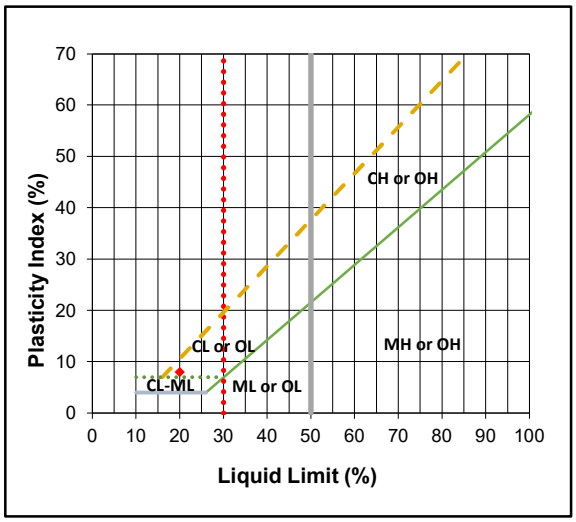
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	10	22	32		
$W_{Wet\ Soil}$ + Tare (g)	37.58	34.17	34.14		
$W_{Dry\ Soil}$ + Tare (g)	31.54	29.34	29.57		
W_{Water} (g)	6.04	4.83	4.57		
Tare (g)	5.78	5.79	5.79		
$W_{Dry\ Soil}$ (g)	25.76	23.55	23.78	**Water Content (%)**	12.7
Water Content (%)	23.4	20.5	19.2		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	20.81	19.83
$W_{Dry\ Soil}$ + Tare (g)	19.15	18.25
W_{Water} (g)	1.66	1.58
Tare (g)	5.64	5.60
$W_{Dry\ Soil}$ (g)	13.51	12.65
Water Content (%)	12.3	12.5
Average Mc (%)	12.4	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
20	**12**	**8**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

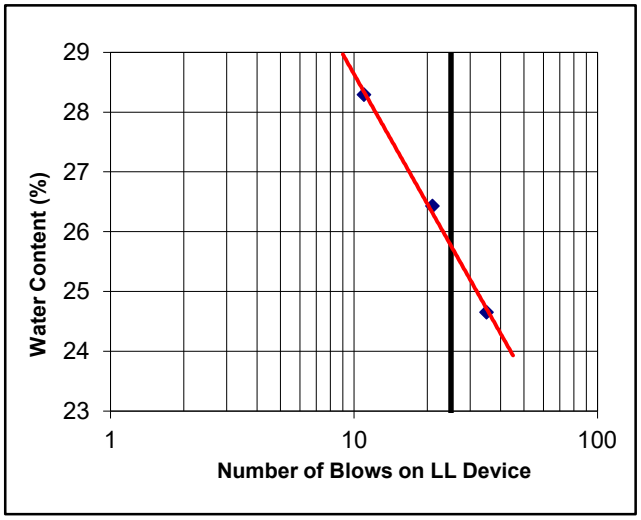
Project Info: 317086-54170 / Grise Fiord , Nunavut
Reviewed by: S. F.
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Sample Info: ***BH25-08 GB01 4.55-4.70 m***

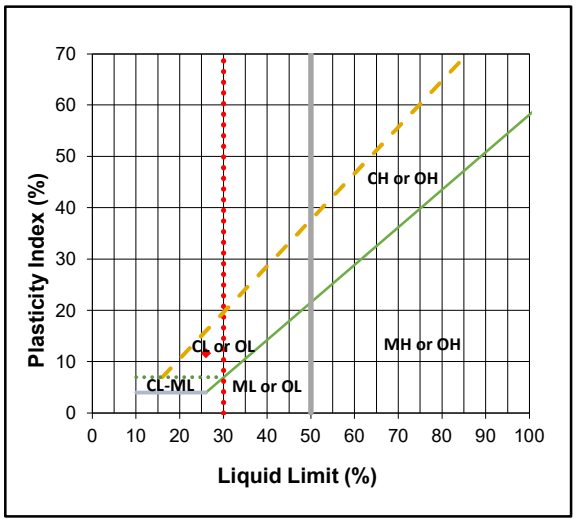
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	11	21	35		
$W_{Wet\ Soil}$ + Tare (g)	37.71	35.02	39.87		
$W_{Dry\ Soil}$ + Tare (g)	30.64	28.87	33.11		
W_{Water} (g)	7.07	6.15	6.76		
Tare (g)	5.65	5.60	5.69		
$W_{Dry\ Soil}$ (g)	24.99	23.27	27.42	**Water Content (%)**	13.2
Water Content (%)	28.3	26.4	24.7		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	23.56	25.06
$W_{Dry\ Soil}$ + Tare (g)	21.38	22.68
W_{Water} (g)	2.18	2.38
Tare (g)	5.62	5.64
$W_{Dry\ Soil}$ (g)	15.76	17.04
Water Content (%)	13.8	14.0
Average Mc (%)	13.9	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
26	**14**	**12**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

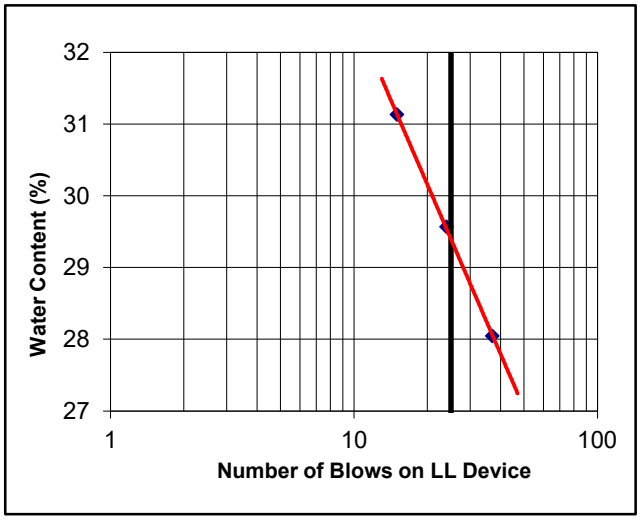
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-08 SS06 8.00-8.21 m***		

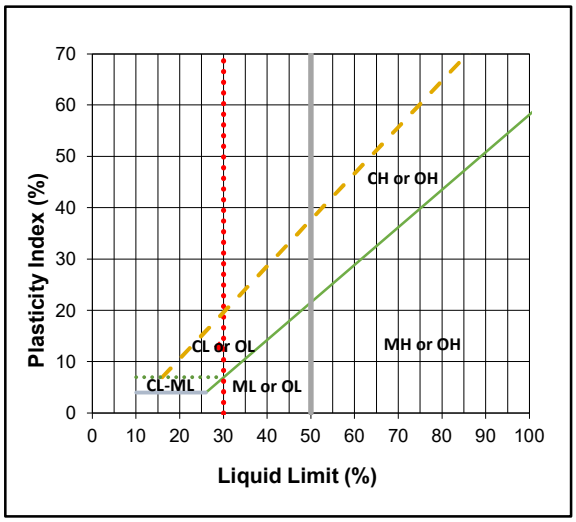
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	15	24	37		
$W_{Wet\ Soil}$ + Tare (g)	22.32	38.50	33.58		
$W_{Dry\ Soil}$ + Tare (g)	18.36	30.99	27.46		
W_{Water} (g)	3.96	7.51	6.12		
Tare (g)	5.64	5.59	5.64		
$W_{Dry\ Soil}$ (g)	12.72	25.40	21.82	**Water Content (%)**	14.8
Water Content (%)	31.1	29.6	28.0		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	23.85	21.27
$W_{Dry\ Soil}$ + Tare (g)	21.38	19.13
W_{Water} (g)	2.47	2.14
Tare (g)	5.65	5.62
$W_{Dry\ Soil}$ (g)	15.73	13.51
Water Content (%)	15.7	15.8
Average Mc (%)	15.8	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
29	**16**	**13**	**CL**





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Atterberg Limits (ASTM D4318 - Method A)

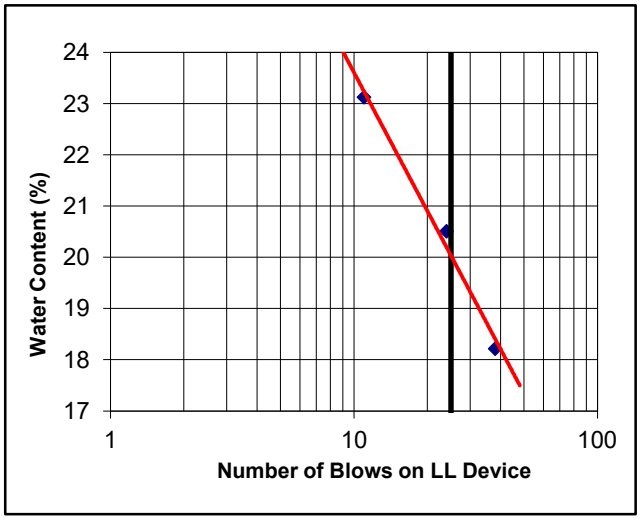
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by:*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		
Sample Info:	***BH25-09 GB01 6.30-6.50 m***		

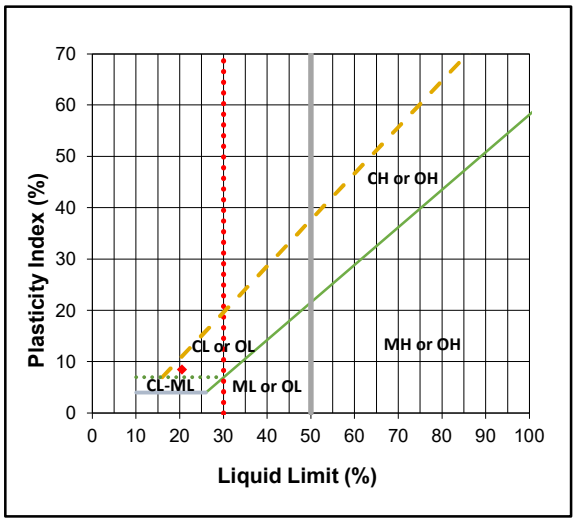
Atterberg Limits - ASTM D4318 (Method A)

	Liquid Limit (Air-Dried) - Multipoint Method			Water Content Received	
Container ID	1	2	3		
Number of Blows	11	24	38		
$W_{Wet\ Soil}$ + Tare (g)	40.62	43.32	37.18		
$W_{Dry\ Soil}$ + Tare (g)	34.05	36.90	32.32		
W_{Water} (g)	6.57	6.42	4.86		
Tare (g)	5.64	5.59	5.64		
$W_{Dry\ Soil}$ (g)	28.41	31.31	26.68	**Water Content (%)**	12.0
Water Content (%)	23.1	20.5	18.2		

	Plastic Limit	
Container ID	4	5
$W_{Wet\ Soil}$ + Tare (g)	20.96	20.70
$W_{Dry\ Soil}$ + Tare (g)	19.32	19.05
W_{Water} (g)	1.64	1.65
Tare (g)	5.65	5.62
$W_{Dry\ Soil}$ (g)	13.67	13.43
Water Content (%)	12.0	12.3
Average Mc (%)	12.1	

Results			
Liquid Limit (Air Dried)(%)	Plastic Limit (%)	Plastic Index (%)	USCS
21	**12**	**9**	**CL**





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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

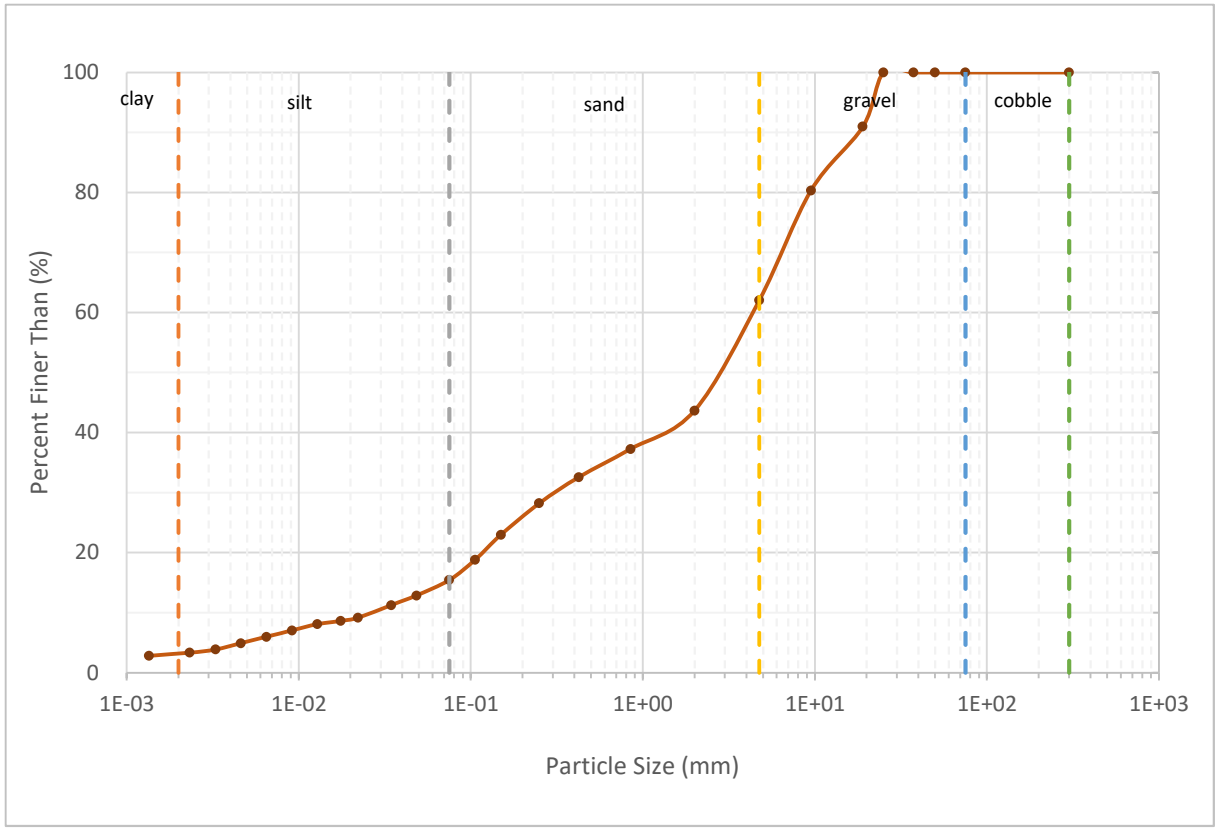
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-04*** ***SS01*** ***0.00-0.40 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	91.01
	9.500	80.36
	4.750	62.06
SAND	2.000	43.68
	0.850	37.28
	0.425	32.62
	0.250	28.26
	0.150	23.02
	0.106	18.83
	0.075	15.46
HYDROMETER	0.0484	12.88
	0.0346	11.29
	0.0221	9.18
	0.0175	8.65
	0.0129	8.12
	0.0091	7.06
	0.0065	6.00
	0.0046	4.95
	0.0033	3.89
	0.0023	3.36
	0.0013	2.83

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**37.9**	**46.6**	**12.1**	**3.4**



SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

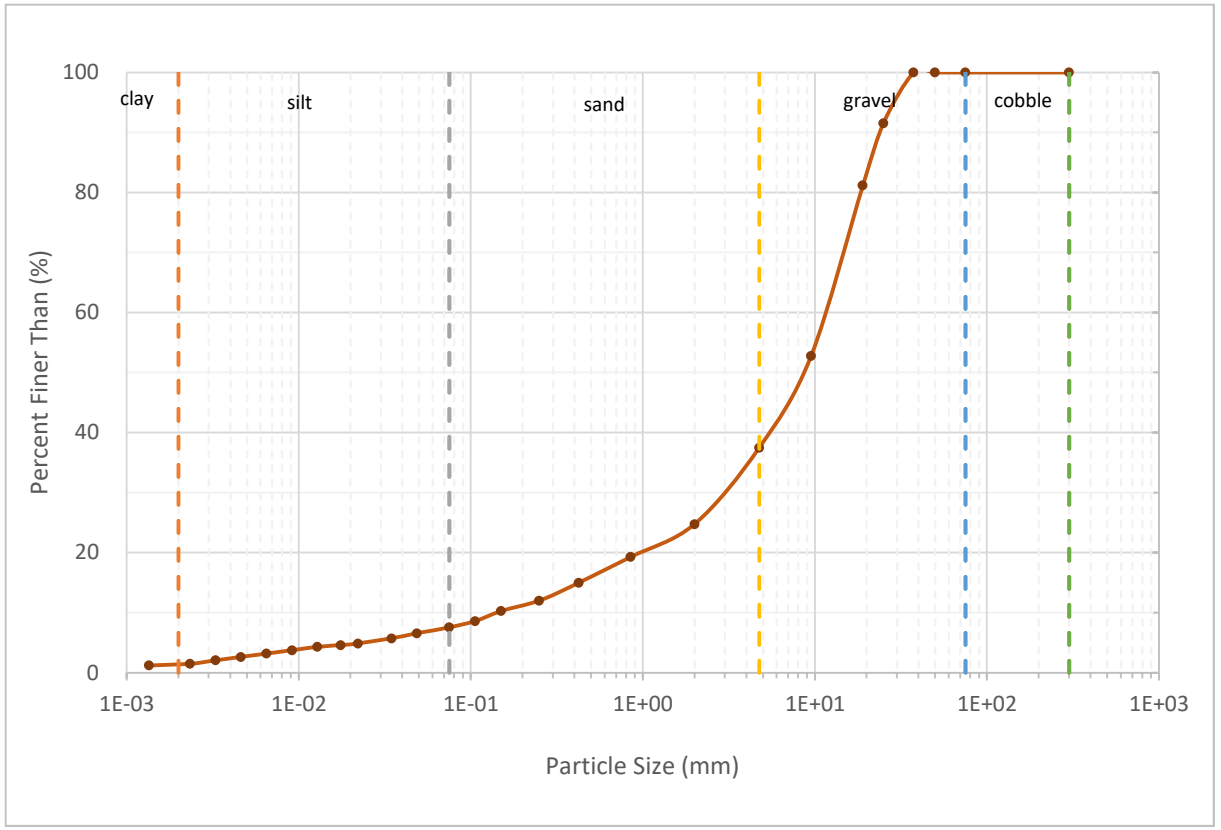
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-04*** ***SS02*** ***1.40-2.00 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	91.53
	19.000	81.20
	9.500	52.78
	4.750	37.50
SAND	2.000	24.77
	0.850	19.29
	0.425	15.02
	0.250	12.02
	0.150	10.28
	0.106	8.62
	0.075	7.57
HYDROMETER	0.0486	6.59
	0.0347	5.74
	0.0221	4.90
	0.0175	4.61
	0.0129	4.33
	0.0091	3.77
	0.0065	3.20
	0.0046	2.64
	0.0033	2.07
	0.0023	1.51
	0.0014	1.23

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**62.5**	**29.9**	**6.1**	**1.5**



SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

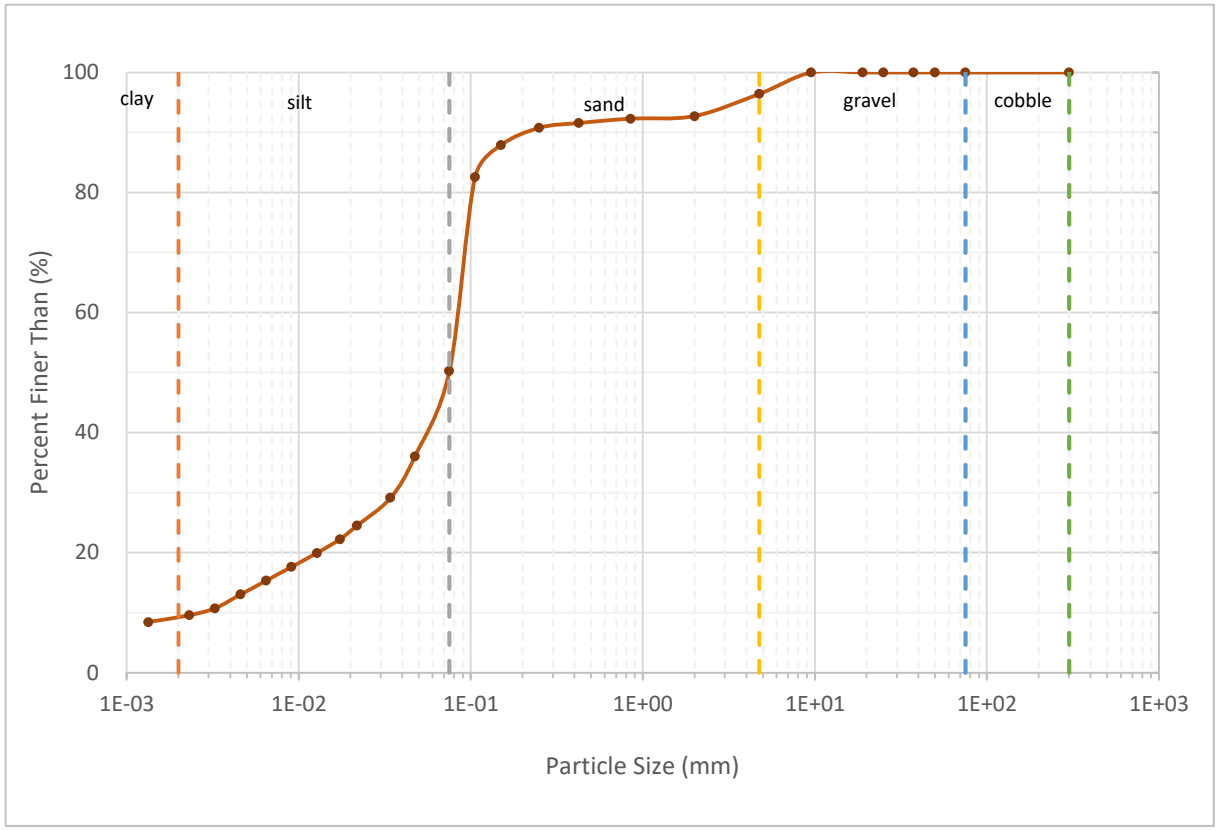
Reviewed by *S. F.*

Sample Info: ***BH25-04*** ***SS05*** ***5.77-6.37 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	96.45
SAND	2.000	92.74
	0.850	92.30
	0.425	91.59
	0.250	90.79
	0.150	87.91
	0.106	82.62
	0.075	50.27
HYDROMETER	0.0474	36.06
	0.0342	29.16
	0.0219	24.56
	0.0174	22.26
	0.0128	19.96
	0.0091	17.66
	0.0065	15.36
	0.0046	13.06
	0.0033	10.76
	0.0023	9.61
	0.0013	8.46

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**3.6**	**46.2**	**40.7**	**9.5**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

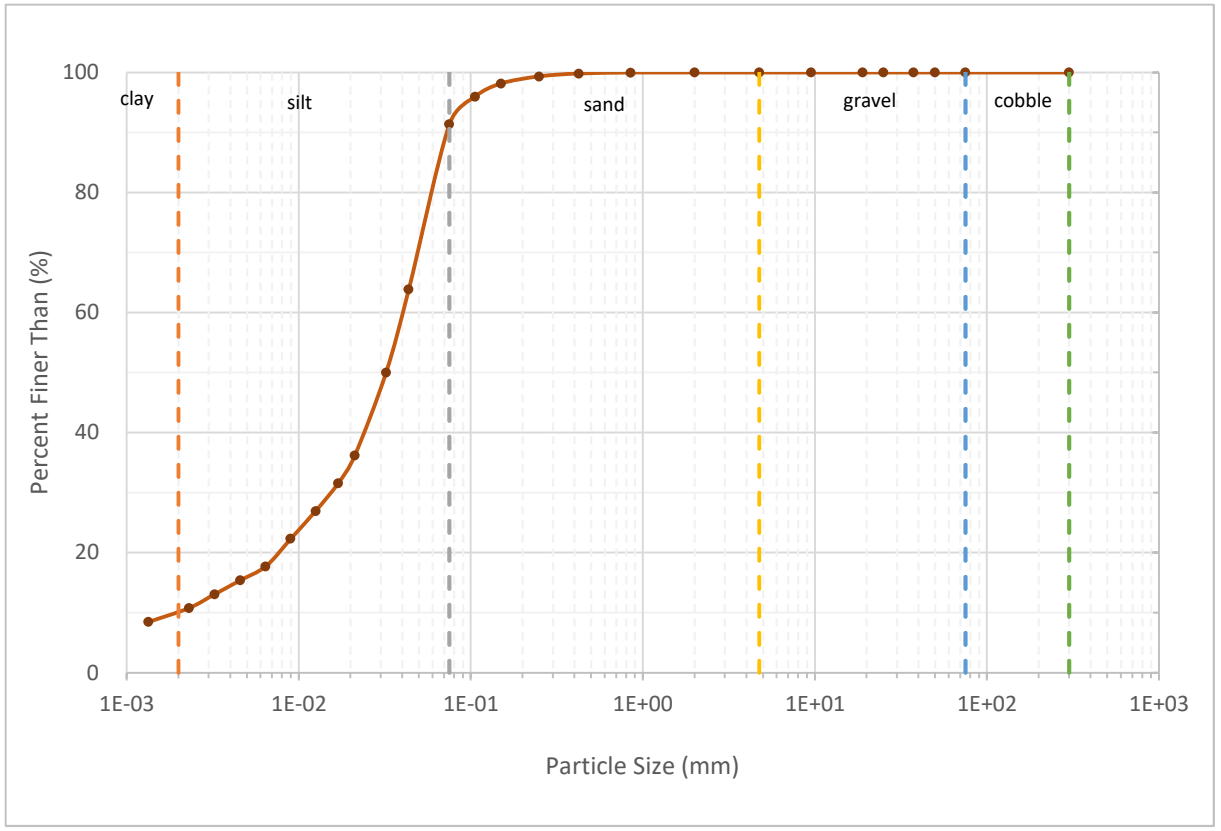
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-04*** ***GB01*** ***9.90-10.20 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	100.00
SAND	2.000	100.00
	0.850	99.98
	0.425	99.82
	0.250	99.35
	0.150	98.18
	0.106	95.98
	0.075	91.41
HYDROMETER	0.0436	63.90
	0.0322	50.05
	0.0212	36.19
	0.0170	31.57
	0.0125	26.96
	0.0090	22.34
	0.0064	17.72
	0.0046	15.41
	0.0032	13.10
	0.0023	10.79
	0.0013	8.49

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**0.0**	**8.6**	**80.6**	**10.8**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

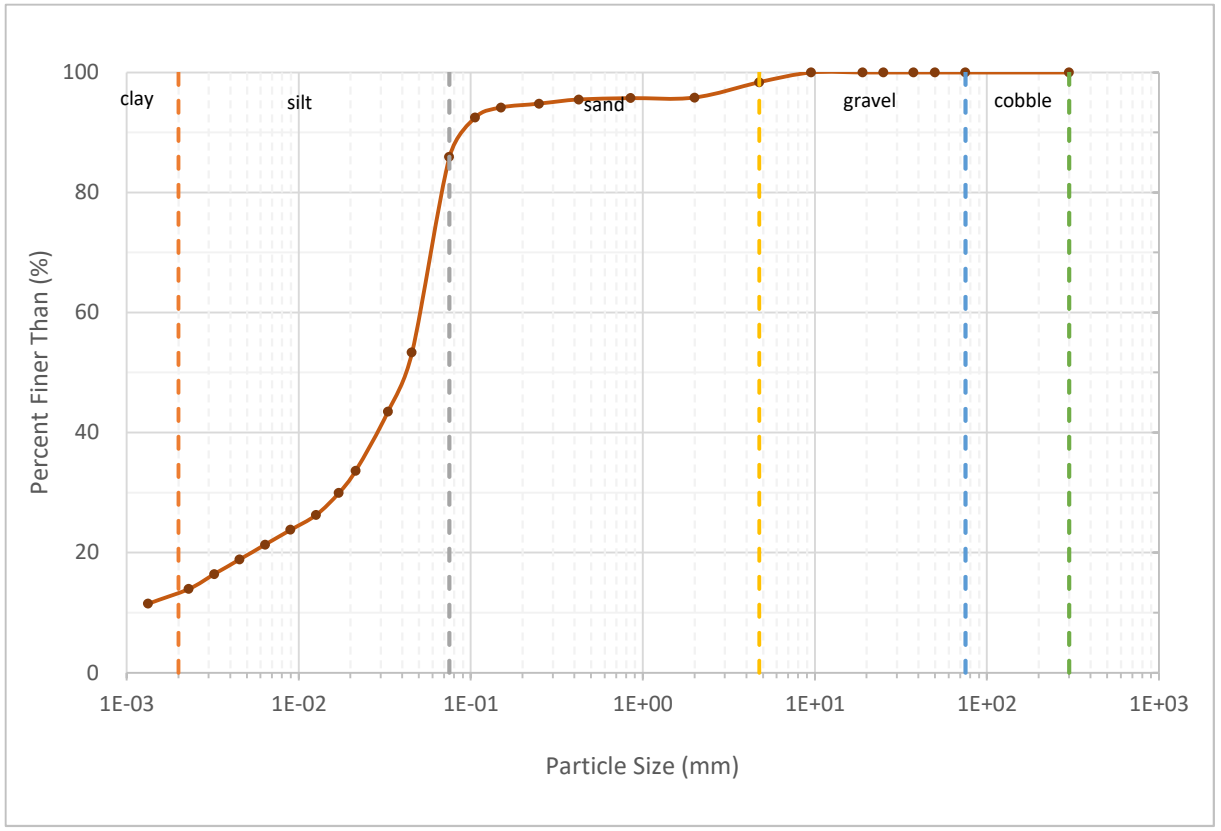
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-04*** ***SS09*** ***11.35-11.75 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	98.37
SAND	2.000	95.81
	0.850	95.74
	0.425	95.49
	0.250	94.80
	0.150	94.16
	0.106	92.49
	0.075	85.94
HYDROMETER	0.0455	53.37
	0.0331	43.52
	0.0215	33.67
	0.0171	29.98
	0.0126	26.29
	0.0090	23.82
	0.0064	21.36
	0.0045	18.90
	0.0032	16.44
	0.0023	13.97
	0.0013	11.51

