



Fracflow Consultants Inc.
Environmental, Hydrogeological and
Geotechnical Engineering Consultants



Government of Canada **Gouvernement du Canada**

GEOTECHNICAL FACTUAL REPORT

Neddy Harbour, NL

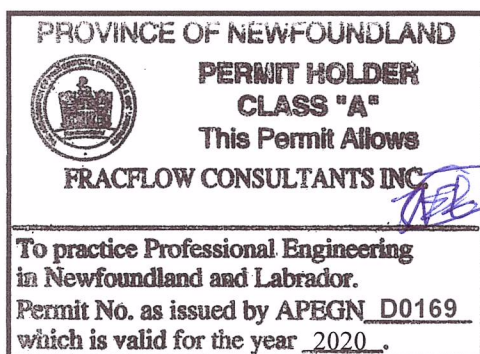
(FFC File: 3151)

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August 2020



Preface

Department of Fisheries and Oceans Canada (DFO) retained Fracflow Consultants Inc. to undertake a marine geotechnical site investigation at Neddy Harbour, NL under Contract F6139-200044 dated June 9, 2020.

The scope of work for the Neddy Harbour project consisted of drilling and sampling three (3) barge-based and one (1) land-based geotechnical borehole(s) at the approximate locations specified by the Client. The scope of work also included collection of marine sediment samples at three (3) of the borehole locations. The field work for this investigation was conducted between July 9 and 16, 2020.

The field work for these investigations utilized a Foremost Mobile B-47 geotechnical drill rig at the approximate locations specified by the Client. Split-spoon sampling and Standard Penetration Tests (SPTs) were conducted using a NW/NQ diamond drill string in each borehole at the standard 1.5 m interval where soil conditions permitted. Marine sediment sampling was conducted using a HW/HQ diamond drill string and a 76 mm diameter split-spoon.

The end of hole elevations of the three (3) barge-based and one (1) land-based borehole(s) ranged from -2.43 m LNT at BH1 to -20.0 m LNT at BH3.

A visual inspection of the subsurface soil conditions encountered, based on the split-spoon samples that were recovered during the field program, was used to describe the soil conditions at the site. Overburden in the area of borehole BH1 can be described as a very thin layer of sand, gravel, and cobbles that overlies bedrock. In the area of boreholes BH2, BH3 and BH4, overburden can be described as a layer of sand and gravel over a thick (5.7 m to 9.3 m thick) silt/clay layer, with some minor silt/clay layer interbedded the sand layer below the main silt/clay layer, which overlies bedrock. Harbour bottom topography slopes south, away from the end of the current finger pier, with harbour bottom elevations ranging from -0.06 m LNT at BH2

to -0.41 m LNT at BH3. Overburden thickness ranged from 1.371 m in BH1 to 19.09 m in BH3. Overburden in the area of boreholes BH2, BH3 and BH4 is soft to hard, with “N” Values in the sand/gravel layer ranging from 1 to 47, and silt/clay layer ranging from 1 to 8. In the three (3) barge-based boreholes, a slightly firmer layer existed at the harbour bottom, followed by the soft silt/clay layer, which in turn is underlain by firmer material and bedrock. During drilling, the split spoon regularly sank through the silt/clay layer under its own weight without requiring any force to drive the SPT.

Bedrock was encountered at all three (3) barge-based and one (1) land-based borehole(s) locations, at elevations ranging from 0.69 m LNT in BH1 to -19.5 m LNT in BH3. Bedrock topography slopes south, away from the end of the current finger pier. Bedrock encountered was a blue grey shale, with recoveries ranging from 66% to 93% and Rock Quality Designation (RQD) values ranging from 25% to 94%.

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1.0 INTRODUCTION

Department of Fisheries and Oceans Canada (DFO) retained Fracflow Consultants Inc. to undertake a marine geotechnical site investigation at Neddy Harbour, NL under Contract F6139-200044 dated June 9, 2020.

The scope of work for the Neddy Harbour project consisted of drilling and sampling three (3) barge-based and one (1) land-based geotechnical borehole(s) at the approximate locations specified by the Client. The scope of work also included collection of marine sediment samples at the borehole locations. All sediment samples were delivered to BV Laboratories in St. John's, NL on behalf of DFO for analysis under the Public Works Government Services Canada (PWGSC) Standing Offer for laboratory work. The field work was conducted between July 9 and 16, 2020.

The borehole and marine sediment sampling locations are shown on the site plan in **Figure 1.1**. A summary of the geotechnical field work conducted is shown in **Table 1.1**. A summary of the marine sediment sampling is shown in **Table 1.2**.

This report contains a factual presentation and full disclosure of all findings of the subsurface investigation. The following sections provide: (1) a description of the site and the general geology of the area; (2) a summary of the investigative procedures used; and (3) a detailed description of the subsurface conditions. Appended to this report are the detailed geotechnical logs for each borehole and grain size analysis reports and related laboratory data.

Table 1.1 Summary of geotechnical borehole investigations at Neddy Harbour, NL.

Borehole ID	Overburden Drilled (m)	Bedrock Drilled (m)	Total Depth Drilled (m)	SPT & Split- spoon Samples Attempted	Split-spoon Samples Tested
BH1	2.44	2.06	4.50	0	0
BH2	15.59	0.92	16.51	11	6
BH3	19.09	0.46	19.55	13	6
BH4	16.88	0.59	17.47	10	6
Total	54.00	4.03	58.03	34	18

* No split-spoon sample was collected at BH1 due to there only being a thin layer of sediment plus fill overlaying bedrock.

Table 1.2 Summary of marine sediment environmental sampling at Neddy Harbour, NL.

Borehole ID	Elevation of Harbour Bottom Relative to LNT (m)	Final sample/hole Elevation Relative to LNT (m)	Split-spoon Samples Attempted	Sample ID's	Samples Submitted for Analysis
BH1	-	-	-	-	-
BH2	-0.06	-4.38	3	SS1, SS2, and SS3	3
BH3	-0.41	-4.19	3	SS1, SS2, and SS3	3
BH4	-0.39	-4.63	3	SS1, SS2, and SS3	3

2.0 SITE DESCRIPTION AND GENERAL GEOLOGY

The community of Neddy Harbour is located on the north west side of Bonne Bay, on the west coast of Newfoundland in the community of Norris Point. It is located approximately 9 km south of Rocky Harbour. The surficial geology (Nolan, White & Associates Ltd, 1979) in the area of Neddy Harbour consists of an upper unit of 1.5 - 3 m of sandy gravel (boulders in places) and a lower “stony marine clay formed by the accumulation of debries dropped from floating ice and from the ice shelf that extended eastward from the piedmont glacier” (Grant, 1973, p. 124). In at least one area near Cow Head, this marine clay overlies a shelly marine sand deposit. Bedrock in the area consists of light to dark grey and buff dolomite and lime stone.

3.0 INVESTIGATIVE PROCEDURES

At the Neddy Harbour site, the project consisted of drilling and sampling three (3) barge-based and one (1) land-based geotechnical borehole(s) around the existing wooden walkway and floating dock and the concrete boat launchway. The project also included collecting marine sediment samples at the borehole locations. The field work for these investigations utilized a Foremost Mobile B-47 at the approximate locations shown in **Figure 1.1**. The field work was conducted between July 9 and 16, 2020.

Overburden material was drilled using ‘NW’ (OD 88.9 mm, ID 76.2 mm) flush joint casing and “NQ” (OD 69.9 mm, ID 60.3 mm) diamond drill string. Soil samples were collected using a 51 mm OD, 610 mm long, split-spoon sampler. In conjunction with this split-spoon soil sampling, Standard Penetration Tests (SPTs) were performed to estimate relative soil densities. The standard procedure is to drive each split-spoon into the ground using a 63.5 kg weight falling a distance of 760 mm. The number of blows is recorded for each 150 mm the split-spoon is advanced. After the first 150 mm advance, an N-value is calculated as the sum of the blow counts required to drive the spoon an additional 300 mm (i.e., the sum of the second and third set of blow counts). The calculated N-value is a direct reflection of the relative density of the soil strata as defined in the Canadian Foundation Engineering Manual (CGS, 1992). In selected boreholes, the split spoon was advanced in 150 mm increments, until the split spoon showed consistent blow counts or very soft material was penetrated (low blow counts), and inspection of the open split spoon showed that the split spoon was not full.

The soil samples were logged and labeled in the field immediately after collection. Soil samples were stored in moisture proof containers. All soil samples were returned to Fracflow’s office and select soil samples collected during the investigation were tested. Soil testing in the laboratory consisted of standard mechanical sieve analyses, water content determinations, hydrometer analyses, and Atterberg Limit tests that were performed according to ASTM standards as required. The soil samples are stored by Fracflow for a two-year period.

Marine sediment samples for environmental analysis were collected at the three (3) barge-based borehole locations. No marine sediment sample was collected at BH1 due to there only being a thin layer of sediment overlying bedrock. Three (3) marine sediment samples were collected from each of BH2, BH3 and BH4 for a total of nine (9) samples. Sediment samples were collected from ocean bottom to approximately 1.5 m below ocean bottom or to where the sampler encountered refusal using a 76 mm diameter split-spoon. Collection of the environmental samples followed the procedures that had been established by PWGSC and the samples were stored on ice before being submitted to BV Laboratories in St. John's for analysis.

4.0 SUBSURFACE CONDITIONS AND CHARACTERIZATION

Subsurface characterization is based on the field data collected from the three (3) barge-based and one (1) land-based geotechnical borehole(s) that were completed at this site. Data collection included split-spoon sampling while drilling in conjunction with the SPTs. A description of the soil profiles is provided below using both terminologies defined in the Unified Soil Classification System (USCS) and in the Canadian Foundation Engineering Manual (CFEM) (CGS, 1992). Photographs of the pieces of rock/cobbles/boulders or bedrock core that were recovered in the core tube from each borehole are provided in **Figure 4.1**. Detailed logs of the geological conditions at each borehole are provided in **Appendix A**. **Appendix B** contains the grain-size analysis information and related laboratory data for each soil sample tested.

4.1 Soil Description

Sixteen (16) soil samples were analyzed in the lab using mechanical grain size analysis. Eight (8) samples were further analyzed using hydrometer analysis, and Atterberg Limit Tests were conducted on one (1) sample. The samples were classified by CFEM as BH2-SS1: Gravelly Sand, some Silt/Clay, BH2-SS3: Sand, some Silt, some Gravel, trace Clay, BH2-SS5: Silt/Clay, trace Sand, trace Gravel, BH2-SS7: Clayey Silt, some Sand, BH2-SS8: Silt/Clay, trace Sand, BH2-SS11: Sandy Silt, some Clay, trace Gravel, BH3-SS2: Silty Sand, trace Gravel, BH3-SS3: Sand, some silt/clay, trace gravel, BH3-SS4: Gravel and sand, trace silt/clay, BH3-SS6: Sandy Silt, some Clay, BH3-SS8: Silt/Clay, some Sand, BH3-SS12: Sand and Silt, trace Clay, BH4-SS2: Sand, some gravel, some silt/clay, BH4-SS4: Silt and Clay, trace Sand, BH4-SS8: Silt/Clay, some Sand, BH4-SS10: Sandy Silt, some Clay, trace Gravel.

Overburden in the area of borehole BH1 can be described as a thin layer of sand, gravel, and cobbles that overlies bedrock. In the area of boreholes BH2, BH3 and BH4, overburden can be described as a layer of sand and gravel over a thick (5.7 m to 9.3 m thick) silt/clay layer, with

some minor silt/clay layer interbedded the sand layer below the main silt/clay layer, which overlies bedrock. Harbour bottom topography slopes south, away from the end of the current finger pier, with harbour bottom elevations ranging from -0.06 m LNT at BH2 to -0.41 m LNT at BH3. Overburden thickness ranged from 1.371 m in BH1 to 19.09 m in BH3.

Overburden in the area of boreholes BH2, BH3 and BH4 is soft to hard, with “N” Values in the sand/gravel layer ranging from 1 to 47, and silt/clay layer ranging from 1 to 8. In the three (3) barge-based boreholes, a slightly firmer layer existed at the harbour bottom, followed by the soft silt/clay layer, which in turn is underlain by firmer material and bedrock. During drilling, the split spoon regularly sank through the silt/clay layer under its own weight without requiring any force to drive the SPT.

4.2 Bedrock Description

The general description of bedrock in the area consists of light to dark grey and buff dolomite and lime stone. Bedrock was encountered at all the three (3) barge-based and one (1) land-based borehole(s) locations, at elevations ranging from 0.69 m LNT in BH1 to -19.5 m LNT in BH3. Bedrock topography slopes south, away from the end of the current finger pier. Bedrock encountered was a blue grey shale, with recoveries ranging from 66% to 93% and Rock Quality Designation (RQD) values ranging from 25% to 94%.

Hole ID: BH1



Hole ID: BH2



Hole ID: BH3



Hole ID: BH4



Figure 4.1 Photographs of recovery obtained from core tube during drilling from boreholes BH1 to BH4 (elevations are shown in metres LNT).

5.0 REFERENCES

Canadian Geotechnical Society (CGS), 1992, *Canadian Foundation Engineering Manual*, 3rd Edition, Technical Committee on Foundations, 512 p.

Grant, D.R., 1973, Terrain Conditions, Gros Morne National Park, Western Newfoundland; Geol. Surv. Canada, paper 73-1, part B, p 121-125.

Nolan, White & Associates Ltd., 1979, Hydrogeology of the Great Northern Peninsula, Department of Consumer Affairs and Environment, Water Resources Branch, St. John's, Newfoundland.

