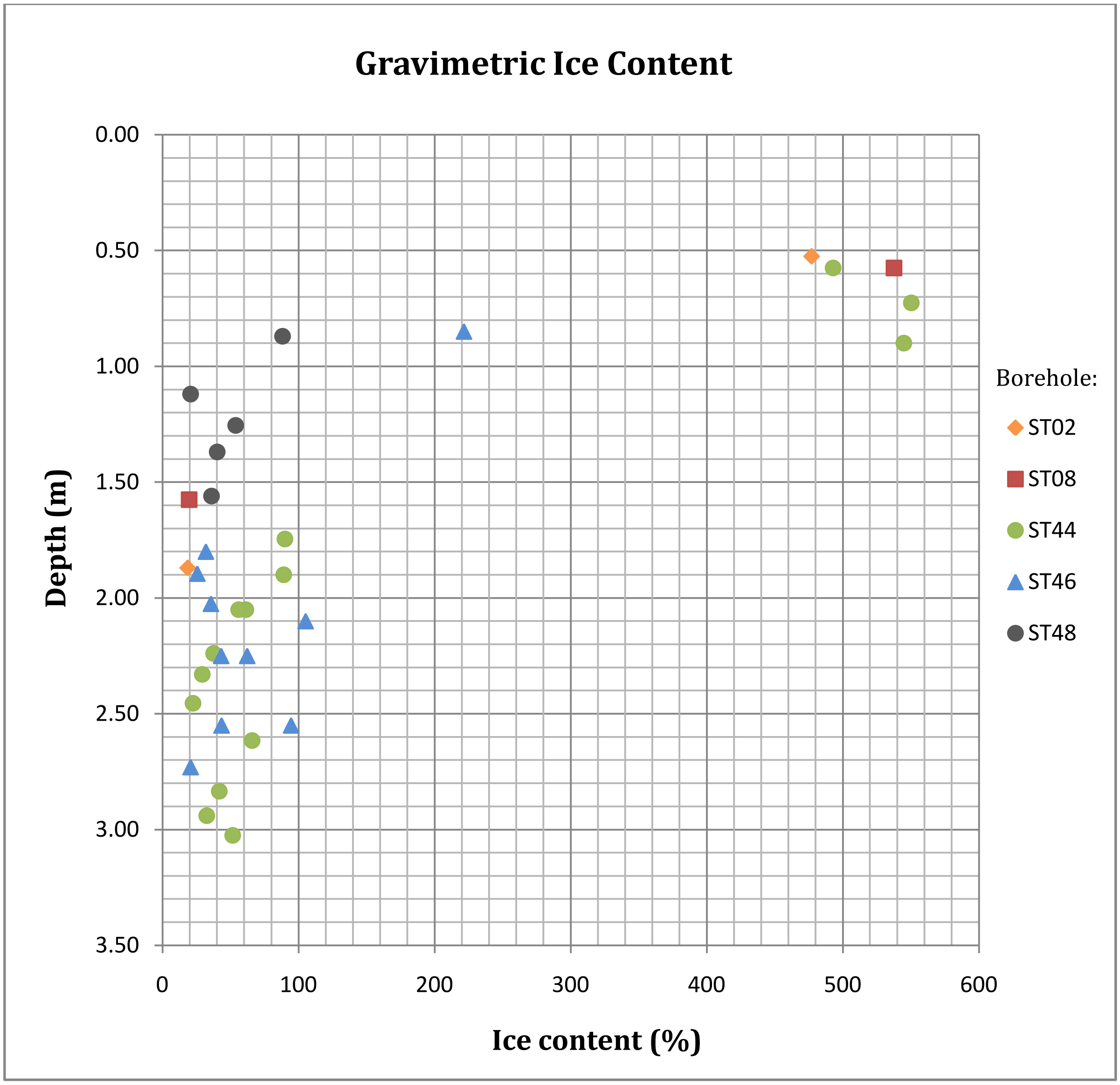


Figure 2-10: Selected gravimetric ice contents for various types of deposits encountered in the boreholes

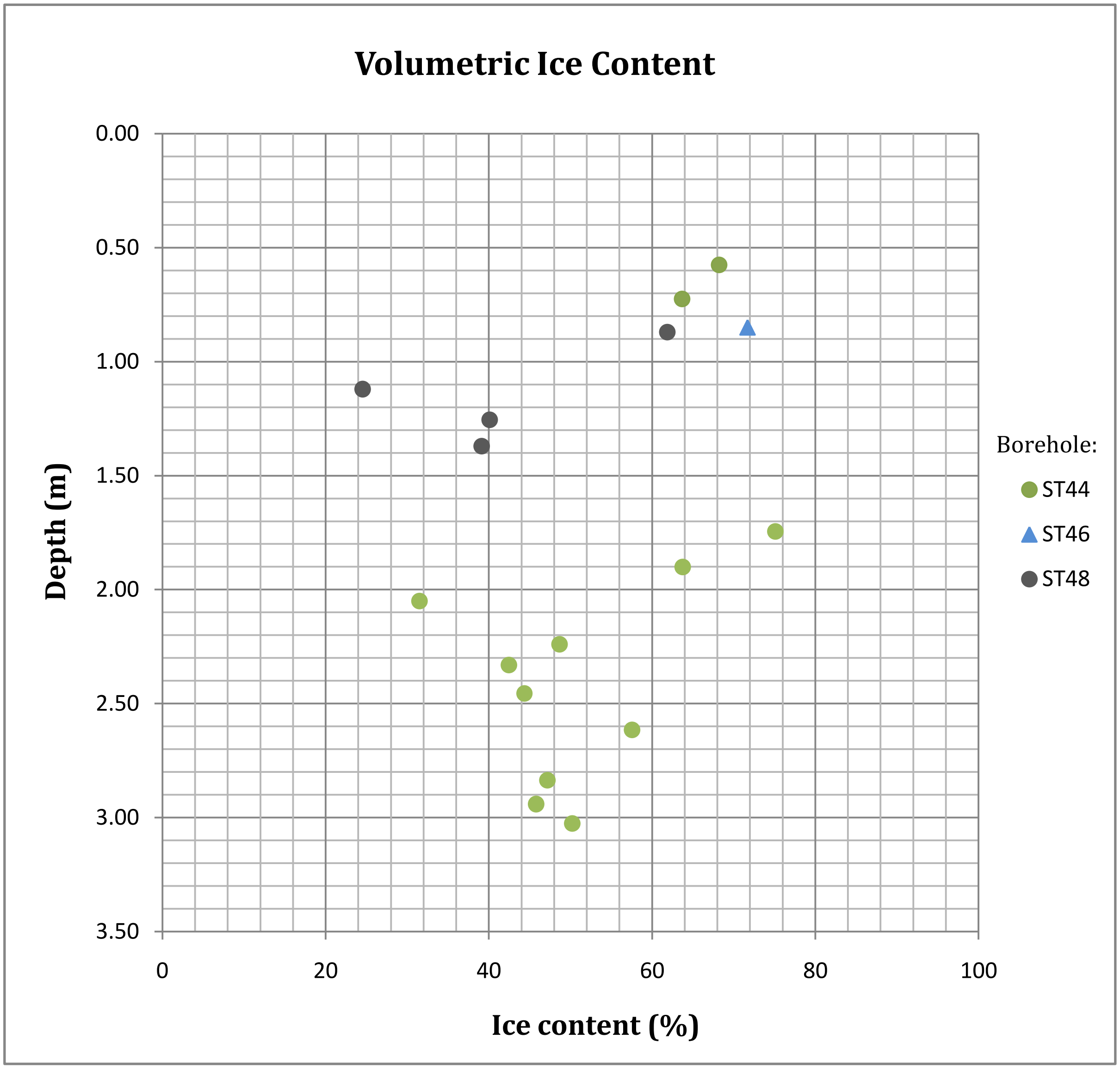


Figure 2-11: Selected volumetric ice contents for the permafrost boreholes (see appendix for additional information)

2.3 Soils

2.3.1 Overview

The Thor Lake Project area is comprised mainly of moderately well, poorly and very poorly drained soil complexes. These soils occur in patterns of Organics, peaty Regosols, Gleyed Regosols, Brunisols, Cryosols and bedrock exposures throughout the area. The patterns of soil can be quite complex in part due to the lack of well-established drainage pathways.

The Project area is composed of 37% (402.6 ha) mineral soils, 13% (148.3 ha) organic soils and 27% (295.8 ha) bedrock. The remainder is either previously disturbed land (1%, 8.4 ha), or open water (22%, 242 ha). Within the mineral soils, fine-textured soils (23%, 248.3 ha) almost double the area covered with coarse textured soils (12%, 128.6 ha). The rest of the mineral soil is composed of Cryosolic soils that are frozen within one meter of the surface (2%, 25.6 ha). Organic soils occupy 13 percent of the Project area, and 8% of these organic soils were mapped as Organic Cryosols. Soils personnel have found considerable extents of thin organic layers that are not of sufficient thickness (e.g., <40cm) to be designated as peatlands; some of these shallow organic areas have been mapped as organics by the Terrain program.

2.3.2 Soil Map Units

Eight (8) soil units based on texture and soil order were found and mapped in the area sampled in 2008 (Table 2-3). Four soil orders were identified in the field, including Brunisols, Cryosols, Organics and Regosols; Luvisols, which are known to occur regionally, were not found within the Project area. A total of 17 different soil subgroups were identified from the 63 soil investigations. The dominant soil order found in the Thor Lake Study Area was Regosolic.

Table 2-3 provides a summary of the eight soil units mapped within the Thor Lake Project area. These soil units were mapped at 1:5,000 (Figure 2-12). Mappable soil units are those occurring in extents large enough to be represented as polygons that are legible and meaningful.

Table 2-3: Description of Soil Units Mapped in the Thor Lake Project Area

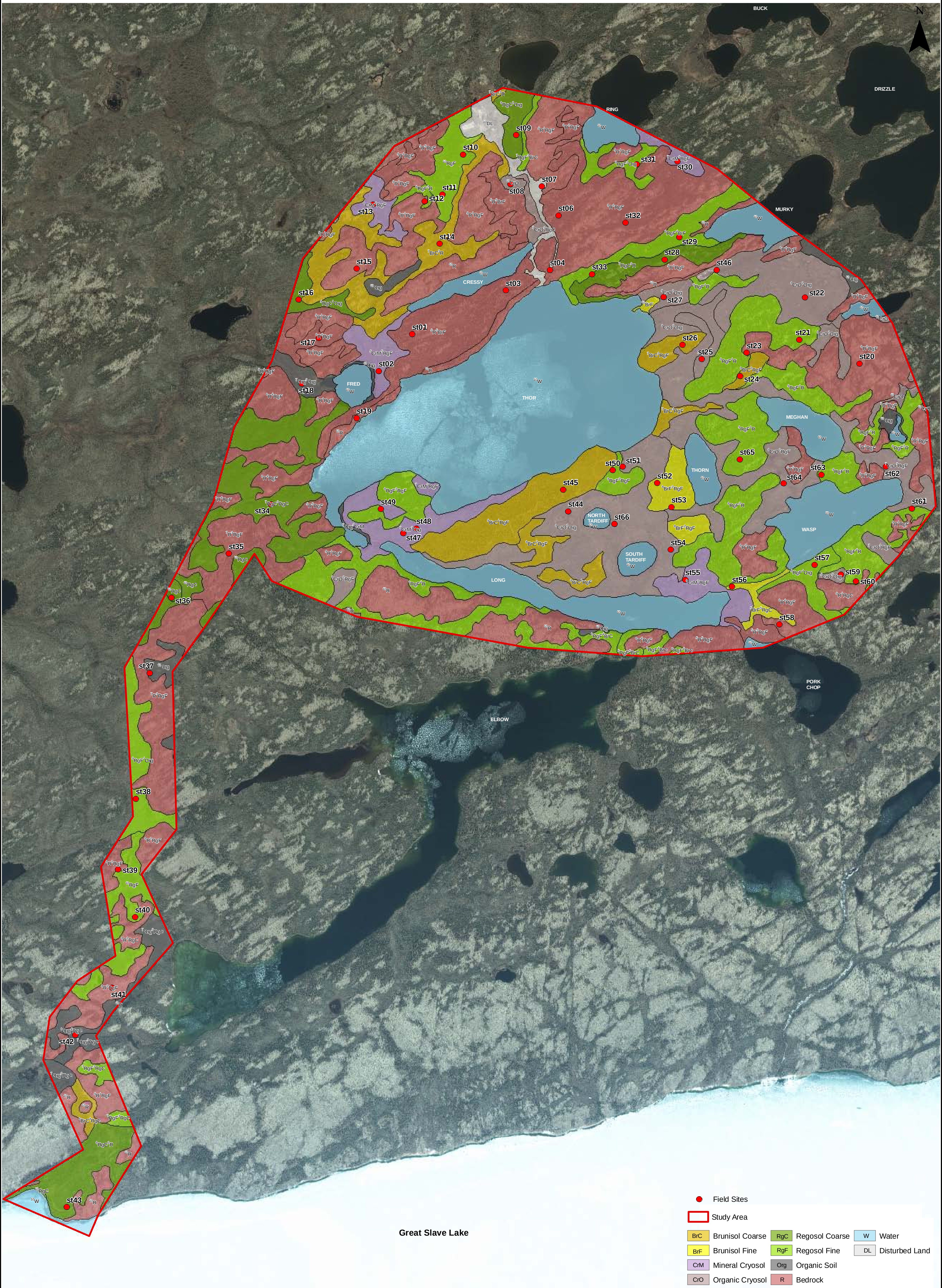
Soil Order	Mineral/ Organic	Texture	Soil Unit	Parent Materials (Sampled)	Soil Subgroups
Brunisolic	Mineral	Very Coarse to Medium	BrC	Till Glaciofluvial	Eluviated Dystric Brunisol
					Orthic Dystric Brunisol
					Orthic Eutric Brunisol
		Moderately Fine to Very Fine	BrF	Till, Glaciolacustrine	Orthic Eutric Brunisol
Regosols	Mineral	Very Coarse to Medium	RgC	Lacustrine, Glaciofluvial, Till, Fluvial	Orthic Regosol
					Gleyed Regosol
					Orthic Humic Regosol
					Gleyed Cumulic Regosol
		Moderately Fine to Very Fine	RgF	Lacustrine, Glaciolacustrine, Till, Fluvial	Gleyed Regosol
					Gleyed Cumulic Regosol
Cryosols	Organic	Mesic and Fibric	CrO	Organic	Fibric Organic Cryosol
					Mesic Organic Cryosol
					Terric Mesic Organic Cryosol
					Terric Fibric Organic Cryosol
	Mineral	Moderately Fine to Very Fine	CrM	Lacustrine, Glaciolacustrine	Gleyed Static Cryosol
					Rego Static Cryosol
					Histic Rego Static Cryosol
Organic	Organic	Mesic and Humic	Org	Organic	Terric Mesisol
					Terric Mesic Humisol
Bedrock		Bedrock	R	Rock	Non Soil