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**1.6**	**12.4**	**72.0**	**14.0**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

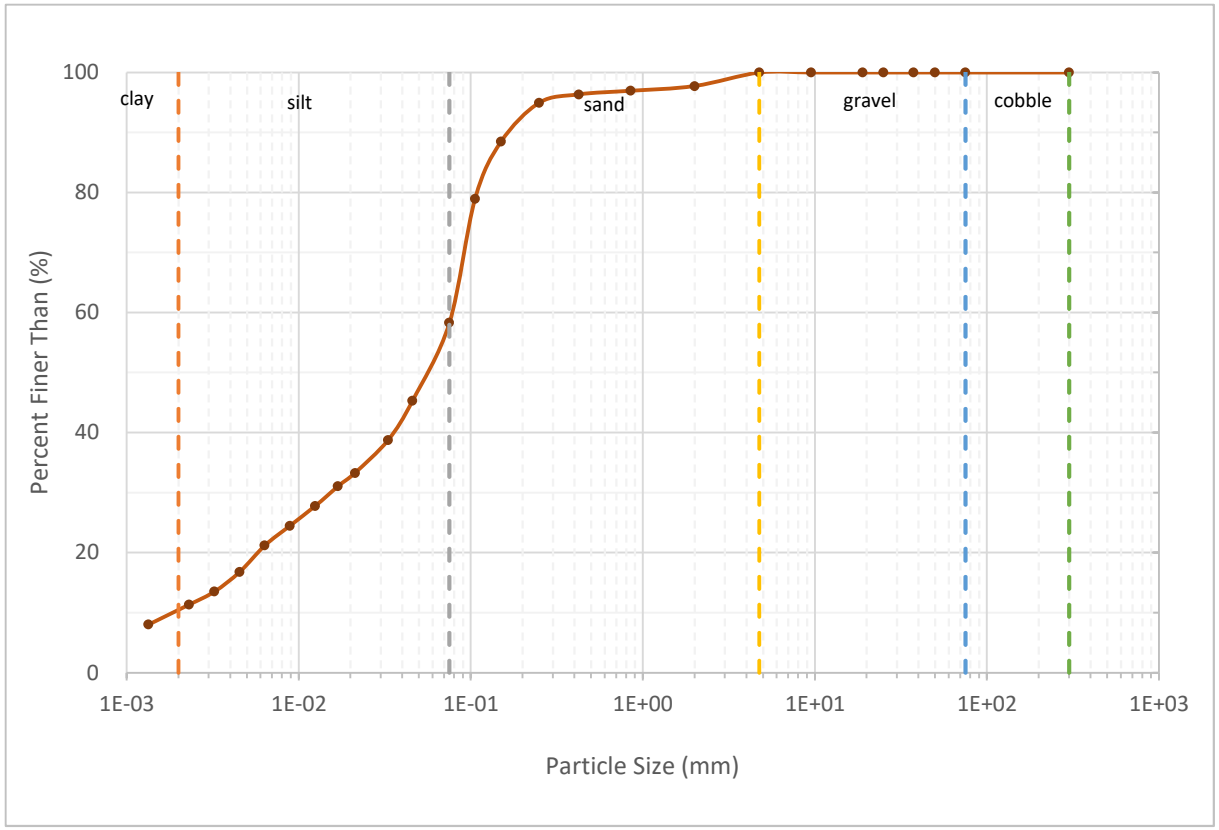
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-04*** ***SS11*** ***14.35-15.18 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	100.00
SAND	2.000	97.75
	0.850	96.96
	0.425	96.35
	0.250	94.97
	0.150	88.50
	0.106	78.98
	0.075	58.32
HYDROMETER	0.0458	45.35
	0.0331	38.77
	0.0213	33.28
	0.0169	31.09
	0.0125	27.80
	0.0089	24.51
	0.0063	21.22
	0.0045	16.83
	0.0032	13.54
	0.0023	11.35
	0.0013	8.06

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**0.0**	**41.7**	**47.0**	**11.3**



Particle Size Analysis
(ASTM D6913 & D7928)

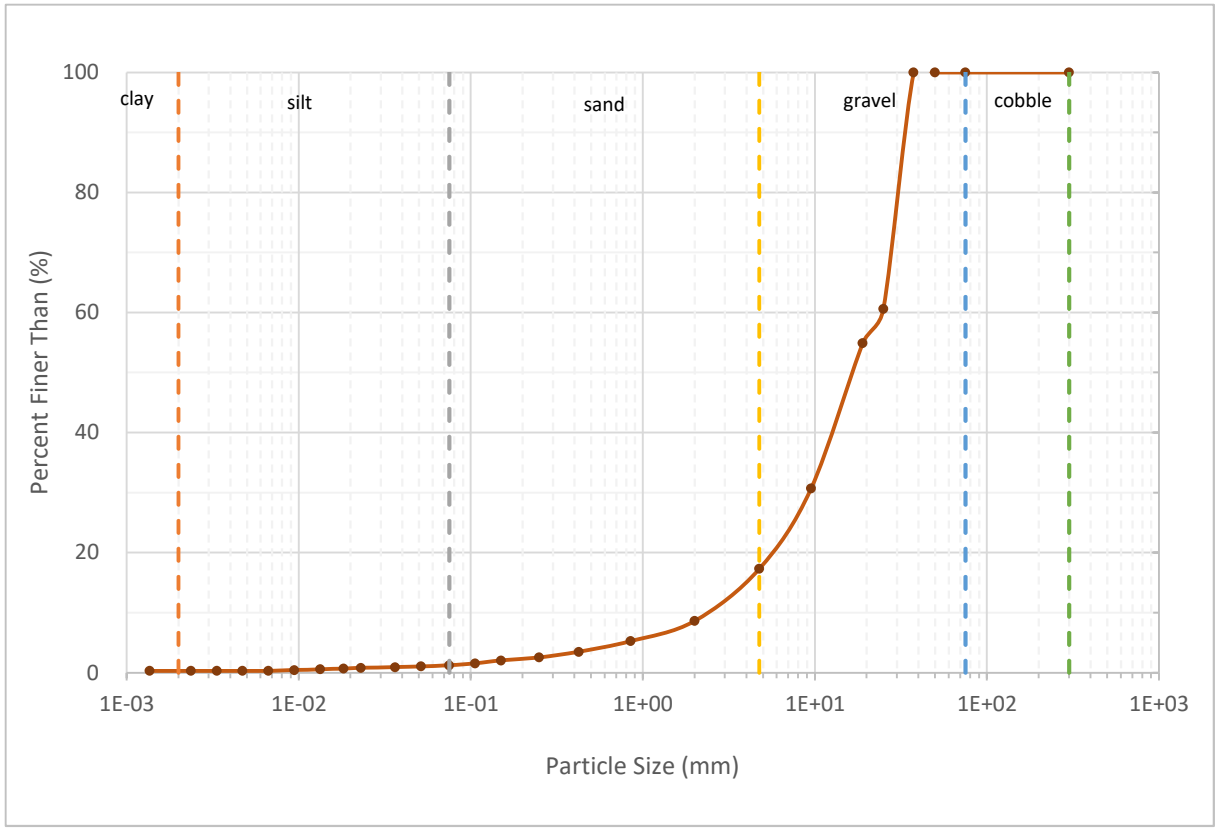
Project Info:	*317086-54170 / Grise Fiord , Nunavut*	*Reviewed by*	*S. F.*
Client:	*Worley Canada Services Ltd.*		
Solum Job No.:	*00101250516(185)*		

Sample Info: ***BH25-05*** ***SS02*** ***1.19-1.79 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	60.64
	19.000	54.95
	9.500	30.70
	4.750	17.32
SAND	2.000	8.63
	0.850	5.29
	0.425	3.51
	0.250	2.57
	0.150	2.06
	0.106	1.59
	0.075	1.25
HYDROMETER	0.0513	1.07
	0.0364	0.95
	0.0230	0.83
	0.0182	0.70
	0.0133	0.58
	0.0094	0.46
	0.0067	0.33
	0.0047	0.33
	0.0033	0.33
	0.0024	0.33
	0.0014	0.33

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**82.7**	**16.1**	**0.9**	**0.3**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

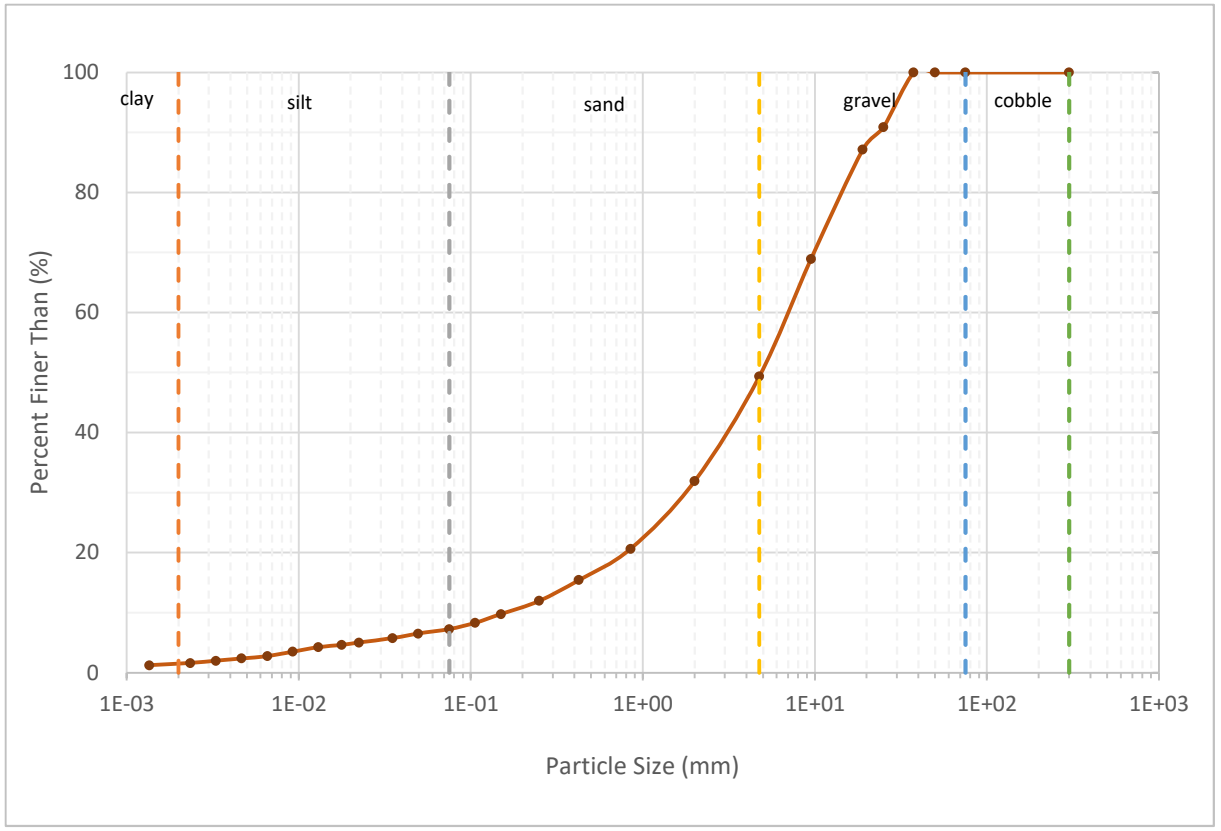
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-05*** ***SS03*** ***2.58-3.10 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	90.89
	19.000	87.18
	9.500	68.95
	4.750	49.36
SAND	2.000	31.93
	0.850	20.66
	0.425	15.47
	0.250	11.99
	0.150	9.80
	0.106	8.33
	0.075	7.29
HYDROMETER	0.0495	6.54
	0.0352	5.79
	0.0224	5.03
	0.0177	4.65
	0.0130	4.28
	0.0092	3.52
	0.0066	2.77
	0.0047	2.39
	0.0033	2.02
	0.0023	1.64
	0.0014	1.26

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**50.6**	**42.1**	**5.6**	**1.7**



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Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut*

Client: *Worley Canada Services Ltd.*

Solum Job No.: *00101250516(185)*

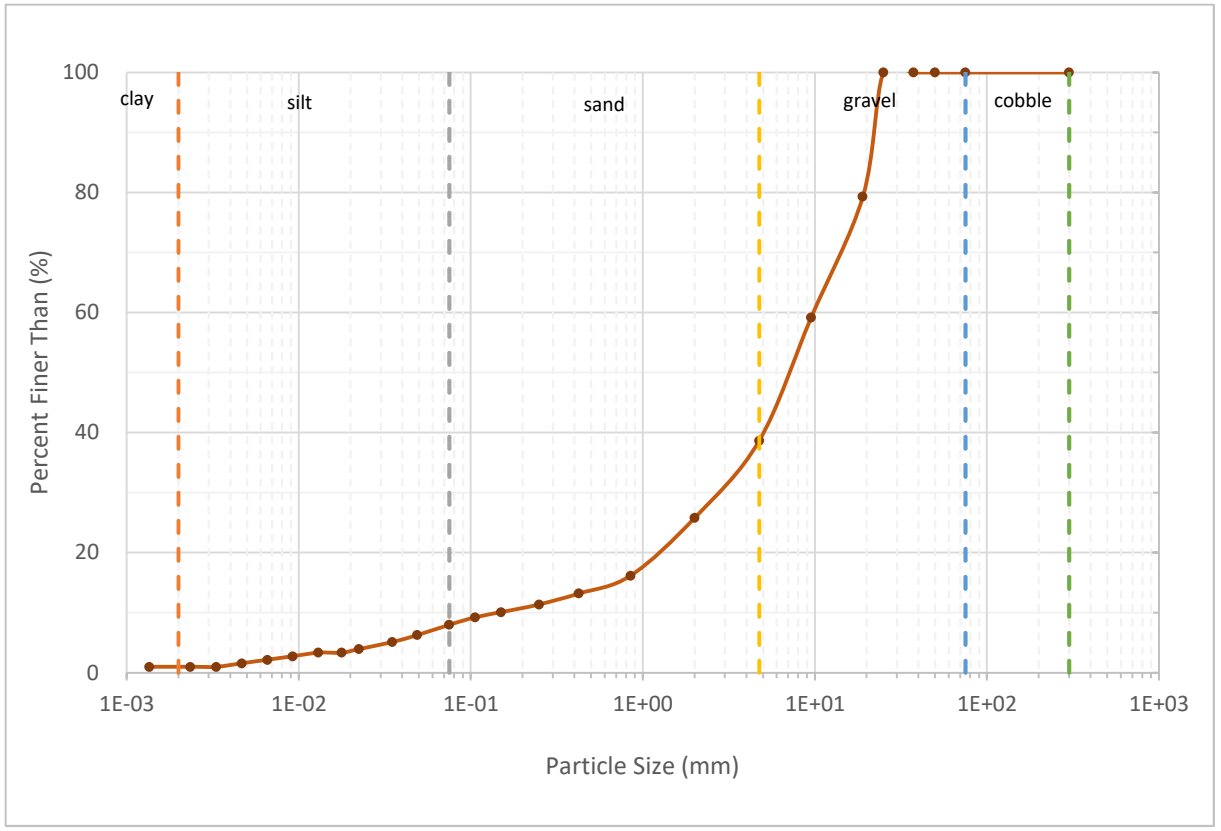
Reviewed by *S. F.*

Sample Info: ***BH25-05*** ***SS05*** ***4.96-5.56 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	79.36
	9.500	59.17
	4.750	38.67
SAND	2.000	25.81
	0.850	16.18
	0.425	13.24
	0.250	11.39
	0.150	10.11
	0.106	9.24
	0.075	8.01
HYDROMETER	0.0489	6.31
	0.0350	5.12
	0.0224	3.94
	0.0178	3.35
	0.0130	3.35
	0.0092	2.76
	0.0066	2.17
	0.0047	1.58
	0.0033	0.99
	0.0023	0.99
	0.0014	0.99

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**61.3**	**30.7**	**7.0**	**1.0**



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Particle Size Analysis (ASTM D6913 & D7928)

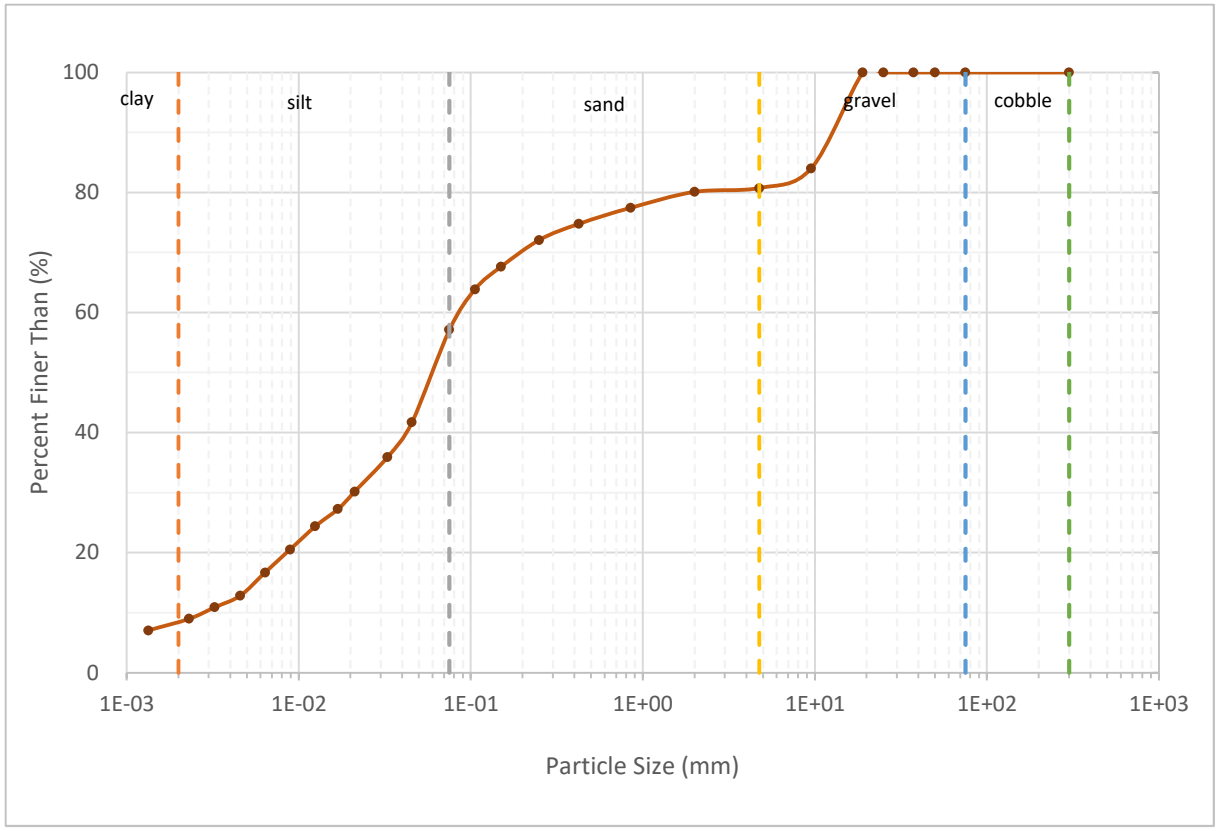
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-06*** ***SS01*** ***0.00-0.60 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	84.02
	4.750	80.74
SAND	2.000	80.12
	0.850	77.47
	0.425	74.81
	0.250	72.09
	0.150	67.66
	0.106	63.91
	0.075	57.15
HYDROMETER	0.0455	41.75
	0.0329	35.97
	0.0212	30.19
	0.0169	27.30
	0.0125	24.41
	0.0089	20.56
	0.0064	16.71
	0.0046	12.86
	0.0032	10.93
	0.0023	9.00
	0.0013	7.08

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**19.3**	**23.6**	**48.1**	**9.0**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

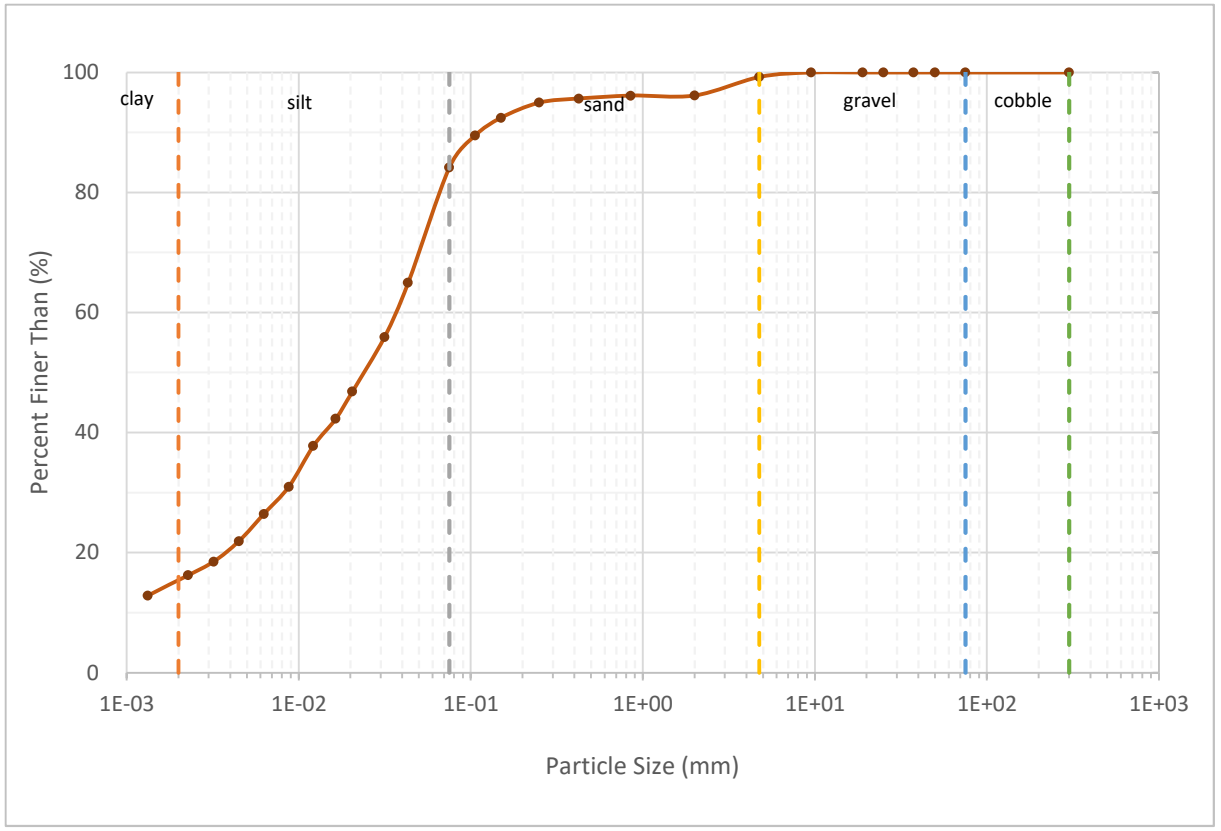
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-06*** ***SS03*** ***2.78-3.38 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	99.27
SAND	2.000	96.18
	0.850	96.15
	0.425	95.65
	0.250	95.00
	0.150	92.46
	0.106	89.51
	0.075	84.21
HYDROMETER	0.0432	65.00
	0.0315	55.93
	0.0205	46.86
	0.0164	42.33
	0.0122	37.80
	0.0088	31.00
	0.0063	26.46
	0.0045	21.93
	0.0032	18.53
	0.0023	16.26
	0.0013	12.86

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**0.7**	**15.1**	**67.9**	**16.3**



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Particle Size Analysis (ASTM D6913 & D7928)

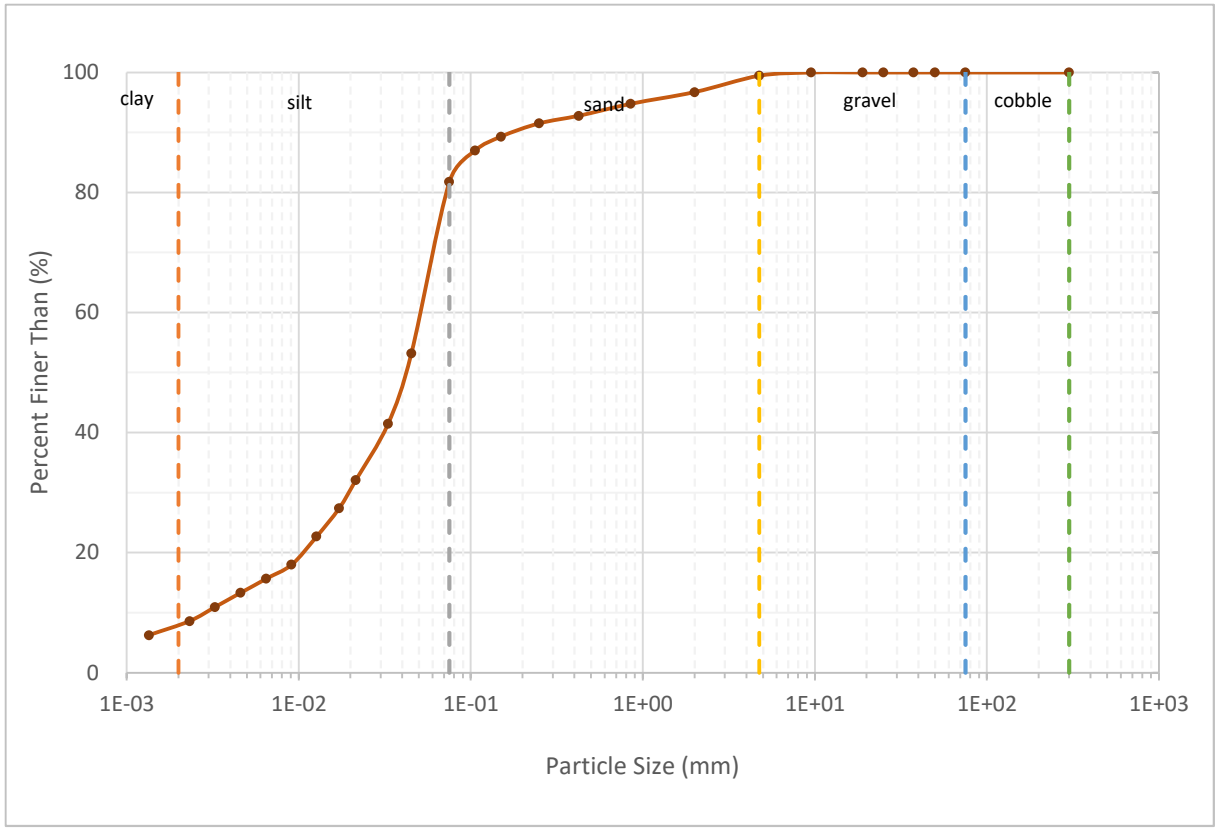
Project Info: *317086-54170 / Grise Fiord , Nunavut*
Client: *Worley Canada Services Ltd.*
Solum Job No.: *00101250516(185)*
Reviewed by *S. F.*

Sample Info: ***BH25-06*** ***SS04*** ***4.52-5.12 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	99.47
SAND	2.000	96.73
	0.850	94.78
	0.425	92.79
	0.250	91.54
	0.150	89.31
	0.106	87.01
	0.075	81.80
HYDROMETER	0.0452	53.22
	0.0331	41.49
	0.0215	32.10
	0.0172	27.40
	0.0127	22.71
	0.0091	18.02
	0.0065	15.67
	0.0046	13.32
	0.0033	10.97
	0.0023	8.63
	0.0013	6.28

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**0.5**	**17.7**	**73.2**	**8.6**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