APPENDIX A

Borehole Logs

Project: Marine Geotechnical Investigation

Log of Borehole: BH1

Client: Fisheries and Oceans Canada

Project No: 3151

Location: Neddy Harbour, NL

Date: July 16, 2020

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm
Depth below Ground Surface	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	
0		Ground Surface	2.06						20 40 60 80
1		Top: Overburden		OB	--		30		
2		Bottom: 0.41 m Blue-grey shale							
3		Fill trucked in to make drill pad							
4			0.689						
5		Did not retract core tube		OB	--				
6		Bedrock:		RC	--		79	78	
7		Blue-grey shale							
8			-0.377						
9		Did not retract core tube		RC	--				
10			-1.23						
11		Bedrock:		RC	--		75	53	
12		Blue-grey shale							
13			-2.43						
14		End of Borehole							
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									



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Datum: Geodetic

Driller: Formation Drilling Ltd.

Sheet: 1 of 1

Project: Marine Geotechnical Investigation

Log of Borehole: BH2

Client: Fisheries and Oceans Canada

Project No: 3151

Location: Neddy Harbour, NL

Date: July 13, 2020

SUBSURFACE PROFILE					SAMPLE					Standard Penetration Test "N" Value per 300 mm				
Depth below LNT	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)						
ft	m								20					
0	0	0 m LNT	0											
		Harbour bottom (-0.06 m LNT)												
1		SPT: 7 / 4 / 6 / 11 / 8 / 5 / 6 Marine Sediment Sample: 3151-BH2-SS1 CFEM: Gravelly Sand, some Silt/Clay	-1.14	SS	1	10	28							
2		No Recovery	-1.53	OB	--		0	--						
3	1	SPT: 5 / 4 / 7 / 7 / 9 / 10 / 8 / 9 Marine Sediment Sample: 3151-BH2-SS2 Grey sand with some wood and/or organic material	-2.76	SS	2	11	44							
4		No Recovery	-3.15	OB	--		0	--						
5	2	SPT: 5 / 5 / 5 / 13 / 6 / 2 / 2 / 2 Marine Sediment Sample: 3151-BH2-SS3 CFEM: Sand, some Silt, some Gravel, trace Clay	-4.38	SS	3	10	45							
6		No Recovery	-4.78	OB	--		0	--						
7	3	SPT: 1 / Sank 1.13 m under own weight Top: 0.05 m of grey sand Bottom: 0.51 m of brownish-grey clay/silt	-6.07	SS	4	0	48							
8		No Recovery	-6.55	OB	--		0	--						
9	4													
10														
11														
12														
13														
14														
15														
16	5													
17														
18														
19														
20	6													
21														
22														
23														



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Datum: LNT

Driller: Formation Drilling Ltd.

Sheet: 1 of 3

Project: Marine Geotechnical Investigation

Log of Borehole: BH2

Client: Fisheries and Oceans Canada

Project No: 3151

Location: Neddy Harbour, NL

Date: July 13, 2020

SUBSURFACE PROFILE					SAMPLE					Standard Penetration Test "N" Value per 300 mm				
Depth below LNT	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)						
23		Split-spoon sank 1.17 m into soft sediment under own weight		SS	5	0	52			20	40	60	80	
24		CFEM: Silt/Clay, trace Sand, trace Gravel	-7.73											
25														
26	8	No Recovery	-8.25	OB	--		0	--						
27														
28		Split-spoon sank 0.91 m into soft sediment under own weight		SS	6	0	72							
29		Brown-grey clay/silt with thin layer of sand 0.15 m from bottom of split-spoon	-9.17											
30	9													
31		No Recovery	-10	OB	--		0	--						
32														
33	10													
34		SPT: Sank for 0.14 m / 3 / 2 / 1 / 1 for 0.30 m		SS	7	3	87							
35		CFEM: Clayey Silt, some Sand	-10.8											
36	11	No Recovery	-11.2	OB	--		0	--						
37														
38		SPT: 4 for 0.46 m / 2 / 1 for 0.30 m / 1		SS	8	0	62							
39		CFEM: Silt/Clay, trace Sand	-12.3											
40	12													
41		No Recovery	-12.8	OB	--		0	--						
42														
43	13	SPT: Sank for 0.50 m / 2 for 0.01 m / 5 / 3		SS	9	8	79							
44		Grey-brown clay/silt, some sand	-13.7											
45		No Recovery	-14.1	OB	--		0	--						
46	14													



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Datum: LNT

Driller: Formation Drilling Ltd.

Sheet: 2 of 3

Project: Marine Geotechnical Investigation

Client: Fisheries and Oceans Canada

Location: Neddy Harbour, NL

Log of Borehole: BH2

Project No: 3151

Date: July 13, 2020

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm				
Depth below LNT	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)					
													20
46				OB	--		0	--					
47		SPT: Sank for 0.55 m / 3 for 0.12 m / 1 for 0.30 m Grey-brown clay/silt, some sand	-15.1	SS	10	1	62						
48													
49	15												
50		No Recovery	-15.4	OB	--		0	--					
51		SPT: 1 / 6 for 0.10 m / 52 for 0 m (Refusal) CFEM: Sandy Silt, some Clay, trace Gravel	-15.7	SS	11	53	100						
52		Bedrock: Grey shale		RC	--		66	36					
53	16												
54													
55		End of Borehole											
56	17												
57													
58													
59	18												
60													
61													
62	19												
63													
64													
65													
66	20												
67													
68													
69	21												



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Driller: Formation Drilling Ltd.

Datum: LNT

Sheet: 3 of 3

Project: Marine Geotechnical Investigation

Log of Borehole: BH3

Client: Fisheries and Oceans Canada

Project No: 3151

Location: Neddy Harbour, NL

Date: July 15, 2020

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm
Depth below LNT	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)	
0 m		0 m LNT	0						20 40 60 80
1		Harbour bottom (-0.41 m LNT)	-0.41						
2		SPT: 1 / 2 / 2 / 2 / 2 for 0.19 m Marine Sediment Sample: 3151-BH3-SS1 Brown-grey sand and silt/clay	-1.21	SS	1	4	35		
3		No Recovery	-1.5	OB	--		0	--	
4		SPT: 1 for 0.30 m / 2 / 3 / 4 / 4 / 5 / 5 Marine Sediment Sample: 3151-BH3-SS2 CFEM: Silty Sand, trace Gravel	-2.57	SS	2	2	57		
5		No Recovery	-3.27	OB	--		0	--	
6		SPT: 2 / 4 / 4 / 8 / 8 / 10 Marine Sediment Sample: 3151-BH3-SS3 CFEM: Sand, some Silt/Clay, trace Gravel	-4.19	SS	3	8	58		
7		Gravel	-4.72	OB	--		25	--	
8		SPT: 20 / 21 / 26 / 18 / 39 for 0.16 m CFEM: Gravel and Sand, trace Silt/Clay	-5.51	SS	4	47	39		
9		Gravel	-6.51	OB	--		16	--	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									



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Driller: Formation Drilling Ltd.

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Sheet: 1 of 3

Project: Marine Geotechnical Investigation

Log of Borehole: BH3

Client: Fisheries and Oceans Canada

Project No: 3151

Location: Neddy Harbour, NL

Date: July 15, 2020

SUBSURFACE PROFILE					SAMPLE					Standard Penetration Test "N" Value per 300 mm				
Depth below LNT	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)						
23		SPT: 1 / 1 / 1 / 1 / 4 / 6 / 3 for 0.17 m Brownish-grey clay/silt	-7.59	SS	5	2	19			20	40	60	80	
24														
25		No Recovery	-8.1	OB	--		0	--						
26	8													
27														
28		SPT: 1 for 0.61 m / 1 / 1 for 0.30 m CFEM: Sandy Silt, some Clay	-9.17	SS	6	0	57							
29	9													
30		No Recovery	-9.72	OB	--		0	--						
31														
32														
33	10	SPT: 1 for 0.30 m / 2 for 0.76 m Top: 0.20 m Grey fine sand Bottom: 0.46 m Brown clay/silt	-10.8	SS	7	2	62							
34														
35														
36	11	No Recovery	-11.9	OB	--		0	--						
37														
38														
39														
40	12	SPT: 2 / 1 for 0.53 m CFEM: Silt/Clay, some Sand	-12.6	SS	8	1	96							
41														
42		No Recovery	-13.3	OB	--		0	--						
43	13													
44														
45		SPT: Sank for 0.12 m / 3 / 3 / 2 for 0.32 m Brown clay/silt, some sand	-14	SS	9	5	85							
46	14													



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Sheet: 2 of 3

Project: Marine Geotechnical Investigation

Log of Borehole: BH3

Client: Fisheries and Oceans Canada

Project No: 3151

Location: Neddy Harbour, NL

Date: July 15, 2020

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm				
Depth below LNT	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)					
46													
47		No Recovery		OB	--		0	--					
48			-14.7										
49	15	SPT: 1 for 0.30 m / 2 / 2 / 7 / 7 Top: 0.25 m Grey fine sand Bottom: 0.36 m Brown-grey clay/silt		SS	10	2	67		■				
50			-15.6										
51													
52	16	No Recovery	-16.1	OB	--		0	--					
53													
54		SPT: Sank for 0.50 m / 1 for 0.61 m Top: 0.30 m Grey fine sand Bottom: 0.33 m Grey-brown silt/clay		SS	11	0	57		■				
55			-17.2										
56	17												
57		No Recovery	-17.6	OB	--		0	--					
58													
59	18	SPT: 3 / 3 / 6 / 5 / 3 / 3 CFEM: Sand and Silt, trace Clay		SS	12	9	72		■				
60			-18.5										
61													
62	19	No Recovery	-19.1	OB	--		0	--					
63		SPT: 4 for 0.36 m / 4 for 0.10 m / 52 for 0 m (Refusal)		SS	13	0	100		■				
64		Top: 0.21 m Grey fine sand Middle: 0.25 m Grey-brown clay/silt Bottom: Blue-grey shale	-19.5										
65				RC	--		93	28					
66	20	Bedrock: Blue-grey shale	-20										
67		End of Borehole											
68													
69	21												



Fracflow Consultants Inc.
154 Major's Path
St. John's, NL A1A 5A1
Phone: (709) 739-7270
Fax: (709) 753-5101

Drilling Method: NW Casing / NQ Coring

Datum: LNT

Driller: Formation Drilling Ltd.

Sheet: 3 of 3

Project: Marine Geotechnical Investigation

Log of Borehole: BH4

Client: Fisheries and Oceans Canada

Project No: 3151

Location: Neddy Harbour, NL

Date: July 9 - 11, 2020

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm				
Depth below Ground Surface	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)					
0 ft 0 m		Ground Surface	0										
1		Harbour bottom (-0.39 m LNT)	-0.391										
2		SPT: Sank for 0.14 m / 2 / 3 / 4 / 5 / 5 Marine Sediment Sample: 3151-BH4-SS1 Grey sand	-1.29	SS	1	7	32						
3		No Recovery	-2.04	OB	--		0	--					
4		SPT: 4 / 7 / 6 / 9 / 10 / 9 for 0.13 m Marine Sediment Sample: 3151-BH4-SS2 CFEM: Sand, some Gravel, some Silt/Clay	-2.95	SS	2	13	22						
5		No Recovery	-3.56	OB	--		0	--					
6		SPT: 5 / 7 / 4 / 10 / 9 / 13 / 6 Marine Sediment Sample: 3151-BH4-SS3 Fine grey sand with some brown organic material	-4.63	SS	3	11	33						
7		No Recovery	-4.82	OB	--		0	--					
8		SPT: 1 for 0.61 m / 1 for 0.46 m CFEM: Silt and Clay, trace Sand	-5.89	SS	4	0	57						
9		No Recovery	-6.36	OB	--		0	--					
10		SPT: 1 for 0.45 m / 1 / 1 / 1 Light brown - grey clay/silt					48						



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Drilling Method: NW Casing / NQ Coring

Datum: LNT

Driller: Formation Drilling Ltd

Sheet: 1 of 3

Project: Marine Geotechnical Investigation

Log of Borehole: BH4

Client: Fisheries and Oceans Canada

Project No: 3151

Location: Neddy Harbour, NL

Date: July 9 - 11, 2020

SUBSURFACE PROFILE					SAMPLE					Standard Penetration Test "N" Value per 300 mm				
Depth below Ground Surface	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)						
23			-7.27	SS	5	0	48			20	40	60	80	
24		No Recovery		OB	--		0	--						
25			-7.9											
26	8													
27		SPT: 1 / 1 / 1 / 2 / 1 / 2 Grey clay/silt		SS	6	2	67							
28			-8.81											
29		No Recovery		OB	--		0	--						
30	9		-9.2											
31		SPT: Sank for 0.05 m / 2 / 1 / 1 / 2 / 3 / 2 Grey clay/silt		SS	7	2	63							
32			-10.2											
33	10													
34		No Recovery		OB	--		0	--						
35			-10.8											
36														
37	11	SPT: 2 / 1 / 3 / 1 / 2 / 2 CFEM: Silt/Clay, some Sand		SS	8	4	57							
38			-11.9											
39		No Recovery		OB	--		0	--						
40	12		-12.6											
41														
42		SPT: 2 / 1 for 0.30 m / 1 / Sank for 0.50 m under own weight Grey clay/silt		SS	9	1	55							
43	13		-13.8											
44		No Recovery		OB	--		0	--						
45			-14.1											
46	14													



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Drilling Method: NW Casing / NQ Coring