The characteristics of the soil units and mapping units are described in Table 2-3. The extent of each soil within the Thor Lake Project area is shown in Table 2-4; Figure 2-12 is a map showing the spatial distribution of the various mapped soil units. This map has been colour coded according to organic soils, mineral soils, disturbed land, water and bedrock. Detailed soil unit descriptions are provided in Appendix C. Each polygon has been assigned deciles to represent significant components or inclusions of other non-dominant soil types found in that polygon. All soils within a polygon may not mirror the typical profile description of the soil unit for that polygon. The natural variability inherent in soil results in an accepted range of characteristics classified within one unit. This map contains two miscellaneous map units that do not represent soil types. These units are disturbed land and open water; together, these units equate to approximately 23% of the total Project area. Water is by far the dominant miscellaneous unit at 22%. Disturbed land represents areas where the soil has been anthropogenically disturbed from its natural state.

Table 2-4: Extent of Soils Mapped within the Thor Lake Project Area

Soil Unit	Area (ha)	Proportion of PDA Study Area (%)
Mineral Soils		
BrC	56	5
BrF	29.9	3
RgC	72.8	7
RgF	218.7	20
CrM	25.6	2
Subtotal	**403**	**37**
Organic Soils		
CrO	101.4	9
Org	46.6	4
Subtotal	**148**	**13**
Bedrock		
R	295.8	27
Miscellaneous		
Disturbed land	8.4	1
Water	242	22
Subtotal	**250.4**	**23**
Total	**1,097.1**	**100**

NOTE:
Columns may not equal totals due to rounding



Draft Technical Data Report
Thor Lake Project, Nechalacho Deposit

Surficial Geology of Thor Lake Study Area

AVALON RARE METALS INC.

0 0.25 0.5 1
Kilometres

PREPARED BY		
Stantec		
DRAFT DATE 21/12/2009	SCALE 1:20,000	
REVISION DATE	PROJECT 1036222	FIGURE NO. 2-12
DRAWN KS / CHECKED RH / APPROVED NL	VOL	

3 CLOSURE

Stantec has prepared this report for the sole benefit of Avalon Rare Metals Inc. for the purpose of documenting baseline conditions at its Thor Lake site. The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of Stantec and Avalon. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties.

The information provided in this report was compiled from existing documents and data provided by Avalon and field data compiled by Stantec (formerly Jacques Whitford AXYS Ltd.).This report represents the best professional judgment of our personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

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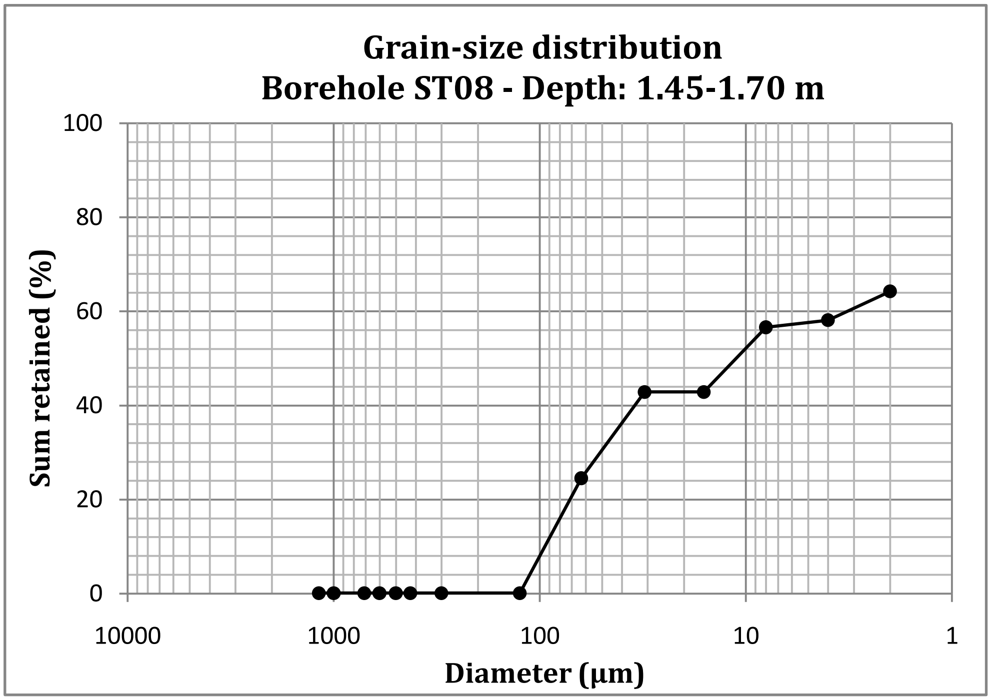
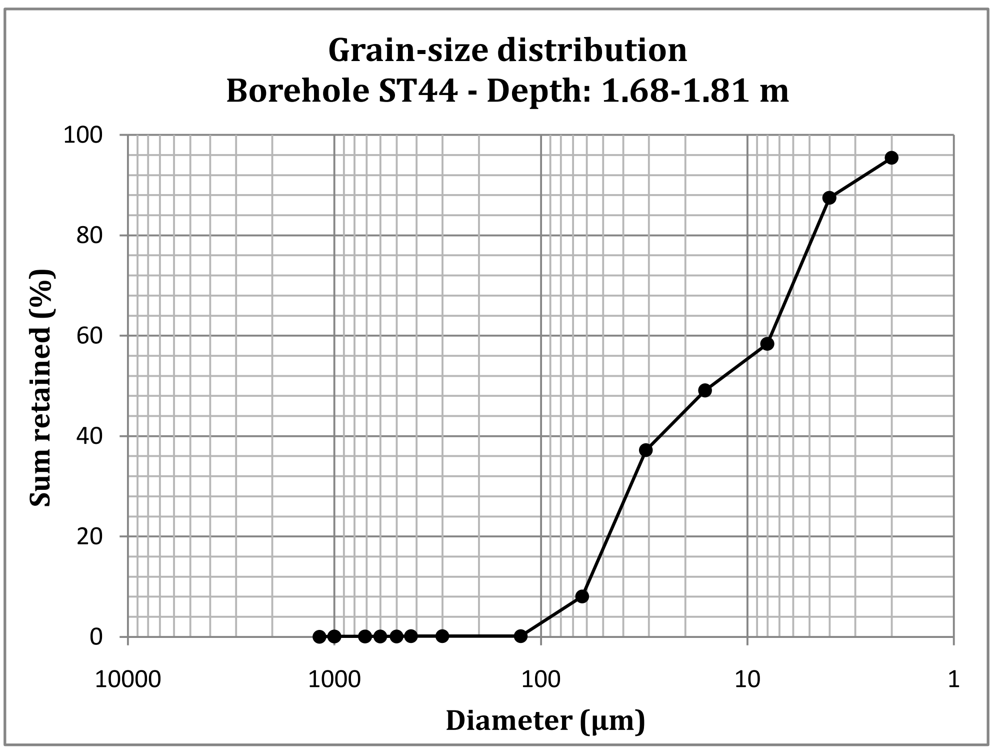
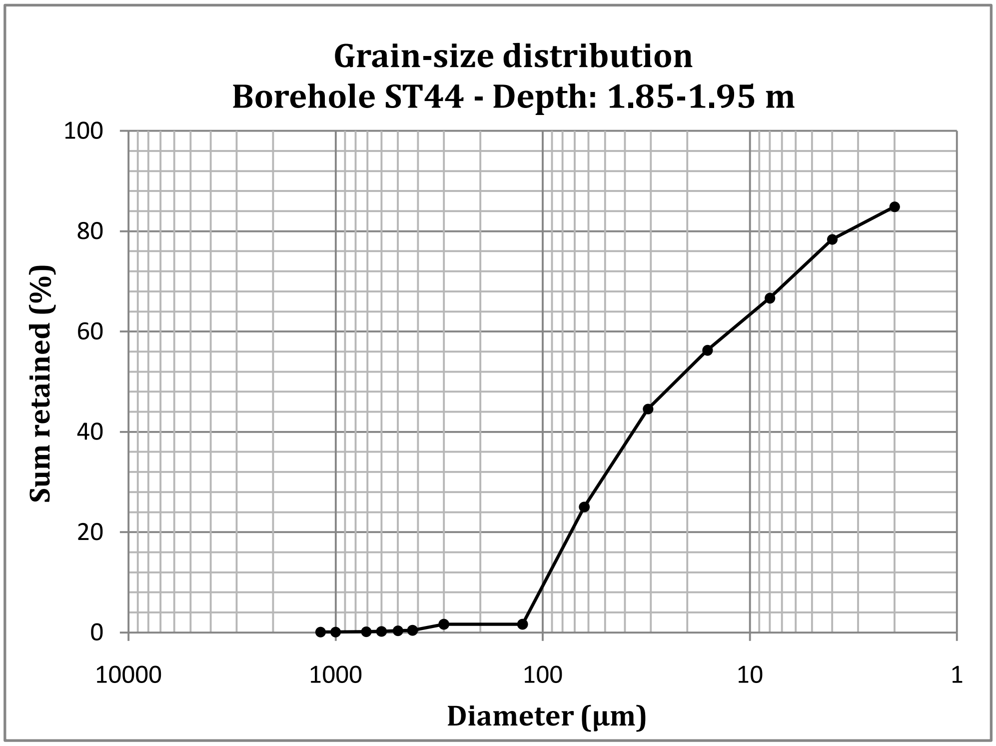
APPENDIX A