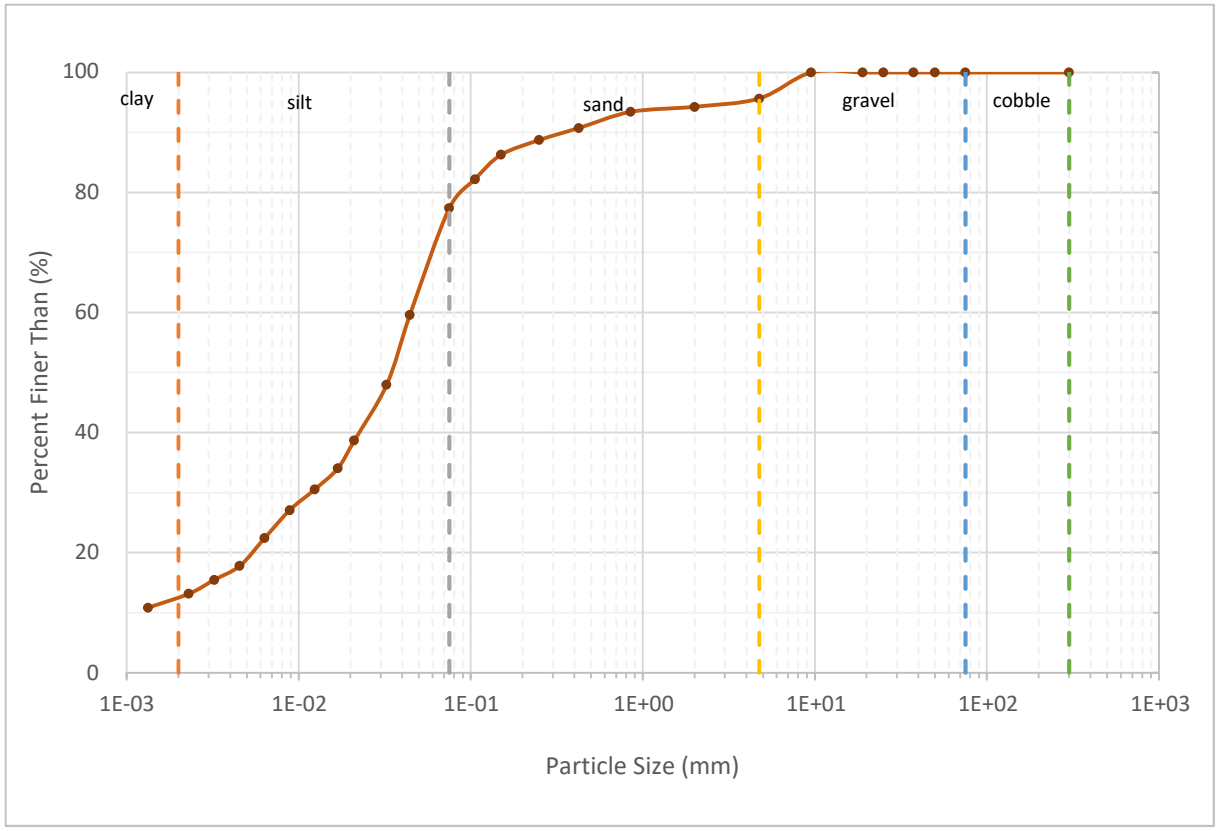
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-06*** ***SS07*** ***8.39-9.87 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	95.67
SAND	2.000	94.29
	0.850	93.45
	0.425	90.76
	0.250	88.76
	0.150	86.30
	0.106	82.24
	0.075	77.43
HYDROMETER	0.0442	59.61
	0.0324	48.00
	0.0211	38.71
	0.0169	34.07
	0.0124	30.59
	0.0089	27.11
	0.0063	22.46
	0.0045	17.82
	0.0032	15.50
	0.0023	13.18
	0.0013	10.85

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**4.3**	**18.2**	**64.3**	**13.2**



SOLUM CONSULTANTS LTD.
GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

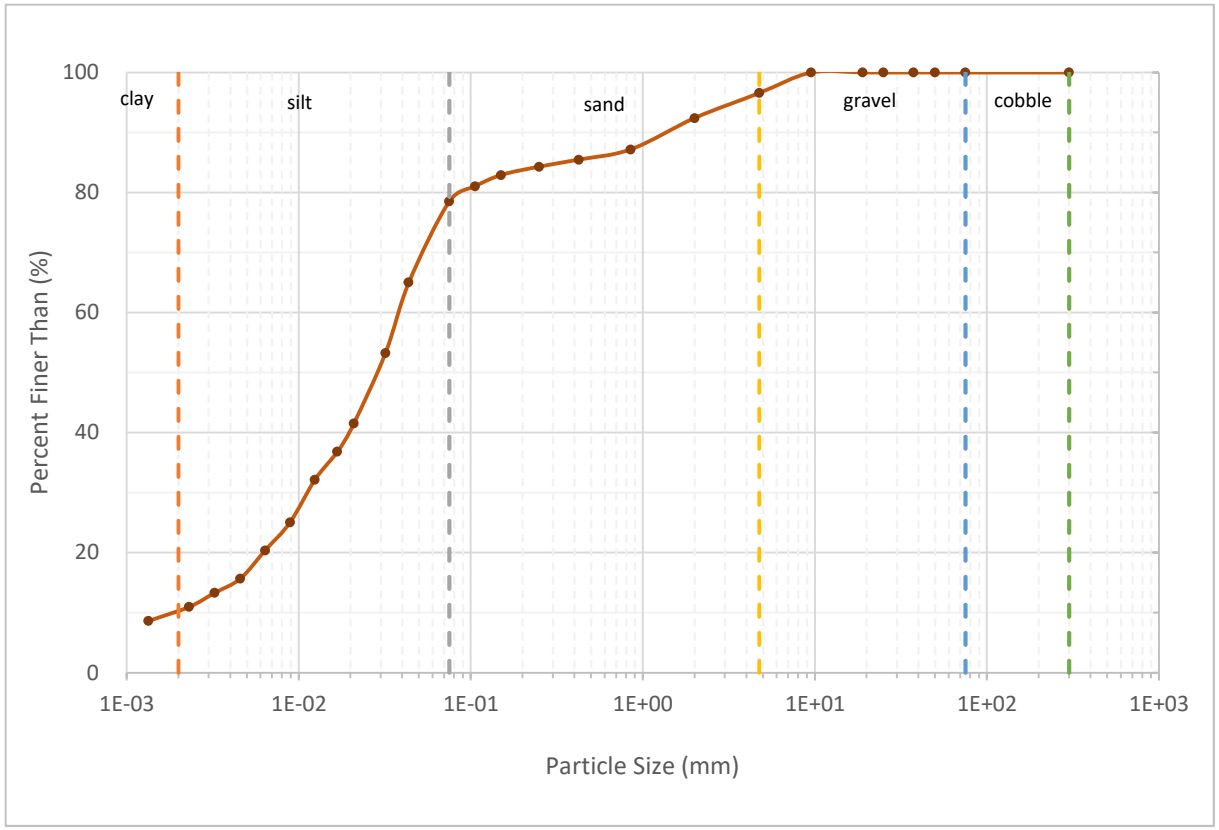
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-06*** ***SS11*** ***14.55-15.15 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	96.59
SAND	2.000	92.41
	0.850	87.19
	0.425	85.47
	0.250	84.30
	0.150	82.91
	0.106	81.06
	0.075	78.54
HYDROMETER	0.0436	65.04
	0.0320	53.29
	0.0209	41.54
	0.0168	36.84
	0.0124	32.14
	0.0089	25.09
	0.0064	20.39
	0.0046	15.69
	0.0032	13.34
	0.0023	10.99
	0.0013	8.64

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**3.4**	**18.0**	**67.6**	**11.0**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

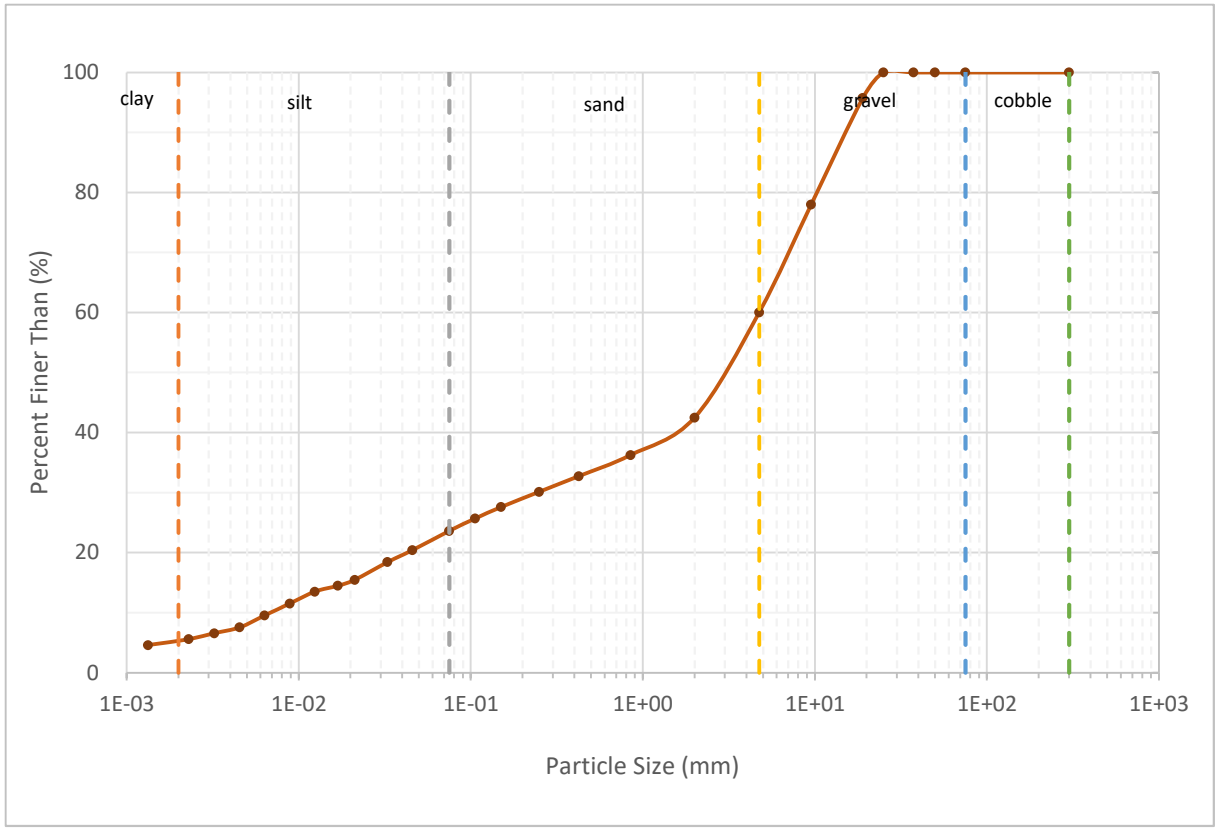
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-07*** ***SS01*** ***0.00-0.56 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	95.77
	9.500	77.99
	4.750	60.05
SAND	2.000	42.50
	0.850	36.29
	0.425	32.76
	0.250	30.16
	0.150	27.63
	0.106	25.70
	0.075	23.63
HYDROMETER	0.0458	20.44
	0.0329	18.46
	0.0212	15.49
	0.0169	14.51
	0.0124	13.52
	0.0089	11.54
	0.0063	9.56
	0.0045	7.59
	0.0032	6.60
	0.0023	5.61
	0.0013	4.62

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**40.0**	**36.4**	**18.0**	**5.6**



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Particle Size Analysis (ASTM D6913 & D7928)

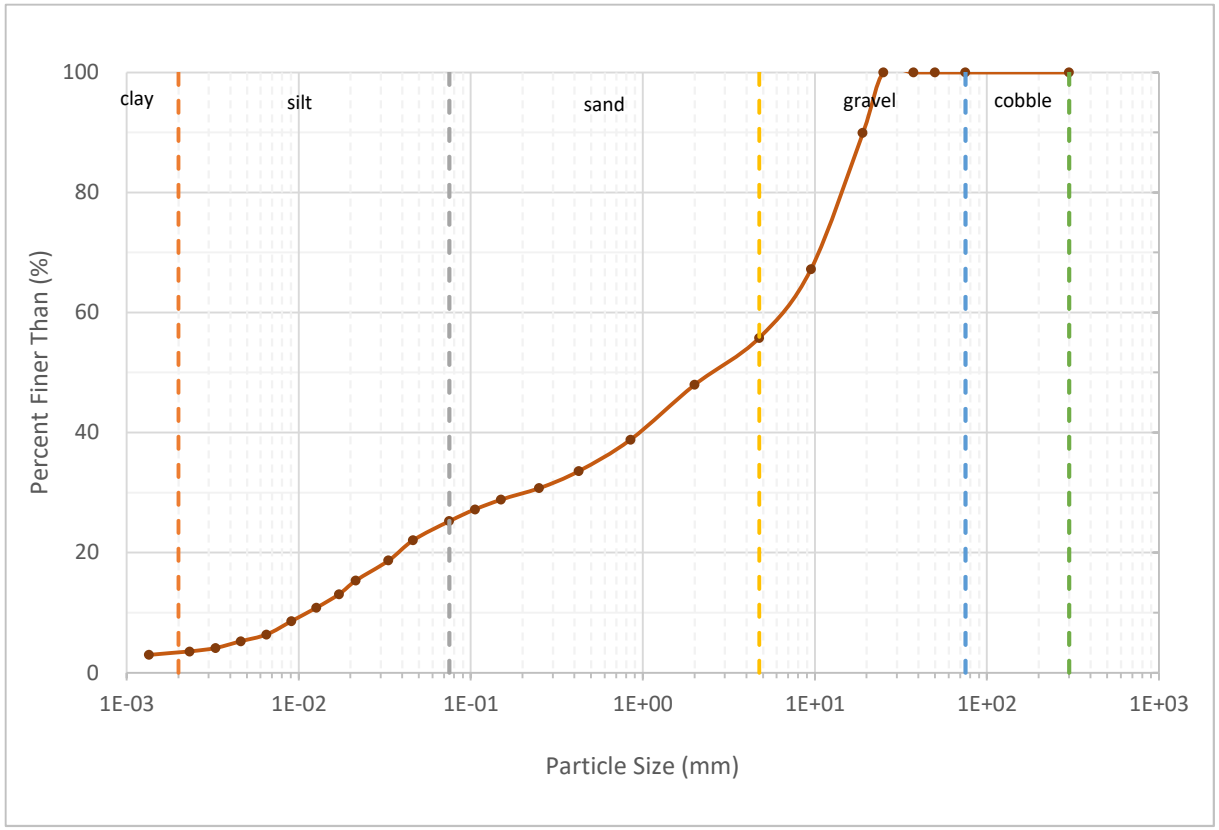
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-07*** ***SS02*** ***1.29-1.73 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	89.95
	9.500	67.26
	4.750	55.78
SAND	2.000	47.99
	0.850	38.84
	0.425	33.61
	0.250	30.77
	0.150	28.85
	0.106	27.23
	0.075	25.26
HYDROMETER	0.0462	22.08
	0.0333	18.71
	0.0215	15.35
	0.0172	13.10
	0.0127	10.86
	0.0091	8.61
	0.0065	6.37
	0.0046	5.25
	0.0033	4.12
	0.0023	3.56
	0.0013	3.00

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**44.2**	**30.5**	**21.7**	**3.6**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

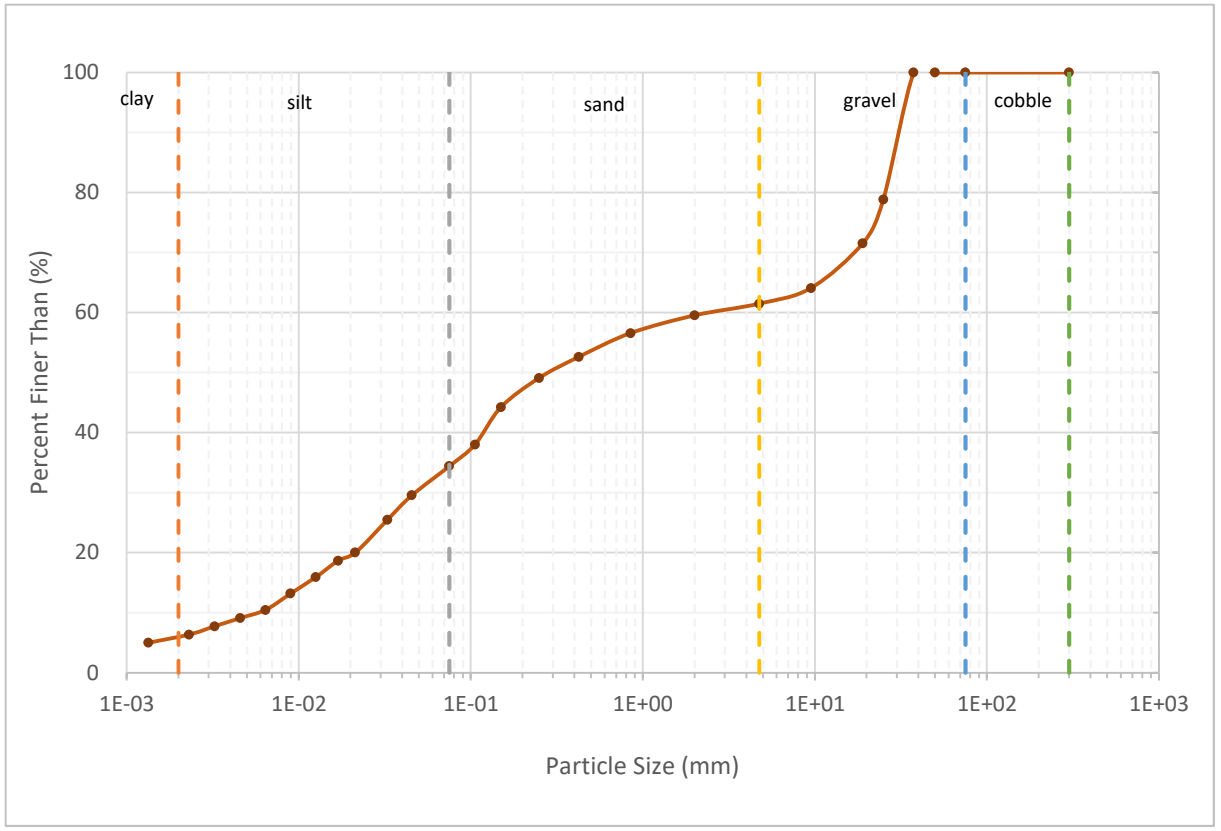
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-07*** ***GB01*** ***2.10-2.50 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	78.86
	19.000	71.57
	9.500	64.11
	4.750	61.49
SAND	2.000	59.55
	0.850	56.58
	0.425	52.64
	0.250	49.14
	0.150	44.28
	0.106	38.05
	0.075	34.43
HYDROMETER	0.0455	29.60
	0.0329	25.51
	0.0213	20.04
	0.0170	18.68
	0.0125	15.95
	0.0090	13.21
	0.0064	10.48
	0.0046	9.12
	0.0032	7.75
	0.0023	6.38
	0.0013	5.02

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**38.5**	**27.1**	**28.0**	**6.4**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

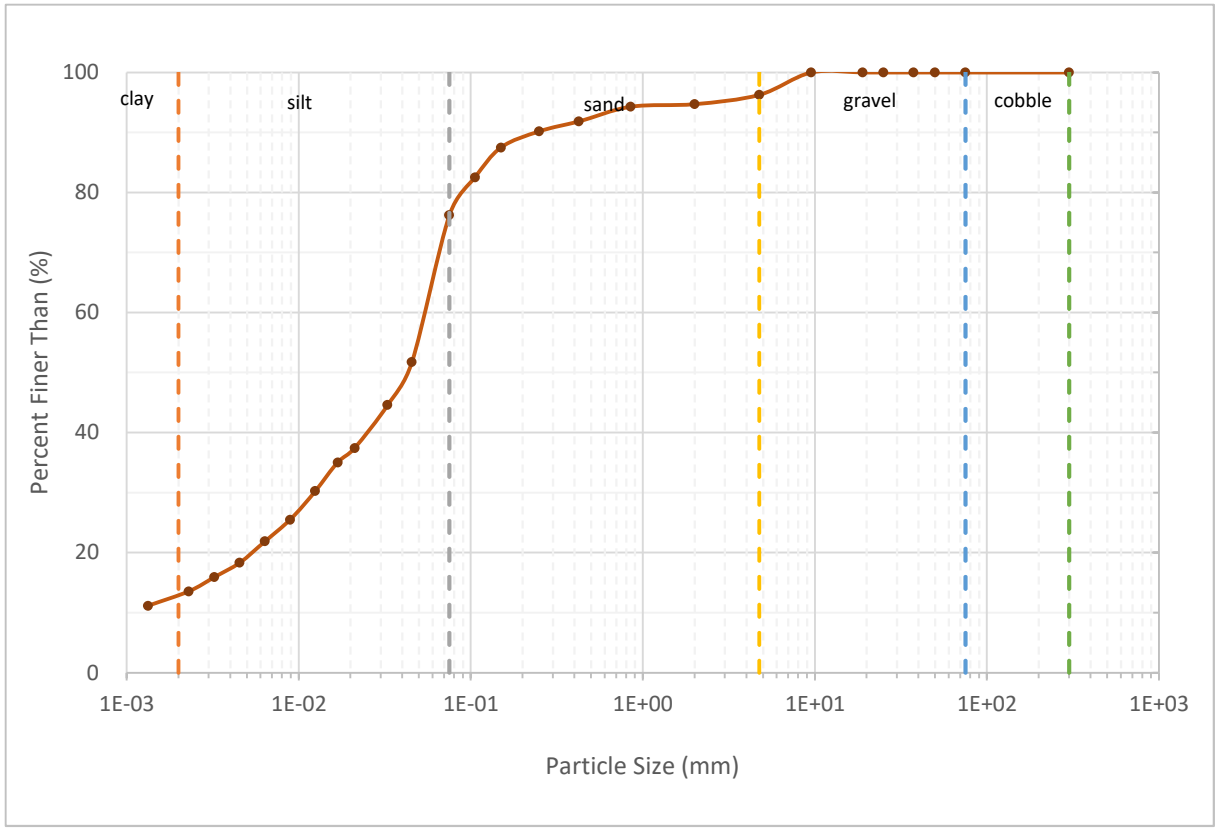
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-07*** ***SS04*** ***3.89-4.49 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	96.27
SAND	2.000	94.73
	0.850	94.30
	0.425	91.86
	0.250	90.21
	0.150	87.51
	0.106	82.56
	0.075	76.25
HYDROMETER	0.0455	51.80
	0.0329	44.63
	0.0212	37.46
	0.0169	35.07
	0.0125	30.29
	0.0089	25.51
	0.0064	21.93
	0.0045	18.34
	0.0032	15.95
	0.0023	13.56
	0.0013	11.17

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**3.7**	**20.0**	**62.7**	**13.6**



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Particle Size Analysis (ASTM D6913 & D7928)

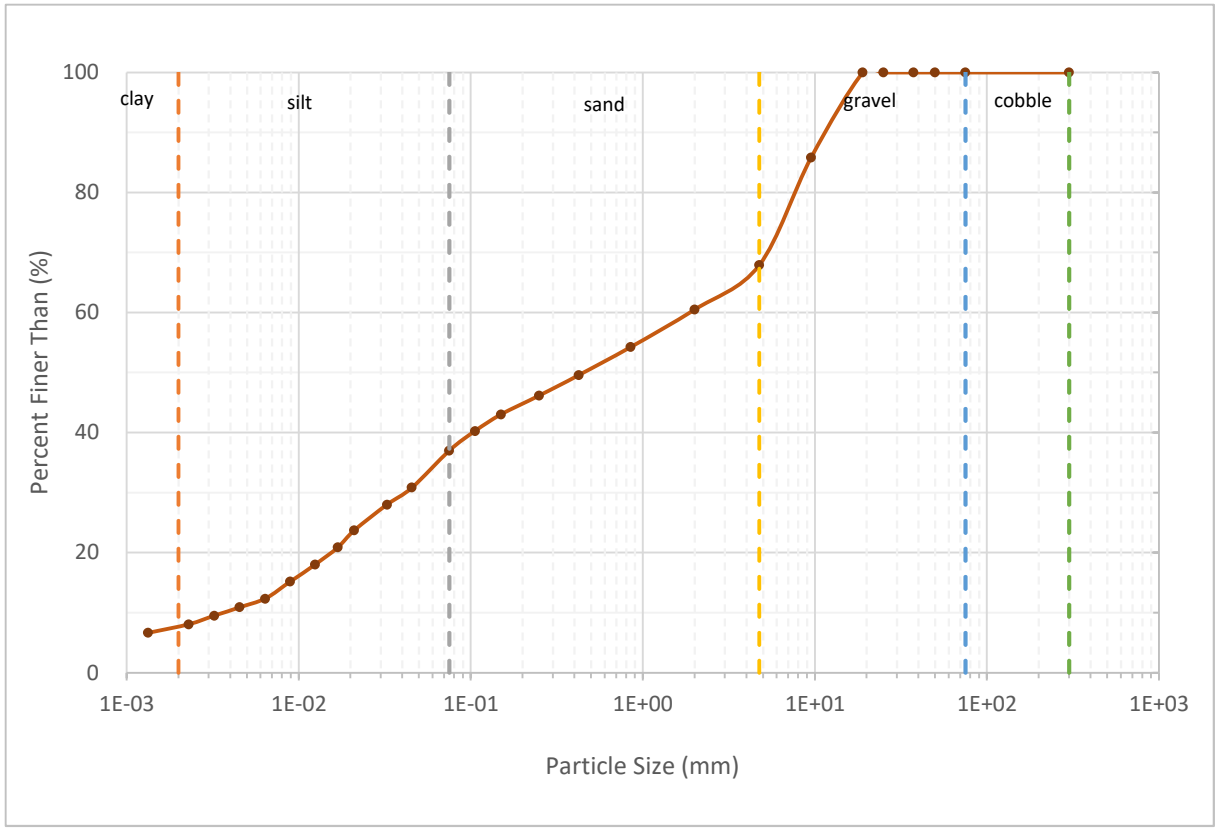
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-08*** ***SS01*** ***0.00-0.41 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	85.84
	4.750	67.93
SAND	2.000	60.51
	0.850	54.26
	0.425	49.60
	0.250	46.19
	0.150	43.05
	0.106	40.28
	0.075	37.01
HYDROMETER	0.0455	30.87
	0.0326	28.02
	0.0211	23.75
	0.0169	20.90
	0.0125	18.05
	0.0089	15.20
	0.0064	12.35
	0.0045	10.93
	0.0032	9.51
	0.0023	8.08
	0.0013	6.66

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**32.1**	**30.9**	**28.9**	**8.1**



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Particle Size Analysis (ASTM D6913 & D7928)

Project Info: *317086-54170 / Grise Fiord , Nunavut* *Reviewed by* *S. F.*

Client: *Worley Canada Services Ltd.*

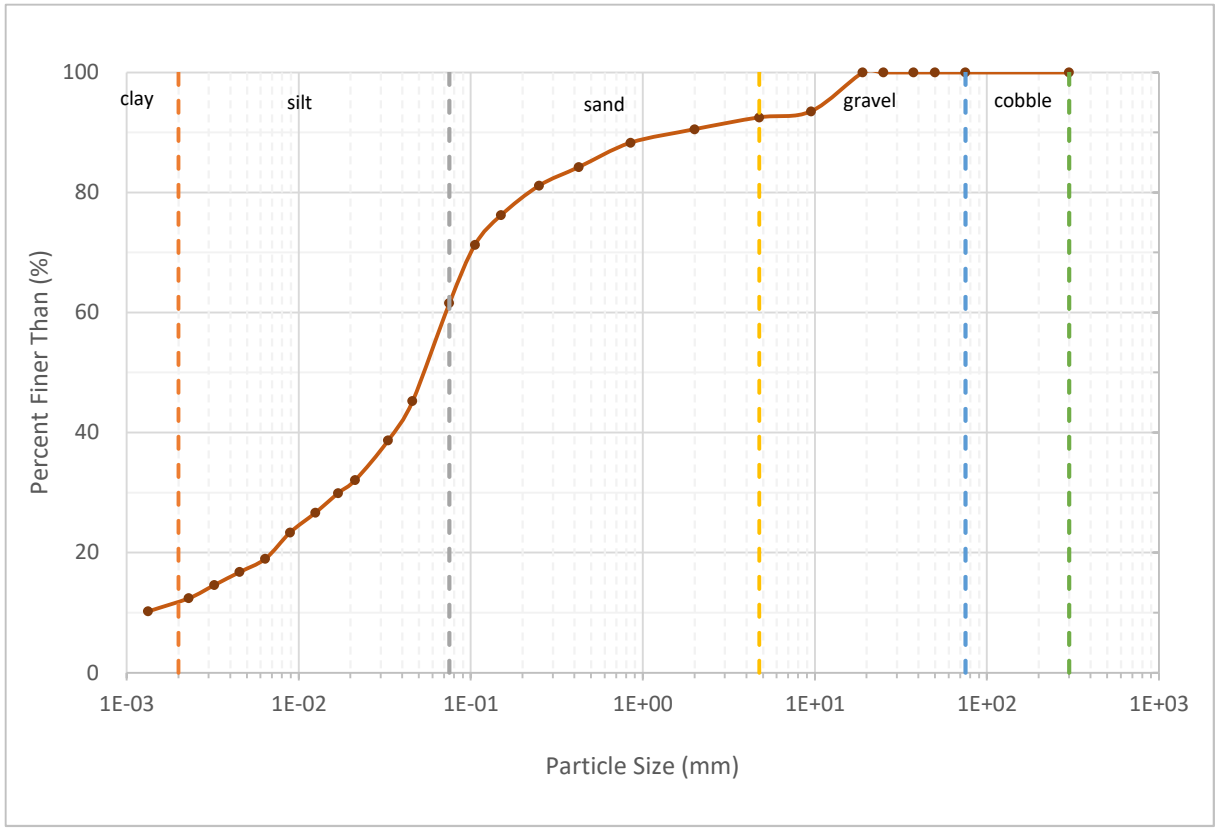
Solum Job No.: *00101250516(185)*

Sample Info: ***BH25-08*** ***GB01*** ***4.55-4.70 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	93.53
	4.750	92.53
SAND	2.000	90.54
	0.850	88.30
	0.425	84.25
	0.250	81.17
	0.150	76.24
	0.106	71.31
	0.075	61.57
HYDROMETER	0.0458	45.27
	0.0331	38.70
	0.0213	32.13
	0.0170	29.94
	0.0125	26.66
	0.0089	23.37
	0.0064	18.99
	0.0045	16.80
	0.0032	14.62
	0.0023	12.43
	0.0013	10.24