Datum: LNT

Driller: Formation Drilling Ltd

Sheet: 2 of 3

Project: Marine Geotechnical Investigation

Log of Borehole: BH4

Client: Fisheries and Oceans Canada

Project No: 3151

Location: Neddy Harbour, NL

Date: July 9 - 11, 2020

SUBSURFACE PROFILE				SAMPLE					Standard Penetration Test "N" Value per 300 mm			
Depth below Ground Surface	Symbol	Geologic Description	Elevation (m)	Sample Type	Sample No.	"N" Value	Recovery (%)	RQD (%)				
46				OB	--		0	--				
47												
48		SPT: 2 / 1 / 3 / 2 for 0.76 m		SS	10	4	54					
49	15	CFEM: Sandy Silt, some Clay, trace Gravel										
50			-15.4									
51				PC	20	0						
52				PC	21	0						
53				PC	22	0						
54	16			PC	23	0						
55				PC	24	0						
56				PC	25	0						
57		DCPT: Sank under own weight for 2.08 m / 1 / 52 for 0.04 m (Refusal)		PC	26	0						
58				PC	27	0						
59				PC	28	0						
60				PC	29	0						
61				PC	30	0						
62	17			PC	31	0						
63				PC	32	0						
64				PC	33	0						
65				PC	34	1						
66			-17.5	RC	--		90	25				
67		Bedrock: Blue-Grey Shale	-17.8									
68	18	End of Borehole										
69												
70												
71												
72												
73												
74	19											
75												
76												
77												
78												
79												
80	20											
81												
82												
83												
84												
85												
86												
87												
88												
89	21											



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Drilling Method: NW Casing / NQ Coring

Datum: LNT

Driller: Formation Drilling Ltd

Sheet: 3 of 3

APPENDIX B

Grain Size Analysis

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

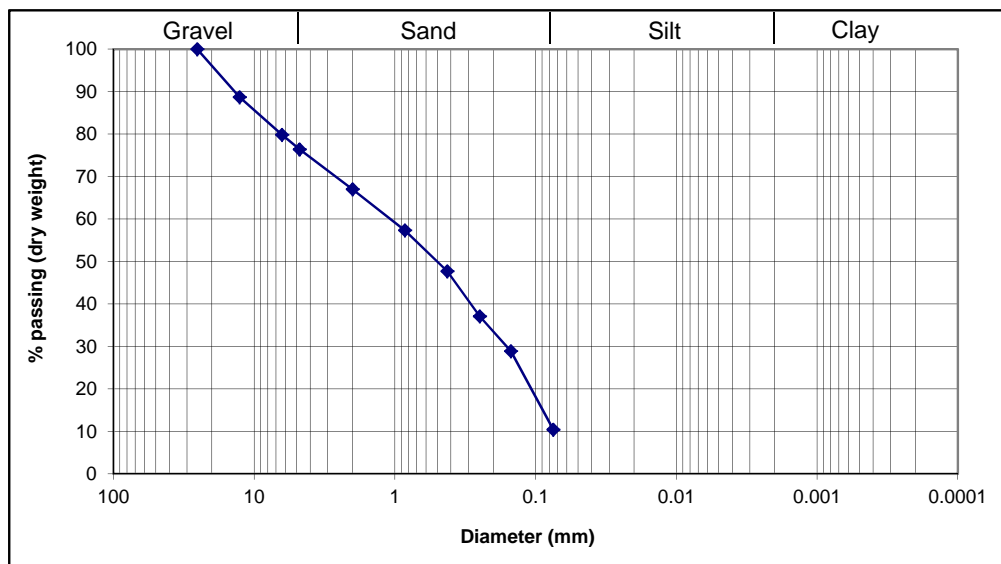
Sample No. : 3151-BH2-SS1

Depth below GS : 0.06 m - 1.40 m

Sieve Analysis

Dry weight of sample (g) = 267.11

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	30.14	11.28	11.28	88.72
1/4"	6.35	23.71	8.88	20.16	79.84
4	4.76	9.16	3.43	23.59	76.41
10	2.00	25.07	9.39	32.98	67.02
20	0.85	25.87	9.69	42.66	57.34
40	0.425	25.71	9.63	52.29	47.71
60	0.25	28.32	10.60	62.89	37.11
100	0.15	21.94	8.21	71.10	28.90
200	0.075	49.40	18.49	89.60	10.40
pan	---	27.79	10.40	100.00	---
		267.11			



$$D_{10} = 0.0745$$

$$D_{30} = 0.17$$

$$D_{60} = 1.1$$

$$Cu = 14.77$$

$$Cc = 0.35$$

USCS: SP-SM (Poorly graded sand with silt and gravel),

or SP-SC (Poorly graded sand with clay and gravel)

$$R_{200} = 89.60$$

$$R_4 = 23.59$$

$$R_4/R_{200} = 0.26$$

$$SF = 66.01$$

$$GF = 23.59$$

$$\% \text{ Gravel} = 23.59$$

$$\% \text{ Sand} = 66.01$$

$$\% \text{ Silt \& Clay} = 10.40$$

$$\% \text{ Clay} = \text{NA}$$

CFEM: Gravelly Sand, some Silt/Clay

Moisture Content (%): 15.24

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

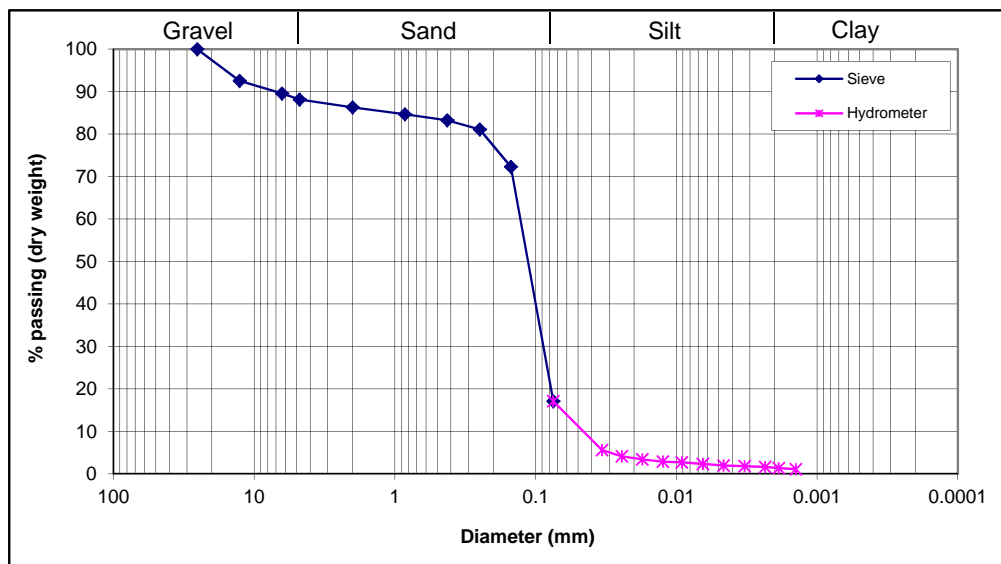
Sample No. : 3151-BH2-SS3

Depth below GS : 3.15 m - 4.38 m

Sieve Analysis

Dry weight of sample (g) = 276.60

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	20.60	7.45	7.45	92.55
1/4"	6.35	8.29	3.00	10.44	89.56
4	4.76	3.93	1.42	11.87	88.13
10	2.00	5.10	1.84	13.71	86.29
20	0.85	4.42	1.60	15.31	84.69
40	0.425	3.96	1.43	16.74	83.26
60	0.25	5.95	2.15	18.89	81.11
100	0.15	24.42	8.83	27.72	72.28
200	0.075	152.65	55.19	82.91	17.09
pan	---	47.28	17.09	100.00	---
		276.60			



$$D_{10} = 0.046$$

$$D_{30} = 0.087$$

$$D_{60} = 0.128$$

$$Cu = 2.78$$

$$Cc = 1.29$$

USCS: SM (Silty sand), or SC (Clayey sand), or SC-SM (Silty, clayey sand)

$$R_{200} = 82.91$$

$$R_4 = 11.87$$

$$R_4/R_{200} = 0.14$$

$$SF = 71.04$$

$$GF = 11.87$$

$$\% \text{ Gravel} = 11.87$$

$$\% \text{ Sand} = 71.04$$

$$\% \text{ Silt} = 15.69$$

$$\% \text{ Clay} = 1.40$$

CFEM: Sand, some Silt, some Gravel, trace Clay

Moisture Content (%): 26.70

GRAIN SIZE ANALYSIS-HYDROMETER

Project No. : 3151

Location of Project : Neddy Harbour

Sample No. : 3151-BH2-SS3

Description of Soil : _____

Sample Depth : 3.15 m - 4.38 m

Tested By : ZR

Test Date : August 18, 2020

Hydrometer Analysis

Hydrometer Type: 152H

Zero Correction : 5

Meniscus Correction: 1

Dispersing Agent: NaPO₄

Amount Used: 4% @ 125 ml

G_s of Solids: 2.65

C.F. a : 1.0 (From Table 6-2)

Mass of Soil (g): 47.17

Control Sieve No. : 200

% finer than #200 from sieve analysis : 17.09

	1	2	3	5	4	6	7	8	9	10	11	12	13
Date	Time of reading	Elapsed Time, t(min.)	Temp. (°C)	Act. Hyd. Reading, R _a	Temp. Corr. Factor, C _T (6-3)	Corr. Hyd. Reading, R _c	Actual % Finer	Adjusted % Finer	Hyd. corr. for meniscus, R	L (cm) {table 6-5}	L/t	K {table 6-4}	D (mm)
8/18/20	9:39	0	---	---	---	---	---	17.09	---	---	---	---	0.075
8/18/20	9:41	2	22	20	0.4	15.4	32.6	5.6	21	12.90	6.450E+00	1.33E-02	3.378E-02
8/18/20	9:43	4	22	16	0.4	11.4	24.2	4.1	17	13.50	3.375E+00	1.33E-02	2.443E-02
8/18/20	9:47	8	22	14	0.4	9.4	19.9	3.4	15	13.80	1.725E+00	1.33E-02	1.747E-02
8/18/20	9:55	16	22	12.5	0.4	7.9	16.7	2.9	13.5	14.10	8.813E-01	1.33E-02	1.249E-02
8/18/20	10:09	30	22	12	0.4	7.4	15.7	2.7	13	14.20	4.733E-01	1.33E-02	9.150E-03
8/18/20	10:39	60	22	11	0.4	6.4	13.6	2.3	12	14.30	2.383E-01	1.33E-02	6.493E-03
8/18/20	11:39	120	22	10	0.4	5.4	11.4	2.0	11	14.50	1.208E-01	1.33E-02	4.623E-03
8/18/20	13:39	240	22	9.5	0.4	4.9	10.4	1.8	10.5	14.60	6.083E-02	1.33E-02	3.280E-03
8/18/20	17:33	474	22	9	0.4	4.4	9.3	1.6	10	14.70	3.101E-02	1.33E-02	2.342E-03
8/18/20	22:21	762	21	8.5	0.2	3.7	7.8	1.3	9.5	14.75	1.936E-02	1.35E-02	1.878E-03
8/19/20	8:36	1377	20	8	0	3	6.4	1.1	9	14.80	1.075E-02	1.37E-02	1.420E-03

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

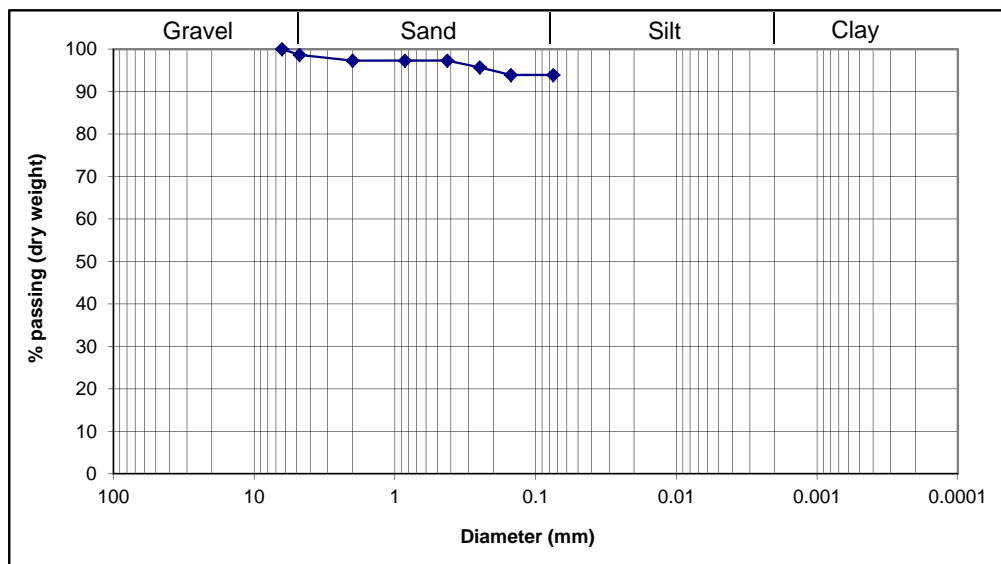
Sample No. : 3151-BH2-SS5

Depth below GS : 6.56 m - 7.73 m

Sieve Analysis

Dry weight of sample (g) = 126.88

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	-	-		
1/2"	12.7	-	-		
1/4"	6.35	0.00	0.00	0.00	100.00
4	4.76	1.71	1.35	1.35	98.65
10	2.00	1.72	1.36	2.70	97.30
20	0.85	0.00	0.00	2.70	97.30
40	0.425	0.00	0.00	2.70	97.30
60	0.25	2.02	1.59	4.30	95.70
100	0.15	2.30	1.81	6.11	93.89
200	0.075	0.00	0.00	6.11	93.89
pan	---	119.13	93.89	100.00	---
		126.88			