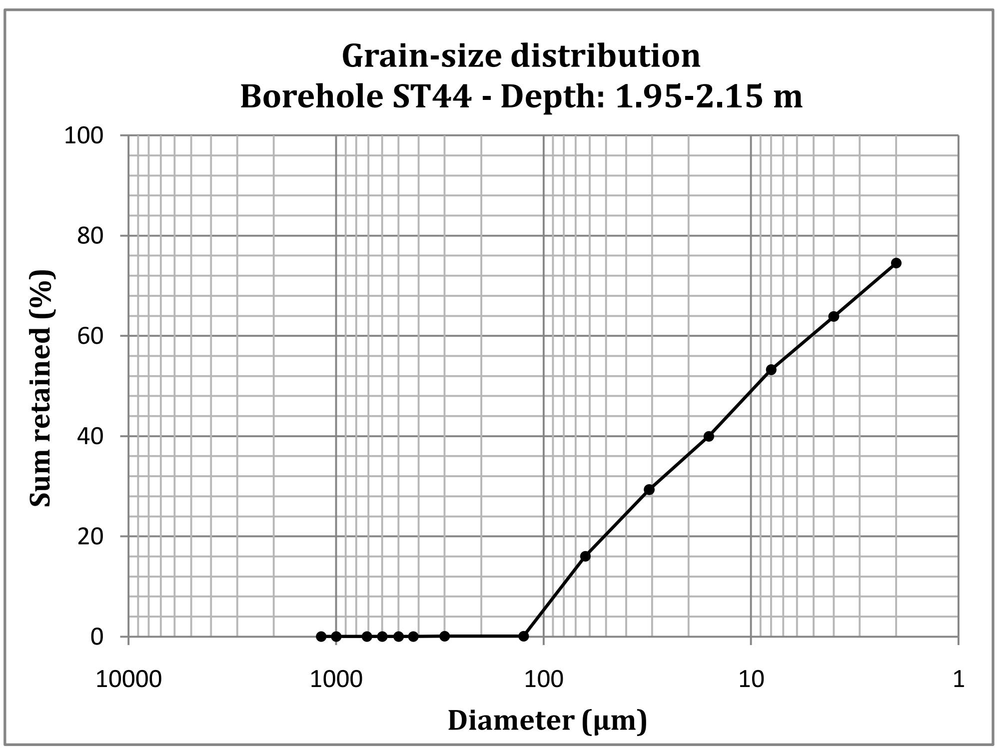
Permafrost Data

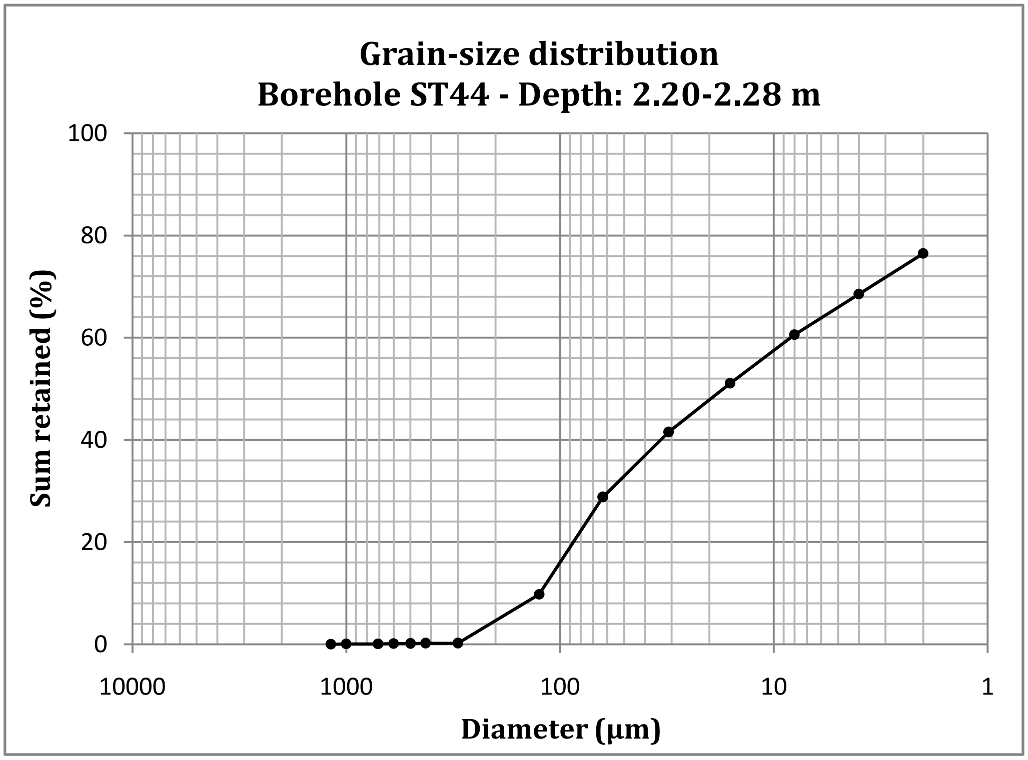
Grain-size Distribution Curves

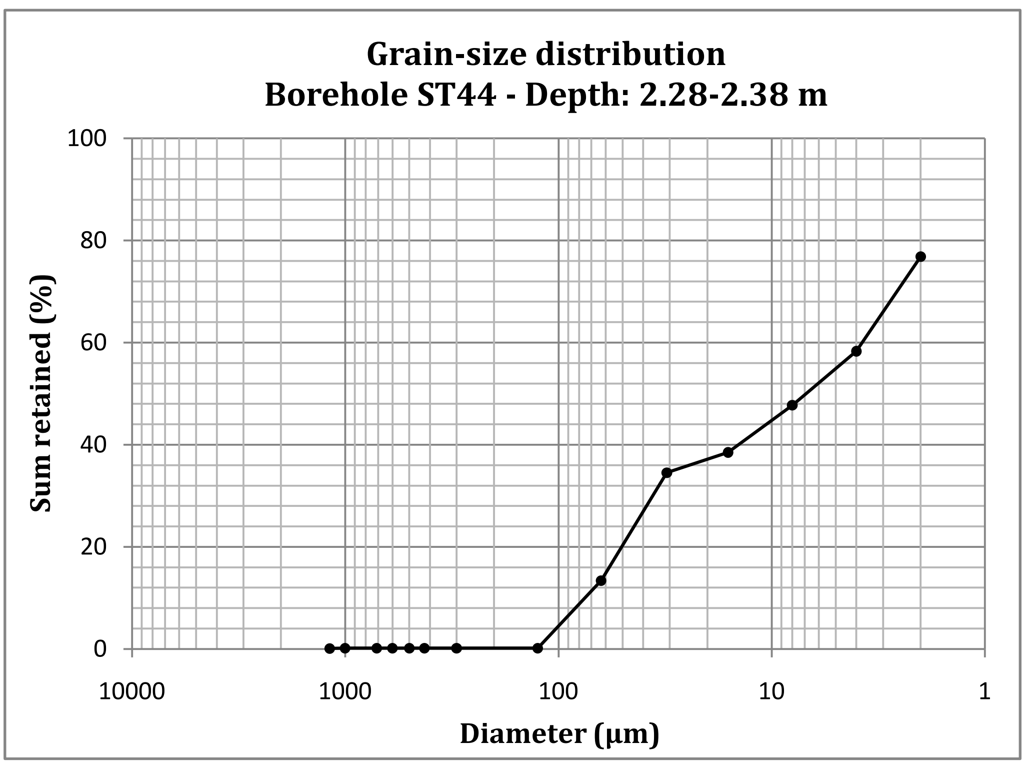


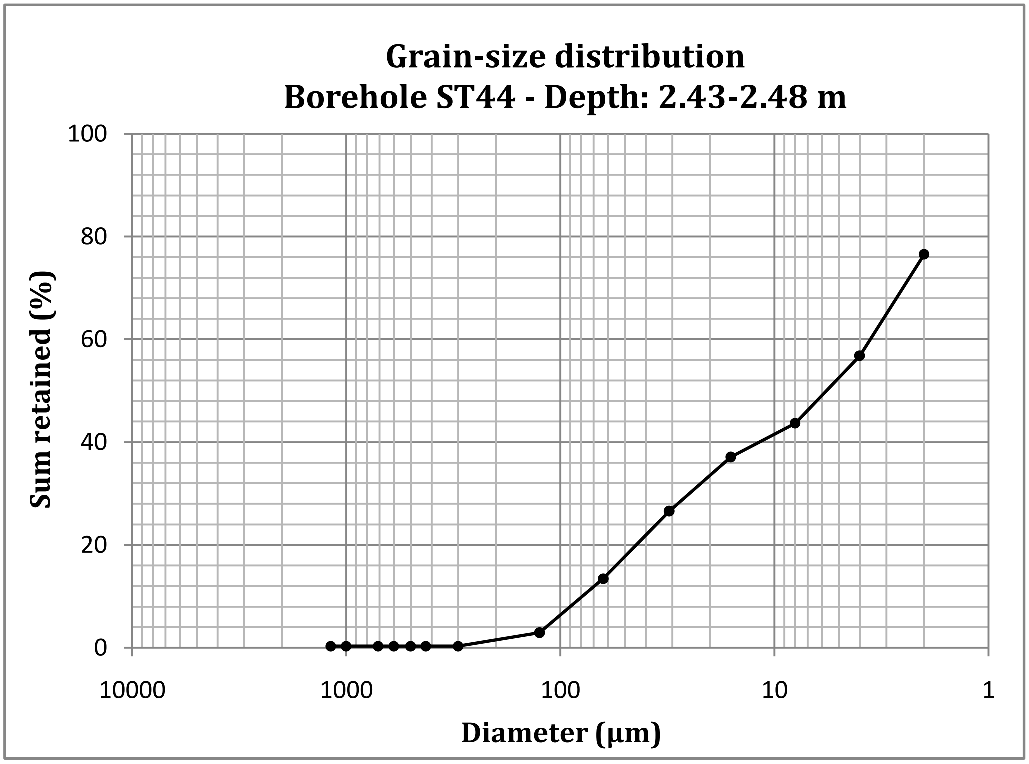


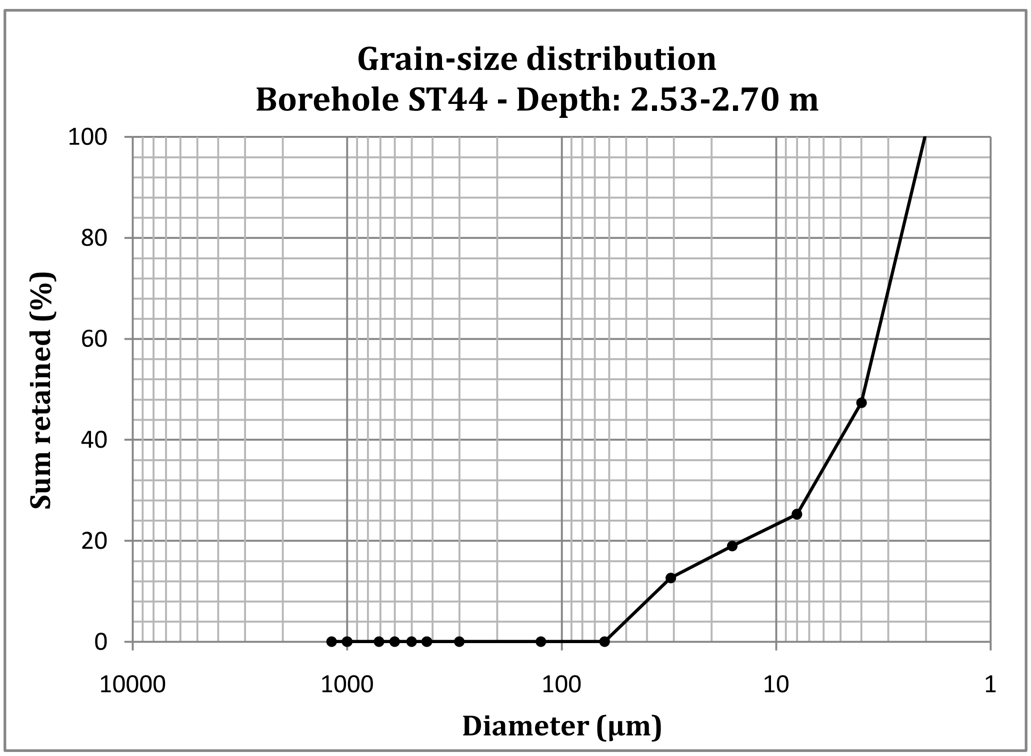

Grain-size distribution
Borehole ST44 - Depth: 1.85-1.95 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)

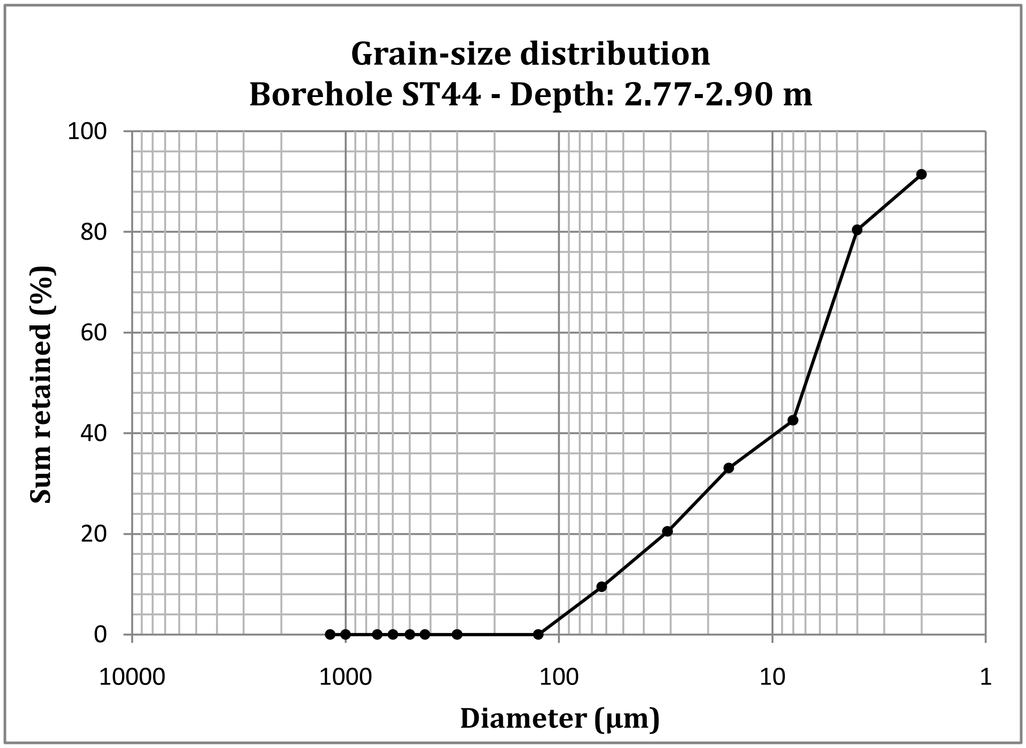

Grain-size distribution
Borehole ST44 - Depth: 1.95-2.15 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)