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**7.5**	**31.0**	**49.1**	**12.4**



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Particle Size Analysis (ASTM D6913 & D7928)

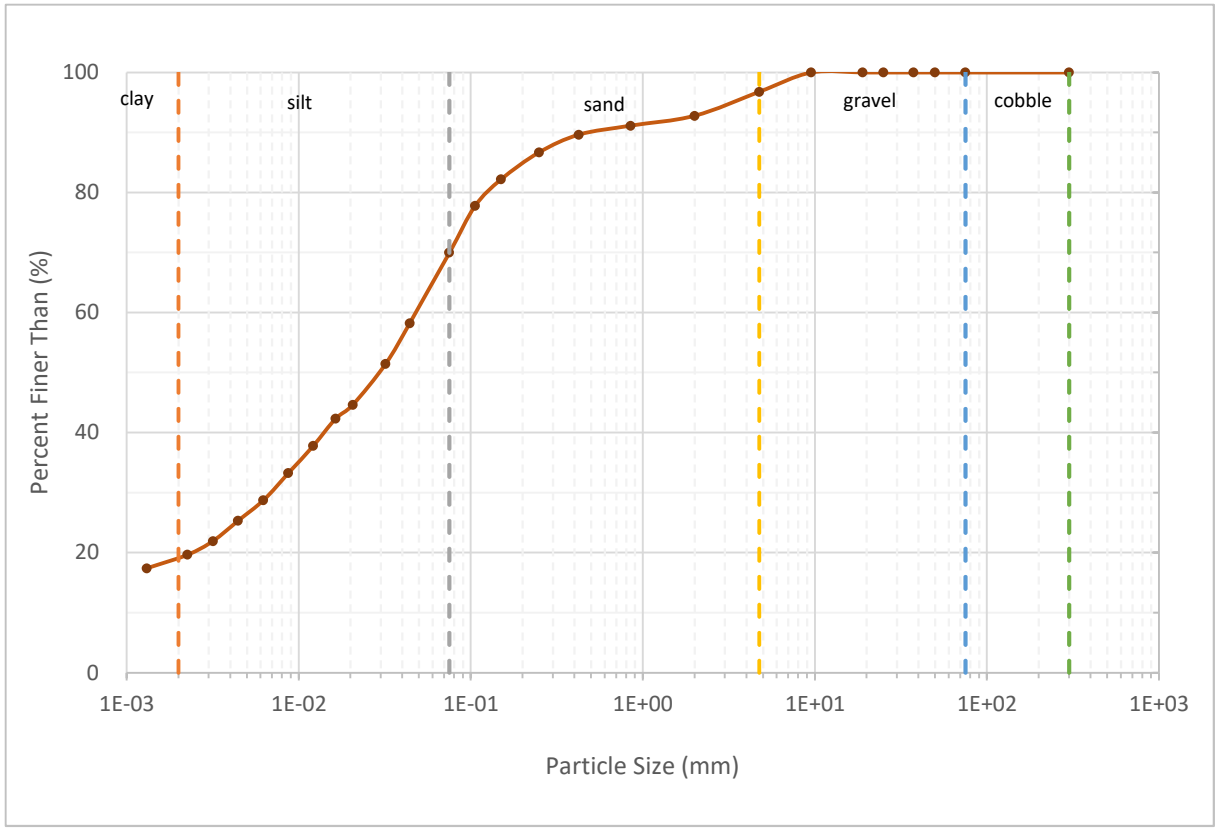
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-08*** ***SS06*** ***8.00-8.21 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	96.78
SAND	2.000	92.79
	0.850	91.14
	0.425	89.64
	0.250	86.71
	0.150	82.20
	0.106	77.77
	0.075	69.99
HYDROMETER	0.0442	58.25
	0.0320	51.44
	0.0206	44.64
	0.0164	42.37
	0.0122	37.83
	0.0087	33.29
	0.0062	28.76
	0.0044	25.35
	0.0032	21.95
	0.0023	19.68
	0.0013	17.41

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**3.2**	**26.8**	**50.3**	**19.7**



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Particle Size Analysis (ASTM D6913 & D7928)

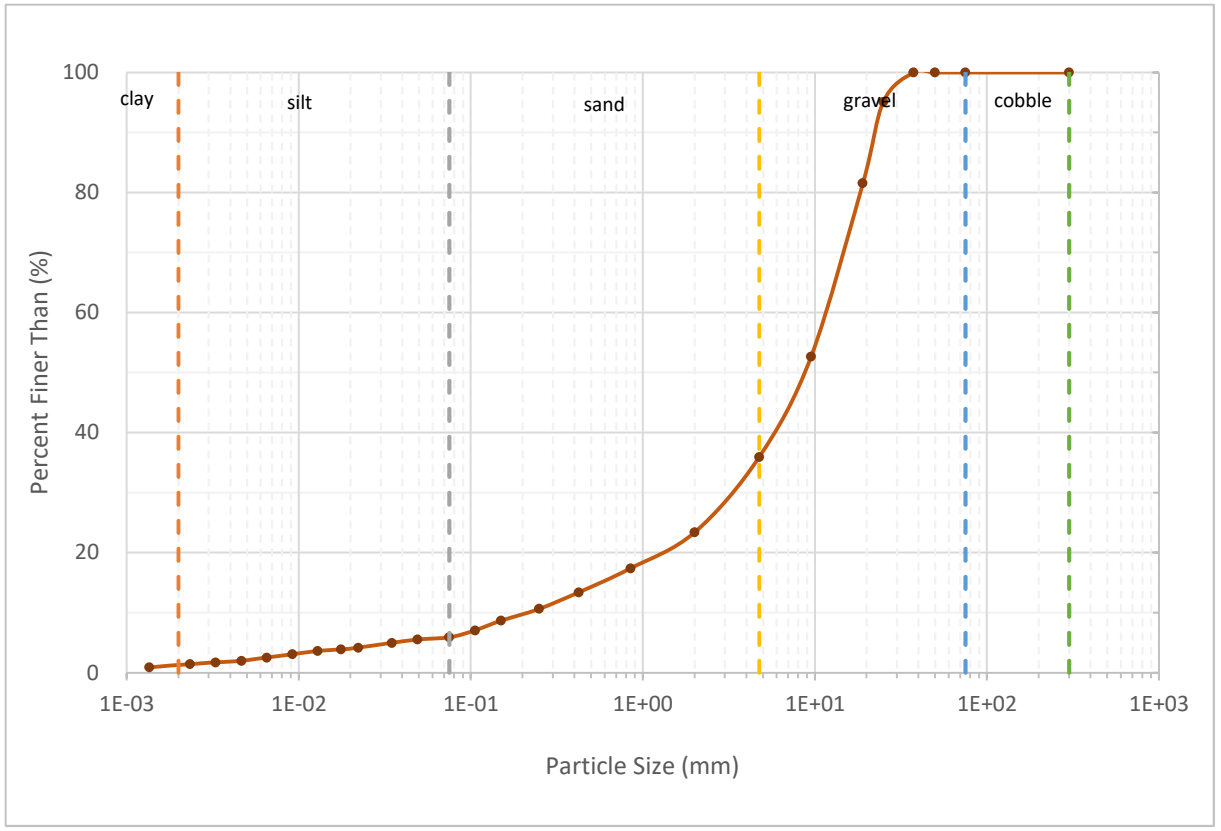
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-09*** ***SS02*** ***1.10-1.70 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	95.14
	19.000	81.57
	9.500	52.69
	4.750	35.95
SAND	2.000	23.41
	0.850	17.40
	0.425	13.41
	0.250	10.66
	0.150	8.68
	0.106	7.08
	0.075	5.93
HYDROMETER	0.0490	5.54
	0.0349	5.00
	0.0223	4.18
	0.0176	3.91
	0.0129	3.63
	0.0092	3.09
	0.0065	2.55
	0.0046	2.00
	0.0033	1.73
	0.0023	1.46
	0.0014	0.91

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**64.0**	**30.0**	**4.5**	**1.5**



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Particle Size Analysis (ASTM D6913 & D7928)

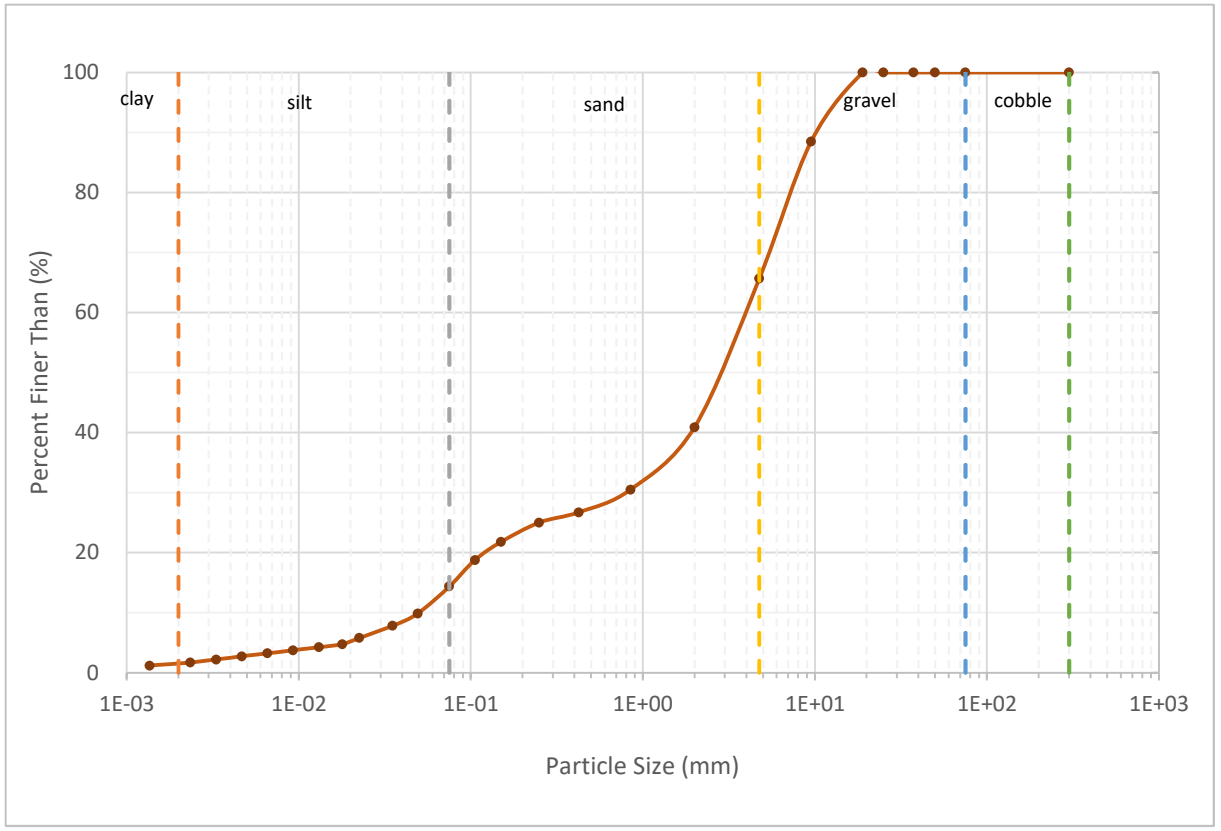
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-09*** ***SS04*** ***4.10-4.30 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	88.50
	4.750	65.68
SAND	2.000	40.92
	0.850	30.53
	0.425	26.75
	0.250	25.02
	0.150	21.82
	0.106	18.80
	0.075	14.39
HYDROMETER	0.0492	9.90
	0.0352	7.85
	0.0225	5.81
	0.0179	4.78
	0.0131	4.27
	0.0093	3.76
	0.0066	3.25
	0.0047	2.74
	0.0033	2.22
	0.0023	1.71
	0.0014	1.20

Test Results

Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
(75-300mm)	*(4.75-75mm)*	*(0.075-4.75mm)*	*0.002-0.075mm*	*<0.002mm*
0.0	**34.3**	**51.3**	**12.7**	**1.7**



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GEOTECHNICAL & MATERIAL TESTING LABORATORY

Particle Size Analysis (ASTM D6913 & D7928)

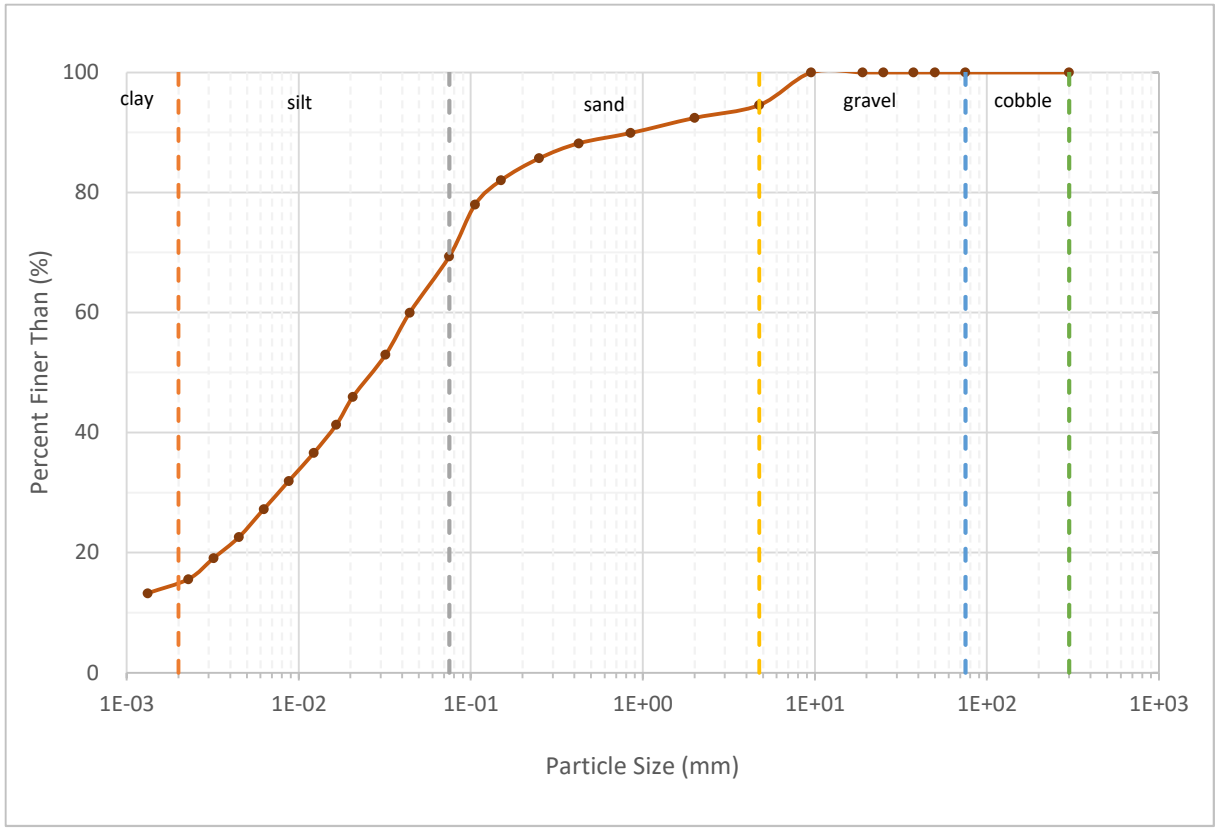
Project Info: 317086-54170 / Grise Fiord , Nunavut
Client: Worley Canada Services Ltd.
Solum Job No.: 00101250516(185)
Reviewed by S. F.

Sample Info: ***BH25-09*** ***GB01*** ***6.30-6.50 m***

	PARTICLE-SIZE (mm)	PERCENT FINER (%)
GRAVEL	300.000	100.00
	75.000	100.00
	50.000	100.00
	37.500	100.00
	25.000	100.00
	19.000	100.00
	9.500	100.00
	4.750	94.58
SAND	2.000	92.43
	0.850	89.93
	0.425	88.20
	0.250	85.72
	0.150	82.05
	0.106	77.99
	0.075	69.39
HYDROMETER	0.0442	60.00
	0.0320	52.99
	0.0206	45.98
	0.0165	41.31
	0.0122	36.63
	0.0088	31.96
	0.0063	27.28
	0.0045	22.61
	0.0032	19.11
	0.0023	15.60
	0.0013	13.26

Test Results

Cobbles (%) *(75-300mm)*	Gravel (%) *(4.75-75mm)*	Sand (%) *(0.075-4.75mm)*	Silt (%) *0.002-0.075mm*	Clay (%) *<0.002mm*
0.0	**5.4**	**25.2**	**53.8**	**15.6**



SOLUM™
CONSULTANTS LTD.

GEOTECHNICAL & MATERIAL
TESTING LABORATORY

STANDARD LABORATORY TERMS AND CONDITIONS

1.0 Description of Services to be Performed by Solum Consultants Ltd. (Solum)

Solum shall provide geotechnical and material laboratory testing services on samples in accordance with these terms and conditions and executed Laboratory Testing Request Forms. Solum shall perform its work in accordance with accepted laboratory standards, such as ASTM, CSA or client's specific specs, as well as accepted standard operating procedures. Solum reserves the right to modify methods as necessary based upon experience and/or current scientific literature. If the Client requests a manner of analysis that varies from standard operating or recommended procedures, the Client shall not hold Solum responsible for the results. Such variations of analysis will be noted on the reports. Solum reserves the right to subcontract laboratory testing if a particular test cannot be performed by Solum.

2.0 Reports, Confidentiality and Third Parties

Laboratory reports provided by Solum will be composed of a cover page, tables and figures if applicable. Reports will be e-mailed in PDF format to the individual(s) specified on the Laboratory Testing Request Forms. Laboratory reports may also be faxed or mailed to the Client upon request. Except as required by law, Solum shall not disclose testing results or reports to any party other than the Client, unless the Client, in writing, requests information to be provided to a third party. Solum shall abide by any additional confidentiality requirements requested by the Client provided that such requirements are provided to Solum at or before execution of the testing.

Information provided by Solum is intended for Client use only. Any use by a third party, of reports or documents authored by Solum, or any reliance on or decisions made by a third party based on the findings described in said documents, are the sole responsibility of such third parities, and Solum accepts no responsibility of damages suffered by any third party as a result of decisions made or actions conducted.

3.0 Laboratory Testing Request Form (Chain of Custody)

The laboratory testing request form must be completed by the Client and be accompanied with the samples. Other form of COC may be accepted; however, the condition of Solum COC is still applied. Testing will not commence until the laboratory testing request form has been completed. If requested by the Client, Solum shall provide a copy of the laboratory testing request form with the report.

No persons other than the designated representatives for each Laboratory Testing Request Form are authorized to act regarding changes to the testing request form. Any changes or amendments of the laboratory testing request form must be in writing and be completed by the originator.

4.0 Acceptance, Contamination and Disposal of Samples

Loss or damages to samples remains the responsibility of the Client until Solum representatives acceptance of samples by notation on the laboratory testing request form.

As to any samples that are suspected of containing hazardous substances, the Client will specify the suspected or known substance and level of contamination. This information is to be stated on the laboratory testing request form and be accompanied with the samples before testing can commence. Solum may refuse acceptance of samples if it determines they present a risk to health and safety.

Samples accepted by Solum shall remain the property and liability of the Client while in the custody of Solum. Solum will discard all non-contaminated samples after two weeks of submitting lab report or a month from the date of receiving the samples without additional retention period at a fixed disposal charge, or if requested by the Client, samples may be returned to the Client at no cost to Solum. If requested by client, Solum will store samples provided the client agrees to pay for the storage charge. Contaminated material may be returned/shipped to the Client at the Client's expense or Solum will discard samples with disposal rates varying for samples containing higher levels of contamination, refer to price list.

Soil samples requested to be stored will be stored inside the lab up to the expiration of storage period. Soil samples will be discarded upon the expiration date of the storage period unless client requests either extending storage period or return samples back to client at no cost to Solum.

5.0 Indemnification/Hold Harmless

Solum shall protect, indemnify and save harmless Client, and its directors, officers, employees, agents, representatives, invitees and subcontractors, and at Client's request, investigate and defend such entities form and against all claims, demands and causes of action, of every kind and character, without limitation, arising in favour of or made by third parties, on account of bodily injury, death or damage to or loss of their property resulting from any negligent act or wilful misconduct of Solum.

The Client shall protect, indemnify and save harmless Solum, and its directors, officers, employees, agents, representatives, invitees and subcontractors, and at Solum's request, investigate and defend such entities form and against all claims, demands and causes of action, of every kind and character, without limitation, arising in favour of or made by third parties, on account of bodily injury, death or damage to or loss of their property resulting from any negligent act or wilful misconduct of Client.

6.0 Limitation of Liability

The total liability of Solum or its staff whether based in contract or tort, will be limited to the lesser of the fees paid or actual damages incurred by the Client. Solum will not be responsible for any consequential or indirect damages even if caused by negligence of Solum. Solum will only be liable for damages resulting form negligence of Solum. All claims by the Client shall be deemed relinquished if not made within one year after the testing date. No warranty is either expressed or implied, or intended by any agreement or by furnishing oral or written reports or findings.

7.0 Termination of Testing Work Order

The Client may order work suspended or terminated upon seven days advance written notice. If work is suspended, Solum shall receive, upon resumption, an adjustment in the cost of services to compensate for additional costs incurred due to the interruption of services. Upon suspension or termination, Solum shall preserve samples provided that the Client agrees to pay the sample storage charge.

8.0 Pricing, Payments and Invoicing

Invoices will be based on most current Solum laboratory testing rates; rates may change without notice. Solum invoices shall be paid within thirty (30) days of receipt of the invoice. Amounts not paid when due shall bear interest at the rate of 18% per annum from the date due until the date of payment.

SGS proposal: 20846-PR1
SGS project #: 2510

Work order date: 11-Feb-25
Report date: 24-Feb-25
Sample receipt date: 15-Jan-25
Version: Final

Customer details

Name:	Lauren Tagg
Address:	Worley Consulting

Project reference: Worley Consulting

P.O. number:

COC:

ANALYSIS REPORT

SGS WO: 1

Report Distribution

Name	Email
Lauren Tagg	lauren.tagg@worley.com

Special notes:

3260 Production Way
Burnaby - British Columbia - V5A 4W4
Phone: 604-638-2349 FAX: 604-444-5486

SGS proposal: 20846-PR1
SGS project #: 2510

Work order date: 11-Feb-25
Report date: 24-Feb-25

Version: Final

ANALYSIS REPORT

Method Summaries *Test method information available upon request.*

S(T) and C(T): Total sulfur and total carbon by LECO, Method CSA06V
S(SO4): Sulfate by HCl digestion with ICP finish, Method CSA07V
S(S2-): Sulfide by calculation of S(T) - S(SO4) or by nitric acid digestion with ICP finish (Method CSA08C1)

TIC: Total inorganic carbon by coulometry, Method CSB02V
AP: Acid generating potential based on sulfide sulfur
NP: Modified neutralisation potential by excess acid addition and back titration to pH 8.3
Net NP: Net neutralisation potential = NP - AP

Metals by aqua regia digest with ICP-OES/MS finish, Method ICP21B20/ICM21B20
Metals by multi-acid digest with ICP-OES/MS finish, Method ICP40Q12/IMS40Q12

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Preliminary Data

Anahita Etemadifar - Laboratory Supervisor

Final Data Approval

Noelene Ahern - Manager: ARD

3260 Production Way
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Phone: 604-638-2349 FAX: 604-444-5486

ABA Report

Test	S(T)	S(SO4)	S(S-2)	Insoluble S	AP
Units	%	%	%	%	kg CaCO3/t
Method Code	CSA06V	CSA07C1	Calc.	Calc.	Calc.
LOD	0.005	0.01	0.01	#N/A	#N/A
Sample ID					
BH24-Q01 4.07-4.17m	0.007	<0.01	0.007	NA	0.2
BH24-Q02 4.38-4.48m	0.005	<0.01	0.005	NA	0.2
Quarry Location 2 Moraine	0.010	<0.01	0.01	NA	0.3
Duplicates					
BH24-Q01 4.07-4.17m		<0.01			
QA/QC					
Blank	0.008	<0.01			
Certified standards					
RTS-3a		0.96			
GS915-8	0.135				

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SGS proposal: 20846-PR1
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Report date: 24-Feb-25

Version: Final

ABA Report

Test Units	C(T) %	TIC %	CaCO3 NP kg CaCO3/t	Modified NP kg CaCO3/t	Net Modified NP kg CaCO3/t	Fizz Test	Paste pH
Method Code	CSA06V	CSB02V	Calc.	Modified	Calc.	Sobek	Sobek
LOD	0.005	0.01		0.5			0.2
Sample ID							
BH24-Q01 4.07-4.17m	12.260	12.53	1043.9	1054.9	1054.7	Moderate	9.41
BH24-Q02 4.38-4.48m	12.260	12.86	1071.8	1040.1	1040.0	Moderate	9.48
Quarry Location 2 Moraine	0.265	0.26	21.4	22.9	22.6	Slight	9.07
Duplicates							
BH24-Q01 4.07-4.17m	12.325			1053.4		Moderate	9.40
QA/QC							
Blank	0.008						
Certified standards							
NBM-1				42.5		Slight	
GS915-8	0.070						

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SGS

ANALYSIS REPORT

ABA Report - CRM Expected Values and Tolerances

CRM	Test	S(T)	S(SO4)	S(SO4)	S(S-2)	C(T)	TIC	CO2	Modified NP	Modified with Siderite Correction NP
	Units	%	%	%	%	%	%	%	kg CaCO3/t	kg CaCO3/t
	Method Code	CSA06V	CSA07V	CSA07D	Calc.	CSA06V	CSB02V	CSB02V	Modified	
	LOD	0.005	0.01	1.01	0.01	0.005	0.01	0.005	0.5	
GGC-07	Expected value	0.51				0.56				
	Tolerance (+/-)	0.09				0.09				
HCC-1	Expected value	33.92								
	Tolerance (+/-)	5.04								
RTS-3a	Expected value		0.98	1.34						
	Tolerance (+/-)		0.12	0.35						
OREAS 278	Expected value				0.699					
	Tolerance (+/-)				0.06					
NBM-1	Expected value								42.44	50.27
	Tolerance (+/-)								3.04	2.31
TIC-L1	Expected value						0.13	0.477		
	Tolerance (+/-)						0.02	0.78		
GS314-2	Expected value	2.56				5.15				
	Tolerance (+/-)	0.14				0.27				
GS915-8	Expected value	0.13				0.07				
	Tolerance (+/-)	0.02				0.02				
OREAS 550	Expected value	0.220				4.110				
	Tolerance (+/-)	0.004				0.22				
SX35-13	Expected value						11.954			
	Tolerance (+/-)						0.626			
SY4	Expected value						0.95			
	Tolerance (+/-)						0.06			

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Sobek With Siderite NP kg CaCO3/t	Fizz Test	Paste pH
	Sobek	Sobek 0.2
57.6	Slight	
1.3		

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Quantitative X-Ray Diffraction by Rietveld Refinement

Report Prepared for:	*ARD-XRD (2510 Worly)* *3260 Production Way, Burnaby, Canada*
Project Number/ LIMS No.	*Custom XRD/MI7005-FEB25*
Sample Receipt:	*February 12, 2025*
Sample Analysis:	*February 21, 2025*
Reporting Date:	*March 13, 2025*

Instrument:	Panalytical X'pert Pro Diffractometer
Test Conditions:	Co radiation, 40 kV, 45 mA; Detector: X'Celerator Regular Scanning: Step: 0.033°, Step time:0.15s, 2θ range: 5-80°
Interpretations :	PDF2/PDF4 powder diffraction databases issued by the International Center for Diffraction Data (ICDD). DiffracPlus Eva and Topas software.
Detection Limit :	0.5-2%. Strongly dependent on crystallinity.

Contents:

1) Method Summary
2) Quantitative XRD Results
3) XRD Pattern(s)

Melody Hao, M.Sc.
Mineralogist

Huyun Zhou, Ph.D., P.Geo.
Senior Mineralogist

Method Summary

Mineral Identification and Interpretation:

Mineral identification and interpretation involves matching the diffraction pattern of an unknown material to patterns of single-phase reference materials. The reference patterns are compiled by the Joint Committee on Powder Diffraction Standards - International Center for Diffraction Data (JCPDS-ICDD) database and released on software as Powder Diffraction Files (PDF).

Interpretations do not reflect the presence of non-crystalline and/or amorphous compounds, except when internal standards have been added by request. Mineral proportions may be strongly influenced by crystallinity, crystal structure and preferred orientations. Mineral or compound identification and quantitative analysis results should be accompanied by supporting chemical assay data or other additional tests.

Quantitative Rietveld Analysis:

Quantitative Rietveld Analysis is performed by using Diffrac Topas 7 (Bruker), a graphics based profile analysis program built around a non-linear least squares fitting system, to determine the amount of different phases present in a multicomponent sample. Whole pattern analyses are predicated by the fact that the X-ray diffraction pattern is a total sum of both instrumental and specimen factors. Unlike other peak intensity-based methods, the Rietveld method uses a least squares approach to refine a theoretical line profile until it matches the obtained experimental patterns.

Rietveld refinement is completed with a set of minerals specifically identified for the sample. Zero values indicate that the mineral was included in the refinement calculations, but the calculated concentration was less than 0.05wt%. Minerals not identified by the analyst are not included in refinement calculations for specific samples and are indicated with a dash.