$D_{10} = \text{NA}$

$D_{30} = \text{NA}$

$D_{60} = \text{NA}$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: CL (Lean clay), or ML (Silt), or CL-ML (Silty clay),
or CH (Fat clay), or MH (Elastic silt)

$R_{200} = 6.11$

$R_4 = 1.35$

$R_4/R_{200} = 0.22$

SF = 4.76

GF = 1.35

% Gravel = 1.35

% Sand = 4.76

% Silt & Clay = 93.89

% Clay = NA

CFEM: Silt/Clay, trace Sand, trace Gravel

Moisture Content (%): 25.89

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

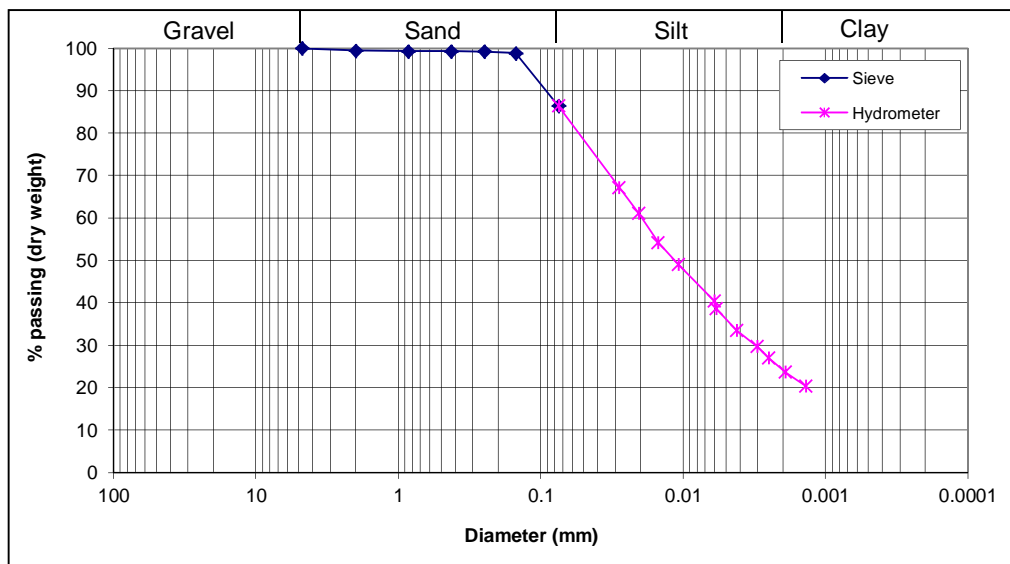
Sample No. : 3151-BH2-SS7

Depth below GS : 10.05 m - 10.81 m

Sieve Analysis

Dry weight of sample (g) = 139.21

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	-	-		
1/2"	12.7	-	-		
1/4"	6.35	-	-		
4	4.76	0.00	0.00	0.00	100.00
10	2.00	0.76	0.55	0.55	99.45
20	0.85	0.16	0.11	0.66	99.34
40	0.425	0.05	0.04	0.70	99.30
60	0.25	0.11	0.08	0.78	99.22
100	0.15	0.47	0.34	1.11	98.89
200	0.075	17.36	12.47	13.58	86.42
pan	---	120.30	86.42	100.00	---
		139.21			



$D_{10} = \text{NA}$

$D_{30} = 0.0031$

$D_{60} = 0.019$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: CL (Lean clay), or ML (Silt), or CL-ML (Silty clay),
or CH (Fat clay), or MH (Elastic silt)

$R_{200} = 13.58$

$R_4 = 0.00$

$R_4/R_{200} = 0.00$

SF = 13.58

GF = 0.00

% Gravel = 0.00

% Sand = 13.58

% Silt = 62.22

% Clay = 24.20

CFEM: Clayey Silt, some Sand

Moisture Content (%): 25.70

GRAIN SIZE ANALYSIS-HYDROMETER

Project No. : 3151

Location of Project : Neddy Harbour

Sample No. : 3151-BH2-SS7

Description of Soil : _____

Sample Depth : 10.05 m - 10.81 m

Tested By : ZR

Test Date : August 20, 2020

Hydrometer Analysis

Hydrometer Type: 152H

Zero Correction : 5

Meniscus Correction: 1

Dispersing Agent: NaPO₄

Amount Used: 4% @ 125 ml

G_s of Solids: 2.65

C.F. a : 1.0 (From Table 6-2)

Mass of Soil (g): 50

Control Sieve No. : 200

% finer than #200 from sieve analysis : 86.42

	1	2	3	5	4	6	7	8	9	10	11	12	13
Date	Time of reading	Elapsed Time, t(min.)	Temp. (°C)	Act. Hyd. Reading, R _a	Temp. Corr. Factor, C _T (6-3)	Corr. Hyd. Reading, R _c	Actual % Finer	Adjusted % Finer	Hyd. corr. for meniscus, R	L (cm) {table 6-5}	L/t	K {table 6-4}	D (mm)
8/20/20	11:39	0	---	---	---	---	---	86.42	---	---	---	---	0.075
8/20/20	11:41	2	22	43.5	0.4	38.9	77.8	67.2	44.5	9.00	4.500E+00	1.33E-02	2.821E-02
8/20/20	11:43	4	22	40	0.4	35.4	70.8	61.2	41	9.60	2.400E+00	1.33E-02	2.060E-02
8/20/20	11:47	8	22	36	0.4	31.4	62.8	54.3	37	10.20	1.275E+00	1.33E-02	1.502E-02
8/20/20	11:55	16	22	33	0.4	28.4	56.8	49.1	34	10.70	6.688E-01	1.33E-02	1.088E-02
8/20/20	12:34	55	22	28	0.4	23.4	46.8	40.4	29	11.50	2.091E-01	1.33E-02	6.082E-03
8/20/20	12:39	60	22	27	0.4	22.4	44.8	38.7	28	11.70	1.950E-01	1.33E-02	5.873E-03
8/20/20	13:39	120	22	24	0.4	19.4	38.8	33.5	25	12.20	1.017E-01	1.33E-02	4.241E-03
8/20/20	15:39	240	23	21.5	0.7	17.2	34.4	29.7	22.5	12.60	5.250E-02	1.32E-02	3.024E-03
8/20/20	17:31	352	23	20	0.7	15.7	31.4	27.1	21	12.90	3.665E-02	1.32E-02	2.527E-03
8/20/20	22:05	626	23	18	0.7	13.7	27.4	23.7	19	13.20	2.109E-02	1.32E-02	1.917E-03
8/21/20	8:30	1251	21.5	16.5	0.3	11.8	23.6	20.4	17.5	13.40	1.071E-02	1.34E-02	1.387E-03

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

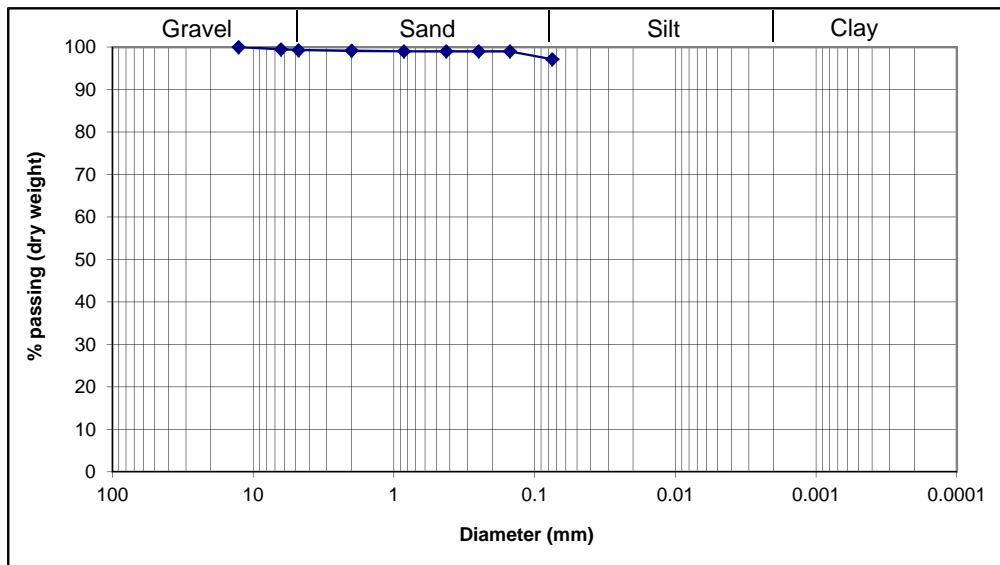
Sample No. : 3151-BH2-SS8

Depth below GS : 11.24 m - 12.29 m

Sieve Analysis

Dry weight of sample (g) = 140.02

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	-	-		
1/2"	12.7	0.00	0.00	0.00	100.00
1/4"	6.35	0.73	0.52	0.52	99.48
4	4.76	0.27	0.19	0.71	99.29
10	2.00	0.18	0.13	0.84	99.16
20	0.85	0.21	0.15	0.99	99.01
40	0.425	0.00	0.00	0.99	99.01
60	0.25	0.00	0.00	0.99	99.01
100	0.15	0.00	0.00	0.99	99.01
200	0.075	2.63	1.88	2.87	97.13
pan	---	136.00	97.13	100.00	---
		140.02			



$D_{10} = \text{NA}$

$D_{30} = \text{NA}$

$D_{60} = \text{NA}$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: CL (Lean clay), or ML (Silt), or CL-ML (Silty clay),
or CH (Fat clay), or MH (Elastic silt)

$R_{200} = 2.87$

$R_4 = 0.71$

$R_4/R_{200} = 0.25$

SF = 2.16

GF = 0.71

% Gravel = 0.71

% Sand = 2.16

% Silt & Clay = 97.13

% Clay = NA

CFEM: Silt/Clay, trace Sand

Moisture Content (%): 22.39

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

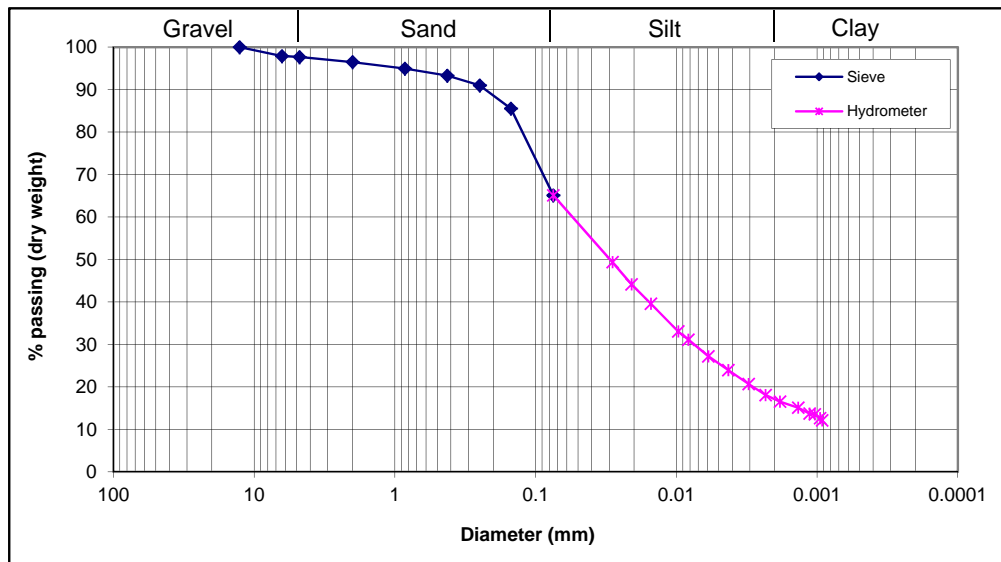
Sample No. : 3151-BH2-SS11

Depth below GS : 15.42 m - 15.65 m

Sieve Analysis

Dry weight of sample (g) = 144.40

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	-	-		
1/2"	12.7	0.00	0.00	0.00	100.00
1/4"	6.35	3.05	2.11	2.11	97.89
4	4.76	0.31	0.21	2.33	97.67
10	2.00	1.72	1.19	3.52	96.48
20	0.85	2.20	1.52	5.04	94.96
40	0.425	2.40	1.66	6.70	93.30
60	0.25	3.32	2.30	9.00	91.00
100	0.15	7.88	5.46	14.46	85.54
200	0.075	29.50	20.43	34.89	65.11
pan	---	94.02	65.11	100.00	---
		144.40			



$D_{10} = \text{NA}$

$D_{30} = 0.0075$

$D_{60} = 0.055$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: CL (Sandy lean clay), or ML (Sandy silt), or CL-ML (Sandy silty clay),
or CH (Sandy fat clay), or MH (Sandy elastic silt)

$R_{200} = 34.89$

$R_4 = 2.33$

$R_4/R_{200} = 0.07$

SF = 32.56

GF = 2.33

% Gravel = 2.33

% Sand = 32.56

% Silt = 47.51

% Clay = 17.60

CFEM: Sandy Silt, some Clay, trace Gravel

Moisture Content (%): 21.12

GRAIN SIZE ANALYSIS-HYDROMETER

Project No. : 3151

Location of Project : Neddy Harbour

Sample No. : 3151-BH2-SS11

Description of Soil : _____

Sample Depth : 15.42 m - 15.65 m

Tested By : ZR

Test Date : August 18, 2020

Hydrometer Analysis

Hydrometer Type: 152H

Zero Correction : 5

Meniscus Correction: 1

Dispersing Agent: NaPO₄

Amount Used: 4% @ 125 ml

G_s of Solids: 2.65

C.F. a : 1.0 (From Table 6-2)