Grain-size distribution
Borehole ST44 - Depth: 2.20-2.28 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (μm)


Grain-size distribution
Borehole ST44 - Depth: 2.28-2.38 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (μm)


Grain-size distribution
Borehole ST44 - Depth: 2.43-2.48 m
Sum retained (%)
0
20
40
60
80
100
10000
1000
100
10
1
Diameter (µm)


Grain-size distribution
Borehole ST44 - Depth: 2.53-2.70 m
Sum retained (%)
0
20
40
60
80
100
10000
1000
100
10
1
Diameter (µm)


Grain-size distribution
Borehole ST44 - Depth: 2.77-2.90 m
Sum retained (%)
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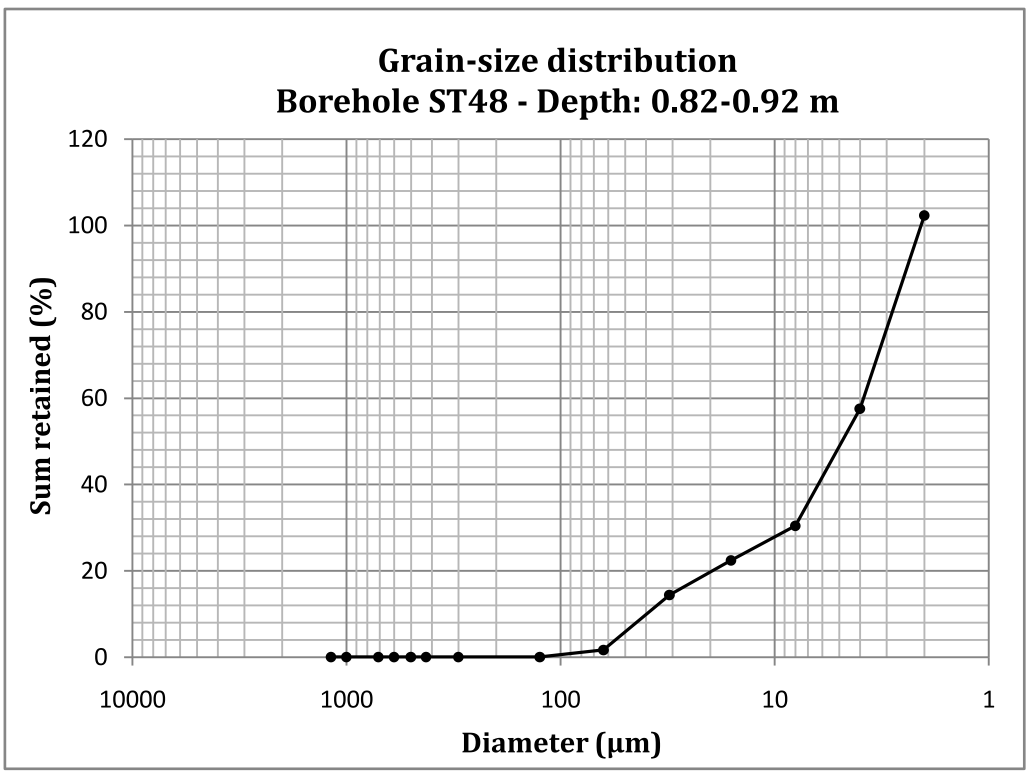
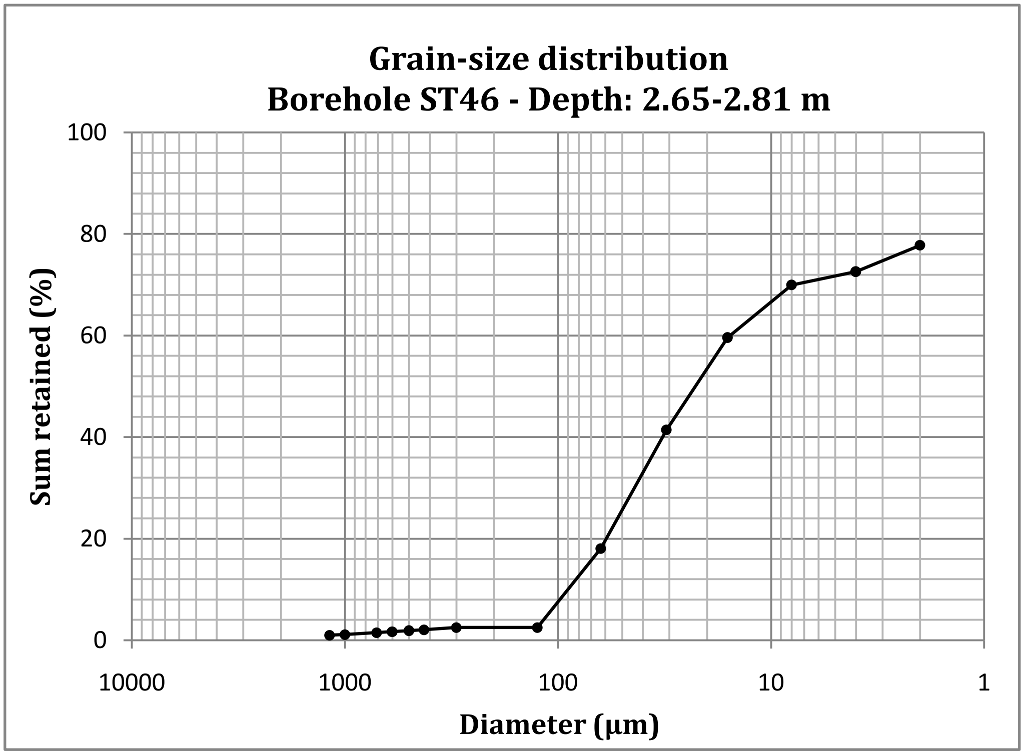
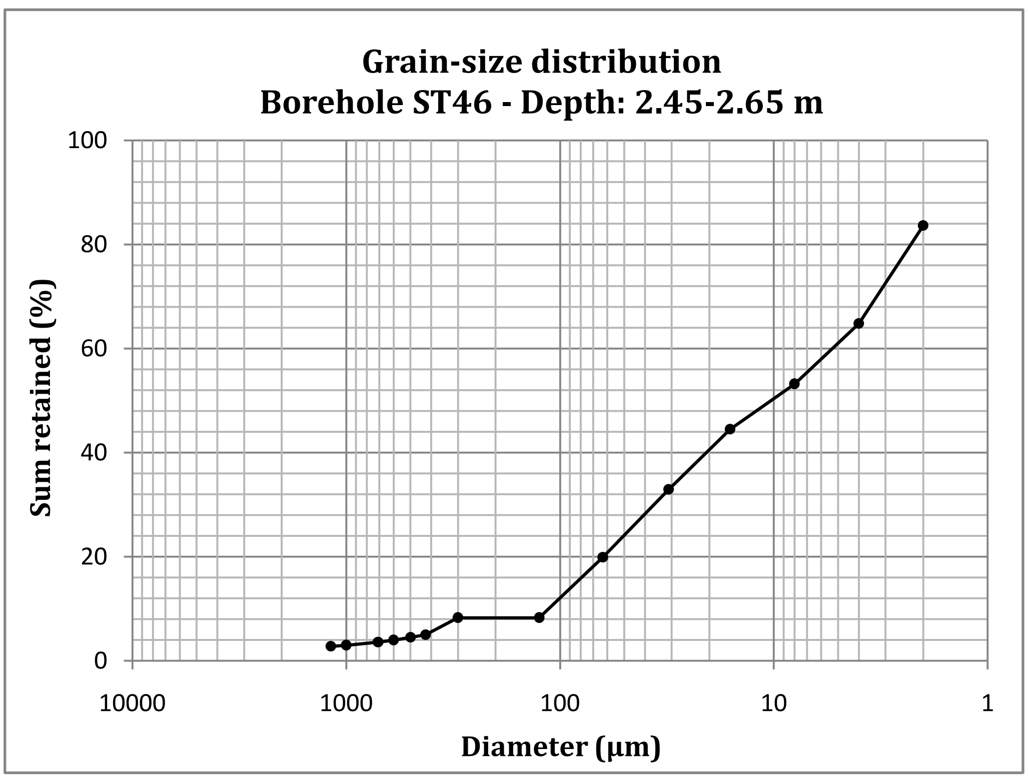
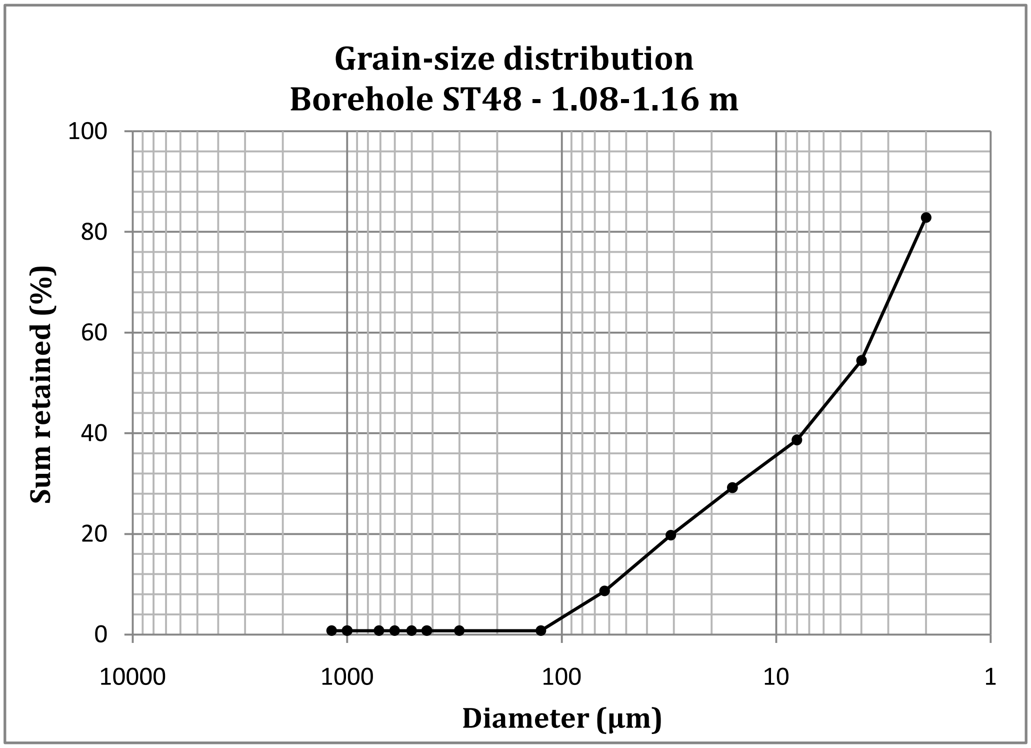
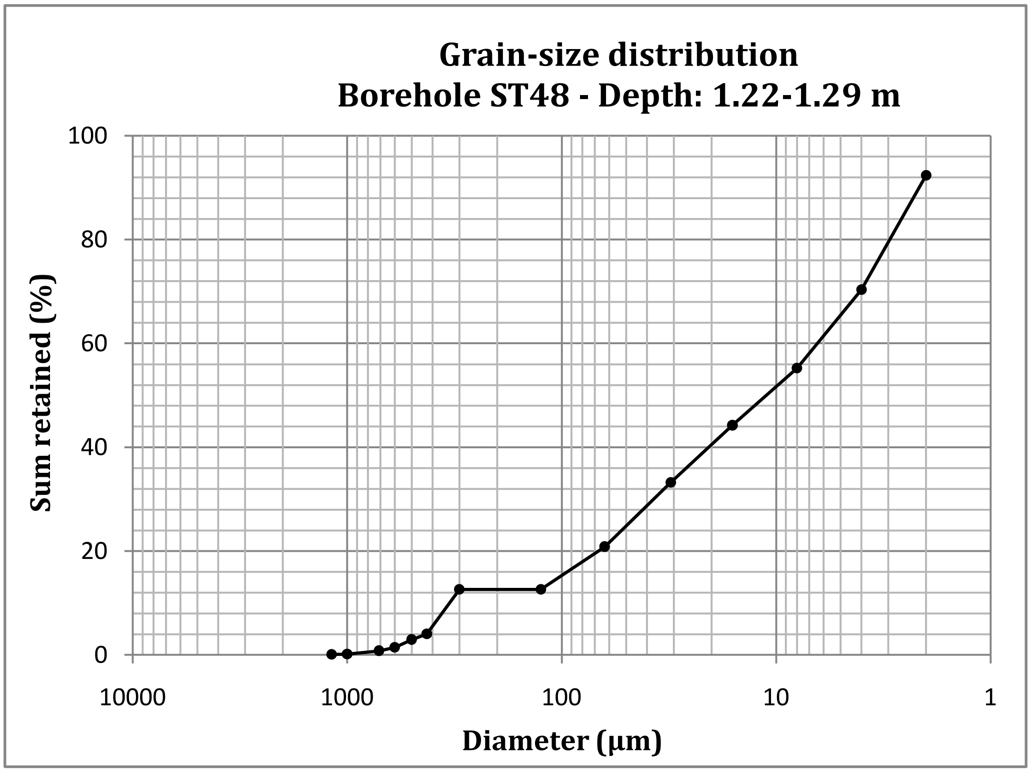
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)