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WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was(were) drawn and / or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted.

Summary of Rietveld Quantitative Analysis X-Ray Diffraction Results

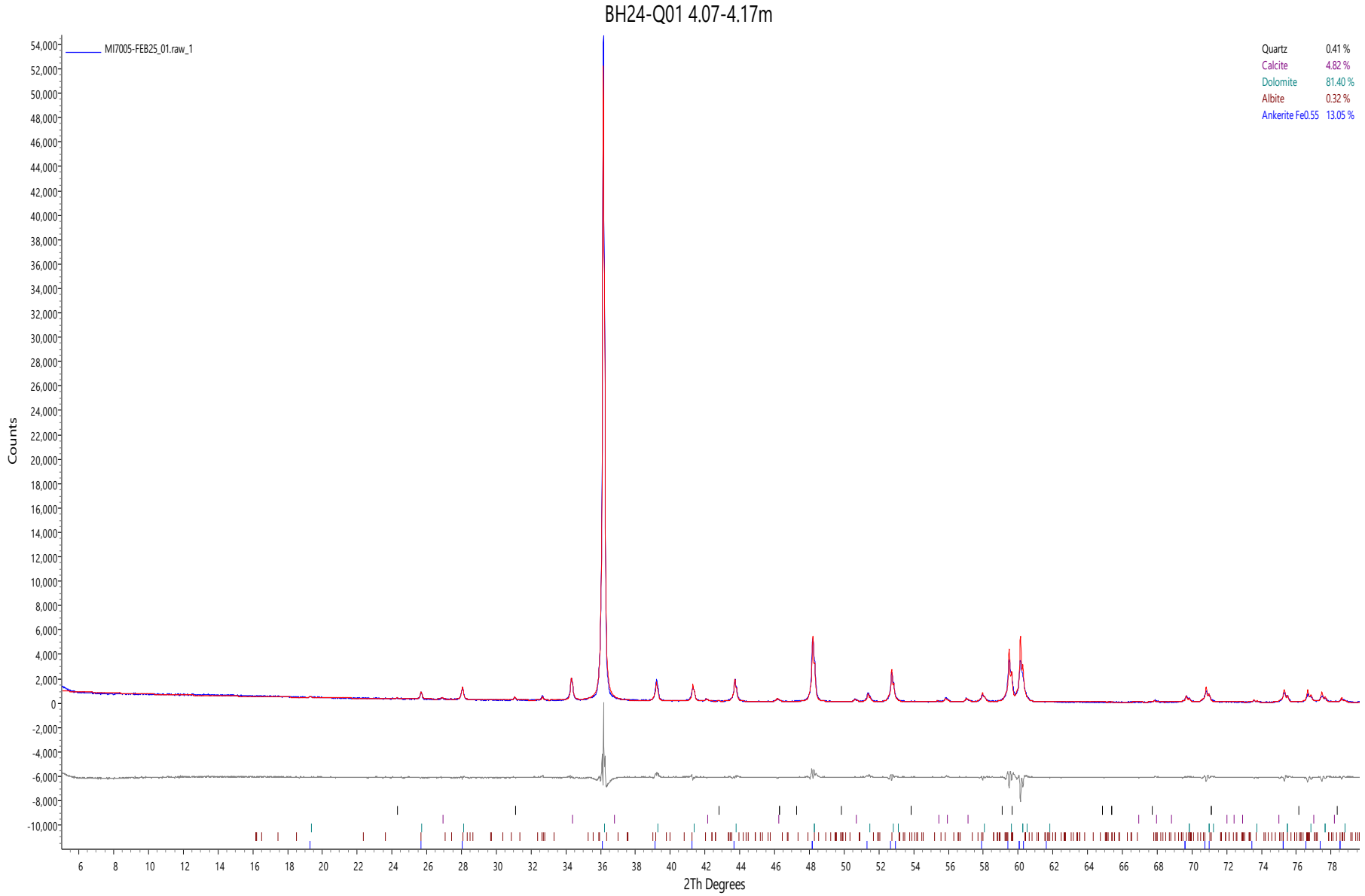
Mineral/Compound	BH24-Q01 4.07-4.17m FEB7005-01 (wt %)	BH24-Q02 4.38-4.48m FEB7005-02 (wt %)	Quarry Location 2 Moraine FEB7005-03 (wt %)
Quartz	0.4	0.4	38.8
Calcite	4.8	0.2	0.4
Dolomite	81.4	68.6	1.2
Albite	0.3	0.4	19.0
Ankerite	13.0	30.5	1.2
Chlorite	-	-	2.4
Muscovite	-	-	2.1
Biotite	-	-	0.0
Actinolite	-	-	0.4
Grossular	-	-	0.6
Orthoclase	-	-	23.0
Microcline	-	-	7.6
Diopside	-	-	3.2
TOTAL	100	100	100

Zero values indicate that the mineral was included in the refinement, but the calculated concentration is below a measurable value.

Dashes indicate that the mineral was not identified by the analyst and not included in the refinement calculation for the sample.

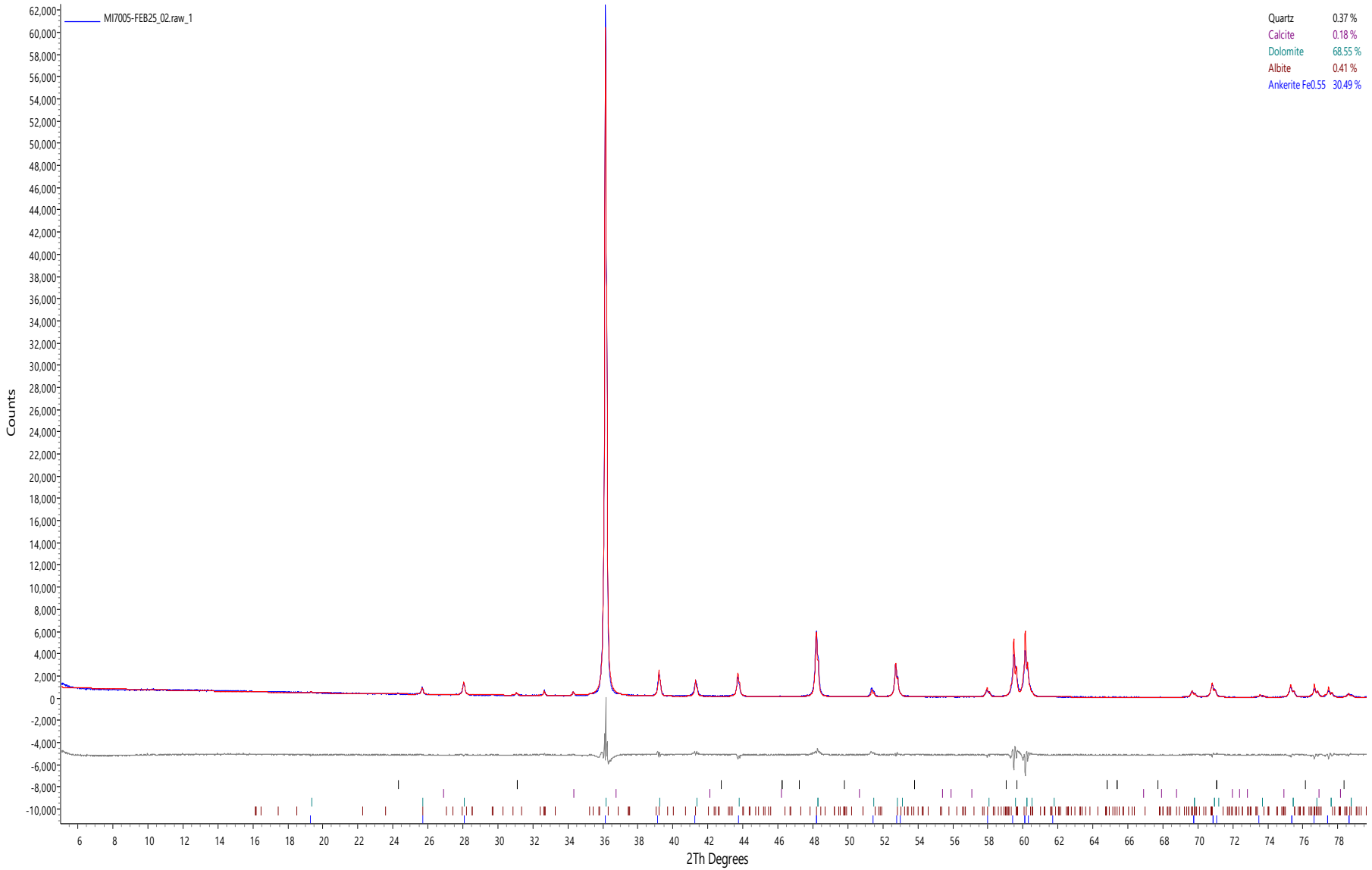
The weight percent quantities indicated have been normalized to a sum of 100%. The quantity of amorphous material has not been determined.

Mineral/Compound	Formula
Quartz	SiO_2
Calcite	$CaCO_3$
Dolomite	$CaMg(CO_3)_2$
Albite	$NaAlSi_3O_8$
Ankerite	$CaFe(CO_3)_2$
Chlorite	$(Fe,(Mg,Mn)_5,Al)(Si_3Al)O_{10}(OH)_8$
Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$
Biotite	$K(Mg,Fe)_3(AlSi_3O_{10})(OH)_2$
Actinolite	$Ca_2(Mg,Fe)_5Si_8O_{22}(OH)_2$
Grossular	$Ca_3Al_2Si_3O_{12}$
Orthoclase	$KAlSi_3O_8$
Microcline	$KAlSi_3O_8$
Diopside	$CaMgSi_2O_6$


BH24-Q01 4.07-4.17m
MI7005-FEB25_01.raw_1
Quartz 0.41 %
Calcite 4.82 %
Dolomite 81.40 %
Albite 0.32 %
Ankerite Fe0.55 13.05 %
Counts
2Th Degrees

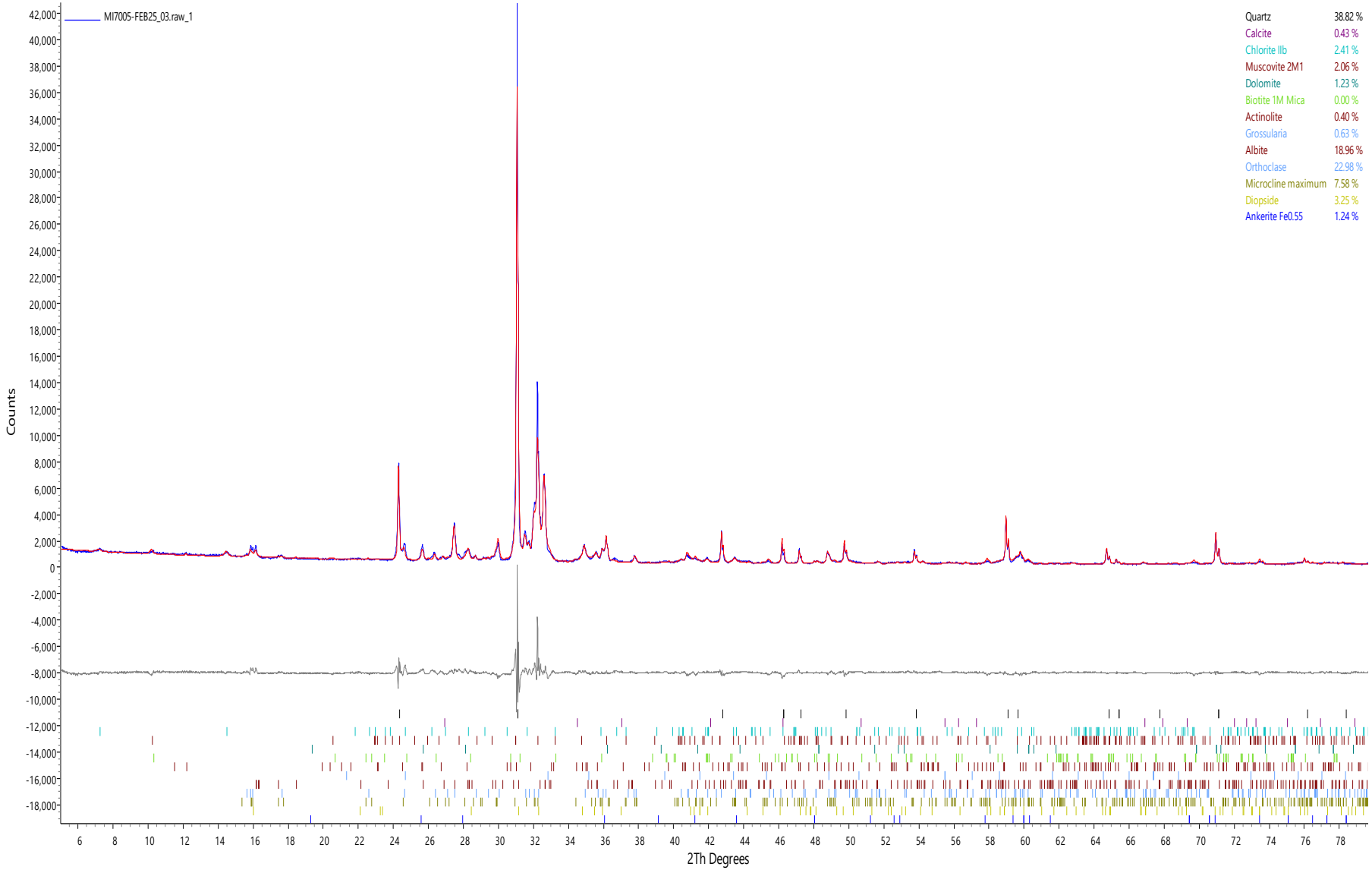
SGS

BH24-Q02 4.38-4.48m



SGS

Quarry Location 2 Moraine



Report 250010 for
Lauren Tagg,
Worley Consulting,
2930 Virtual Way, Unit 200,
Vancouver, BC, V5M 0A5
604-440-7178 (mob)
VancouverOffice@worley.com

January, 2025

Samples: BH24-Q01, BH24-Q02, Quarry #2

Summary:

Sample BH24-Q01 is of massive marble composed of uniform extremely fine grained slightly turbid calcite with trace disseminated non-reflective opaque (probably hematite). A patch 4 x 1 to 1.5 mm across is of slightly coarser grained, clear calcite with trace non-reflective opaque.

Sample BH24-Q02 is of massive marble that is similar to Sample BH24-Q01; it is slightly coarser grained, contains slightly more abundant dusty disseminated non-reflective opaque (probably hematite), and contains more abundant but smaller patches of recrystallized, clear calcite.

Sample Quarry #2 is of well foliated moderately well banded gneiss dominated by quartz and perthitic K-feldspar with lesser plagioclase (altered slightly to sericite) and accessory biotite. Grain size varies widely, from plagioclase-(K-feldspar) aggregates 0.02-0.03 mm in grain size to accessory quartz and K-feldspar grains from 1 to 2 mm long. Two discontinuous veinlets are of calcite.

Photographic Notes:

The scanned sections show the gross textural features; these features are seen much better on the digital image than on the printed image. For the photographs, sample numbers are shown in the upper left corner, photo numbers are shown in the lower left corner, and the letter in the lower right corner indicates the lighting conditions: plane polarized transmitted light (P); transmitted light in crossed nicols (= X); reflected light in slightly crossed nicols and transmitted light in crossed nicols (= ~RX). Locations of photographs are shown on the scanned section. Descriptions of the photographs are at the end of the report.

John G. Payne, Ph.D., P.Geol.
Tel: (604)-597-1080
email: jppayne@telus.net

Sample BH24-Q01 Limestone/Marble

The sample is of massive uniform extremely fine grained slightly turbid calcite with trace disseminated no-reflective opaque (possibly hematite). A patch 4 x 1 to 1.5 mm across is of slightly coarser grained, clear calcite with trace non-reflective opaque.

mineral	**percentage**	**main grain size range (mm)**
calcite	99.5%	0.03-0.06
non-reflective opaque	minor	0.02-0.04
pyrite (?)	trace	0.01
recrystallized		
calcite	0.4	0.07-0.15

Calcite forms anhedral equant, slightly turbid grains. The rock effervesces slowly to moderately with cold dilute HCl.

Non-reflective opaque (hematite?) forms trace disseminated patches up to 0.05 mm across. One patch contains a grain of pyrite 0.01 mm across.

A fairly sharply defined patch 4 x 1 to 1.5 mm in size is of slightly coarser grained, clearer recrystallized calcite.

Sample BH24-Q02 Limestone/Marble

The sample is similar to Sample BH24-Q01; it is slightly coarser grained, contains slightly more abundant dusty disseminated non-reflective opaque (probably hematite), and contains more abundant but smaller patches of recrystallized, clear calcite.

mineral	**percentage**	**main grain size range (mm)**	
calcite	99.9%	0.05-0.08	(a few up to 0.12 mm)
non-reflective opaque	0.3	dusty-0.05	
recrystallized			
calcite	0.4	0.07-0.1	

Calcite forms anhedral slightly to moderately turbid equant grains mainly of fairy uniform size.

Much of the section contains minor non-reflective opaque (hematite?) that ranges from dusty to patches up to 0.05 mm across.

A few recrystallized patches up to 1 mm across are of slightly coarser grained, commonly clearer calcite; some of these have cavities up to 0.3 mm across.

Sample Quarry #2 **Biotite-Plagioclase-K-feldspar-Quartz Gneiss**
Veinlets: Calcite

The sample is of well foliated moderately well banded gneiss dominated by quartz and perthitic K-feldspar with lesser plagioclase (altered slightly to sericite) and accessory biotite. Grain size varies widely, from plagioclase-(K-feldspar) aggregates 0.02-0.03 mm in grain size to accessory quartz and K-feldspar grains from 1 to 2 mm long. Two veinlets are of calcite.

mineral	**percentage**	**main grain size range (mm)**
quartz	35-40%	0.3-0.7; a few up to 1.5 mm long
K-feldspar (perthitic)	30-35	0.3-0.7; 0.03-0.07; a few 1-2 mm
plagioclase	20-25	0.3-0.5; 0.03-0.07
biotite	2- 3	0.3-1
hematite	0.3	0.05-0.1
veinlets		
1) calcite	0.1	0.03-0.1

Quartz is concentrated moderately in bands up to 2.5 mm wide parallel to foliation interlayered with bands mainly less than 1 mm wide that are dominated by perthitic K-feldspar and plagioclase. Some quartz-rich bands also contain moderately abundant fine to medium grained perthitic K-feldspar.

K-feldspar occurs with quartz as described above, and less abundantly is intergrown with extremely fine grained granular plagioclase. K-feldspar contains very fine subparallel lenses of perthitic sodic plagioclase.

Plagioclase (altered slightly to sericite) forms anhedral extremely fine to locally fine anhedral equant aggregates, in part intergrown with K-feldspar and less commonly with quartz.

Biotite forms scattered elongate flakes that are concentrated in a few bands and seams parallel to foliation; it commonly is associated with plagioclase.

Hematite(?) forms a few patches and lenses up to 0.3 mm long.

Calcite forms a lensy veinlet 0.02 mm wide and a discontinuous veinlet 2 mm long by up to 0.2 mm wide; both cut foliation at a high angle.

List of Photos

Photo	Sample	Description
01	BH24-Q01	extremely fine grained, turbid calcite with minor disseminated hematite; with a fairly sharply defined elongate patch of slightly coarser grained, clear, recrystallized calcite with minor disseminated hematite.
02	BH24-Q01	same view as Photo 01 (crossed nicols).
03	BH24-Q02	extremely fine grained calcite with minor to accessory disseminated hematite as dusty disseminations and a few patches up to 0.05 mm across; top right: small patch of recrystallized calcite-(hematite).
04	BH24-Q02	in the centre: patch of slightly coarser grained, recrystallized clear calcite with cavities (possibly formed during recrystallization) surrounded by slightly turbid, slightly finer grained calcite with disseminated hematite (mainly dusty with local concentrations up to 0.03 mm across.
05	Quarry #2	banded gneiss: extremely fine grained plagioclase-(K-feldspar) aggregates interlayered with bands of very fine to coarse grained perthitic K-feldspar and very fine to fine grained quartz.
06	Quarry #2	upper right: band of very fine to fine grained quartz-(plagioclase); middle: band of extremely fine to very fine grained plagioclase (altered slightly to sericite), and lesser biotite and K-feldspar; lower left: band of very fine to fine grained perthitic K-feldspar, with lesser plagioclase and quartz, and minor biotite.
07	Quarry #2	banded gneiss: from lower left to upper right: fine to coarse perthitic K-feldspar and fine grained quartz; narrow band: very fine grained plagioclase and an elongate flake of biotite; band of fine to medium grained quartz with accessory K-feldspar; lens of extremely fine to very fine grained plagioclase-(K-feldspar-quartz); band of fine to very fine grained quartz and accessory very fine grained K-feldspar.
08	Quarry #2	intergrowth of very fine to fine grained quartz and perthitic K-feldspar with irregular patches of extremely fine grained plagioclase (altered slightly to sericite); discontinuous irregular veinlet of calcite.

VP250010 worley blocks



BH24-Q01

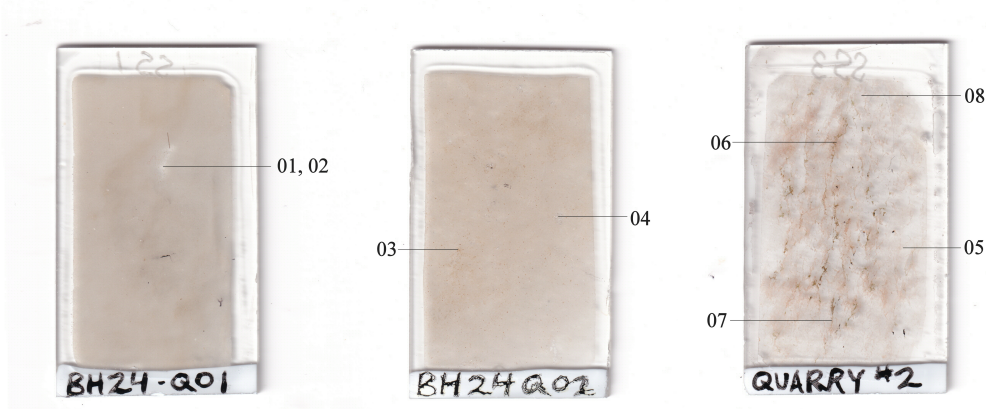


BH24-Q02



Quarry #2

VP250010 worley sections




BH24-Q01
ct
he
01
1.0 mm
P

BH24-Q01

ct ct ct

BH24-Q02

ct

ct-(he)

he

ct

ct

ct

ct-(he)

he

he

ct

ct

ct

ct-(he)

03

0.5 mm

P

BH24-Q02

ct
ct
ct
ct
ct-(he)
ct
ct
ct
cavity
ct
ct
ct
cavity
ct
ct
ct
ct
ct
ct
ct
ct
ct

04

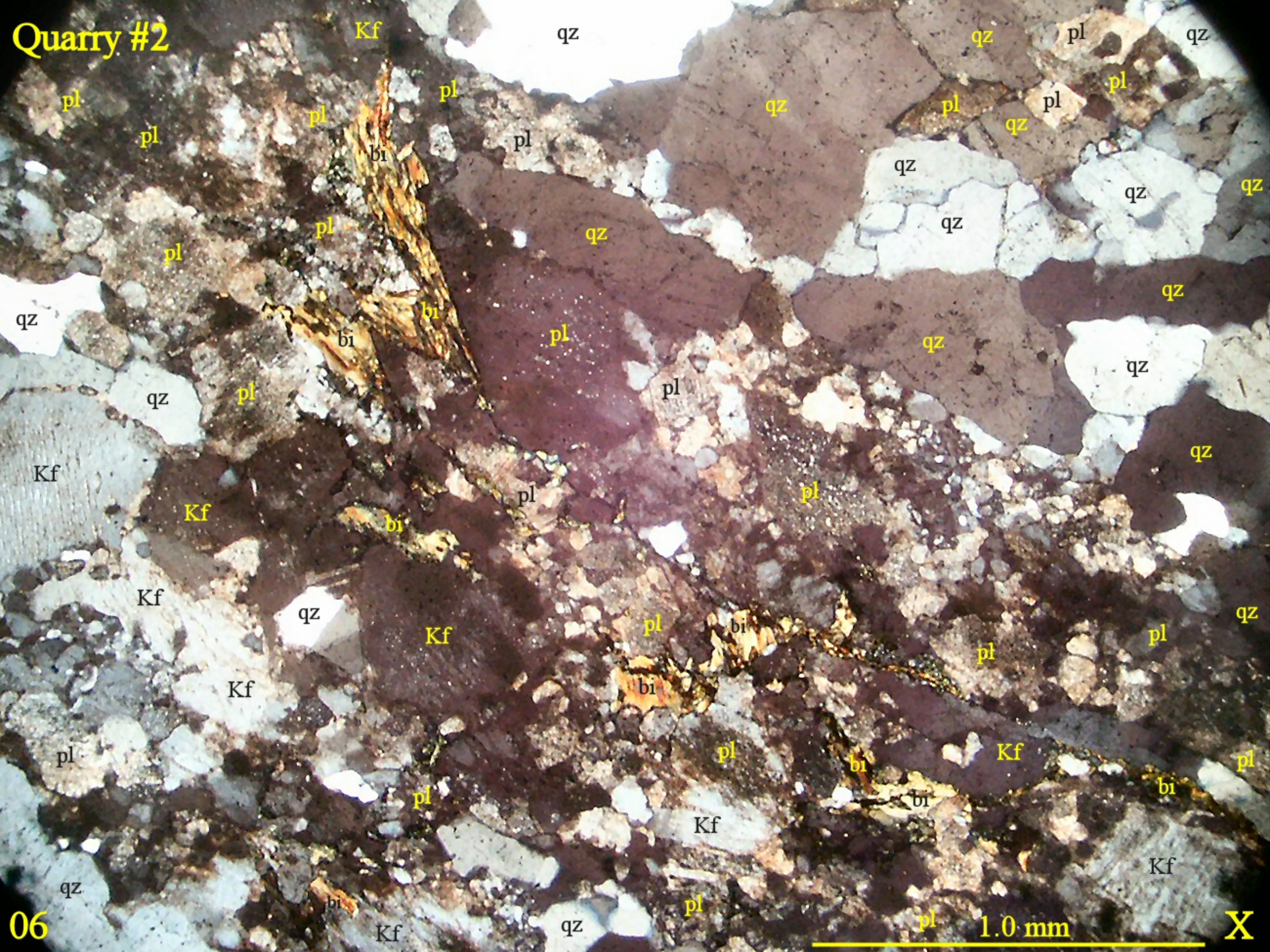
1.0 mm

~RX

Quarry #2

qz qz qz

Quarry #2



06

X

Quarry #2

bi qz bi qz Kf qz

qz qz Kf pl qz

Kf-(pl) bi Kf qz

bi pl qz

bi Kf pl

qz

pl Kf qz

Kf pl qz

qz

Kf pl-(Kf)

bi Kf

pl Kf pl

qz

qz pl

Kf bi pl

qz pl

Kf pl

bi qz

Kf pl

qz

Kf pl

pl he Kf

pl-Kf

pl

qz

pl

qz

qz pl-Kf he

1.0 mm

07

X

Quarry #2

1.0 mm

08

X

Appendix G. Geophysical Survey Results by Frontier Geosciences Ltd.

Frontier Geosciences Inc.

MULTIBEAM BATHYMETRY, SEISMIC REFRACTION AND MULTICHANNEL ANALYSIS OF SURFACE WAVES SURVEY REPORT

GRISE FIORD HARBOUR PROJECT

GRISE FIORD, NU

Submitted to:

Worley

February 27, 2026

Authors:

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Project: FGI-1891

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604 987 3037

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1. Introduction

During the period of September 3 to 6, 2024, Frontier Geosciences Inc. carried out a multibeam bathymetry, seismic refraction and multichannel analysis of surface waves investigation for Worley, in support of the Grise Fiord Harbour project, located in Grise Fiord, Nunavut. A Survey Location Plan of the area is shown at a scale of 1:50,000 in Figure 1 of the Appendix.

The purpose of the geophysical survey was to provide bathymetric and MASW information in the harbour, and overburden layering and depth to bedrock information for a proposed quarry site, approximately 2 kilometres northwest of the Grise Fiord airport. In the harbour the bathymetry profiling was carried out over an area approximately 0.55 square kilometres, and 345 metres of MASW data were collected. At the quarry site, 216 metres of seismic refraction data were collected along one traverse.

This work follows a program of geophysics carried out by Frontier Geosciences in 2019 (Ref. 1). The 2019 marine seismic data were reviewed and interpreted to extract MASW information, and incorporated with the 2024 data for this report.



Laptop Setup on Survey Vessel

2. The Multibeam Bathymetric Survey

2.1 Survey Equipment

The overwater bathymetry survey was completed using an Imagenex DeltaT multibeam sonar. This sonar sounder operates at 260 kHz, and provides a resolution of 0.2% of range. The sonar employs an ethernet connection to transmit the data at high speed to the acquisition system for real-time display and logging. The motion and orientation of the sonar system was monitored with a Honeywell HMR gyro-compass. The resolution of the Honeywell heading, roll and pitch measurement is 0.1 degrees.