Mass of Soil (g): 50

Control Sieve No. : 200

% finer than #200 from sieve analysis : 65.11

	1	2	3	5	4	6	7	8	9	10	11	12	13
Date	Time of reading	Elapsed Time, t(min.)	Temp. (°C)	Act. Hyd. Reading, R _a	Temp. Corr. Factor, C _T (6-3)	Corr. Hyd. Reading, R _c	Actual % Finer	Adjusted % Finer	Hyd. corr. for meniscus, R	L (cm) {table 6-5}	L/t	K {table 6-4}	D (mm)
8/18/20	10:27	0	---	---	---	---	---	65.11	---	---	---	---	0.075
8/18/20	10:29	2	22	42.5	0.4	37.9	75.8	49.4	43.5	9.15	4.575E+00	1.33E-02	2.845E-02
8/18/20	10:31	4	22	38.5	0.4	33.9	67.8	44.1	39.5	9.80	2.450E+00	1.33E-02	2.082E-02
8/18/20	10:35	8	22	35	0.4	30.4	60.8	39.6	36	10.40	1.300E+00	1.33E-02	1.516E-02
8/18/20	10:48	21	22	30	0.4	25.4	50.8	33.1	31	11.20	5.333E-01	1.33E-02	9.713E-03
8/18/20	10:57	30	22	28.5	0.4	23.9	47.8	31.1	29.5	11.45	3.817E-01	1.33E-02	8.217E-03
8/18/20	11:27	60	22	25.5	0.4	20.9	41.8	27.2	26.5	11.95	1.992E-01	1.33E-02	5.936E-03
8/18/20	12:27	120	22	23	0.4	18.4	36.8	24.0	24	12.40	1.033E-01	1.33E-02	4.275E-03
8/18/20	14:27	240	22	20.5	0.4	15.9	31.8	20.7	21.5	12.80	5.333E-02	1.33E-02	3.072E-03
8/18/20	17:35	428	22	18.5	0.4	13.9	27.8	18.1	19.5	13.10	3.061E-02	1.33E-02	2.327E-03
8/18/20	22:23	716	21	17.5	0.2	12.7	25.4	16.5	18.5	13.25	1.851E-02	1.35E-02	1.836E-03
8/19/20	8:37	1330	20.5	16.5	0.1	11.6	23.2	15.1	17.5	13.40	1.008E-02	1.36E-02	1.365E-03
8/19/20	17:37	1870	22.5	15	0.55	10.55	21.1	13.7	16	13.70	7.326E-03	1.33E-02	1.134E-03
8/19/20	23:51	2244	22	15	0.4	10.4	20.8	13.5	16	13.70	6.105E-03	1.33E-02	1.039E-03
8/20/20	8:19	2752	21	14.5	0.2	9.7	19.4	12.6	15.5	13.75	4.996E-03	1.35E-02	9.542E-04
8/20/20	11:00	2913	21.5	14	0.3	9.3	18.6	12.1	15	13.80	4.737E-03	1.34E-02	9.223E-04

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

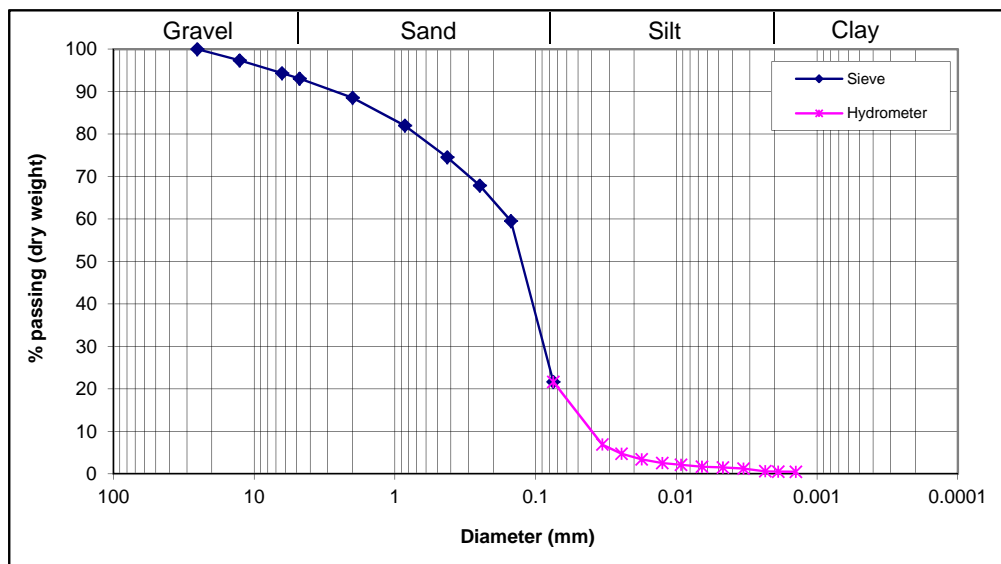
Sample No. : 3151-BH3-SS2

Depth below GS : 1.50 m - 2.57 m

Sieve Analysis

Dry weight of sample (g) = 249.90

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	6.60	2.64	2.64	97.36
1/4"	6.35	7.52	3.01	5.65	94.35
4	4.76	3.20	1.28	6.93	93.07
10	2.00	11.30	4.52	11.45	88.55
20	0.85	16.33	6.53	17.99	82.01
40	0.425	18.66	7.47	25.45	74.55
60	0.25	16.60	6.64	32.10	67.90
100	0.15	20.92	8.37	40.47	59.53
200	0.075	94.59	37.85	78.32	21.68
pan	---	54.18	21.68	100.00	---
		249.90			



$$D_{10} = 0.04$$

$$D_{30} = 0.087$$

$$D_{60} = 0.155$$

$$Cu = 3.88$$

$$Cc = 1.22$$

USCS: SM (Silty sand), or SC (Clayey sand), or SC-SM (Silty, clayey sand)

$$R_{200} = 78.32$$

$$R_4 = 6.93$$

$$R_4/R_{200} = 0.09$$

$$SF = 71.39$$

$$GF = 6.93$$

$$\% \text{ Gravel} = 6.93$$

$$\% \text{ Sand} = 71.39$$

$$\% \text{ Silt} = 21.68$$

$$\% \text{ Clay} = 0.50$$

CFEM: Silty Sand, trace Gravel

Moisture Content (%): 36.94

GRAIN SIZE ANALYSIS-HYDROMETER

Project No. : 3151

Location of Project : Neddy Harbour

Sample No. : 3151-BH3-SS2

Description of Soil : _____

Sample Depth : 1.50 m - 2.57 m

Tested By : ZR

Test Date : August 18, 2020

Hydrometer Analysis

Hydrometer Type: 152H

Zero Correction : 5

Meniscus Correction: 1

Dispersing Agent: NaPO₄

Amount Used: 4% @ 125 ml

G_s of Solids: 2.65

C.F. a : 1.0 (From Table 6-2)

Mass of Soil (g): 50

Control Sieve No. : 200

% finer than #200 from sieve analysis : 21.68

	1	2	3	5	4	6	7	8	9	10	11	12	13
Date	Time of reading	Elapsed Time, t(min.)	Temp. (°C)	Act. Hyd. Reading, R _a	Temp. Corr. Factor, C _T (6-3)	Corr. Hyd. Reading, R _c	Actual % Finer	Adjusted % Finer	Hyd. corr. for meniscus, R	L (cm) {table 6-5}	L/t	K {table 6-4}	D (mm)
8/18/20	9:20	0	---	---	---	---	---	21.68	---	---	---	---	0.075
8/18/20	9:22	2	22	20.5	0.4	15.9	31.8	6.9	21.5	12.80	6.400E+00	1.33E-02	3.365E-02
8/18/20	9:24	4	22	15.5	0.4	10.9	21.8	4.7	16.5	13.60	3.400E+00	1.33E-02	2.452E-02
8/18/20	9:28	8	22	12.5	0.4	7.9	15.8	3.4	13.5	14.10	1.763E+00	1.33E-02	1.766E-02
8/18/20	9:36	16	22	10.5	0.4	5.9	11.8	2.6	11.5	14.40	9.000E-01	1.33E-02	1.262E-02
8/18/20	9:50	30	22	9.5	0.4	4.9	9.8	2.1	10.5	14.60	4.867E-01	1.33E-02	9.278E-03
8/18/20	10:20	60	22	8.5	0.4	3.9	7.8	1.7	9.5	14.75	2.458E-01	1.33E-02	6.594E-03
8/18/20	11:20	120	22	8	0.4	3.4	6.8	1.5	9	14.80	1.233E-01	1.33E-02	4.671E-03
8/18/20	13:20	240	21.5	7.5	0.3	2.8	5.6	1.2	8.5	14.90	6.208E-02	1.34E-02	3.339E-03
8/18/20	17:31	491	22	6	0.4	1.4	2.8	0.6	7	15.20	3.096E-02	1.33E-02	2.340E-03
8/18/20	22:15	775	21	6	0.2	1.2	2.4	0.5	7	15.20	1.961E-02	1.35E-02	1.891E-03
8/19/20	8:35	1395	20.5	6	0.1	1.1	2.2	0.5	7	15.20	1.090E-02	1.36E-02	1.420E-03

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

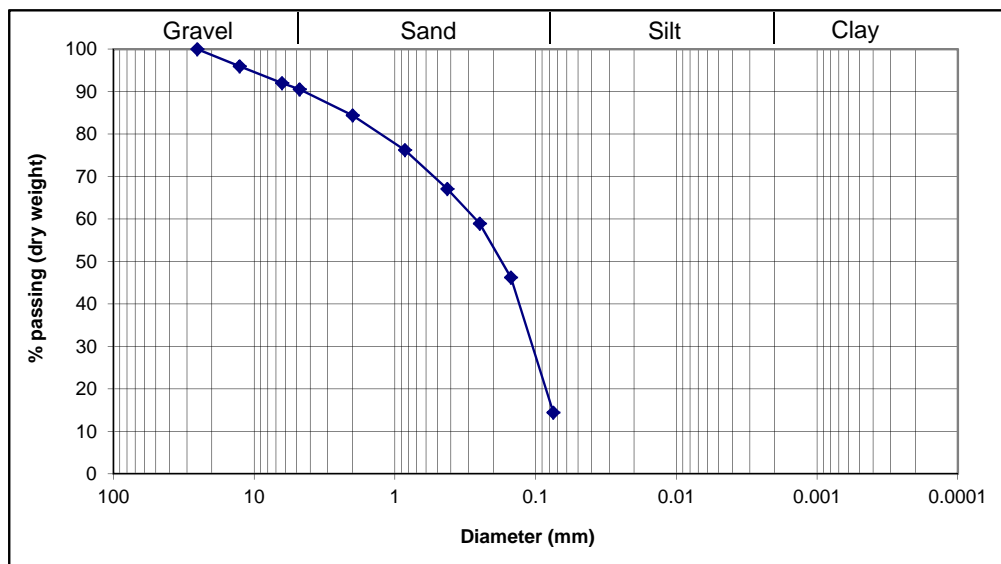
Sample No. : 3151-BH3-SS3

Depth below GS : 3.27 m - 4.19 m

Sieve Analysis

Dry weight of sample (g) = 257.96

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8				
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	10.38	4.02	4.02	95.98
1/4"	6.35	10.18	3.95	7.97	92.03
4	4.76	3.78	1.47	9.44	90.56
10	2.00	15.86	6.15	15.58	84.42
20	0.85	21.10	8.18	23.76	76.24
40	0.425	23.58	9.14	32.90	67.10
60	0.25	21.04	8.16	41.06	58.94
100	0.15	32.75	12.70	53.76	46.24
200	0.075	82.04	31.80	85.56	14.44
pan	---	37.25	14.44	100.00	---
		257.96			



$D_{10} = \text{NA}$

$D_{30} = 0.11$

$D_{60} = 0.27$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: SM (Silty sand) or SC (Clayey sand) or SC-SM (Silty, clayey sand)