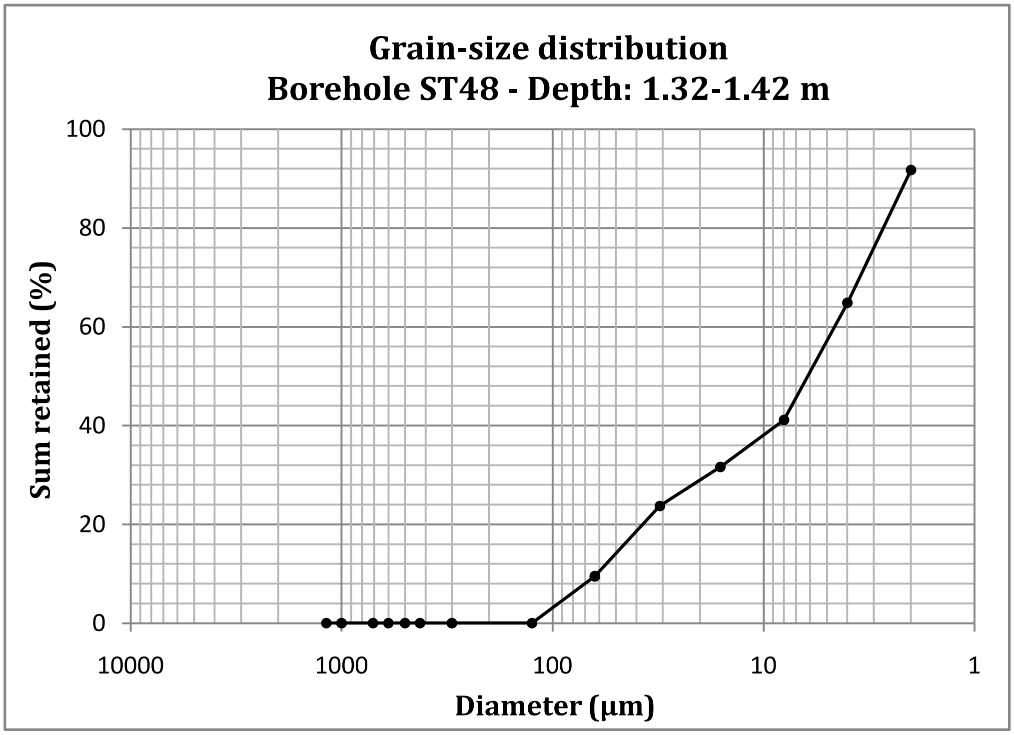

Grain-size distribution
Borehole ST48 - Depth: 0.82-0.92 m
Sum retained (%)
120
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)

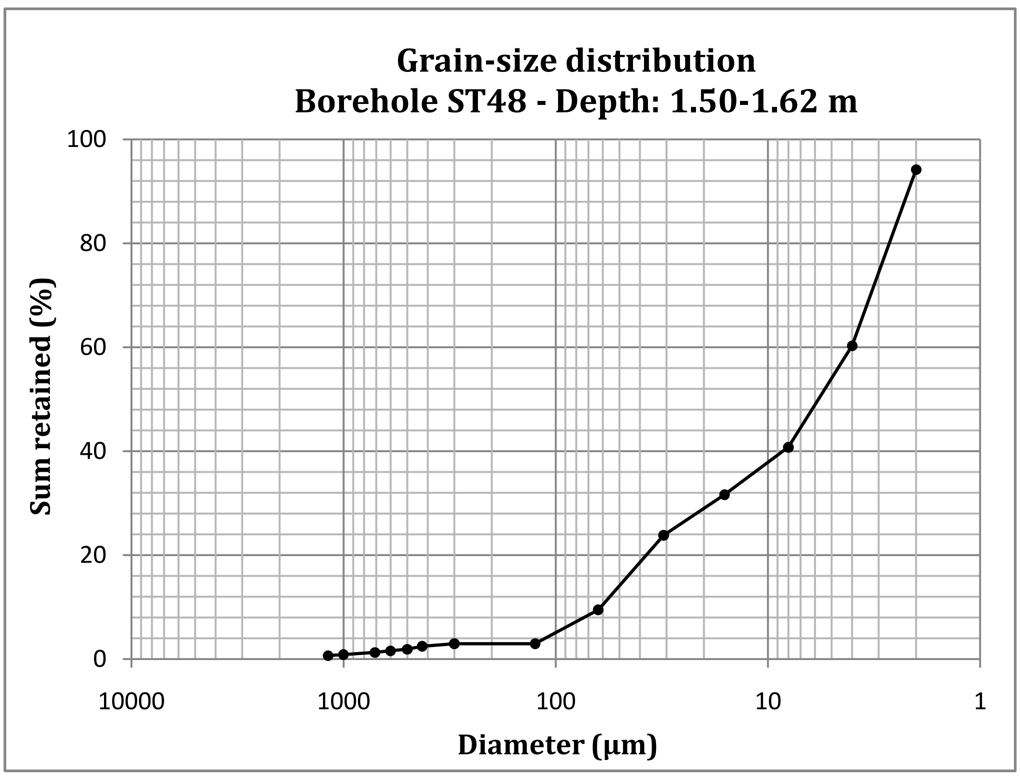

Grain-size distribution
Borehole ST46 - Depth: 2.65-2.81 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)


Grain-size distribution
Borehole ST46 - Depth: 2.45-2.65 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)


Grain-size distribution
Borehole ST48 - 1.08-1.16 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)


Grain-size distribution
Borehole ST48 - Depth: 1.22-1.29 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)


Grain-size distribution
Borehole ST48 - Depth: 1.32-1.42 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)


Grain-size distribution
Borehole ST48 - Depth: 1.50-1.62 m
Sum retained (%)
100
80
60
40
20
0
10000
1000
100
10
1
Diameter (µm)

Grain-size distribution statistics – Borehole ST 08

Borehole:	ST08
Depth (m):	1.45-1.70
Sample ID:	14
Sample type:	Trimodal, Very Poorly Sorted
Textural group:	Sandy Mud
Sediment name:	Very Fine Sandy Mud
Mean:	Medium Silt
Sorting:	Very Poorly Sorted
Skewness:	Symmetrical
Kurtosis:	Very Platykurtic
Mode 1 (μm):	1,500
Mode 2 (μm):	94,00
Mode 3 (μm):	12,00
D_{10} (μm):	1,214
D_{50} (μm):	11,16
D_{90} (μm):	94,70
% Gravel:	0,0%
% Sand:	24,7%
% Mud:	75,3%

Table 1: Grain-size Distribution Statistics – Borehole ST44

Borehole:	ST44	ST44	ST44	ST44	ST44	ST44	ST44	ST44	ST44	ST44
Depth (m):	1.68-181	1.85-1.95	1.95-2.15	2.20-2.28	2.28-2.38	2.40-2.48	2.53-2.70	2.77-2.90	2.90-2.98	2.98-3.07
Sample ID:	24	25	26	28	29	30	31	32	33	34
Sample Type:	Bimodal, Poorly Sorted	Trimodal, Very Poorly Sorted	Trimodal, Very Poorly Sorted	Bimodal, Very Poorly Sorted	Bimodal, Very Poorly Sorted	Bimodal, Very Poorly Sorted	Bimodal, Poorly Sorted	Bimodal, Poorly Sorted	Bimodal, Poorly Sorted	Trimodal, Poorly Sorted
Textural Group:	Mud	Sandy Mud	Sandy Mud	Sandy Mud	Sandy Mud	Sandy Mud	Mud	Mud	Mud	Mud
Sediment Name:	Very Coarse Silt	Very Fine Sandy Very Coarse Silt	Very Fine Sandy Medium Silt	Very Fine Sandy Very Coarse Silt	Very Fine Sandy Very Coarse Silt	Very Fine Sandy Very Fine Silt	Clay	Fine Silt	Very Fine Silt	Very Fine Silt
Mean:	Medium Silt	Coarse Silt	Medium Silt	Medium Silt	Medium Silt	Medium Silt	Fine Silt	Medium Silt	Fine Silt	Fine Silt
Sorting:	Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted	Poorly Sorted
Skewness:	Symmetrical	Fine Skewed	Symmetrical	Fine Skewed	Coarse Skewed	Coarse Skewed	Very Coarse Skewed	Very Coarse Skewed	Very Coarse Skewed	Very Coarse Skewed
Kurtosis:	Platykurtic	Platykurtic	Very Platykurtic	Very Platykurtic	Very Platykurtic	Platykurtic	Leptokurtic	Mesokurtic	Platykurtic	Leptokurtic
Mode 1 (µm):	6,000	94,00	1,500	1,500	1,500	1,500	3,000	6,000	3,000	3,000
Mode 2 (µm):	47,00	1,500	94,00	94,00	47,00	47,00	47,00	23,50	47,00	23,50
Mode 3 (µm):		6,000	12,00							362,5
D_{10} (µm):	3,215	1,582	1,313	1,343	1,349	1,344	2,306	2,189	1,416	1,393
D_{50} (µm):	14,98	22,81	9,483	17,25	6,901	5,732	3,866	6,981	3,992	3,673
D_{90} (µm):	60,14	97,90	81,69	124,0	75,03	78,85	36,02	60,84	48,90	29,11
% Gravel:	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
% Sand:	8,4%	25,3%	16,2%	29,0%	13,6%	13,6%	0,2%	9,6%	5,6%	6,4%
% Mud:	91,6%	74,7%	83,8%	71,0%	86,4%	86,4%	99,8%	90,4%	94,4%	93,6%

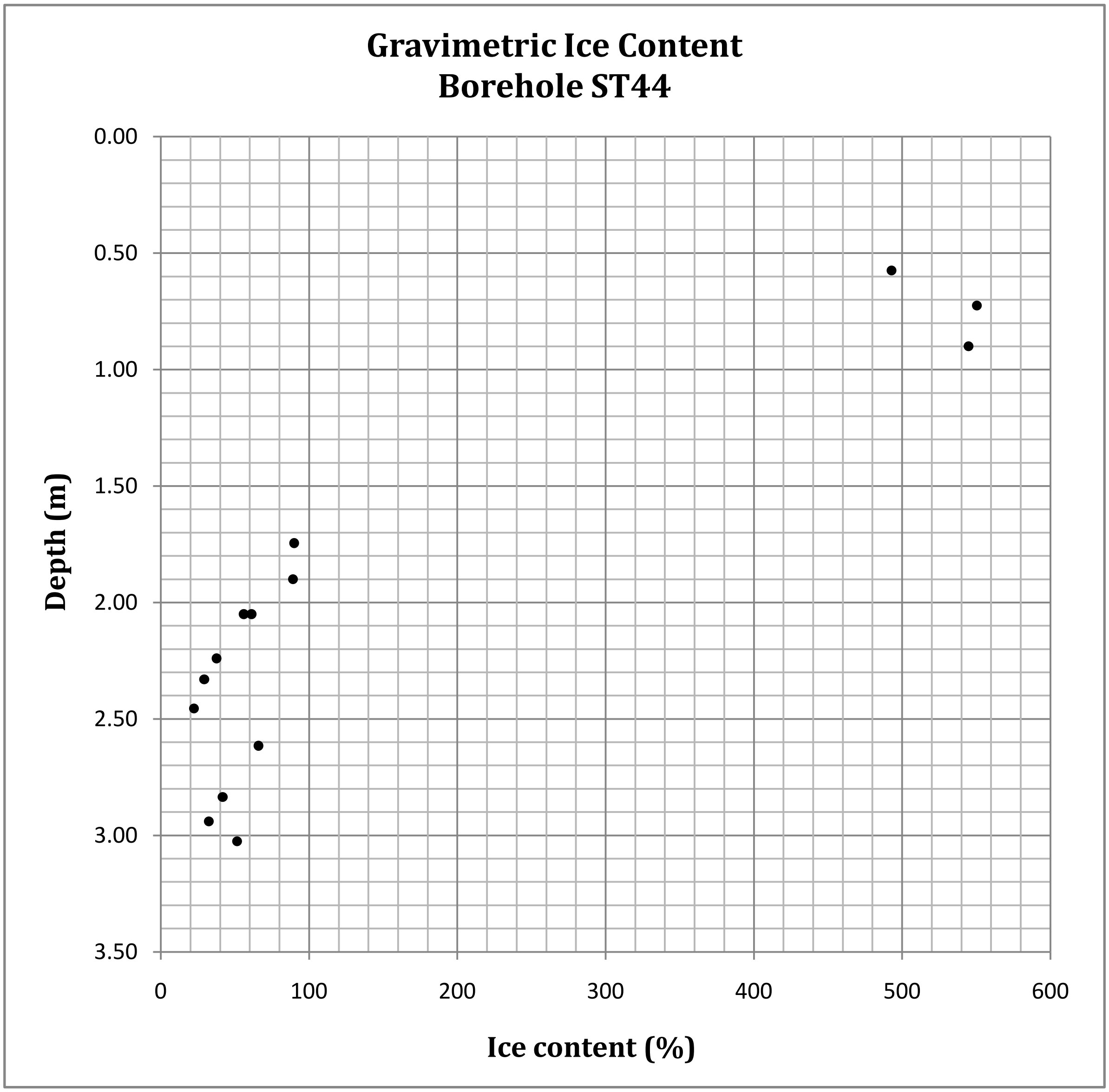
Table 2: Grain-size distribution statistics – Borehole ST46