The position of the sonar system was monitored with a Hemisphere S320 GNSS/GLONASS RTK Global Positioning System (GPS) receiver. The Hemisphere S320 is a 24-channel, dual frequency receiver with L1 and L2 carrier phase measurements. The system includes a GPS antenna, receiver, internal radio and a battery in a unit that is utilized as a RTK rover. The RTK position corrections can be received either by the internal radio, or by the built-in GSM module for mobile phone communication. Communication between the receiver and handheld controller is provided through Bluetooth wireless technology.



Survey Operations in Grise Fiord Harbour

2.2 Survey Procedure

The multibeam sonar was placed in the water at a depth of 23 centimetres on the starboard side of the survey vessel. Data collected from the Imagenex DeltaT were logged in real-time, together with position information, and the HMR gyro-compass data. All data were stored in time synced notebook computers. Data were collected using horizontal datum UTM NAD83 Zone 17 North and vertical datum Tide & Chart.

2.3 Data Processing and Interpretation Procedure

The sonar position and orientation measurements and sonar depth measurements were combined and analyzed using the MB-System multibeam data processing software, developed by the Monterey Bay Aquarium Research Institute and the Lamont-Doherty Earth Observatory. The resulting sonar files were processed to produce a map that merges each individual swath to produce a final detailed map. Gridding and contouring of the data were conducted with the Golden Software program Surfer. A value of 1470 m/s was used to convert the sonar range information into depth.

Control, benchmarks and the uplands survey were provided by Underhill (Ref. 2). All data are presented referenced to Tide and Chart Datum using a conversion of 1.872 metres with respect to Geodetic datum CGVD2013 (CGG2013a).

3. The Seismic Refraction and Multichannel Analysis of Surface Waves Survey

3.1 Survey Equipment

The seismic refraction investigation was carried out using a Geometric Geode, 24 channel, signal enhancement seismograph and 10 Hz geophones. Geophone intervals along the multicored seismic cable were maintained at 5 metres in order to ensure high resolution data on subsurface layering. Seismic energy was provided from a percussive firing rod firing 8 gauge, blank, black powder shells into hand-excavated shotholes. Shot initiation or zero time was established by metal to metal contact of a striking hammer contacting the firing pin of the firing rod.

The crew was equipped with a hydrophone cable for full marine seismic operations, but weather conditions at the time of the survey prevented the use of a local vessel for cable deployment. Favourable daytime tide conditions allowed work to be carried out at low tide, using terrestrial seismic equipment.

3.2 Survey Procedure

The shear wave MASW survey was carried out concurrently with the compressional wave survey. Field procedure entailed setting out one or two 24 channel geophone cables in a straight line, and planting the geophones in the ground. The line was traversed with the seismic energy source, moving progressively down the array of geophones. The seismic source was operated at each individual shotpoint and up to 24 channels of data were recorded digitally with the seismograph. Additional shotpoints were located off the ends of the seismic array where site conditions permitted, to ensure adequate coverage of the subsurface. Each shot was triggered individually and arrival times for each geophone were measured in the seismograph and recorded in the field laptop. Each record length was 2.048 seconds to be sufficiently long to capture the full surface wave train. For quality assurance, field inspection of raw data after each shot was carried out, with additional shots recorded if first arrivals were unclear.

3.3 Seismic Refraction Interpretive Method

The final interpretation of the seismic refraction profiles was arrived at using the Rayfract tomography program. Tomographic inversion of compressional, P-wave travel times was achieved by visually picking the onset arrivals of refracted signals at each receiver. The tomographic analysis then automatically calculates velocities at points across the grid using the simultaneous iterative reconstruction technique. This modification of the initial velocity values consists of repeated cycles of three steps: forward computation of model travel times, calculation of residuals, and application of velocity corrections. An iterative approach using the Neighbourhood Algorithm generates the most accurate subsurface model that is the closest match to the picked compressional wave arrival times for each seismic spread. The best resulting model reduces or eliminates any residual differences between the picked arrival times and the calculated arrival times generated by the inversion analysis.

3.4 MASW Interpretive Method

Interpretation of the MASW data involved a wavefield transformation of the seismogram record. This converted the seismogram from a multichannel shot gather to a dispersion curve that showed the phase velocity of the signal as a function of frequency. The data were processed through the Geometrics Seisimager software and a dispersion curve was created. The fundamental mode event was picked on the dispersion curve and this data inverted in the Seisimager modelling program. The resulting model reveals the shear wave layer velocity structure, and plotted at the centre of the picked seismic array. The individual models produced were then gridded together to produce a shear wave velocity depth section along the survey line.

The MASW processing was applied at select locations where significant sediment thicknesses were present. The relevant seismograms were used to generate a single stacked dispersion curve image with the highest signal-to-noise (S/N) ratio. The derived velocities were then posted on the seismic section, centred on the range of selected seismograms.

4. Geophysical Results

4.1 General

The interpreted bathymetric elevation contour plan is shown at a scale of 1:2,500 in Figure 2 in the Appendix, with contour intervals of 1 metre. Bathymetric detail in the shallow water areas is displayed using a 20 cm contour interval in Figure 3. Figure 4 shows the interpreted bedrock surface acoustic sub-bottom profile survey in the 2019 program. The interpreted results of the MASW lines completed in the harbour are illustrated in profile in Figures 5 to 7, at a scale of 1:500, with the seismic refraction results shown in Figures 8 to 10, in the Appendix. The 2019 data, reinterpreted to extract MASW information, is plotted on Figures 11 and 12. The 2019 refraction profiles are included in Figures 13 and 14 for reference. Current Lidar topographic information was provided by Underhill for the uplands and shoreline areas.

The location of the seismic refraction line completed in the proposed quarry site is shown at a scale of 1:2,500 in Figure 15 in the Appendix. The interpreted results of the seismic refraction line are illustrated in profile on Figure 16, at a scale of 1:500, in the Appendix.

4.2 Discussion

The bathymetric data indicates a shallow region in the northern section of the survey area with a constant contour of approximately -0.5 metres elevation extending to 180 metres off shore. The more detailed view of the bathymetric data shown in the 20 cm contour map in Figure 3 shows that at this distance off shore, a narrow shoal with an elevation of approximately 0 is observed to run parallel to shore. This detailed map also shows information on areas that have been cleared of boulders for boat landings, and other features also evident in the orthophoto.

Figure 2 shows that beyond this shallow shelf and shoal feature, the depths increase to an elevation of approximately -35 to -55 metres at the southwest extent of coverage. South of the point of land, a broad, deep embayment with a width of approximately 400 metres is present. The bathymetric contours drop off steeply from close to shoreline to an elevation of approximately -90 metres, approximately 200 metres from shore. Southeast along the shoreline the extended shallow shelf of approximately -1 to -2 metre elevation is present.

The results of the MASW and seismic refraction interpretation show the site is underlain by sediments with steadily increasing shear and compressional wave velocities with depth. In general, the shear wave velocities are high, in agreement with the borehole data interpretation that the sediments are very dense due to glacial loading. The lowest shear wave velocities, in the 250 m/s range, are seen in the shallow sediments in the southeast lines. At a depth of 10 metres, velocities exceeding 500 m/s are evident over much of the survey area. The 2025 boreholes are plotted in plan on Figures 2 and 3, and on the seismic sections. The two constituent sediments, granular materials, and silty clays, are present at varying depths. The sections show that there is no evident velocity contrast that would enable differentiation of the two sediments, likely due to the high degree of compaction.

Consistent with the shear wave results, the compressional wave surveys show compressional wave velocities ranging from 2,000 m/s to in excess of 2,500 m/s. The 2019 data was gathered using a larger hydrophone spacing resulting in greater exploration depths. These profiles show the interpreted bedrock horizon at depth in agreement with the 2019 sub bottom profiling results shown in Figure 4.

The seismic refraction line SL24-GF-02, completed at the proposed quarry site, is displayed in Figure 16, and the interpreted results of the seismic refraction data indicate that the area is underlain by up to two distinct velocity layers. The interpreted surficial layer has a consistent compressional wave velocity of 1380 m/s for the first half of the line and 1250 m/s for the northeast second half of the line. Averaging approximately 1.9 metres, this layer ranges in thickness from a minimum of around 0.1 metres to a maximum of 4.5 metres.

The basal layer displays compressional wave velocities ranging from 4150 m/s to 5250 m/s, and is the interpreted bedrock surface. Depths to the bedrock surface are fairly uniform along the line, with an average depth of 1.9 metres.



Seismograph and Laptop Setup of the Quarry Seismic Refraction Line

5. Limitations

The depths to ocean bottom derived from overwater bathymetric profiling surveys are generally accepted as accurate to within 0.2 percent of the depth range. Errors may arise from variations in salinity and water temperature within the water column. An underestimate of the velocity function would produce depths that are too shallow, and the reverse occurring with an overestimate of velocity. Additional, small errors may also occur in data gridding.

The depths to subsurface boundaries derived from seismic refraction surveys are generally accepted as accurate to within ten percent of the true depths to the boundaries, below 10 metres. Above 10 metres, the accuracy of seismic refraction data is approximately +/- 1.5 metres due mainly to the greater statistical error in determining the upper velocity layers from fewer data points. In some cases, unusual geological conditions may produce false or misleading data points with the result that computed depths to subsurface boundaries may be less accurate.

The multichannel analysis of surface waves (MASW) method is carried out in the Active or Passive mode with the Active mode generally the most accurate for evaluation of shallow, shear wave velocities. Limitations include reflection and scattering of surface and body waves due to extreme surface topography and in-homogeneous conditions in the subsurface such as boulder concentrations or isolated soil lenses with contrasting properties. Additionally, there are limitations in gridding the data, which can cause sharp velocity changes to present as more gradual contours. The method is generally accepted as an effective means of determining shear wave velocities of geological units.

Shear wave velocity measurements are most effective in the middle range of exploration depths. In the very shallow layers the method may not track very thin low velocity layering accurately. The velocities in the deepest parts of the MASW profile are derived from the lowest frequency parts of the dispersion curve, and tend to have more variability. As the interpreted compressional wave data is directly determined from basal refractor velocity, this value has a high accuracy in distinguishing changes in bedrock conditions, and should be used as the primary method for evaluating bedrock competency.

In seismic refraction surveying difficulties with a 'hidden layer' or a velocity inversion may produce erroneous depths. The first condition is caused by the inability to detect the existence of a layer because of insufficient velocity contrasts or layer thicknesses. A velocity inversion exists when an underlying layer has a lower velocity than the layer directly above it. The interpreted depths shown on drawings are to the closest interface location, which may not be vertically below the measurement point if the refractor dip direction departs significantly from the survey line location. Structural discontinuities occurring on a scale less than the hydrophone spacing or isolated boulders would go undetected in the interpretation of the data. The seismic refraction method may not detect a narrow canyon-like feature incised into bedrock, if the canyon width is narrow relative to the depth of burial of the feature.

The information in this report is based upon geophysical measurements and field procedures and our interpretation of the data. The results are interpretive in nature and are considered to be a reasonably accurate representation of existing subsurface conditions within the limitations of the survey methods discussed.

For: Frontier Geosciences Inc.

Sean Henry, B.Sc.

Cliff Candy, P.Geo.



Feb 27, 2026

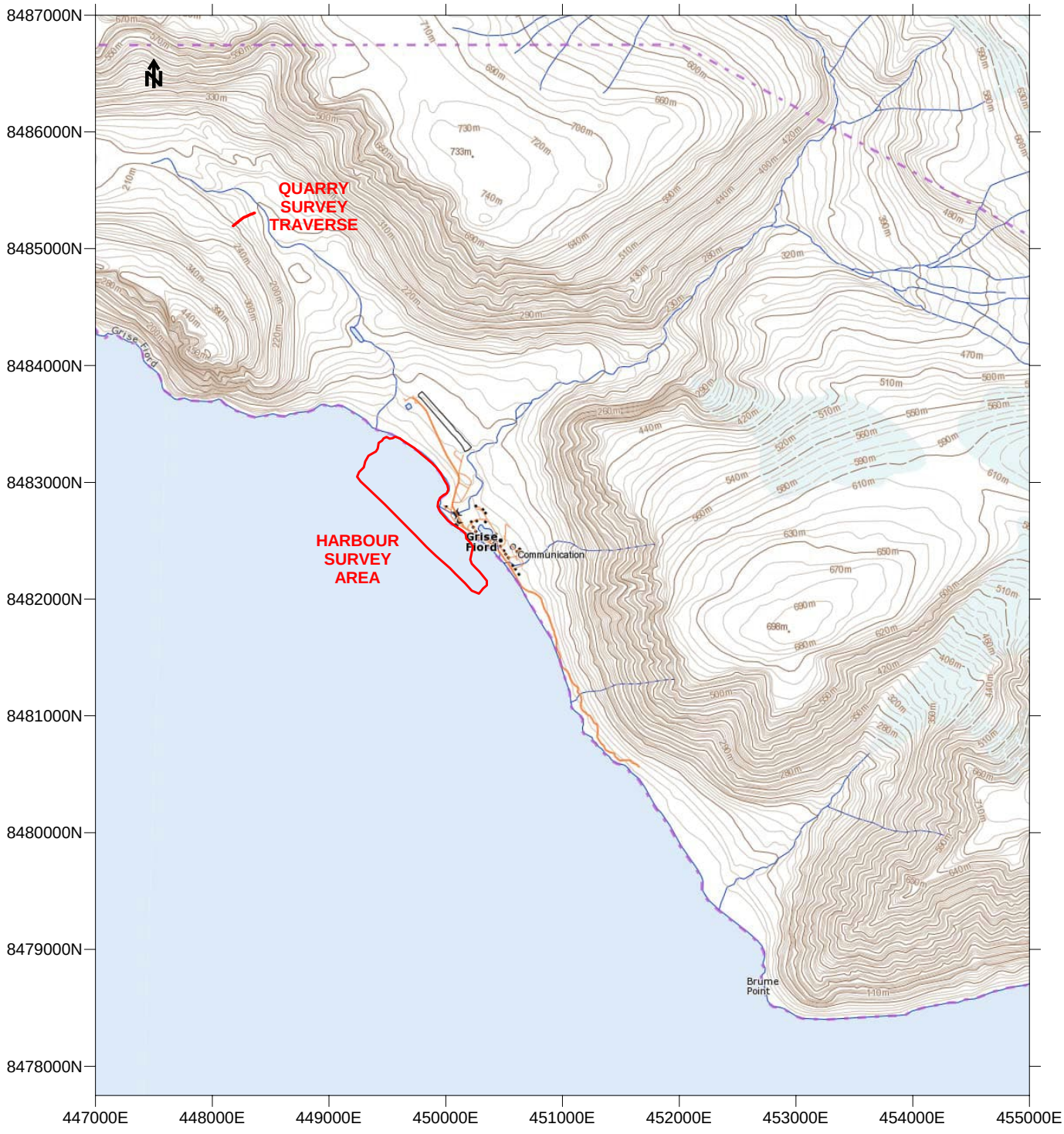
Engineers and Geoscientists of Northwest Territories/Nunavut Permit to Practice # P1551

6. References

Ref 1: Frontier Geosciences Inc., Seismic Refraction and Sub-Bottom Acoustic Profiling Survey Report, FGI-1630, Small Craft Harbours Study, Lancaster Sound Area, Nunavut, Advisian, Dec. 9, 2019

Ref 2: Underhill Geomatics Ltd. Small Craft Harbour Feasibility Studies, Control Network Survey Report, Grise Fiord, Nunavut, Worley, Dec. 10, 2024

APPENDIX



NATURAL RESOURCES CANADA
TOPORAMA MAPSHEET 49A06
UTM NAD83 ZONE 17

WORLEY

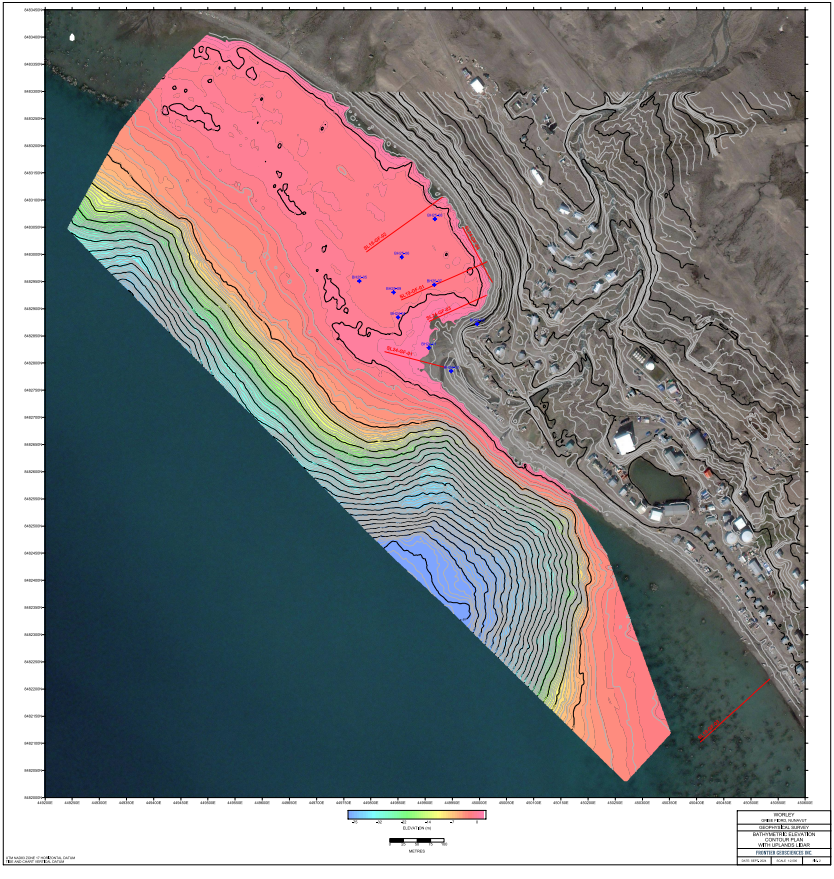
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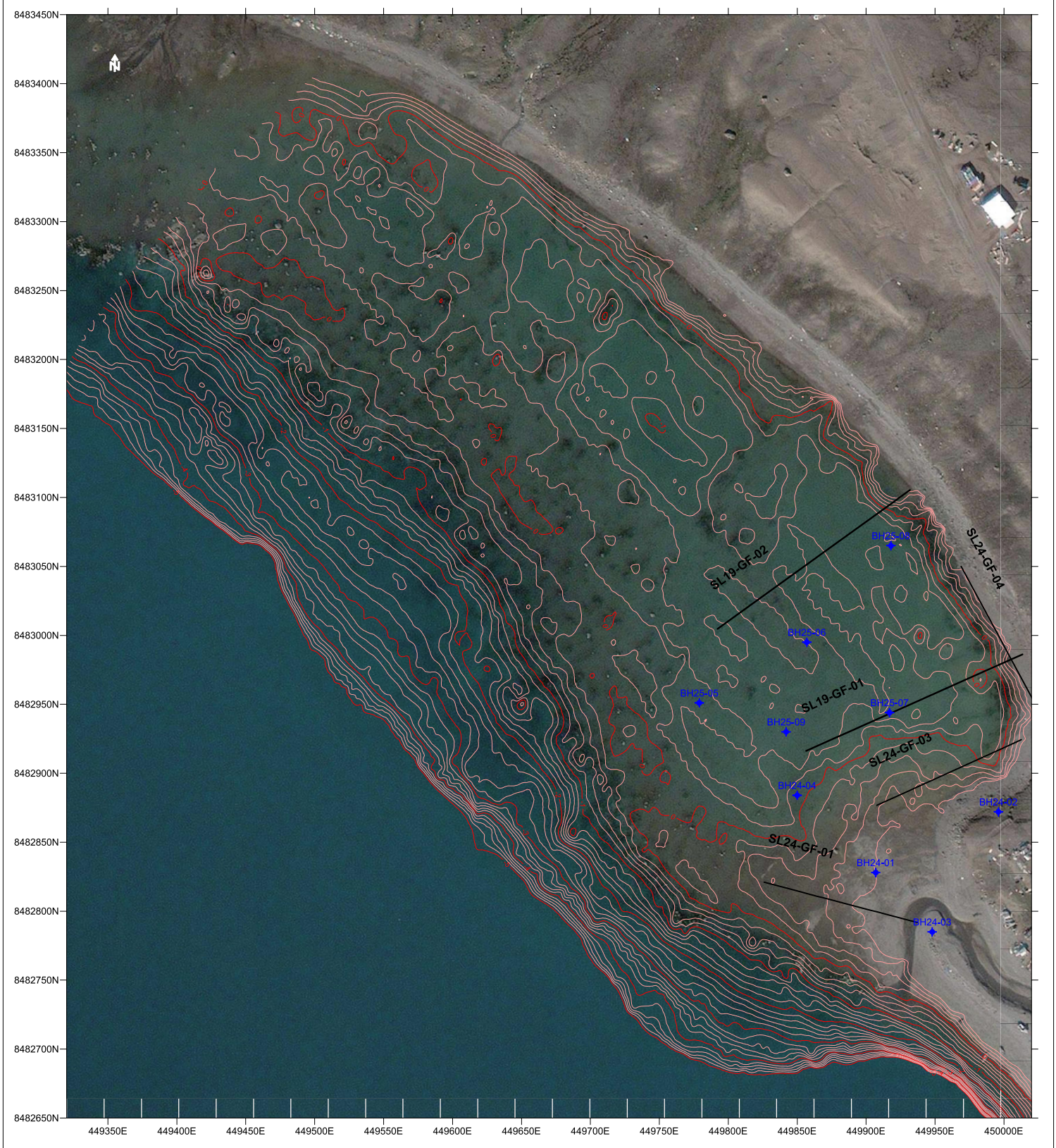
GEOPHYSICAL SURVEY

SURVEY LOCATION PLAN

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2024	SCALE 1:50,000	FIG. 1


BATHYMETRIC CONTOUR PLAN
WITH UPLANDS LIDAR
ELEVATION (m)
METRES
PROJECT
SHIRLEY ISLAND, NUNAVUT
GEOSPATIAL SURVEY
PRINTER GEOSCIENCE INC.

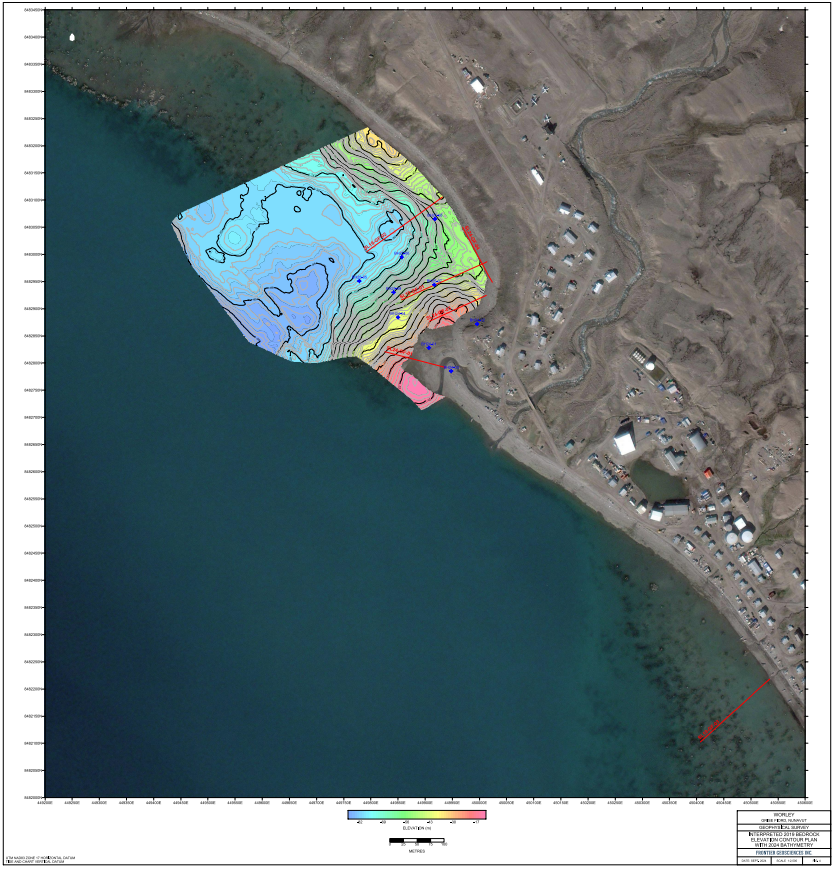


0 25 50 75 100

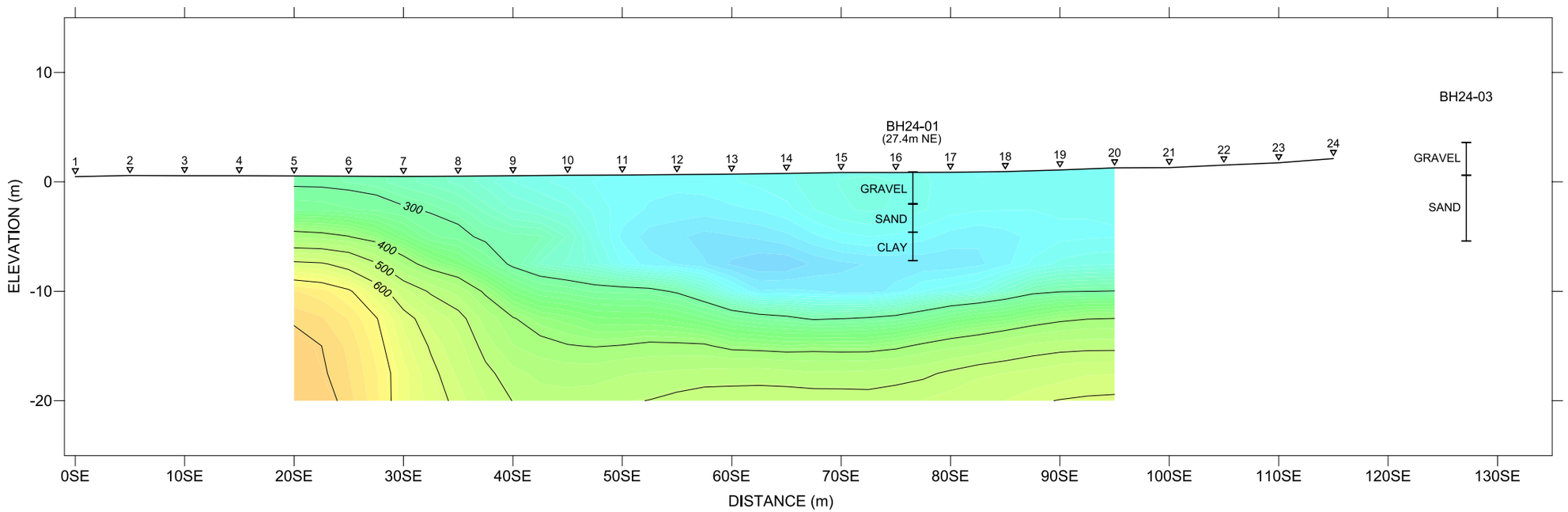
METRES

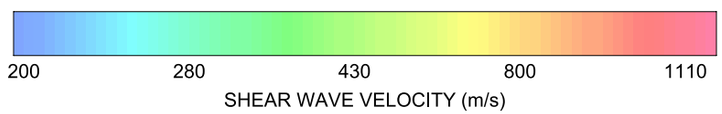
CONTOURS SHOWN FROM -5.0m TO +0.80m ELEVATION
UTM NAD83 ZONE 17 HORIZONTAL DATUM
TIDE AND CHART VERTICAL DATUM

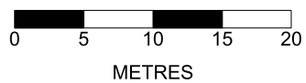
WORLEY GRISE FIORD, NUNAVUT		
GEOPHYSICAL SURVEY		
BATHYMETRIC ELEVATION CONTOUR PLAN (20 cm INTERVAL) WITH UPLANDS LIDAR		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT. 2024	SCALE 1:2,500	FIG. 3


ELEVATION (m)
METRES
RECIPLEY
GREEN HORN, NUNAVUT
GEOPHYSICAL SURVEY
INTERPRETED 2019 BEDROCK ELEVATION CONTOUR PLAN WITH 2024 BATHYMETRY
PANTER GEOSCIENCE INC.
DATE SEPT/2025
SCALE 1:4000
Rev