$R_{200} = 85.56$

$R_4 = 9.44$

$R_4/R_{200} = 0.11$

SF = 76.12

GF = 9.44

% Gravel = 9.44

% Sand = 76.12

% Silt & Clay = 14.44

% Clay = NA

CFEM: Sand, some Silt/Clay, trace Gravel

Moisture Content (%): 21.73

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

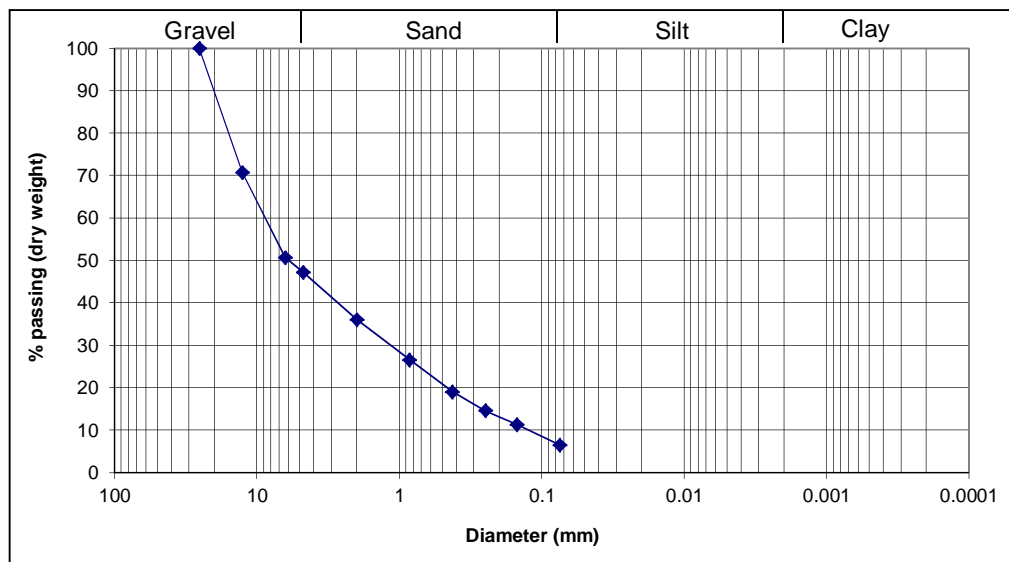
Sample No. : 3151-BH3-SS4

Depth below GS : 4.72 m - 5.51 m

Sieve Analysis

Dry weight of sample (g) = 249.37

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	72.76	29.18	29.18	70.82
1/4"	6.35	49.92	20.02	49.20	50.80
4	4.76	8.69	3.48	52.68	47.32
10	2.00	28.01	11.23	63.91	36.09
20	0.85	23.48	9.42	73.33	26.67
40	0.425	18.83	7.55	80.88	19.12
60	0.25	11.21	4.50	85.38	14.62
100	0.15	7.98	3.20	88.58	11.42
200	0.075	12.25	4.91	93.49	6.51
pan	---	16.24	6.51	100.00	---
		249.37			



$$D_{10} = 0.13$$

$$D_{30} = 1.2$$

$$D_{60} = 8.9$$

$$Cu = 68.46$$

$$Cc = 1.24$$

USCS: GW-GM (Well-graded gravel with silt and sand),

or GW-GC (Well-graded gravel with clay and sand)

$$R_{200} = 93.49$$

$$R_4 = 52.68$$

$$R_4/R_{200} = 0.56$$

$$SF = 40.81$$

$$GF = 52.68$$

$$\% \text{ Gravel} = 52.68$$

$$\% \text{ Sand} = 40.81$$

$$\% \text{ Silt \& Clay} = 6.51$$

$$\% \text{ Clay} = \text{NA}$$

CFEM: Gravel and sand, trace silt/clay

Moisture Content (%): 10.81

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

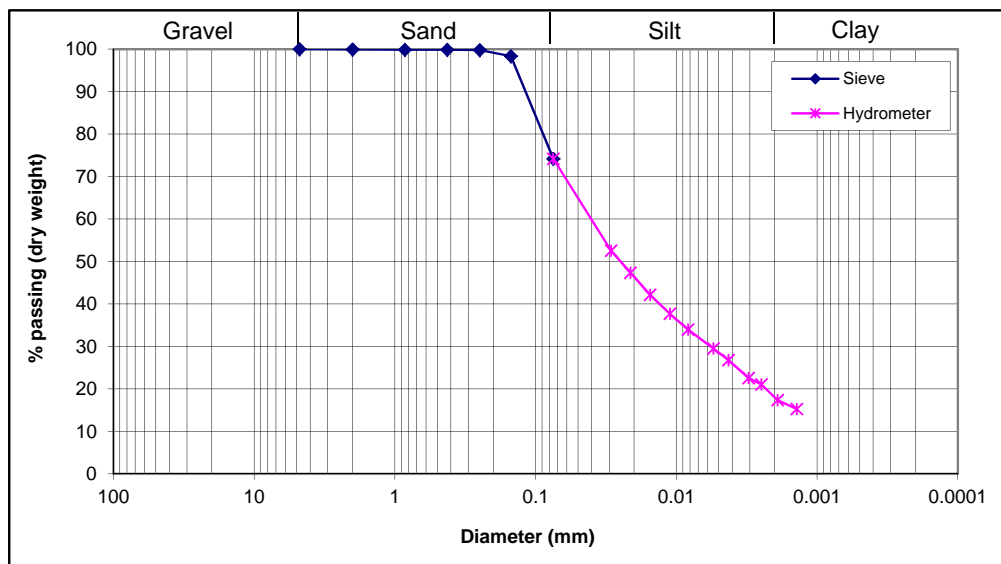
Sample No. : 3151-BH3-SS6

Depth below GS : 8.10 m - 9.17 m

Sieve Analysis

Dry weight of sample (g) = 120.75

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	-	-		
1/2"	12.7	-	-		
1/4"	6.35	-	-		
4	4.76	0.00	0.00	0.00	100.00
10	2.00	0.08	0.07	0.07	99.93
20	0.85	0.09	0.07	0.14	99.86
40	0.425	0.02	0.02	0.16	99.84
60	0.25	0.07	0.06	0.22	99.78
100	0.15	1.75	1.45	1.66	98.34
200	0.075	29.16	24.15	25.81	74.19
pan	---	89.58	74.19	100.00	---
		120.75			



$D_{10} = \text{NA}$

$D_{30} = 0.0057$

$D_{60} = 0.04$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: CL (Lean clay with sand), or ML (Silt with sand), or CL-ML (Silty clay with sand), or CH (Fat clay with sand), or MH (Elastic silt with sand)

$R_{200} = 25.81$

$R_4 = 0.00$

$R_4/R_{200} = 0.00$

SF = 25.81

GF = 0.00

% Gravel = 0.00

% Sand = 25.81

% Silt = 56.27

% Clay = 17.92

CFEM: Sandy Silt, some Clay

Moisture Content (%): 21.91

GRAIN SIZE ANALYSIS-HYDROMETER

Project No. : 3151

Location of Project : Neddy Harbour

Sample No. : 3151-BH3-SS6

Description of Soil : _____

Sample Depth : 8.10 m - 9.17 m

Tested By : ZR

Test Date : August 20, 2020

Hydrometer Analysis

Hydrometer Type: 152H

Zero Correction : 5

Meniscus Correction: 1

Dispersing Agent: NaPO₄

Amount Used: 4% @ 125 ml

G_s of Solids: 2.65

C.F. a : 1.0 (From Table 6-2)

Mass of Soil (g): 50

Control Sieve No. : 200

% finer than #200 from sieve analysis : 74.19

	1	2	3	5	4	6	7	8	9	10	11	12	13
Date	Time of reading	Elapsed Time, t(min.)	Temp. (°C)	Act. Hyd. Reading, R _a	Temp. Corr. Factor, C _T (6-3)	Corr. Hyd. Reading, R _c	Actual % Finer	Adjusted % Finer	Hyd. corr. for meniscus, R	L (cm) {table 6-5}	L/t	K {table 6-4}	D (mm)
8/20/20	11:23	0	---	---	---	---	---	74.19	---	---	---	---	0.075
8/20/20	11:25	2	22	40	0.4	35.4	70.8	52.5	41	9.60	4.800E+00	1.33E-02	2.914E-02
8/20/20	11:27	4	22	36.5	0.4	31.9	63.8	47.3	37.5	10.15	2.538E+00	1.33E-02	2.119E-02
8/20/20	11:31	8	22	33	0.4	28.4	56.8	42.1	34	10.70	1.338E+00	1.33E-02	1.538E-02
8/20/20	11:39	16	22	30	0.4	25.4	50.8	37.7	31	11.20	7.000E-01	1.33E-02	1.113E-02
8/20/20	11:53	30	22	27.5	0.4	22.9	45.8	34.0	28.5	11.60	3.867E-01	1.33E-02	8.270E-03
8/20/20	12:35	72	22	24.5	0.4	19.9	39.8	29.5	25.5	12.10	1.681E-01	1.33E-02	5.452E-03
8/20/20	13:23	120	22.5	22.5	0.55	18.05	36.1	26.8	23.5	12.45	1.038E-01	1.33E-02	4.268E-03
8/20/20	15:23	240	23	19.5	0.7	15.2	30.4	22.6	20.5	12.95	5.396E-02	1.32E-02	3.066E-03
8/20/20	17:31	368	23	18.5	0.7	14.2	28.4	21.1	19.5	13.10	3.560E-02	1.32E-02	2.490E-03
8/20/20	22:06	643	23	16	0.7	11.7	23.4	17.4	17	13.50	2.100E-02	1.32E-02	1.913E-03
8/21/20	8:27	1264	21.5	15	0.3	10.3	20.6	15.3	16	13.70	1.084E-02	1.34E-02	1.395E-03

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

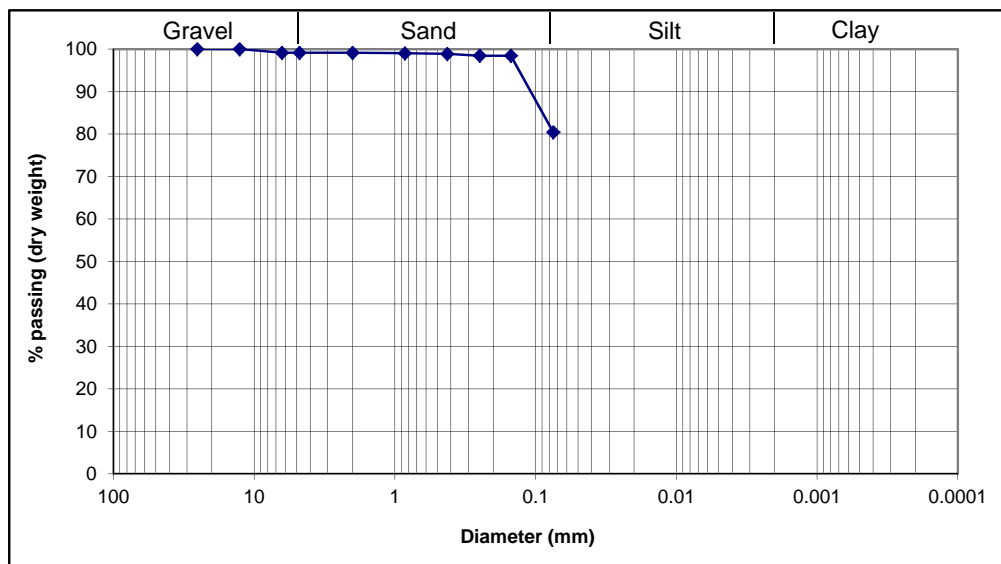
Sample No. : 3151-BH3-SS8

Depth below GS : 11.88 m - 12.57 m

Sieve Analysis

Dry weight of sample (g) = 133.47

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	0.00	0.00	0.00	100.00
1/4"	6.35	1.13	0.85	0.85	99.15
4	4.76	0.00	0.00	0.85	99.15
10	2.00	0.00	0.00	0.85	99.15
20	0.85	0.17	0.13	0.97	99.03
40	0.425	0.21	0.16	1.13	98.87
60	0.25	0.57	0.43	1.56	98.44
100	0.15	0.00	0.00	1.56	98.44
200	0.075	24.05	18.02	19.58	80.42
pan	---	107.34	80.42	100.00	---
		133.47			



$D_{10} = \text{NA}$

$D_{30} = \text{NA}$

$D_{60} = \text{NA}$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: CL (Lean clay with sand), or ML (Silt with sand), or CL-ML (Silty clay with sand), or CH (Fat clay with sand), or MH (Elastic silt with sand)

$R_{200} = 19.58$

$R_4 = 0.85$

$R_4/R_{200} = 0.04$

SF = 18.73

GF = 0.85

% Gravel = 0.85

% Sand = 18.73

% Silt & Clay = 80.42

% Clay = NA

CFEM: Silt/Clay, some Sand

Moisture Content (%): 23.46

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

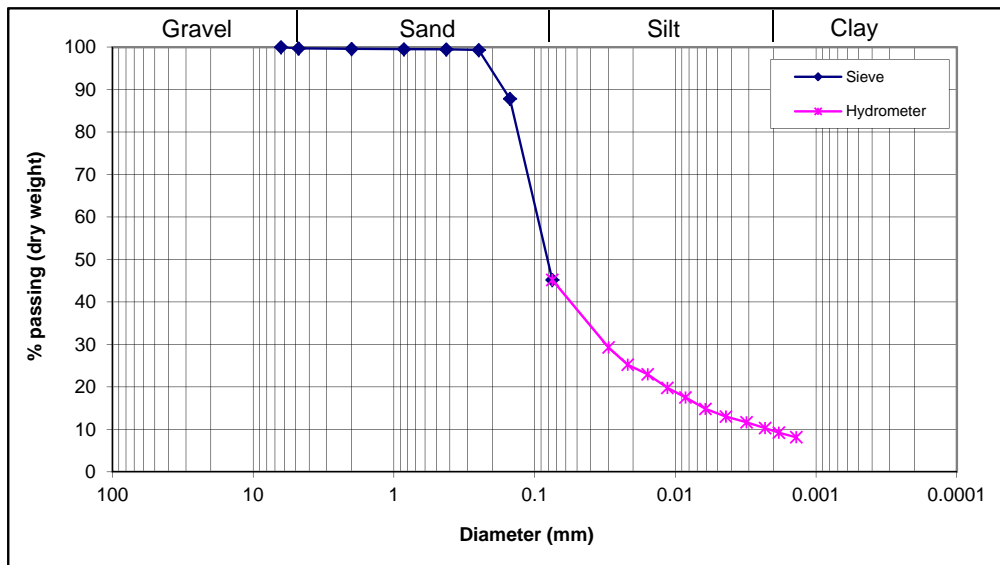
Sample No. : 3151-BH3-SS12

Depth below GS : 17.63 m - 18.54 m

Sieve Analysis

Dry weight of sample (g) = 137.70

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	-	-		
1/2"	12.7	-	-		
1/4"	6.35	0.00	0.00	0.00	100.00
4	4.76	0.40	0.29	0.29	99.71
10	2.00	0.15	0.11	0.40	99.60
20	0.85	0.10	0.07	0.47	99.53
40	0.425	0.09	0.07	0.54	99.46
60	0.25	0.18	0.13	0.67	99.33
100	0.15	15.84	11.50	12.17	87.83
200	0.075	58.69	42.62	54.79	45.21
pan	---	62.25	45.21	100.00	---
		137.70			