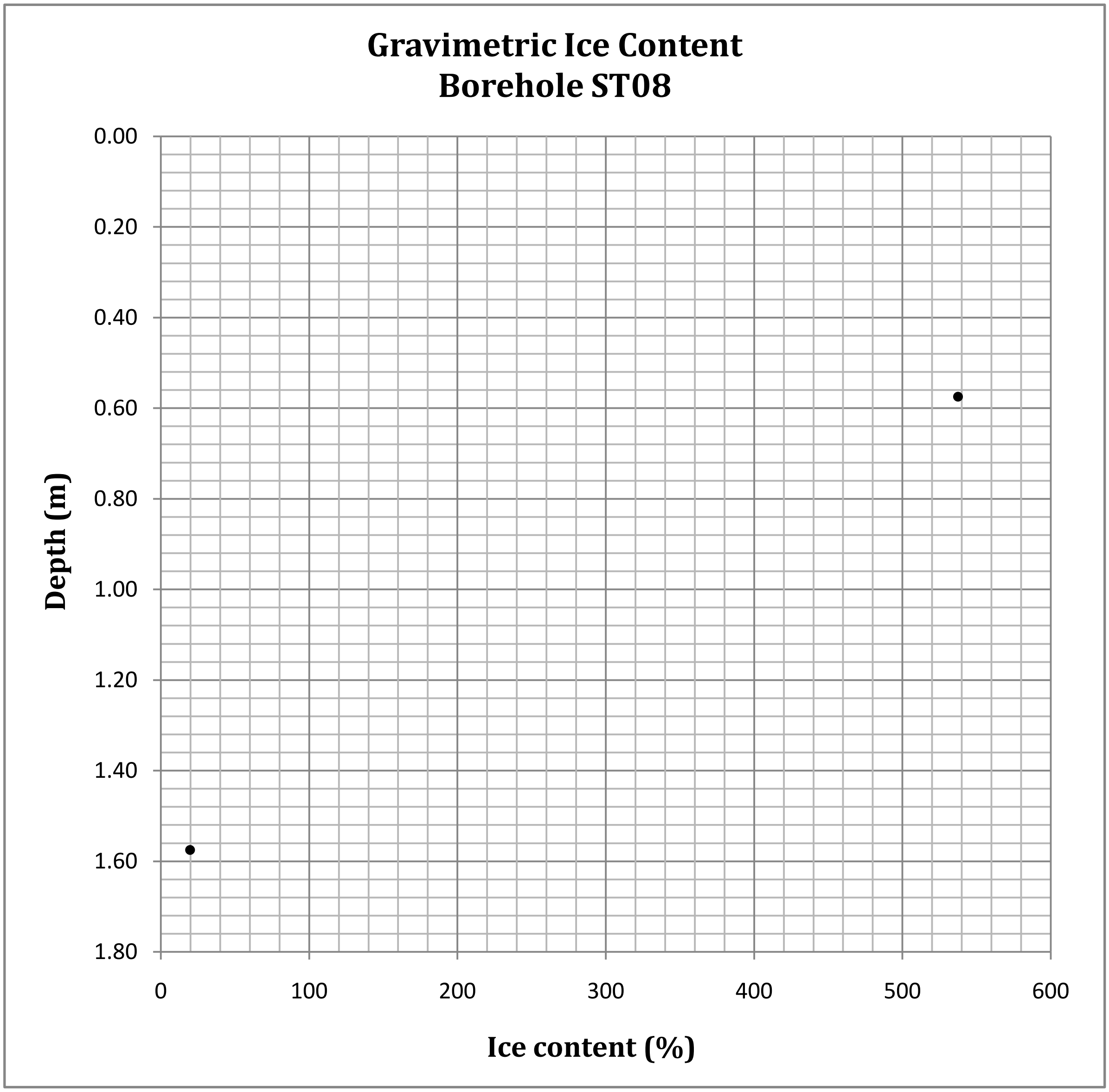
Borehole:	ST46	ST46	ST46	ST46	ST46	ST46	ST46	ST46
Depth (m):	0.80-0.90	1.75-1.85	1.87-192	2.00-2.05	2.05-2.15	2.15-2.35	2.45-2.65	2.65-2.81
Sample ID:	35	41	42	43	44	45	46	47
Sample type:	Bimodal, Very Poorly Sorted	Bimodal, Very Poorly Sorted	Bimodal, Very Poorly Sorted	Bimodal, Poorly Sorted	Trimodal, Very Poorly Sorted	Bimodal, Poorly Sorted	Trimodal, Very Poorly Sorted	Bimodal, Very Poorly Sorted
Textural group:	Sandy Mud	Sandy Mud	Sandy Mud	Mud	Sandy Mud	Mud	Sandy Mud	Sandy Mud
Sediment name:	Very Fine Sandy Mud	Very Fine Sandy Mud	Very Fine Sandy Mud	Very Fine Silt	Very Fine Sandy Very Fine Silt	Very Fine Silt	Very Fine Sandy Very Fine Silt	Very Fine Sandy Very Coarse Silt
Mean:	Fine Silt	Medium Silt	Fine Silt	Medium Silt	Medium Silt	Medium Silt	Medium Silt	Medium Silt
Sorting:	Very Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted
Skewness:	Very Coarse Skewed	Fine Skewed	Very Coarse Skewed	Coarse Skewed	Very Coarse Skewed	Very Coarse Skewed	Coarse Skewed	Very Fine Skewed
Kurtosis:	Very Platykurtic	Very Platykurtic	Very Platykurtic	Very Platykurtic	Mesokurtic	Platykurtic	Platykurtic	Very Platykurtic
Mode 1 (µm):	1,500	1,500	1,500	3,000	3,000	3,000	3,000	47,00
Mode 2 (µm):	94,00	94,00	47,00	47,00	23,50	47,00	47,00	1,500
Mode 3 (µm):					462,5		362,5	
D_{10} (µm):	1,160	1,221	1,165	2,002	2,120	2,124	1,529	1,366
D_{50} (µm):	2,686	18,36	2,981	6,263	6,095	5,485	10,35	22,70
D_{90} (µm):	102,5	98,24	83,99	50,00	79,64	48,58	113,1	89,87
% Gravel:	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
% Sand:	25,6%	24,5%	15,6%	3,4%	12,0%	4,1%	20,0%	18,3%
% Mud:	74,4%	75,5%	84,4%	96,6%	88,0%	95,9%	80,0%	81,7%

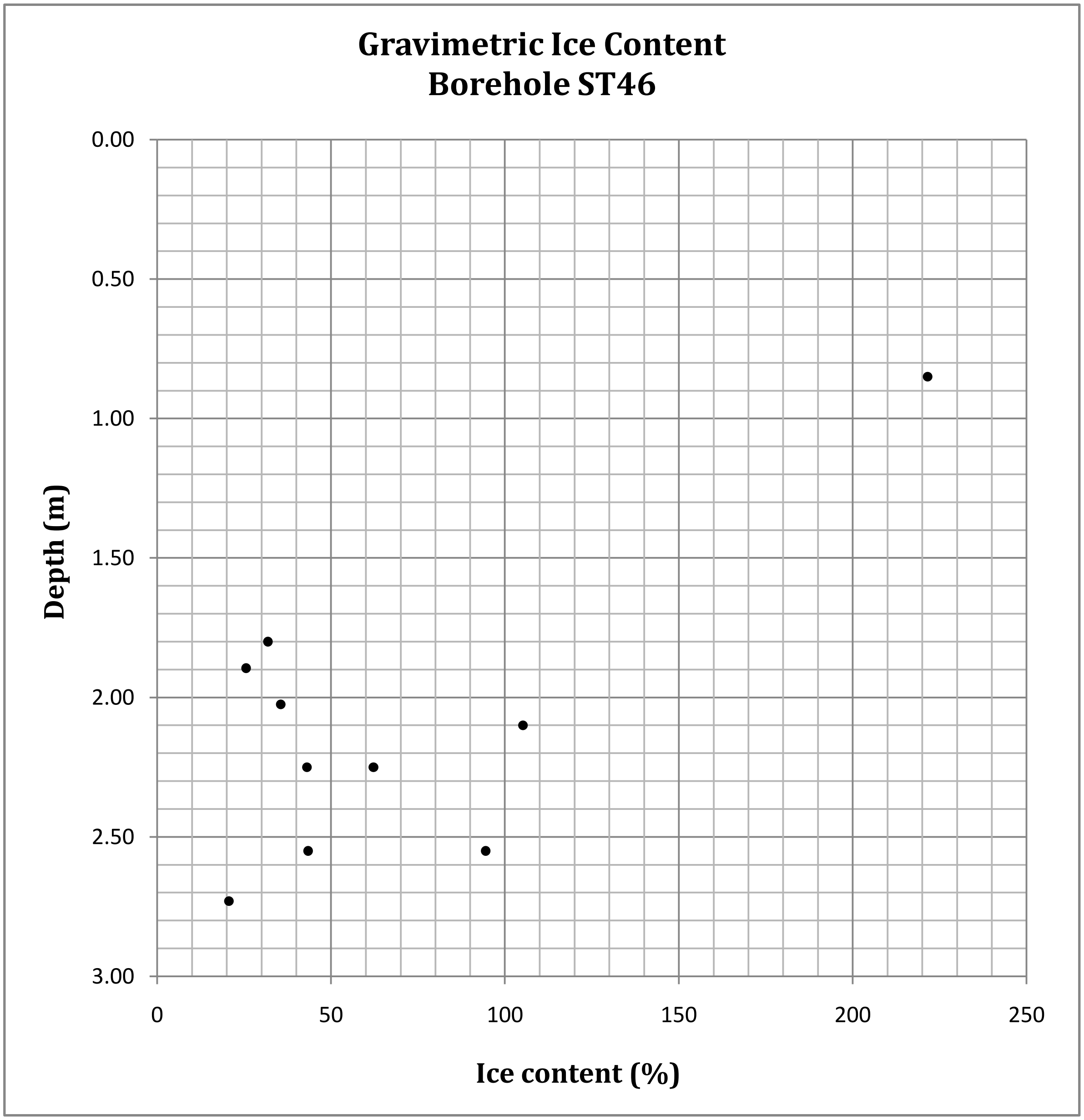
Table 3: Grain-size distribution statistics – Borehole ST48