MASW PROFILE SL24-GF-01







TIDE AND CHART VERTICAL DATUM

WORLEY
GRISE FIORD, NUNAVUT

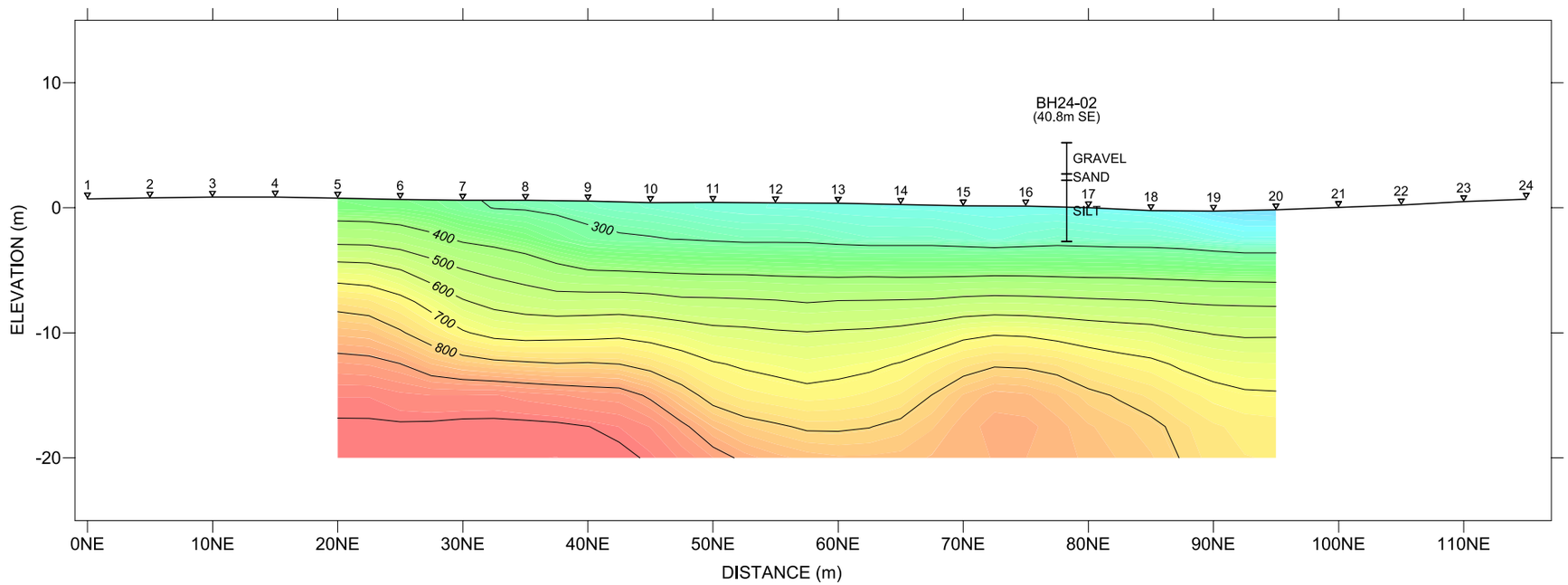
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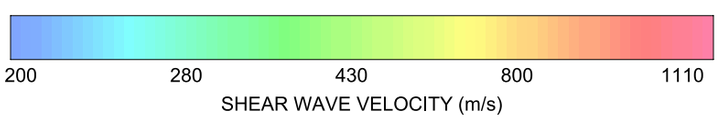
INTERPRETED MASW PROFILE
SL24-GF-01

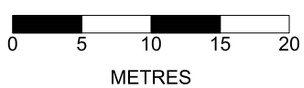
FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2024	SCALE 1:500	FIG. 5

MASW PROFILE SL24-GF-03







TIDE AND CHART VERTICAL DATUM

WORLEY

GRISE FIORD, NUNAVUT

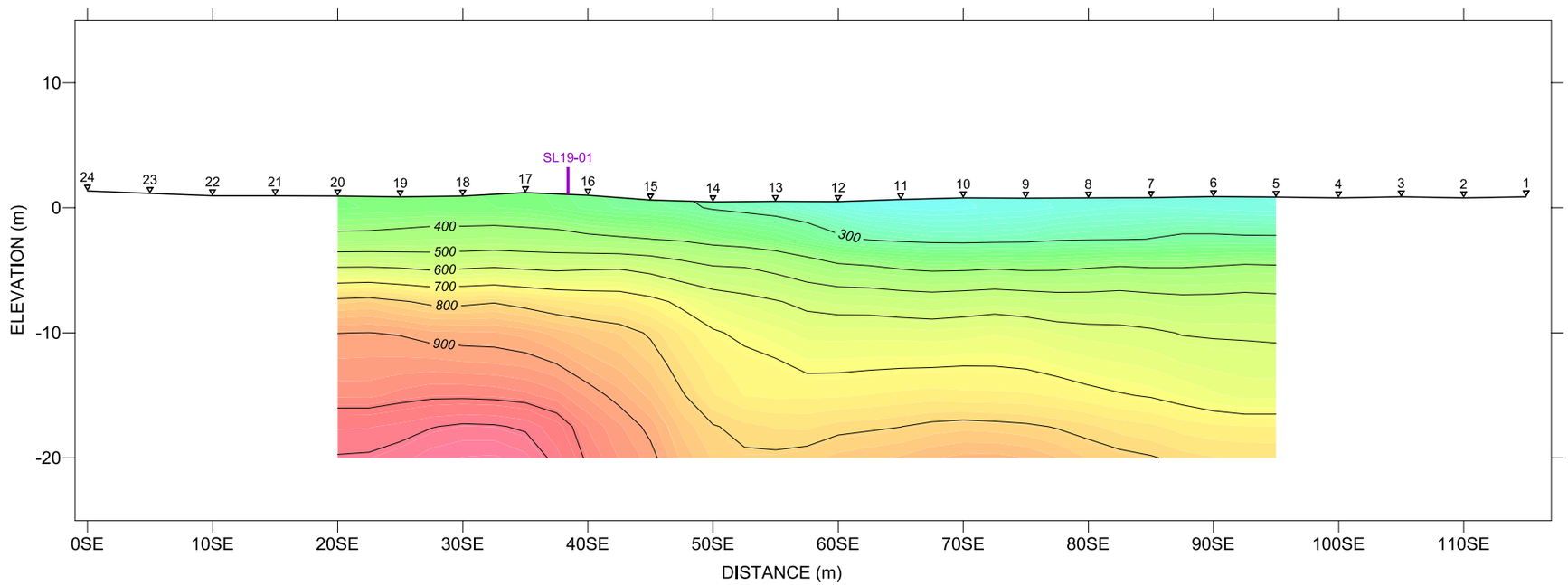
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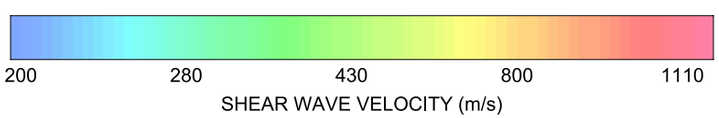
INTERPRETED MASW PROFILE
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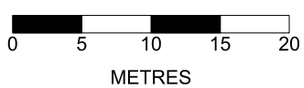
FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2024	SCALE 1:500	FIG. 6

MASW PROFILE SL24-GF-04







TIDE AND CHART VERTICAL DATUM

WORLEY
GRISE FIORD, NUNAVUT

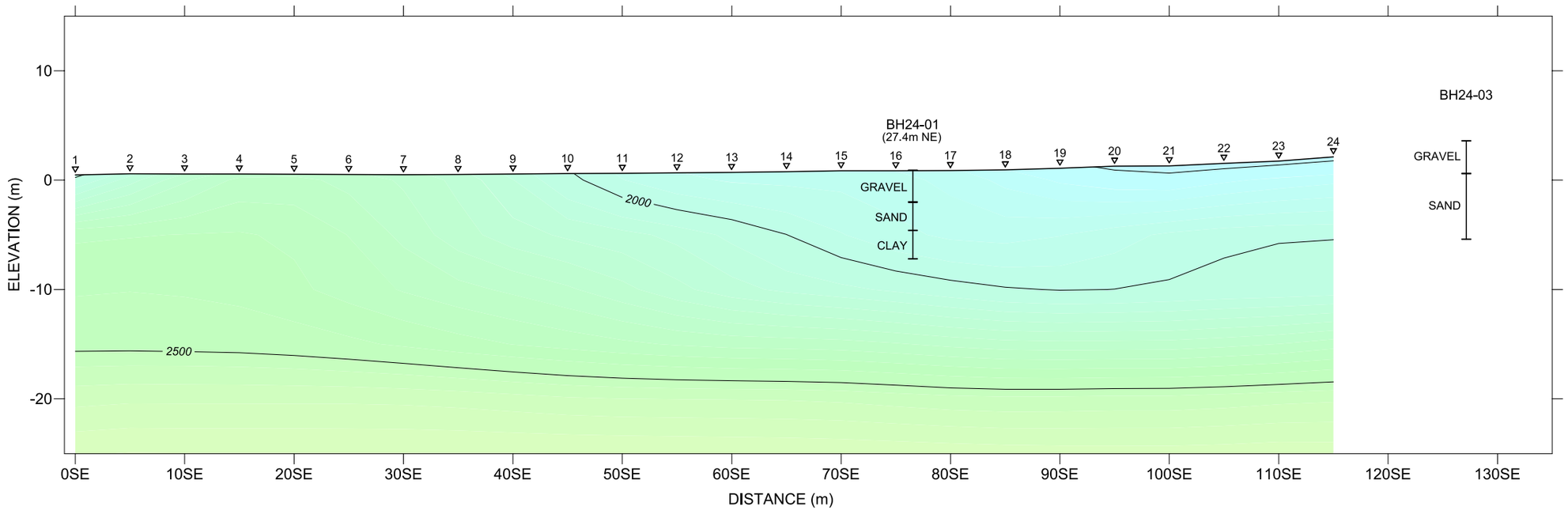
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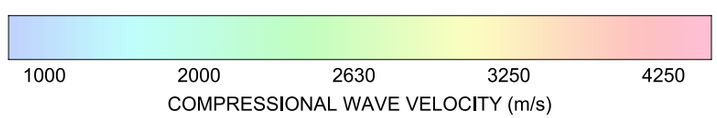
INTERPRETED MASW PROFILE
SL24-GF-04

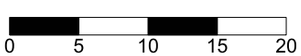
FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2024	SCALE 1:500	FIG. 7

SEISMIC REFRACTION PROFILE SL24-GF-01







TIDE AND CHART VERTICAL DATUM

WORLEY

GRISE FIORD, NUNAVUT

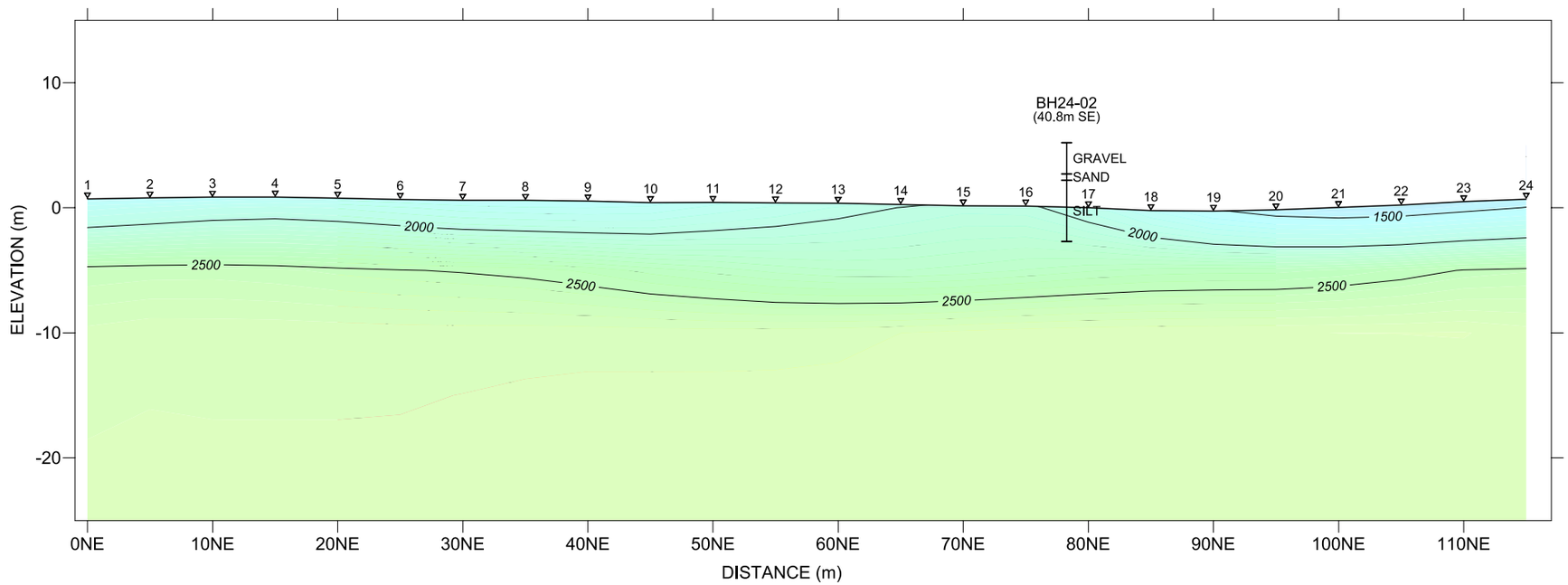
GEOPHYSICAL SURVEY

INTERPRETED SEISMIC REFRACTION PROFILE SL24-GF-01

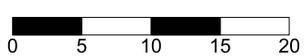
FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2024	SCALE 1:500	FIG. 8

SEISMIC REFRACTION PROFILE SL24-GF-03



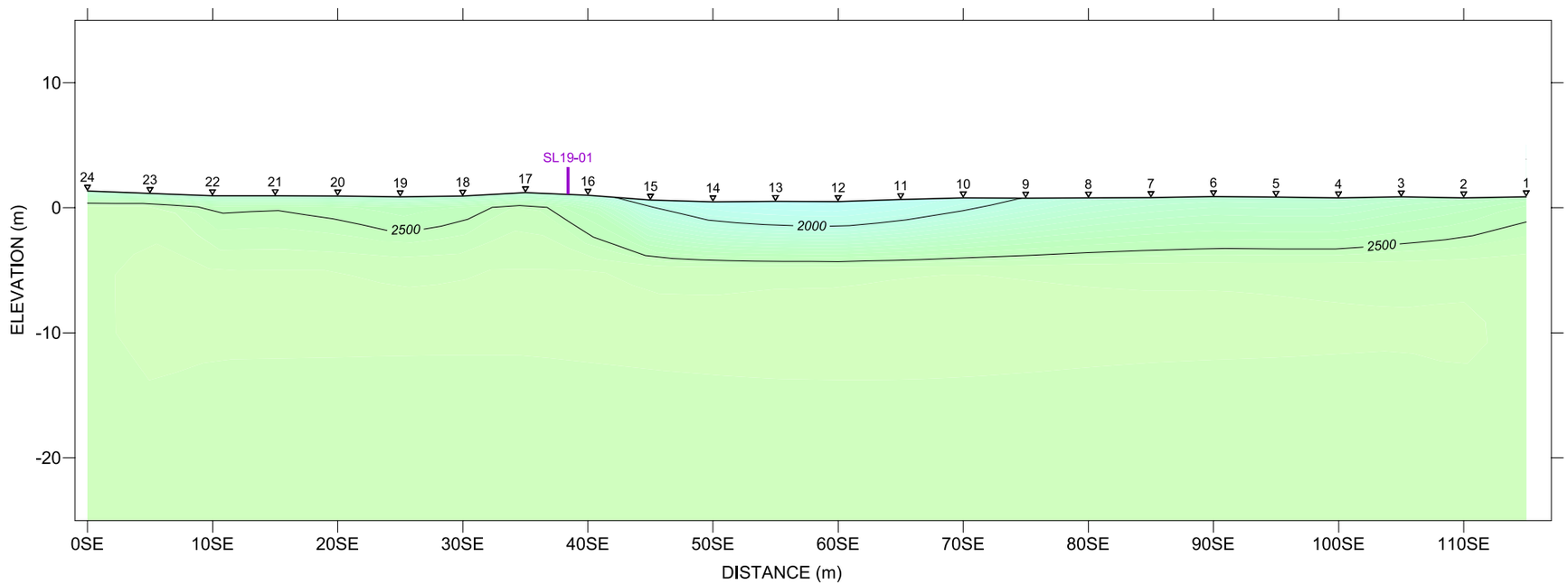


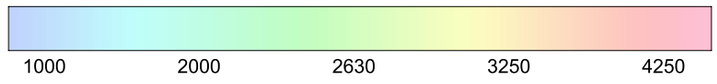


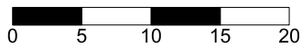
TIDE AND CHART VERTICAL DATUM

WORLEY GRISE FIORD, NUNAVUT		
GEOPHYSICAL SURVEY		
INTERPRETED SEISMIC REFRACTION PROFILE SL24-GF-03		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT. 2024	SCALE 1:500	FIG. 9

SEISMIC REFRACTION PROFILE SL24-GF-04







TIDE AND CHART VERTICAL DATUM

WORLEY
GRISE FIORD, NUNAVUT

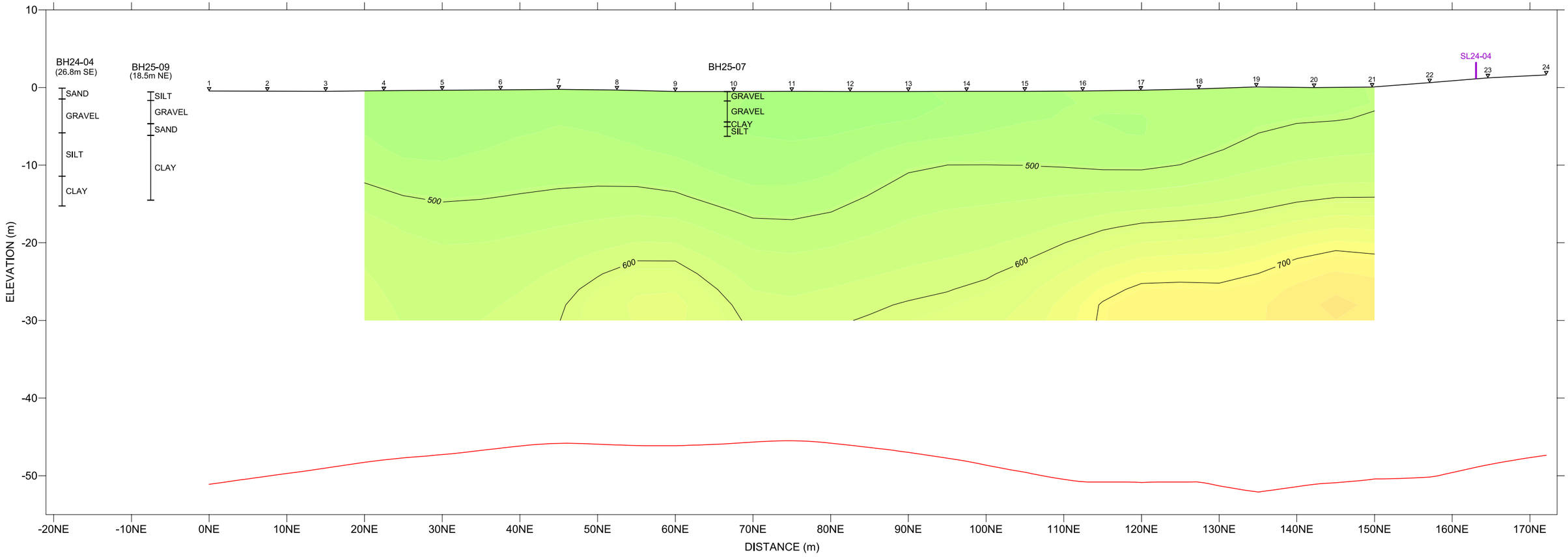
GEOPHYSICAL SURVEY

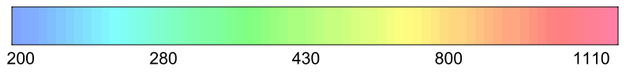
INTERPRETED SEISMIC REFRACTION PROFILE SL24-GF-04

FRONTIER GEOSCIENCES INC.

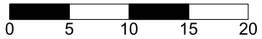
DATE: SEPT. 2024	SCALE 1:500	FIG. 10

MASW PROFILE SL19-GF-01





SHEAR WAVE VELOCITY (m/s)

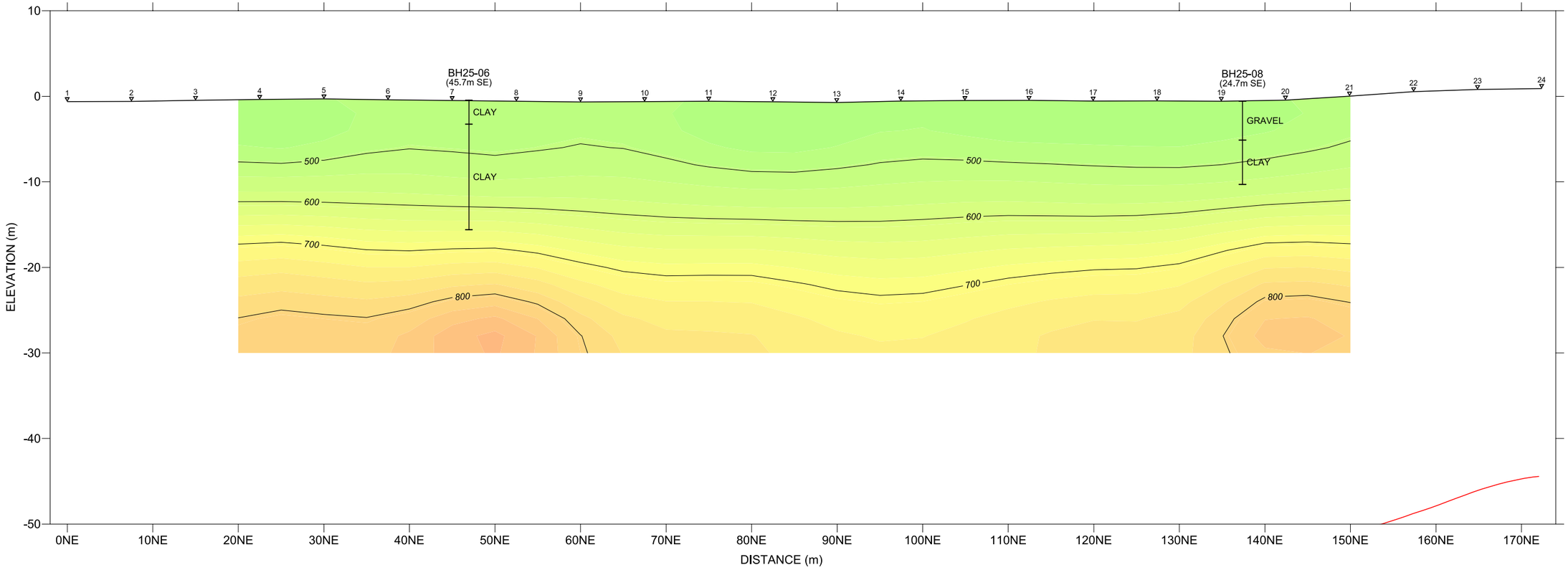


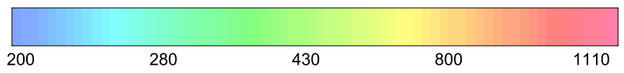
METRES

TIDE AND CHART VERTICAL DATUM

WORLEY GRISE FIORD, NUNAVUT		
GEOPHYSICAL SURVEY		
INTERPRETED MASW PROFILE SL19-GF-01		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT. 2024	SCALE 1:500	FIG. 11

MASW PROFILE SL19-GF-02





SHEAR WAVE VELOCITY (m/s)



METRES

TIDE AND CHART VERTICAL DATUM

WORLEY
GRISE FIORD, NUNAVUT

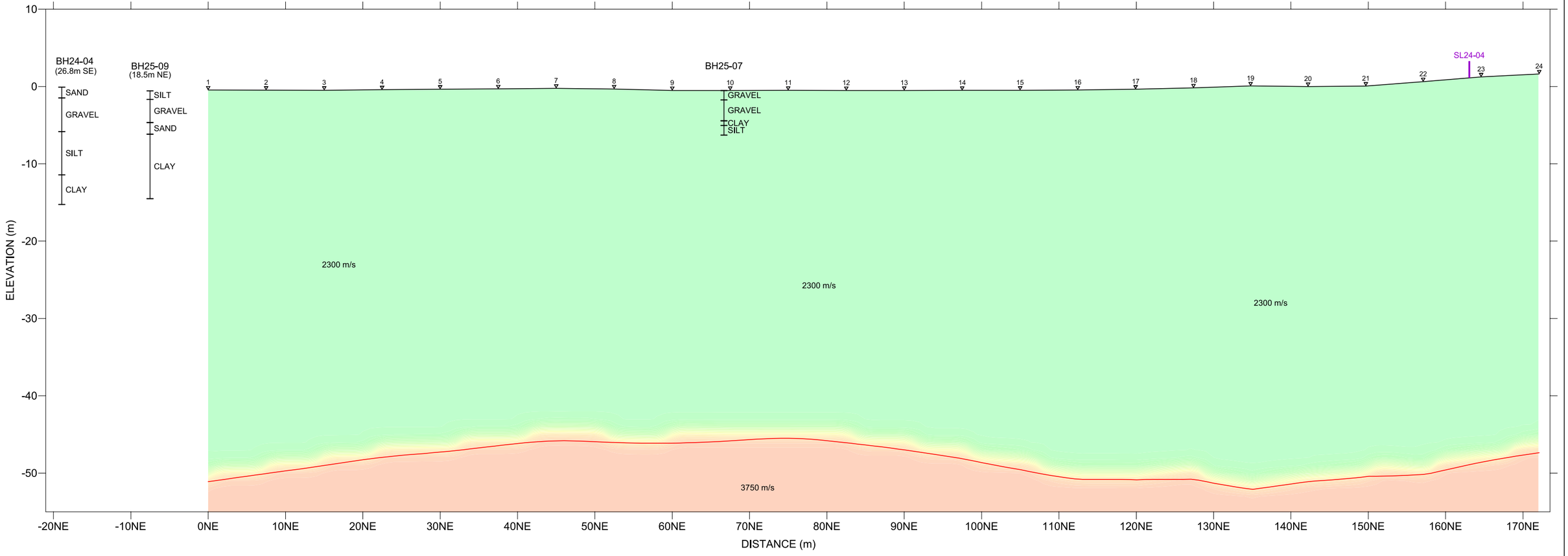
GEOPHYSICAL SURVEY

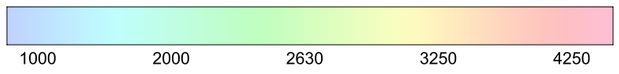
INTERPRETED MASW PROFILE
SL19-GF-02

FRONTIER GEOSCIENCES INC.