$D_{10} = 0.0022$

$D_{30} = 0.031$

$D_{60} = 0.096$

$C_u = 43.64$

$C_c = 4.55$

USCS: SM (Silty sand), or SC (Clayey sand), or SC-SM (Silty, clayey sand)

$R_{200} = 54.79$

$R_4 = 0.29$

$R_4/R_{200} = 0.01$

SF = 54.50

GF = 0.29

% Gravel = 0.29

% Sand = 54.50

% Silt = 35.62

% Clay = 9.59

CFEM: Sand and Silt, trace Clay

Moisture Content (%): 20.96

GRAIN SIZE ANALYSIS-HYDROMETER

Project No. : 3151

Location of Project : Neddy Harbour

Sample No. : 3151-BH3-SS12

Description of Soil : _____

Sample Depth : 17.63 m - 18.54 m

Tested By : ZR

Test Date : August 18, 2020

Hydrometer Analysis

Hydrometer Type: 152H

Zero Correction : 5

Meniscus Correction: 1

Dispersing Agent: NaPO₄

Amount Used: 4% @ 125 ml

G_s of Solids: 2.65

C.F. a : 1.0 (From Table 6-2)

Mass of Soil (g): 50

Control Sieve No. : 200

% finer than #200 from sieve analysis : 45.21

	1	2	3	5	4	6	7	8	9	10	11	12	13
Date	Time of reading	Elapsed Time, t(min.)	Temp. (°C)	Act. Hyd. Reading, R _a	Temp. Corr. Factor, C _T (6-3)	Corr. Hyd. Reading, R _c	Actual % Finer	Adjusted % Finer	Hyd. corr. for meniscus, R	L (cm) {table 6-5}	L/t	K {table 6-4}	D (mm)
8/18/20	10:06	0	---	---	---	---	---	45.21	---	---	---	---	0.075
8/18/20	10:08	2	22	37	0.4	32.4	64.8	29.3	38	10.10	5.050E+00	1.33E-02	2.989E-02
8/18/20	10:10	4	22	32.5	0.4	27.9	55.8	25.2	33.5	10.80	2.700E+00	1.33E-02	2.185E-02
8/18/20	10:14	8	22	30	0.4	25.4	50.8	23.0	31	11.20	1.400E+00	1.33E-02	1.574E-02
8/18/20	10:22	16	22	26.5	0.4	21.9	43.8	19.8	27.5	11.80	7.375E-01	1.33E-02	1.142E-02
8/18/20	10:36	30	22	24	0.4	19.4	38.8	17.5	25	12.20	4.067E-01	1.33E-02	8.481E-03
8/18/20	11:06	60	22	21	0.4	16.4	32.8	14.8	22	12.70	2.117E-01	1.33E-02	6.119E-03
8/18/20	12:06	120	22	19	0.4	14.4	28.8	13.0	20	13.00	1.083E-01	1.33E-02	4.378E-03
8/18/20	14:06	240	22	17.5	0.4	12.9	25.8	11.7	18.5	13.25	5.521E-02	1.33E-02	3.125E-03
8/18/20	17:34	448	22	16	0.4	11.4	22.8	10.3	17	13.50	3.013E-02	1.33E-02	2.309E-03
8/18/20	22:22	736	21	15	0.2	10.2	20.4	9.2	16	13.70	1.861E-02	1.35E-02	1.842E-03
8/19/20	8:38	1352	20	14	0	9	18.0	8.1	15	13.80	1.021E-02	1.37E-02	1.384E-03

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

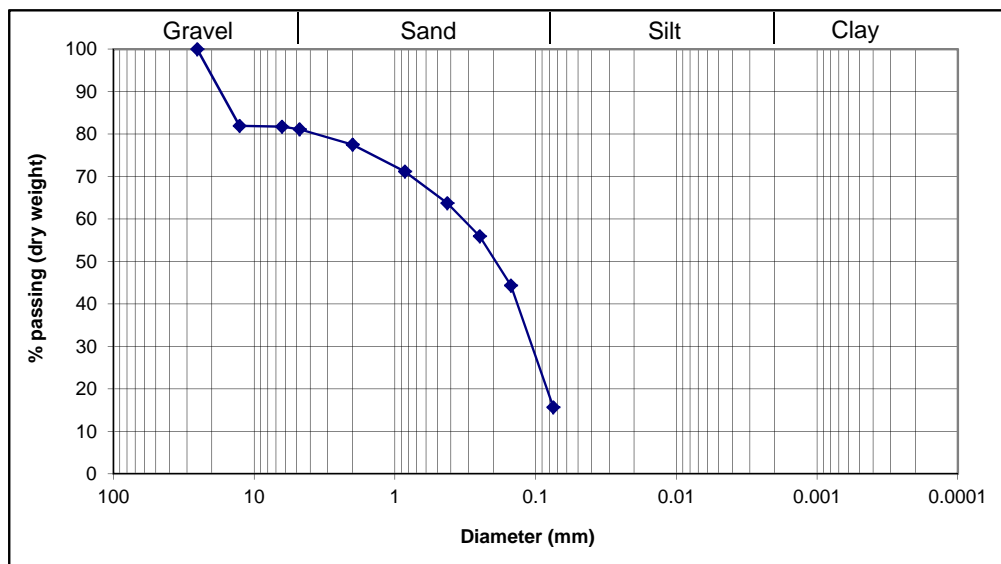
Sample No. : 3151-BH4-SS2

Depth below GS : 2.04 m - 2.95 m

Sieve Analysis

Dry weight of sample (g) = 250.53

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	45.24	18.06	18.06	81.94
1/4"	6.35	0.49	0.20	18.25	81.75
4	4.76	1.54	0.61	18.87	81.13
10	2.00	9.04	3.61	22.48	77.52
20	0.85	15.87	6.33	28.81	71.19
40	0.425	18.60	7.42	36.24	63.76
60	0.25	19.59	7.82	44.05	55.95
100	0.15	28.98	11.57	55.62	44.38
200	0.075	71.88	28.69	84.31	15.69
pan	---	39.30	15.69	100.00	---
		250.53			



$D_{10} = \text{NA}$

$D_{30} = \text{NA}$

$D_{60} = \text{NA}$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: SM (Silty sand with gravel), or SC (Clayey sand with gravel),
or SC-SM (Silty, clayey sand with gravel)

$R_{200} = 84.31$

$R_4 = 18.87$

$R_4/R_{200} = 0.22$

SF = 65.45

GF = 18.87

% Gravel = 18.87

% Sand = 65.45

% Silt & Clay = 15.69

% Clay = NA

CFEM: Sand, some gravel, some silt/clay

Moisture Content (%): 21.76

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

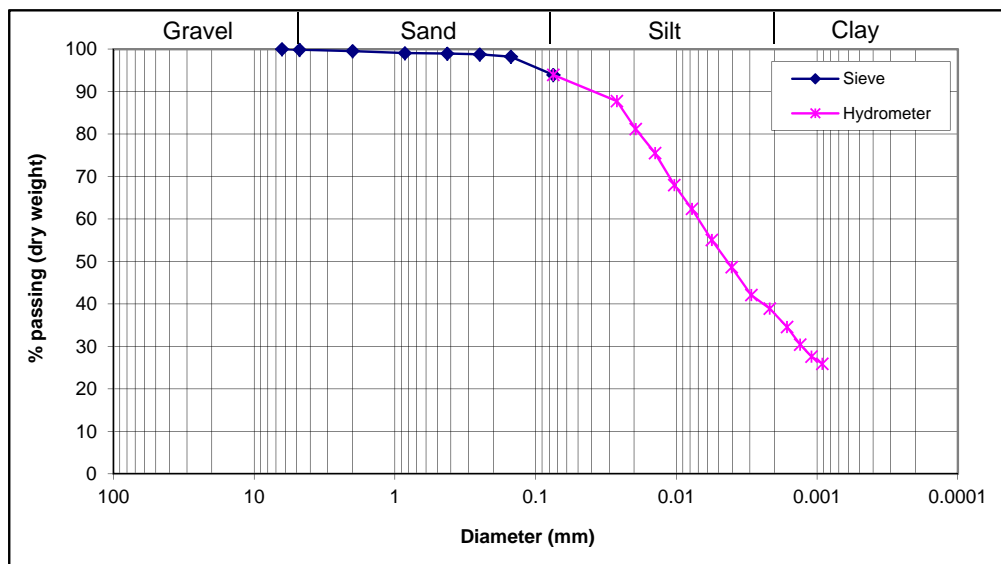
Sample No. : 3151-BH4-SS4

Depth below GS : 4.82 m - 5.89 m

Sieve Analysis

Dry weight of sample (g) = 126.60

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	-	-		
1/2"	12.7	-	-		
1/4"	6.35	0.00	0.00	0.00	100.00
4	4.76	0.19	0.15	0.15	99.85
10	2.00	0.40	0.32	0.47	99.53
20	0.85	0.58	0.46	0.92	99.08
40	0.425	0.14	0.11	1.03	98.97
60	0.25	0.27	0.21	1.25	98.75
100	0.15	0.68	0.54	1.79	98.21
200	0.075	5.40	4.27	6.05	93.95
pan	---	118.94	93.95	100.00	---
		126.60			



$D_{10} = \text{NA}$

$D_{30} = 0.0013$

$D_{60} = 0.0071$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: CL (Lean clay)

$R_{200} = 6.05$

$R_4 = 0.15$

$R_4/R_{200} = 0.02$

SF = 5.90

GF = 0.15

% Gravel = 0.15

% Sand = 5.90

% Silt = 56.44

% Clay = 37.51

CFEM: Silt and Clay, trace Sand

Moisture Content (%): 33.10

GRAIN SIZE ANALYSIS-HYDROMETER

Project No. : 3151

Location of Project : Neddy Harbour

Sample No. : 3151-BH4-SS4

Description of Soil : _____

Sample Depth : 4.82 m - 5.89 m

Tested By : ZR

Test Date : August 19, 2020

Hydrometer Analysis

Hydrometer Type: 152H

Zero Correction : 5

Meniscus Correction: 1

Dispersing Agent: NaPO₄

Amount Used: 4% @ 125 ml

G_s of Solids: 2.65

C.F. a : 1.0 (From Table 6-2)

Mass of Soil (g): 50

Control Sieve No. : 200

% finer than #200 from sieve analysis : 93.95

	1	2	3	5	4	6	7	8	9	10	11	12	13
Date	Time of reading	Elapsed Time, t(min.)	Temp. (°C)	Act. Hyd. Reading, R _a	Temp. Corr. Factor, C _T (6-3)	Corr. Hyd. Reading, R _c	Actual % Finer	Adjusted % Finer	Hyd. corr. for meniscus, R	L (cm) {table 6-5}	L/t	K {table 6-4}	D (mm)
8/19/20	10:11	0	---	---	---	---	---	93.95	---	---	---	---	0.075
8/19/20	10:13	2	21	51.5	0.2	46.7	93.4	87.7	52.5	7.70	3.850E+00	1.35E-02	2.649E-02
8/19/20	10:15	4	21	48	0.2	43.2	86.4	81.2	49	8.30	2.075E+00	1.35E-02	1.945E-02
8/19/20	10:19	8	21	45	0.2	40.2	80.4	75.5	46	8.80	1.100E+00	1.35E-02	1.416E-02
8/19/20	10:27	16	21	41	0.2	36.2	72.4	68.0	42	9.40	5.875E-01	1.35E-02	1.035E-02
8/19/20	10:41	30	21	38	0.2	33.2	66.4	62.4	39	9.90	3.300E-01	1.35E-02	7.755E-03
8/19/20	11:11	60	21.5	34	0.3	29.3	58.6	55.1	35	10.50	1.750E-01	1.34E-02	5.606E-03
8/19/20	12:11	120	22	30.5	0.4	25.9	51.8	48.7	31.5	11.15	9.292E-02	1.33E-02	4.054E-03
8/19/20	14:11	240	22	27	0.4	22.4	44.8	42.1	28	11.70	4.875E-02	1.33E-02	2.937E-03
8/19/20	17:35	444	23	25	0.7	20.7	41.4	38.9	26	12.00	2.703E-02	1.32E-02	2.170E-03
8/19/20	23:49	818	22	23	0.4	18.4	36.8	34.6	24	12.40	1.516E-02	1.33E-02	1.638E-03
8/20/20	8:18	1327	21	21	0.2	16.2	32.4	30.4	22	12.70	9.570E-03	1.35E-02	1.321E-03
8/20/20	17:30	1879	23	19	0.7	14.7	29.4	27.6	20	13.00	6.919E-03	1.32E-02	1.098E-03
8/21/20	8:31	2780	21.5	18.5	0.3	13.8	27.6	25.9	19.5	13.10	4.712E-03	1.34E-02	9.199E-04