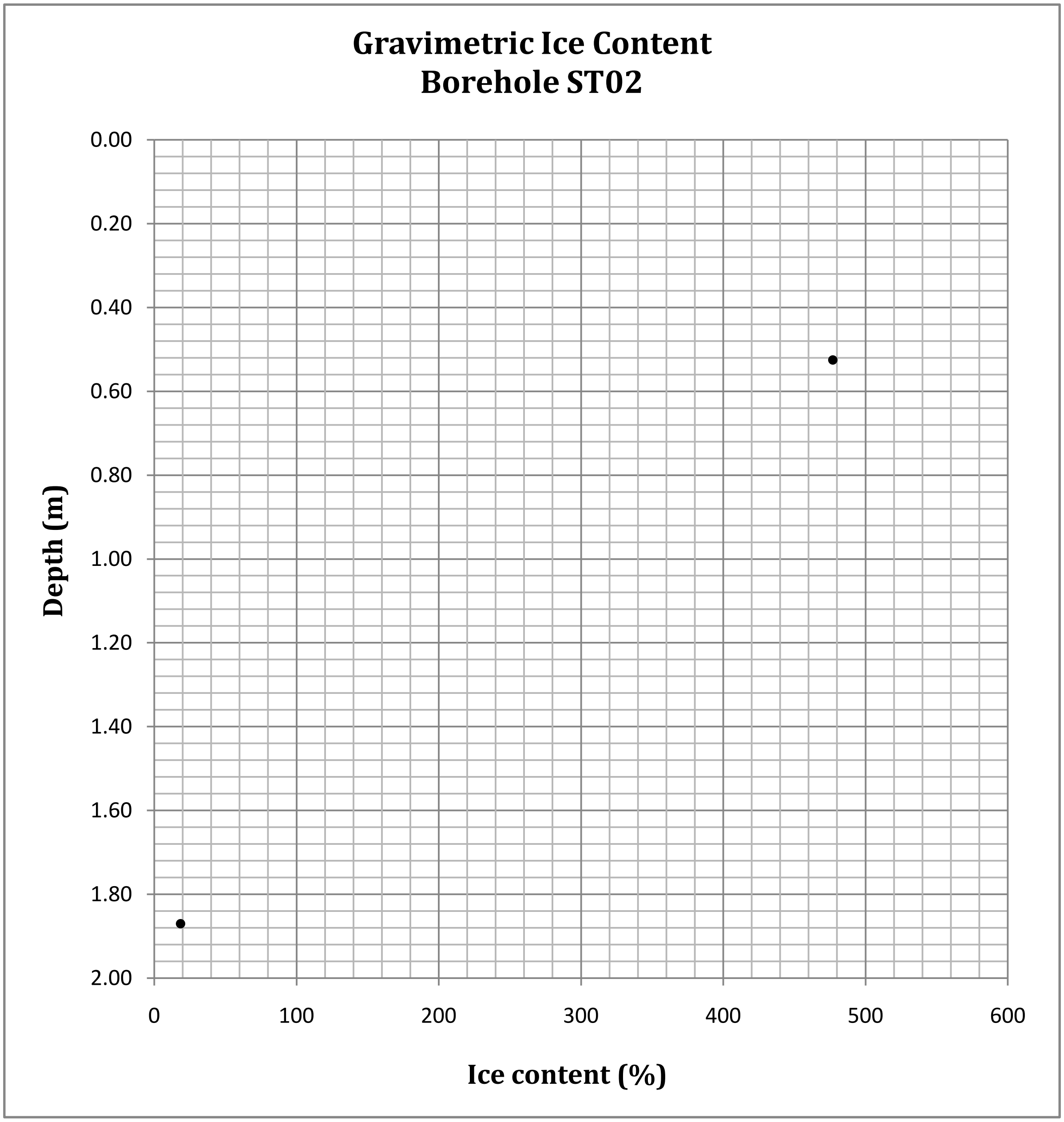
Borehole:	ST48	ST48	ST48	ST48	ST48
Depth (m):	0.82-0.92	1.08-1.16	1.22-1.29	1.32-1.42	1.50-1.62
Sample ID:	48	50	51	52	53
Sample type:	Bimodal, Poorly Sorted	Bimodal, Very Poorly Sorted	Polymodal, Very Poorly Sorted	Bimodal, Poorly Sorted	Bimodal, Poorly Sorted
Textural group:	Mud	Mud	Sandy Mud	Mud	Mud
Sediment name:	Clay	Very Fine Silt	Medium Sandy Very Fine Silt	Very Fine Silt	Very Fine Silt
Mean:	Fine Silt	Fine Silt	Medium Silt	Medium Silt	Medium Silt
Sorting:	Poorly Sorted	Very Poorly Sorted	Very Poorly Sorted	Poorly Sorted	Poorly Sorted
Skewness:	Very Coarse Skewed	Very Coarse Skewed	Coarse Skewed	Very Coarse Skewed	Very Coarse Skewed
Kurtosis:	Mesokurtic	Platykurtic	Platykurtic	Platykurtic	Platykurtic
Mode 1 (µm):	3,000	3,000	3,000	3,000	3,000
Mode 2 (µm):	47,00	47,00	362,5	47,00	47,00
Mode 3 (µm):			47,00		
D_{10} (µm):	2,420	1,499	2,156	2,089	2,180
D_{50} (µm):	4,853	4,863	11,13	6,173	5,770
D_{90} (µm):	39,64	57,77	333,5	61,53	61,51
% Gravel:	0,0%	0,0%	0,0%	0,0%	0,0%
% Sand:	1,8%	8,8%	21,0%	9,7%	9,7%
% Mud:	98,2%	91,2%	79,0%	90,3%	90,3%

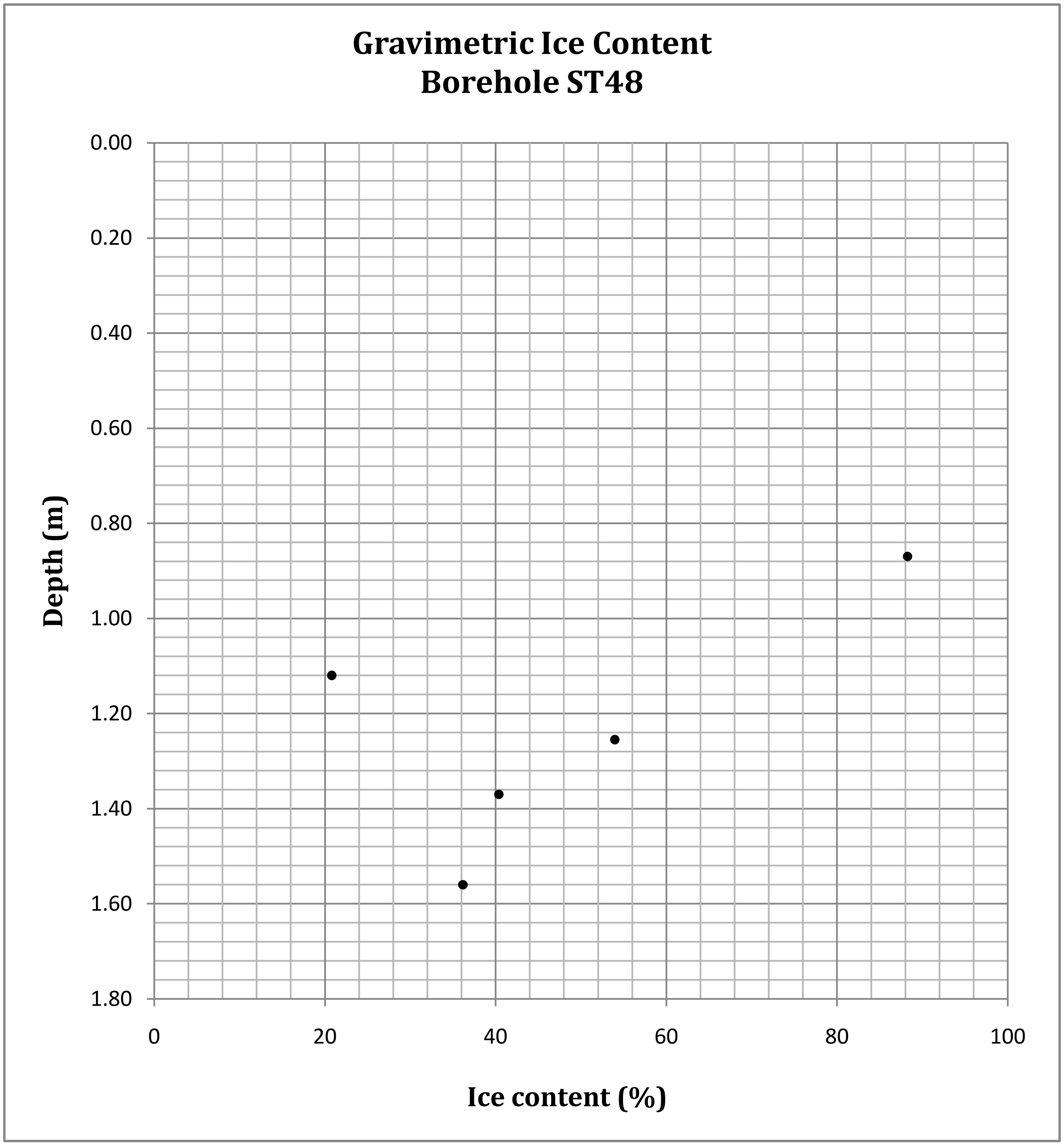
Ice Content


Gravimetric Ice Content
Borehole ST44
Depth (m)
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
0
100
200
300
400
500
600
Ice content (%)


Gravimetric Ice Content
Borehole ST08
Depth (m)
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
0
100
200
300
400
500
600
Ice content (%)


Gravimetric Ice Content
Borehole ST46
Depth (m)
0.00
0.50
1.00
1.50
2.00
2.50
3.00
0
50
100
150
200
250
Ice content (%)


Gravimetric Ice Content
Borehole ST02
Depth (m)
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
0
100
200
300
400
500
600
Ice content (%)


Gravimetric Ice Content
Borehole ST48
Depth (m)
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
0
20
40
60
80
100
Ice content (%)

APPENDIX B

Soil Data

Site ID	Subgroup	Modifier	Parent Material	Soil Code	Slope (%)	Aspect	Surface Expression	Slope Position	Site Drainage	LFH/O Thickness	Horizon	A Thickness (cm)	A Texture	Total Topsoil Thickness (ORG + A) (cm)	Horizon	Upper Subsoil (AB/B) Thickness (cm)	AB/B Texture	Horizon	Lower Subsoil (BC/C) Thickness (cm)	BC/C Texture	Overburden Thickness (cm)
ST01	Bedrock		RES	R	6	160	Undulating	Crest	R	5	-	-	-	5	-	-	-	Non Soil			5
ST02	TFI.OC		GLLC	CrM	<1	190	Undulating	Lower	P	45	-	-	-	45	-	-	-	C/Cz	25+	SiCL	>70
ST03	O.DYB		TILL	BrC	10	340	Undulating	Mid	R	12	-	-	-	12	Bm	18	LS	C1/C2/R	42	LS/SiCL	60
ST04	Bedrock		RES	RgC	5	15	Undulating	Upper	R	6	-	-	-	6	-	-	-	Non Soil	-	-	6
ST05	O.R		TILL/RES	RgC	10	280	Undulating	Mid	R	15	-	-	-	15	-	-	-	C/R	45+	SL-SCL	45
ST06	GL.HR	pt	LACU	RgF	0	N/A	Level	Level	I	17	Ah	10	SiCL	27	-	-	-	Cgj	144	fSL	>181
ST07	Disturbed		TILL	RgC	12	140	Undulating	Mid	R		-	-	-		-	-	-	C	50	LS	>50
ST08	TME.OC		ORG/TILL	CrO	0	N/A	Level	Level	VP	115	-	-	-	115	-	-	-	Cgz	15+	LS	>130
ST09	GLCU.R	pt	FLUV/LACU	RgC	0	N/A	Level	Level	P	16	C/IIAhb	30	cS/L	46	-	-	-	IIC	90	SiCL	>120
ST10	GL.R	pt	LACU	RgF	0	N/A	Level	Level	P	32	-	-	-	32	-	-	-	Cgj	90	SiCL	>120
ST11	GL.R	pt	GLLC	RgF	0	N/A	Level	Level	P	40	-	-	-	40	-	-	-	C1/C2/C3	90	SiCL/LfS/SiCL	>120
ST12	Bedrock		RES	R	17	360	Undulating	Upper	R	2	-	-	-	2	-	-	-	Non Soil	-	-	2
ST13	HR.SC		LACU	CrM	0	N/A	Level	Lower	P	27	-	-	-	27	-	-	-	C/Cz	70+	SiCL	>97
ST14	O.EB	pt	TILL/RES	BrC	1	200	Level	Lower	W	17	-	-	-	17	Bm	15	LS	C/R	10+	SL-SCL	42
ST15	Bedrock		RES	R	4	40	Ridged	Crest	R	7	-	-	-	7	-	-	-	Non Soil	-	-	7
ST16	GL.R		TILL/RES	RgC	0	N/A	Level	Level	I	11	-	-	-	11	-	-	-	Cgj/R	54+	SiL	65
ST17	GL.R	pt	TILL	RgC	2	30	Undulating	Lower	MW	19	-	-	-	19	-	-	-	C/R	70+	SL	89
ST18	R.HG	pt	ORG/LACU	RgF	0	N/A	Level	Depression	VP	80	Ah	30	SiL	110	-	-	-	Cg	20	C	>130