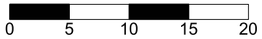
DATE: SEPT. 2024	SCALE 1:500	FIG. 12

SEISMIC REFRACTION PROFILE SL19-GF-01





COMPRESSIONAL WAVE VELOCITY (m/s)

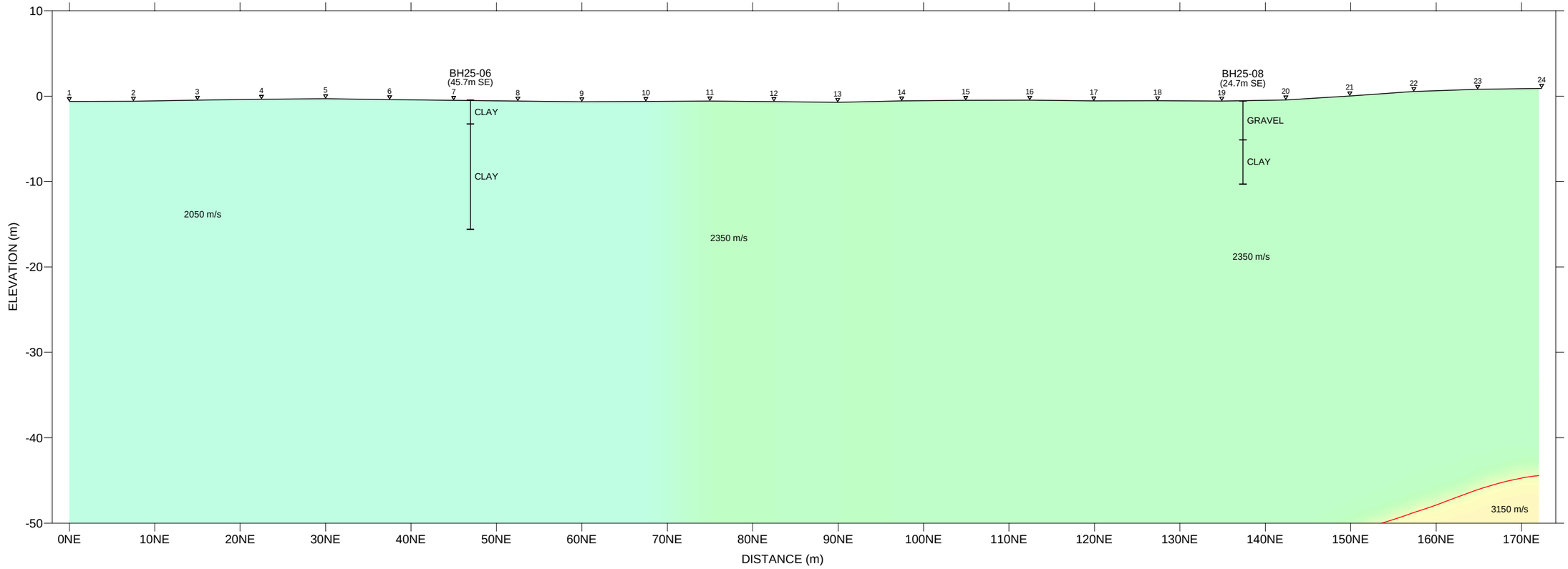


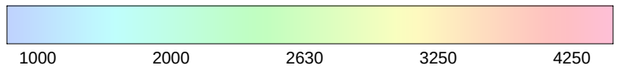
METRES

TIDE AND CHART VERTICAL DATUM

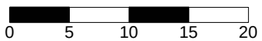
WORLEY GRISE FIORD, NUNAVUT		
GEOPHYSICAL SURVEY		
INTERPRETED DEPTH SECTION SL19-GF-01		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT. 2024	SCALE 1:500	FIG. 13

SEISMIC REFRACTION PROFILE SL19-GF-02





COMPRESSIONAL WAVE VELOCITY (m/s)



METRES

TIDE AND CHART VERTICAL DATUM

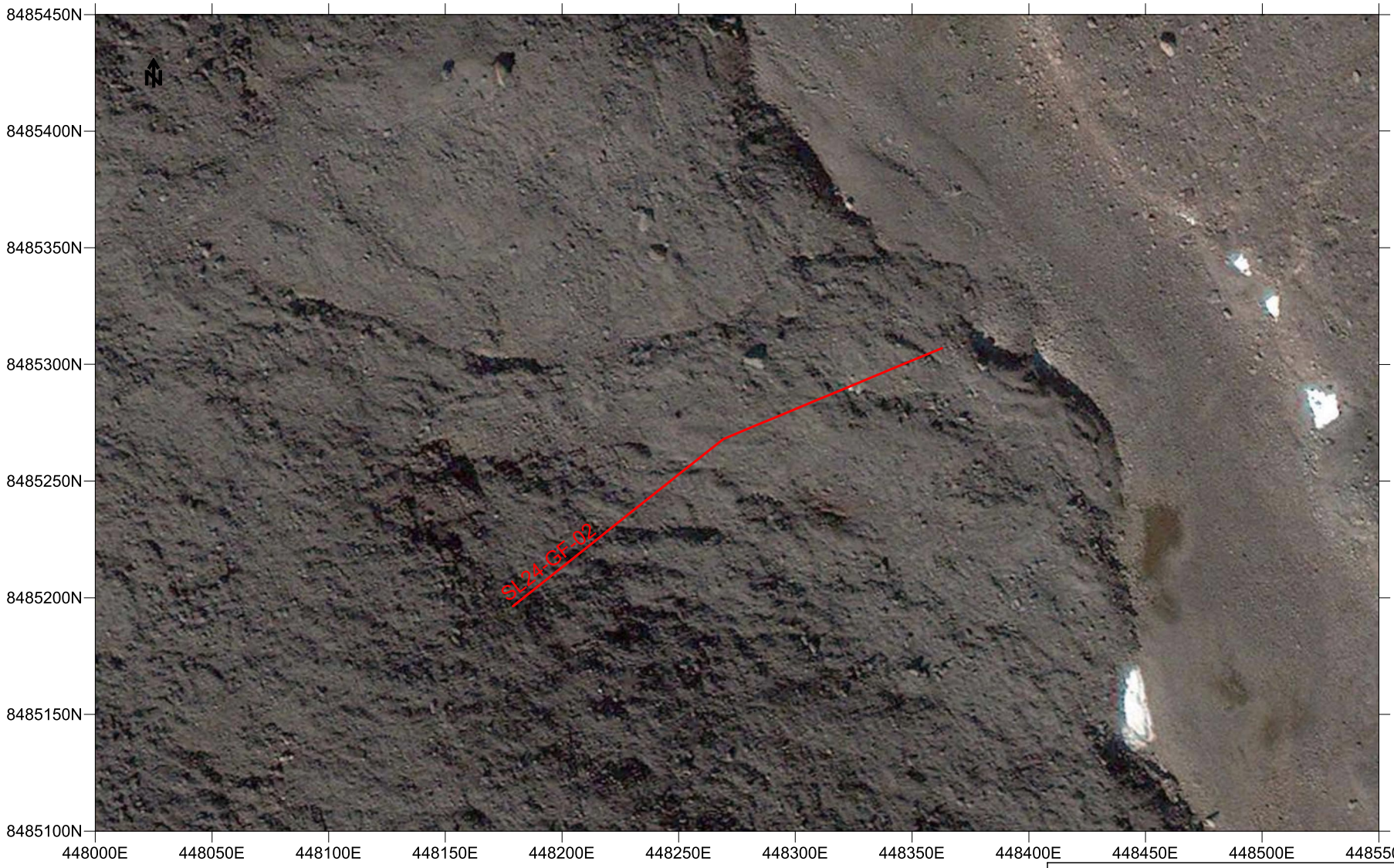
WORLEY
GRISE FIORD, NUNAVUT

GEOPHYSICAL SURVEY

INTERPRETED DEPTH SECTION
SL19-GF-02

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2024	SCALE 1:500	FIG. 14



0 25 50 75 100

METRES

GOOGLE EARTH IMAGERY
UTM NAD83 ZONE 17

WORLEY

GRISE FIORD, NUNAVUT

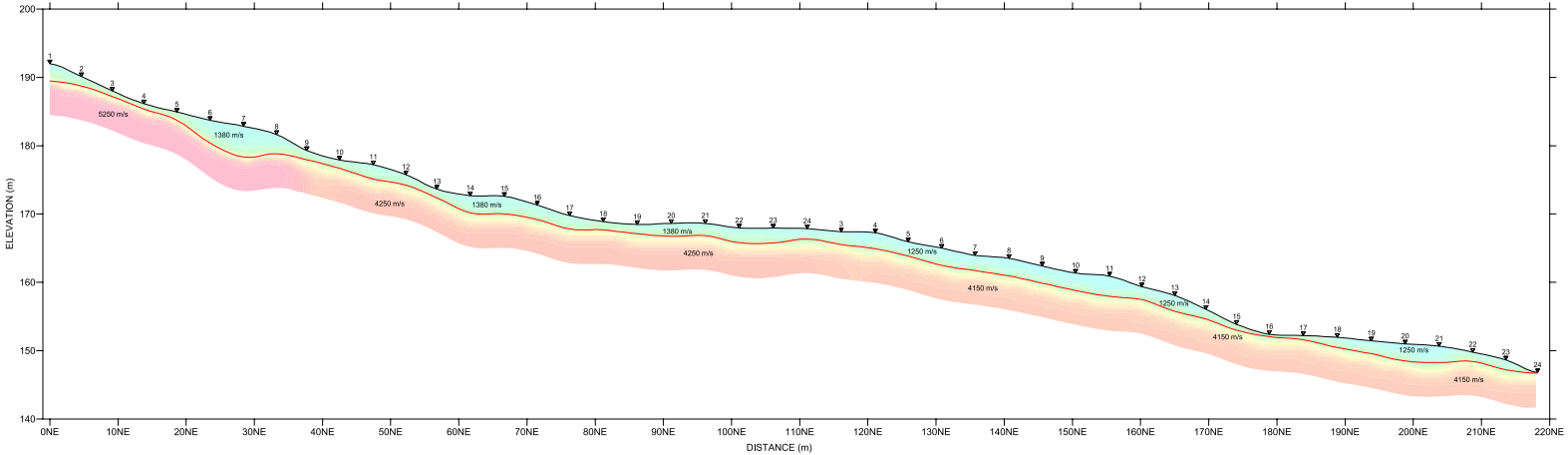
GEOPHYSICAL SURVEY

SITE PLAN
QUARRY AREA

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2024	SCALE 1:2,500	FIG. 15

SEISMIC REFRACTION PROFILE SL24-GF-02







WORLEY GRISE FIORD, NUNAVUT		
GEOPHYSICAL SURVEY		
INTERPRETED SEISMIC REFRACTION PROFILE SL24-GF-02 QUARRY AREA		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT, 2024	SCALE 1:500	FIG. 16

Appendix H. Terrain Mapping by GVM Geological Consultants Ltd.

TERRAIN MAPPING AT GRISE FIORD, ELLESMERE ISLAND, NUNAVUT

Prepared by Gretchen Minning (P. Geol.)

For Worley Consulting

December 04, 2024

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1.0 INTRODUCTION

Gretchen Minning (Senior Geologist, P. Geol.) of Calgary, Alberta was contacted by Jeffery Gibson (Associate Engineering Geologist) of Worley Consulting, Vancouver, BC, to undertake a stereoscopic air photo analysis and geomatics-based terrain map of the study area near the community of Grise Fiord, on Ellesmere Island, Nunavut. Geomatics work was to be done by Sharon Webster, (Senior Associate Technical Consultant, Geoscience) of Worley Consulting Calgary.

Black and white air photos were obtained by Vancouver Worley Consulting from the Government of Canada National Air photo Library. Air photos used for the mapping were 1:20 000 scale. The air photos were flown in1992 and copies were produced as glossy prints. Air photos used were from line A27885 photos 4 to 8. Air photos at 1:8000 scale from 1992 were also examined but not used in mapping as they did not cover the entire study area. These air photos were line A31623 photos 12 to 17.

Stereoscopic terrain mapping was performed on air photo pairs. Terrain information was transferred to an ortho-rectified air photo base that formed the final map product for this study (Attachment 1). An enlarged view of the study area is shown in Attachment 2. A legend describing the terrain units for these maps was prepared (Attachment 3). This report summarizes information from the mapping exercise.

Drone footage and numerous site photos (Attachment 4) taken by geologist Jonathan Wood from Calgary Worley Consulting were viewed as part of the terrain analysis and mapping.

2.0 STUDY OBJECTIVES

The study objectives were to classify, map and describe the principal bedrock and surficial deposits in the study area near Grise Fiord. The detailed map legend describes map unit characteristics including:

- Map symbol
- Terrain unit title (landform title)
- Texture of surficial sediments or type of rock
- Thickness of surficial sediments
- Topography and slope
- Estimated ice content
- Surface drainage
- Erosional or depositional features (escarpments, gullies, channels, unstable slopes)
- Comments on terrain units

The geological setting of the study area (shown on the terrain map) is also described in this report so that it is possible to understand the terrain conditions at Grise Fiord. The terrain mapping

exercise has focused on finding the best terrain units to provide large boulders for harbour construction.

3.0 PREVIOUS WORK

Surficial and bedrock geology studies have been done in the Grise Fiord area by government and industry.

The Geological Survey of Canada (GSC) has mapped bedrock on a regional scale (Harrison et., 2015). A previous report describing the Hamlet of Grise Fiord Drainage Plan includes a map and description of the surficial geology in the vicinity of the hamlet (Tetra Tech, 2021).

Advisian Worley Group has also undertaken studies for Fisheries and Oceans, Canada, on potential haul road and quarry locations for harbour construction at Grise Fiord (Advisian Group 2019a and 2019b)

4.0 GEOLOGICAL SETTING

The study area is in the Davis Highland Physiographic Division of the Davis Region of the Canadian Shield (Bostock, 1970).

The bedrock is dominantly igneous and meta-igneous rock. The surface was glaciated and a thin to thick continuous cover of ground moraine deposits (made of till) cover the bedrock in the lowland area between bedrock highland ridges. The bedrock ridges have some colluvial cover and drainage features with fluvial fans formed where they enter lowland areas.

Near the sea and at the town of Grise Fiord, marine terrace deposits of sand and gravel were formed by sea erosion and deposition during periods of postglacial isostatic rebound of land following retreat of the continental ice sheets in Pleistocene and Holocene time (Tetra Tech, 2021). These staircase-like landforms are gently sloping from the colluvium covered foot of the steep rock cliff (northeast of town) down to the recent marine beach adjacent to the sea.

5.0 BEDROCK GEOLOGY

Near-surface strongly jointed bedrock lies beneath Quaternary deposits and is exposed along the mountainsides bordering the north side of the valley west of Grise Fiord townsite and along the north-facing flank of a broad bedrock hillside (**R** polygons on the terrain map). This bedrock is part of the Paleoproterozoic ETAH plutonic assemblage (Harrison, et al., 2015) of dominantly igneous and meta-igneous rock (tonalite, granite and paragneiss) that forms this part of the Davis Highland.

6.0 SURFICIAL GEOLOGY

This section of the report describes the surficial deposits in the study area. The terrain mapped air photos show the location of these surficial deposits. The map legend lists more detailed properties of the deposits based on air photo interpretation and field investigations including site photos and drone footage. Borehole logs from past infrastructure projects are limited. The mapped area is in the continuous permafrost zone (Heginbottom, 1995).

Moraine Deposits (Mp) are found in the lowland area between the bedrock ridges. Till that forms the moraine plain deposits is >5m thick and consists of fine to coarse-grained materials. Fine grained material includes silt, clay, gravel and sand. Coarse grained material includes mixed fragments, rubble and boulders. The ground surface is generally level (Slope Class 1) and ice contents are predicted to be medium to high. The moraine plain deposits are moderately well drained. The moraine plain deposits are crossed by alluvial deposits at two locations in the study area. It also appears that the moraine plain surface itself has been reworked by water. These deposits can provide some boulder sized construction material, but boulders are not as large or as abundant as in the rolling and ridged moraine terrain units.

Rolling and Ridged Moraine Deposits (Mmr) are found in the lowland between the two bedrock ridges. These deposits are generally closer to the edge of the lowland and adjacent to the bedrock ridges. They represent glacial moraine deposits formed by ice advancing through the lowland. The topography of these moraine deposits is rolling to ridged (Slope Class 1 to 3). Till that forms these deposits is >5m thick and consist of fine to coarse grained material. Fine and medium grained material includes silt, clay, gravel and sand. Abundant coarse-grained material includes mixed fragments, rubble and boulders. Ice contents are predicted to be medium to high. These deposits are well drained. Rolling and ridged deposits are a good source of boulder sized construction material.

Marine Deposits (Wb, Wt) are located adjacent to the sea (Wb) and in terraces (Wt) above the recent marine beach (Wb). The recent marine beach consists of gravel, silt, and sand and is >3m thick. It is level (Slope Class 1) and has low to medium ice content. It is well drained but because it is close to the sea it may be affected by wave action. It is not a good source of coarse construction material.

The community of Grise Fiord is located on a series of marine terraces above the recent marine beach. The terraces are part of a bench-like part of the coastal zone that is composed of marine deposits (stratified clay, silt, sand and gravel) that are 5 to 20 m thick. These sediments form a coarsening upward sequence (Tetra Tech, 2021). A few cobbles and boulders appear on the terraces. These terraces were formed during postglacial isostatic rebound of the following retreat of the glaciers during Pleistocene and Holocene time. The marine terrace deposits are level to gently sloping (Slope Class 1 to 2) and moderately well to poorly drained. The marine terrace deposits are not a good source of coarse construction material.

Fluvial Fan Deposits (Ff) are located where drainage channels from rock ridge uplands enter lowland areas. They are >3m thick and consist of gravel and sand with minor coarse material. They are gent1y to steeply sloping (Slope Class 1 to 4). They are predicted to have medium to high ice contents and are well drained. They can be active during weather events and can be subject to surface flooding. One area of Mmr terrain has a fluvial fan Ff superimposed on it. It was recommended in a previous study to avoid development locations where fluvial fans enter lowland areas (Tetra Tech, 2021).

Alluvial Deposits (Ap) on the terrain map occur along the postglacial creeks that cross the moraine plain deposits in the study area. The alluvial deposits **(Ap)** are > 3 m thick and consist of sand, silt, and gravel. Ice contents in the alluvial plain deposits are medium. These deposits are poorly drained and may be subject to flooding. They are level (Slope Class 1) and are not a good location for coarse construction material.

Colluvial Deposits (Cv)) on this terrain map represents colluvium that is <1m thick. This colluvium formed where thick surficial deposits on marine terraces (Wt) next to the coast were weathered and downslope movement of weathered material occurred. This colluvium consists of silt, clay, sand and gravel. The terrain unit is gently sloping (Slope Class 1 to 2) and has low to medium ice contents. It is moderately well drained. There is potential for erosional issues in this terrain unit as it overlies sediments rather than rock. This terrain unit is not a good source for coarse construction material.

Colluvial Deposits (Cb) are colluvial blanket deposits that are >3m thick. On this terrain map the colluvial blanket deposits overlie lower slopes of bedrock ridges. Colluvial blanket deposits range in texture from fine to coarse grained with mixed fragments and rubble common. The terrain unit is moderately to steeply sloping (Slope Classes 2 to 5). Ice content of the colluvial deposits is expected to be medium to high. Slope stability and erosional issues may affect these deposits. Steep slopes would affect developing these sources for coarse construction material.

Surficial Geology Features including recent gullies and, escarpments that show as symbols on the terrain map. Smaller features such as ice wedge polygons are not visible on the 1:20 000 scale air photos.

7.0 ASSESSMENT OF COARSE MATERIAL SOURCES

The terrain units **tMmr** (rolling and ridged moraine) have the largest concentration of boulders and would probably be the best locations for developing a quarry. Photos 2,3, and 5 in Attachment 2 are from **tMmr** terrain units.

Site 1 photo is from terrain unit **sgWt** (marine terrace). It has sand, gravel, and some boulders, but does not have the same concentration of boulders as **tMmr** terrain units. This terrain unit is close to the community.

Site 4 photo is from terrain unit **tMp.** This terrain unit has fewer large boulders than tMmr terrain units. The smaller boulders in this terrain unit seems to indicate there was some reworking of the moraine plain deposits by water.

8.0 REFERENCES

Advisian Worley Group. 2019a. Grise Fiord – Representative Site Photographs; prepared for Department of Fisheries and Oceans, 7p.

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Heginbottom, J.A., Dubreuil, M.A., and Harker, P.T. 1995. Canada Permafrost; In: National Atlas of Canada, 5th Edition. National Atlas Information Service, Natural Resources of Canada, Ottawa. (MCR 4177), Scale 1:7,500,000.

Howes, D. E. and Kenk, E. 1997. Terrain classification system for British Columbia (Version 2): A System for the Classification of Surficial Materials, Landforms and Geological Processes of British Columbia; Fisheries Branch Ministry of Environment and Surveys and Resources Mapping Branch, Province of British Columbia, Victoria, B.C.

Tetra Tech. 2021. Hamlet of Grise Fiord Master Drainage Plan; Department of Community and Government Services (CGS) Government of Nunavut (FILE: 704-ENG.WTRI03028-01), 226p.

ATTACHMENT 1: TERRAIN MAP – GRISE FIORD

Attachment 1: Terrain Map - Grise Fiord
Ellesmere Island, Nunavut

gsFf
sgWb
sgWt
sfCv/sgWt
tMp
tMmr
sgAp
drCb/R
R
Site 1
Site 2
Site 3
Site 4
Site 5

Selected Field Photograph Locations
Escarpment
Small Gully
Study Area
Terrain Unit Boundary

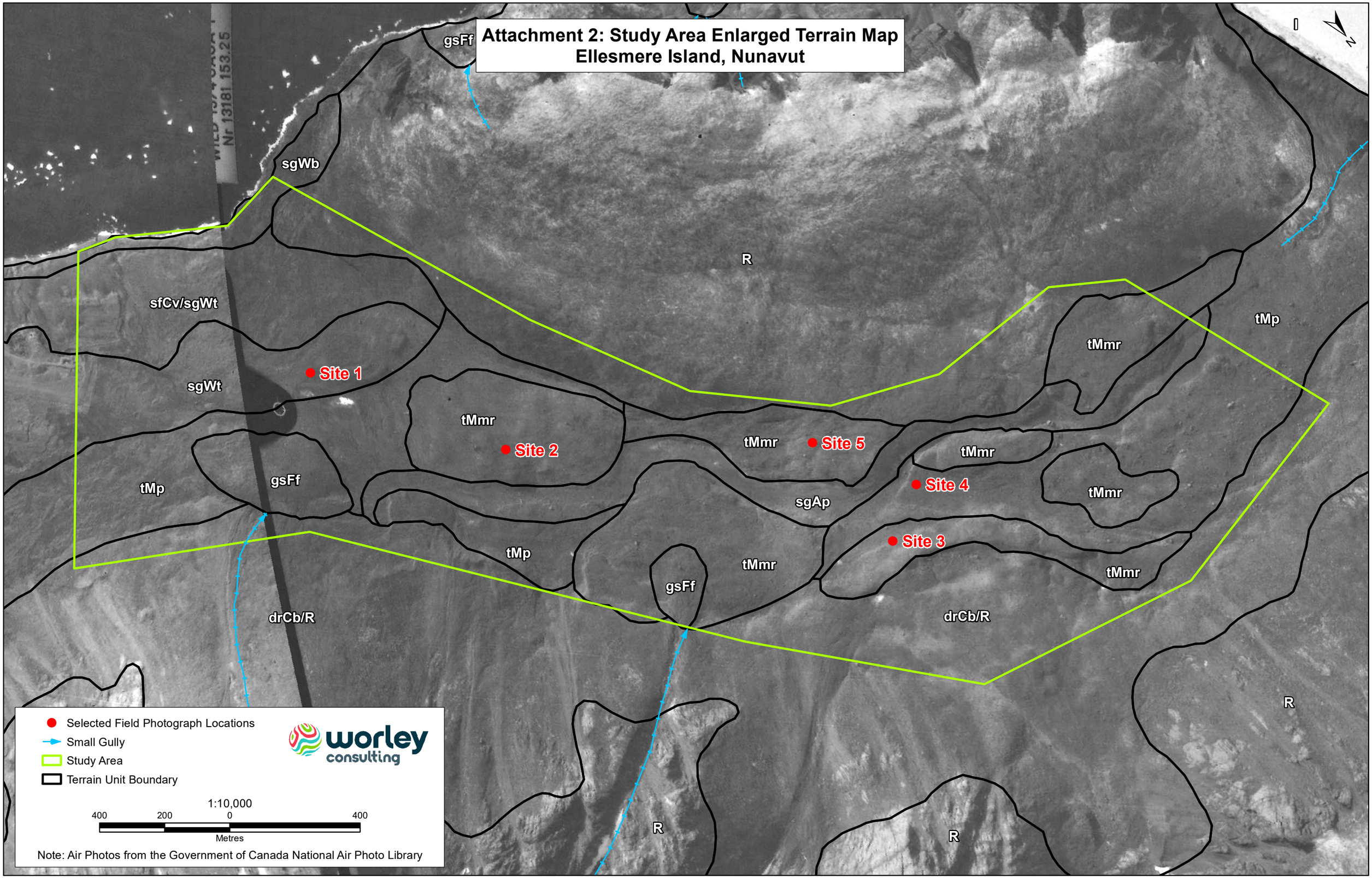
worley consulting

1:20,000
800 400 0 800
Metres

Note: Air Photos from the Government of Canada National Air Photo Library

ATTACHMENT 2: STUDY AREA ENLARGED TERRAIN MAP

Attachment 2: Study Area Enlarged Terrain Map
Ellesmere Island, Nunavut



ATTACHMENT 3: TERRAIN LEGEND - GRISE FIORD

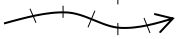
Map Symbol	Terrain Unit	Texture	Thickness	Topography	Ice Content	Drainage	Slope Class *	Comments
I	Ice	Snow and Ice	>3m	Level to Sloping	-	-	1 to 2	Ice as sea ice or glacier
Cv	Colluvial Veneer	Silt, Clay, Sand, Gravel, mixed fragments and rubble	<1m	Gently to Moderately Sloping; (Reflects Underlying Topography)	Low to Medium	Moderately Well Drained	1 to 2	May have slope stability and erosional issues where it overlies marine terrace sediments
Cb	Colluvial Blanket	Silt, Clay, Sand, Gravel, Mixed fragments and, rubble	>3m	Moderately to Steeply Sloping (Reflects Underlying Topography)	Medium to High	Moderately Well Drained	2 to 5	May have slope stability and erosional issues on steep slopes. Not easy to develop for coarse construction material
Ap	Alluvial Plain	Silt, Sand and Gravel	>3m	Level	Medium	Poorly Drained	1	Subject to flooding
Ff	Fluvial Fan	Gravel and Sand	>3m	Gently to Steeply Sloping	Medium to High	Moderately Well Drained	1 to 4	Subject to flooding as Ff deposits are at the end of gullies
Wb	Marine Beach	Gravel and Sand	>3m	Level	Low to Medium	Well Drained	1	Adjacent to sea; may be affected by waves. Not a good source of boulders
Wt	Marine Terrace	Gravel and Sand; Some Coarse Material	>5m to 20m	Level to Gently Sloping	Low to Medium	Moderately Well to Poorly Drained	1 to 2	Not a good source of boulder construction material
Mmr	Rolling and Ridged Moraine	Till that consists of fine to coarse-grained material	>5m	Rolling to Ridged	Medium to High	Well Drained	1 to 3	Good source of boulder sized material for construction purposes.
Mp	Moraine Plain	Till that consists fine- to coarse-grained material	>5 m	Level	Medium to High	Moderately Well Drained	1	Some coarse-grained material but not as many boulders as in Mmr terrain units
R	Rock	Granite of ETHA plutonic Assemblage	At Surface or with colluvial or morainal cover	Steeply Sloping	-	Well Drained	1 to 5	May have slope stability or drainage issues

TERRAIN LEGEND – Textures, Symbols and Slope Classes

Textures (most common texture first in map label)

Silt, Clay **=f**
Sand = **s**
Grave**l =g**
Mixed Fragments = **d**
Rubble = **r**
Boulders = **b**
Till = **t** (fine to coarse grained material including Mixed fragments **d**, rubble **r,** and boulders **b**)

Symbols

Escarpment = 
Small Gully = 

***Slope Classes**

Class	%	Degrees
1	0 -5	0 -3
2	6-26	4-15
3	27-49	16- 26
4	50-70	27-35
5	>70	>35

*Slope Classes: According to Howes and Kenk, 1997

Terrain Unit Example 1: tMmr = rolling and ridged moraine of till that includes fine grained material, gravel, mixed fragments, rubble and boulders

ATTACHMENT 4: SELECTED FIELD PHOTOGRAPHS (SITES 1 TO 5)



Site 1. Typical photo of surficial material in map unit sgWt. Large granite blocks present but not abundant (Photo 20240828_104048).



Site 2, Typical photo of surficial material in map unit tMmr. Large granite blocks abundant (Photo 20240828_112457).



Site 3. Typical photo of surficial material in map unit tMmr forming a small ridge. Large granite blocks abundant (Photo 20240828_125507).



Site 4. Typical photo of surficial material in map unit tMp. Fewer large boulders, but more abundant smaller reworked boulders (Photo 20240828_110757).



Site 5. Typical photo of surficial material in map unit tMmr moraine ridge against bedrock. Abundant large sub equant bedrock granite blocks (Photo 20240828_121039).

Appendix I. Block Size Assessment of Measured Scanlines

Block Size Assessment of Measured Scanlines (Borrow Source 2C and 2D)

Location	Length	Width	Depth (m)	Volume (m^3)	Length to Thickness (LT) Ratio
Grise Fiord Moraine Deposits					
GPS 240	0.90	1.20	0.70	0.76	1.71
	1.30	1.10	0.80	1.14	1.63
	1.40	1.00	0.60	0.84	2.33
	1.90	1.30	2.20	5.43	1.69
	1.80	1.00	1.10	1.98	1.80
	1.20	2.40	1.60	4.61	2.00
	1.20	2.40	1.60	4.61	2.00
	2.40	1.70	1.10	4.49	2.18
	1.90	1.50	1.80	5.13	1.27
	0.60	0.80	0.90	0.43	1.50
	2.80	1.40	1.10	4.31	2.55
	1.50	2.40	1.00	3.60	2.40
	1.30	1.80	1.50	3.51	1.38
	1.40	1.30	1.00	1.82	1.40
	1.50	2.20	1.40	4.62	1.57
	1.30	0.90	1.10	1.29	1.44
	1.70	1.10	1.20	2.24	1.55
	1.70	1.00	1.00	1.70	1.70
	1.60	0.90	0.40	0.58	4.00
	1.90	0.80	1.20	1.82	2.38
	1.00	1.70	0.80	1.36	2.13
	0.90	1.30	1.10	1.29	1.44
GPS 241	0.90	1.50	1.00	1.35	1.67
	1.30	1.20	1.10	1.72	1.18
	2.30	1.00	0.80	1.84	2.88
	1.30	0.80	2.10	2.18	1.63
	1.50	0.60	1.10	0.99	2.50
	0.80	1.10	0.80	0.70	1.38
	2.80	0.90	1.20	3.02	3.11
	1.50	2.00	0.70	2.10	2.86
	1.20	1.40	1.30	2.18	1.17
GPS 244	1.00	1.50	0.80	1.20	1.88
	1.30	1.40	0.70	1.27	2.00
	1.30	0.80	1.10	1.14	1.63
	0.70	1.40	1.10	1.08	2.00
	1.50	1.80	0.70	1.89	2.57
	2.30	1.20	0.90	2.48	2.56
	1.50	1.80	0.80	2.16	2.25
GPS 245	2.30	2.00	1.00	4.60	2.30
	0.80	1.10	0.70	0.62	1.57
	1.20	1.50	0.90	1.62	1.67
	1.70	0.80	1.40	1.90	2.13
	1.30	1.40	1.20	2.18	1.17
	1.60	2.60	1.40	5.82	1.86
	1.10	1.70	1.20	2.24	1.55
	0.70	1.30	1.20	1.09	1.86
	1.50	0.90	1.40	1.89	1.67
	1.00	1.80	1.20	2.16	1.80
	1.50	0.90	1.40	1.89	1.67
	1.00	1.80	1.20	2.16	1.80
	1.50	1.60	1.80	4.32	1.20
	0.90	0.90	0.80	0.65	1.13
	1.20	1.70	0.90	1.84	1.89
	2.70	1.10	1.70	5.05	2.45
	1.50	1.20	0.70	1.26	2.14
	1.50	1.40	1.10	2.31	1.36
	1.10	0.90	0.70	0.69	1.57
	1.50	1.40	1.10	2.31	1.36
	1.10	0.90	0.70	0.69	1.57
	1.70	0.70	0.80	0.95	2.43
	0.90	0.70	1.30	0.82	1.86
	1.10	0.90	0.60	0.59	1.83
	1.30	1.10	1.00	1.43	1.30
	1.30	0.80	2.00	2.08	2.50
	1.30	0.80	0.90	0.94	1.63
	1.60	1.90	0.80	2.43	2.38