ATTERBERG LIMITS

Project No. : 3151

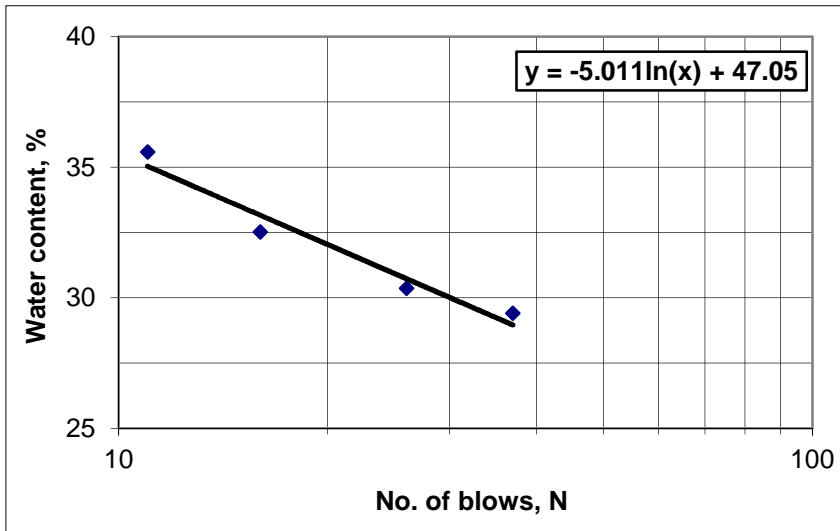
Sample No. : 3151-BH4-SS4

Location of Project : Neddy Harbour, NL

Test Date : August 20, 2020

	Liquid Limit			
Can no.	1	2	3	4
Mass of can, g	2.97	2.95	2.98	2.98
Mass of wet soil + can, g	39.58	42.88	43.2	42.61
Mass of dry soil + can, g	31.26	33.58	33.33	32.21
Mass of dry soil, g	28.29	30.63	30.35	29.23
Mass of moisture, g	8.32	9.3	9.87	10.4
Water content, %	29.4	30.4	32.5	35.6
No. of blows, N	37	26	16	11

No. of blows 25
Water content @ 25 counts 30.9



Liquid Limit : 30.9
Plastic Limit : 18.0
Plasticity Index : 12.9

	Plastic Limit		
Can no.	5	6	7
Mass of can, g	2.95	2.97	2.98
Mass of wet soil + can, g	10.77	13.63	13.14
Mass of dry soil + can, g	9.59	11.99	11.58
Mass of dry soil, g	6.64	9.02	8.6
Mass of moisture, g	1.18	1.64	1.56
Water content, %	17.8	18.2	18.1

Average Water Content, % 18.0

GRAIN SIZE ANALYSIS-MECHANICAL

Project No. : 3151

Location of project: Neddy Harbour, NL

Tested by: VS

Sample No.: 3151-BH4-SS6

Date Tested: August 5, 2020

Moisture Content	
Mass Pan + Soil (wet) :	203.11
Mass Pan + Soil (dry):	167.51
Mass Pan:	4.14
Mass Water:	35.60
Mass Dry Soil:	163.37
Moisture Content (%):	21.79

Air Dry Sample	
	749.12
	630.59
	16.11
	118.53
	614.48
	19.29

777.85

Date Tested: _____

Mass of dry sample + dish:

Mass of dish:

Mass of dry sample: 0.00

Sieve No.	Mass of Sieve (g)	Mass of Sieve + Soil (g)	Mass of Soil (g)
2"			0.00
1"			0.00
1/2"			0.00
1/4"			0.00
4			0.00
10			0.00
20			0.00
40			0.00
60			0.00
100			0.00
200			0.00
Pan			0.00
Sum:			0.00

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

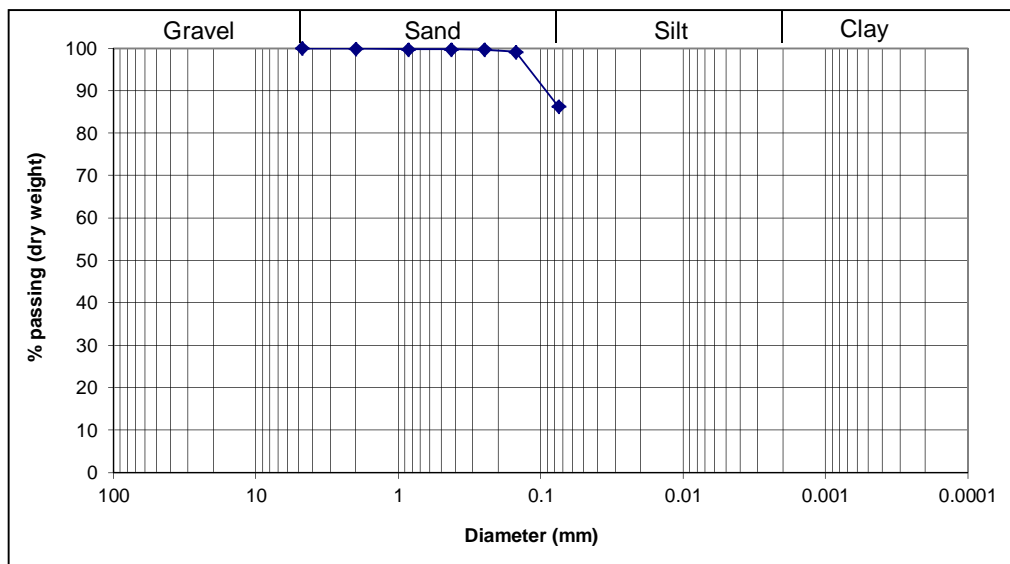
Sample No. : 3151-BH4-SS8

Depth below GS : 10.81 m - 11.88 m

Sieve Analysis

Dry weight of sample (g) = 132.80

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8	-	-		
1	25.4	-	-		
1/2"	12.7	-	-		
1/4"	6.35	-	-		
4	4.76	0.00	0.00	0.00	100.00
10	2.00	0.14	0.11	0.11	99.89
20	0.85	0.13	0.10	0.20	99.80
40	0.425	0.05	0.04	0.24	99.76
60	0.25	0.09	0.07	0.31	99.69
100	0.15	0.71	0.53	0.84	99.16
200	0.075	17.13	12.90	13.74	86.26
pan	---	114.55	86.26	100.00	---
		132.80			



GRAIN SIZE ANALYSIS-MECHANICAL

Project No. : 3151

Location of project: Neddy Harbour, NL

Tested by: VS

Sample No.: 3151-BH4-SS9

Date Tested: August 5, 2020

<u>Moisture Content</u>	
Mass Pan + Soil (wet) :	198.13
Mass Pan + Soil (dry):	162.70
Mass Pan:	4.16
Mass Water:	35.43
Mass Dry Soil:	158.54
Moisture Content (%):	22.35

<u>Air Dry Sample</u>	
	661.70
	551.56
	27.07
	110.14
	524.49
	21.00

683.03

Date Tested: _____

Mass of dry sample + dish:

Mass of dish:

Mass of dry sample: **0.00**

Sieve No.	Mass of Sieve (g)	Mass of Sieve + Soil (g)	Mass of Soil (g)
2"			0.00
1"			0.00
1/2"			0.00
1/4"			0.00
4			0.00
10			0.00
20			0.00
40			0.00
60			0.00
100			0.00
200			0.00
Pan			0.00
Sum:			0.00

GRAIN SIZE ANALYSIS

Project : 3151 - Neddy Harbour

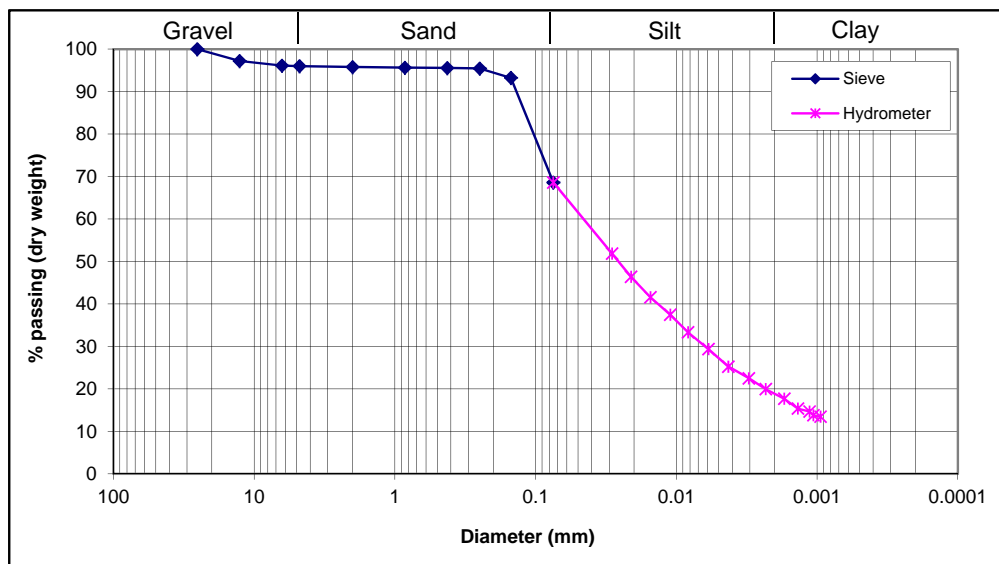
Sample No. : 3151-BH4-SS10

Depth below GS : 14.13 m - 15.35 m

Sieve Analysis

Dry weight of sample (g) = 148.32

Sieve	Opening (mm)	Retained (g)	% Retained	Cumulative % Ret	% Passing
2	50.8				
1	25.4	0.00	0.00	0.00	100.00
1/2"	12.7	4.14	2.79	2.79	97.21
1/4"	6.35	1.60	1.08	3.87	96.13
4	4.76	0.20	0.13	4.00	96.00
10	2.00	0.33	0.22	4.23	95.77
20	0.85	0.19	0.13	4.36	95.64
40	0.425	0.10	0.07	4.42	95.58
60	0.25	0.19	0.13	4.55	95.45
100	0.15	3.27	2.20	6.76	93.24
200	0.075	36.54	24.64	31.39	68.61
pan	---	101.76	68.61	100.00	---
		148.32			



$D_{10} = \text{NA}$

$D_{30} = 0.0064$

$D_{60} = 0.046$

$C_u = \text{NA}$

$C_c = \text{NA}$

USCS: CL (Sandy lean clay), or ML (Sandy silt), or CL-ML (Sandy silty clay),
or CH (Sandy fat clay), or MH (Sandy elastic silt)

$R_{200} = 31.39$

$R_4 = 4.00$

$R_4/R_{200} = 0.13$

SF = 27.39

GF = 4.00

% Gravel = 4.00

% Sand = 27.39

% Silt = 49.84

% Clay = 18.77

CFEM: Sandy Silt, some Clay, trace Gravel

Moisture Content (%): 20.57

GRAIN SIZE ANALYSIS-HYDROMETER

Project No. : 3151

Location of Project : Neddy Harbour

Sample No. : 3151-BH4-SS10

Description of Soil :

Sample Depth : 14.13 m - 15.35 m

Tested By : ZR

Test Date : August 19, 2020

Hydrometer Analysis

Hydrometer Type: 152H

Zero Correction : 5

Meniscus Correction: 1

Dispersing Agent: NaPO₄

Amount Used: 4% @ 125 ml

G_s of Solids: 2.65

C.F. a : 1.0 (From Table 6-2)

Mass of Soil (g): 50

Control Sieve No. : 200

% finer than #200 from sieve analysis : 68.61

	1	2	3	5	4	6	7	8	9	10	11	12	13
Date	Time of reading	Elapsed Time, t(min.)	Temp. (°C)	Act. Hyd. Reading, R _a	Temp. Corr. Factor, C _T (6-3)	Corr. Hyd. Reading, R _c	Actual % Finer	Adjusted % Finer	Hyd. corr. for meniscus, R	L (cm) {table 6-5}	L/t	K {table 6-4}	D (mm)
8/19/20	10:32	0	---	---	---	---	---	68.61	---	---	---	---	0.075
8/19/20	10:34	2	21.5	42.5	0.3	37.8	75.6	51.9	43.5	9.15	4.575E+00	1.34E-02	2.866E-02
8/19/20	10:36	4	21.5	38.5	0.3	33.8	67.6	46.4	39.5	9.80	2.450E+00	1.34E-02	2.097E-02
8/19/20	10:40	8	21.5	35	0.3	30.3	60.6	41.6	36	10.40	1.300E+00	1.34E-02	1.528E-02
8/19/20	10:48	16	21.5	32	0.3	27.3	54.6	37.5	33	10.90	6.813E-01	1.34E-02	1.106E-02
8/19/20	11:02	30	21.5	29	0.3	24.3	48.6	33.3	30	11.40	3.800E-01	1.34E-02	8.260E-03
8/19/20	11:32	60	22	26	0.4	21.4	42.8	29.4	27	11.90	1.983E-01	1.33E-02	5.923E-03
8/19/20	12:32	120	22	23	0.4	18.4	36.8	25.2	24	12.40	1.033E-01	1.33E-02	4.275E-03
8/19/20	14:32	240	22	21	0.4	16.4	32.8	22.5	22	12.70	5.292E-02	1.33E-02	3.059E-03
8/19/20	17:36	424	22.5	19	0.55	14.55	29.1	20.0	20	13.00	3.066E-02	1.33E-02	2.320E-03
8/19/20	23:50	798	22	17.5	0.4	12.9	25.8	17.7	18.5	13.25	1.660E-02	1.33E-02	1.714E-03
8/20/20	8:18	1306	21	16	0.2	11.2	22.4	15.4	17	13.50	1.034E-02	1.35E-02	1.373E-03
8/20/20	17:30	1858	23	15	0.7	10.7	21.4	14.7	16	13.70	7.374E-03	1.32E-02	1.133E-03
8/20/20	22:07	2135	22.5	14.5	0.55	10.05	20.1	13.8	15.5	13.75	6.440E-03	1.33E-02	1.063E-03
8/21/20	8:32	2760	21.5	14.5	0.3	9.8	19.6	13.4	15.5	13.75	4.982E-03	1.34E-02	9.458E-04