ST19	Bedrock		RES	R	11	180	Undulating	Mid	R	4	-	-	-	4	-	-	-	Non Soil	-	-	4
ST20	Bedrock		RES	R	5	64	Undulating	Upper	R		-	-	-	-	-	-	-	Non Soil	-	-	0
ST21	GL.R	pt	TILL	RgC	2	340	Undulating	Lower	I	45	-	-	-	45	-	-	-	C	65	LS	>110
ST22	TME.OC		ORG	CrO	0	N/A	Level	Level	VP	51+	-	-	-	51	-	-	-	-	-	-	>51
ST23	Bedrock		RES	R	6	110	Undulating		R		-	-	-	-	-	-	-	Non Soil	-	-	0
ST24	E.DYB	pt	TILL	BrC	2	350	Level	Lower	MW	36	Ae	6	S	42	Bmgj	23	fS	C	36	LS	>91
ST25	GL.R	pt	LACU/RES	RgF	0	N/A	Level	Level	I	15	-	-	-	15				C/R	77+	SiCL	>92
ST26	E.DYB		GLFL	BrC	0	N/A	Level	Level	R	7	Ae	5	fS	12	Bm	12	fS	BCgj/C	63	fS/LS	>87
ST27	TME.OC		ORG	CrO	2	300	Level	Lower	VP	50+	-	-	-	50	-	-	-	-	-	-	>50
ST28	Bedrock		RES	R	11	20	Ridged	Upper	R		-	-	-	-	-	-	-	Non Soil	-	-	0
ST29	O.EB		GLLC	BrF	2	120		Level	W	10	-	-	-	10	Bm	16	fSL	C/R	59+	SiCL	>85
ST30	HR.SC		GLLC	CrM	0	N/A	Level	Level		40	Ah	21	SiL-SiCL	61	-	-	-	C/Cz	14	SiCL	>75
ST31	GL.R	pt	TILL	RgF	0	N/A	Level	Level	MW	25	Ah	9	SiCL	34	-	-	-	C1/C2/C3	95	SiCL/LcS/C	>139
ST32	O.R		TILL	RgC	0	N/A	Level	Level	W	4	Aej	4	SiL	8	-	-	-	C	42	SL	>50
ST33	O.R		TILL	RgC	3	250	Undulating	Mid		7	-	-	-	7	-	-	-	C	55	SL	>62
ST34	GLCU.R	pt	FLUV/LACU	RgC	0	N/A	Level	Level	I	22	-	-	-	22	-	-	-	C1/C2	100	mS/SiC-SiCL	>120
ST36	GL.R	pt	GLFL/TILL	RgC	0	N/A	Undulating	Depression	I	16	-	-	-	16	-	-	-	C/IIC	105	c-mS/SL	>120
ST37	TME.H		ORG/TILL	Org	0	N/A		Level	VP	80	-	-	-	80	-	-	-	C/R	10+	SL	90
ST38	GL.R	pt	TILL	RgF	1-2	250	Level	Level	P	25	-	-	-	25	-	-	-	C	100	SCL	>125
ST41	Bedrock		RES	R			Undulating	Upper	R		-	-	-	-	-	-	-	Non Soil	-	-	0
ST42	GL.R	pt	GLFL	RgC	1	10	Level	Level	P	25	-	-	-	25	-	-	-	C	60	cS	85
ST43	O.R	pt	TILL	RgC	N/A	0	Level	Level	I	50	-	-	-	50	-	-	-	C	20+	SL	>120

ST44	FI.OC		ORG	CrO	N/A	0	Level	L	VP	168	-	-	-	168	-	-	-	Cz	50+	SiL	>168
ST45	O.DYB		TILL	BrC	6	35	Undulating	Mid	W	5	-	-	-	5	Bm	12	SL	C	53	SL-SCL	>70
ST46	ME.OC		ORG/FLUV/GLLC	CrO	0	N/A	Level	Depression		162	-	-	-	162	-	-	-	Cgz1/Cgz2	178	LS/C	>340
ST48	GL.SC	pt	LACU	CrM	N/A	0	Level	Level	P	22	-	-	-	22	-	-	-	Cgj/C/Cg/Cgz	250+	lFs/SiCL/SiL	>250
ST49	R.SC		LACU	CrM	N/A	0	Level	Level	I	13	-	-	-	13	-	-	-	C1/C2/Cgj/Cgz	110+	LS/C/SiC	>123
ST50	O.R		TILL	RgF	7	350	Undulating	Mid	W	7	-	-	-	7	-	-	-	C1/C2/R	50+	SiL/C	50
ST51	TME.OC		LACU	CrO	<2	N/E	Undulating	Level	VP	65	-	-	-	65	-	-	-	C/Cgz	10+	SL	>140
ST53	O.EB		TILL	BrF	4	140	Undulating	Mid	W	7	-	-	-	7	Bm	20	CL	C/R	50+	CL	70
ST54	T.M		ORG/LACU	Org	N/A		Level	Level	I	50	-	-	-	50	-	-	-	C	70	SiC	>120
ST55	GL.SC	pt	LACU	CrM	1	200	Level	Mid	I	28	-	-	-	28	-	-	-	C/Cgj/Cgz	62+		>90
ST56	O.DYB		GLFL	BrC	14	130	Undulating	Mid	W	14	-	-	-	14	Bm	15	LfS	C/R	80+	SiL	95
ST57	GL.R	pt	TILL	RgF	1-2	330	Undulating	Level	I	16	-	-	-	16	-	-	-	C	110	CL	>126
ST58	Bedrock		RES	R					R		-	-	-		-	-	-	Non Soil	-	-	0
ST59	TFI.OC		ORG	CrO	0	N/A	Level	Level	VP	65+	-	-	-	65	-	-	-	-	-	-	>65
ST60	GL.R		TILL	RgC	<2	N	Level	Level	I	25	-	-	-	25	-	-	-	C1/C2	55	S/SL-SCL	>80
ST61	GL.R		TILL	RgC	0	N/A	Level	Level	I	30	-	-	-	30	-	-	-	C1/C2	110	LS/SiCL	>130
ST62	ME.OC		ORG	CrO	0	N/A		Depression	VP	120	-	-	-	120	-	-	-	-	-	-	>120
ST63	GL.R		TILL/RES	RgF	0	N/A	Level	Level	I	10	-	-	-	10	-	-	-	C/R	68+	CL	68
ST64	ORG		ORG	Org	0	N/A	Level	L	VP	110+	-	-	-	110	-	-	-	-	-	-	>110
ST65	GL.R	pt	TILL	RgF	0	N/A	Level	Level	W	17	-	-	-	17	-	-	-	C	60	CL	>76
ST66	TME.OC		ORG/LACU/GLLC	CrO	0	N/A	Level	Level	VP	90	-	-	-	90	-	-	-	Cgz	90+		>90
ST67	O.R		TILL	RgF	2	120	Level	Level	I	15	Ah	8	CL	15	-	-	-	C1/C2/C3	47	SiL/C/SL	>70
ST68	O.DYB		TILL	BrC	4	NE	Undulating	Upper	W	5	-	-	-	5	Bm	6	SL	BC/C/Ck	54	LcS/SL/SCL	>65

APPENDIX C

Soil Unit Descriptions and Chemical Characteristics of Soils in the LSA

This Appendix provides a brief description of the pertinent characteristics and important comments for the eight soil units located within the LSA. The tables within each series description present a typical site and profile description and are ordered according to soil classification with Brunisols described first, then Regosols, Cryosols, Organics, and Bedrock. The descriptions are based on field data collected during 2008. Additional tables portray the chemical characteristics of each soil series.

Brunisolic Soil Units

Brunisolic soils are moderately developed soils that have a Bm horizon at least 5 cm thick (CSSC). The soils in the study area included the Eutric and Dystric great groups. These soil great groups are similar except Dystric Brunisols have a pH less than 5.5 and Eutric Brunisols have a pH equal to or greater than 5.5. Dystric Brunisols surveyed in the study area included orthic and eluviated subgroups. Eutric Brunisols surveyed in the study area included only orthic subgroups. The Orthic Eutric and Orthic Dystric Brunisols surveyed did not include an A horizon and had Bm horizons that ranged from 6 to 20 cm thick. Eluviated Dystric Brunisols surveyed displayed diagnostic Ae horizons that ranged from 5 to 6 cm thick.

Parent material textures of Brunisols surveyed in the study area were divided into coarse and fine categories. Coarse textured Brunisolic soils included very coarse to medium textured materials and fine textured Brunisolic soils included moderately fine to very fine material. Brunisols were found on several parent materials including till, lacustrine, glaciolacustrine and glaciofluvial. Drainage observed in Brunisols during the soil survey ranged from moderately well to rapid. These soils were found to exist on a variety of slopes and level to undulating topography.

BrC Soil Unit

The BrC soil unit occurs on very coarse to medium textured materials. The parent materials often associated with this soil unit are glaciofluvial and till. The BrC soil unit is generally associated with Eluviated Dystric Brunisols, Orthic Dystric Brunisols, and Orthic Eutric Brunisols. The BrC soils are similar to the BrF soils with the main difference being the coarser textures found with BrC soils.

Table C-1: BrC Summary Table

Dominant Soil Classification		Eluviated Dystric Brunisol, Orthic Dystric Brunisol, Orthic Eutric Brunisol	
Site and Profile Data		**Calculations**	
Texture	Very Coarse to Medium	Land Capability Class	5MR
Parent Material	Glaciofluvial or Till	Reclamation Suitability (Topsoil/Subsoil)	N/A / Poor
Surface Expression	Level to Undulating	Wind Erosion Risk Rating	High
Range of Slopes (%)	0 – 14	Water Erosion Risk Rating (<5% / 5-9% / 9-15% slopes)	Low/Low/Moderate
Drainage Class	Rapid to Well	Compaction Risk Rating (Topsoil/Upper Subsoil/Lower Subsoil)	Low/Low/Low
Topsoil/Subsoil texture	Organic/Loamy Sand, Sandy Loam	Average Topsoil thickness (cm)	15.3
		Area/Proportion of the Study Area (ha)/(%)	56/5

NOTE:
N/A = Not applicable.

Table C-2: Description of BrC Soil Unit

Soil Classification	Orthic Dystric Brunisol
Parent Material	Medium Textured Till
Soil Drainage Class	Well
Topsoil Thickness (cm)	5
Forest Land Capability Calculation	5MR
UTM Coordinates (northing/easting)	12U 6886529/416938

Example Profile – Site ST45							
Horizon	**Depth (cm)**	**Moisture**	**Colour**	**Texture**	**Coarse Fragment Content (%)**	**Structure**	**Consistence**
Of	5 – 0	–	–	–	–	–	–
Bm	0 – 12	Moist	10YR 4/6	Sandy Loam	40	Subangular Blocky	Friable
C	12 – 65	Moist	7.5YR 4/4	Loam	40	Massive	Friable

Table C-3: Physical and Chemical Characteristics of the BrC Soil Unit – Site ST45

Horizon	Depth (cm)	pH (Saturated paste)	EC (dS/m)	Saturation (%)	SAR	TOC (%)	TKN (%)	Texture
Of	5-0	–	–	–	–	35.6	0.36	–
Bm	0-12	5.1	0.06	49	0.4	–	–	Sandy Loam
C	12-65	7.7	0.32	34	0.1	–	–	Loam

NOTES:
[1] TOC = Total Organic carbon, EC = Electrical conductivity, SAR = Sodium adsorption ratio, and TKN = Total Kjeldhal Nitrogen

BrF Soil Unit

The BrF soil unit occurs on moderately fine to very fine textured materials. The parent materials often associated with this soil unit are glaciofluvial and till. The BrF soil unit is generally associated with Orthic Eutric Brunisols.

Table C-4 BrF Summary Table

Dominant Soil Classification		Orthic Eutric Brunisol	
Site and Profile Data		**Calculations**	
Texture	Moderately Fine to Very Fine	Land Capability Class	4DR
Parent Material	Glaciofluvial or Till	Reclamation Suitability (Topsoil/Subsoil)	N/A/Fair
Surface Expression	Undulating	Wind Erosion Risk Rating	Low
Range of Slopes (%)	2-4	Water Erosion Risk Rating (<5% / 5-9% / 9-15% slopes)	Low/Low/Moderate
Drainage Class	Well	Compaction Risk Rating (Topsoil/Upper Subsoil/Lower Subsoil)	N/A/Low/Moderate
Topsoil/Subsoil texture	Sandy Loam, Loam/ Loam, Silty Clay Loam	Average Topsoil thickness (cm)	8.5
		Area/Proportion of the Study Area (ha)/(%)	29.9/3

NOTE:
N/A = Not applicable

Table C-5: Description of BrF Soil Unit

Soil Classification	Orthic Eutric Brunisol
Parent Material	Medium Textured Till
Soil Drainage Class	Well
Topsoil Thickness (cm)	7
Forest Land Capability Calculation	4DR
UTM Coordinates (northing/easting)	12U 6886433/417558

Example Profile – Site ST53							
Horizon	**Depth (cm)**	**Moisture**	**Colour**	**Texture**	**Coarse Fragment Content (%)**	**Structure**	**Consistence**
LFH	7-0	–	–	–	–	–	–
Bm	0-20	Moist	7.5YR 4/4	Loam	15	Granular	Friable
C	20-70	Moist	7.5YR 4/3	Loam	20	Massive	Friable
R	70+	–	–	–	–	–	–

Table C-6: Physical and Chemical Characteristics of the BrF Soil Unit – Site ST53

Horizon	Depth(cm)	pH (Saturated paste)	EC (dS/m)	Saturation (%)	SAR	TOC (%)	TKN (%)	Texture
LFH	7-0	–	–	–	–	29.8	0.55	–
Bm	0-20	6.3	0.27	46	0.2	–	–	Loam
C	20-70	7.9	0.35	41	0.1	–	–	Loam
R	70+	–	–	–	–	–	–	–

NOTES:
[1] TOC = Total Organic carbon, EC = Electrical conductivity, SAR = Sodium adsorption ratio, and TKN = Total Kjeldhal Nitrogen

Regosolic Order

Regosols were found on all major parent material types, except organic. The most commonly observed parent material type was till. Drainages observed at the Regosol survey sites ranged from rapid to poor. This large range exists because of the variety of textures found in the study area. There were a large number of poorly and imperfectly drained soils found because of restricting layers (frozen layers and bedrock) causing perched water tables.

Regosolic soils are weakly developed soils. These soils do not contain a recognizable B horizon which distinguishes these soils from Brunisols (see Brunisolic Order above). One Gleyed Humic Regosol was identified during the soil survey. This soil is characterized by an Ah horizon at least

10 cm thick and gley characteristics within 50 cm of the mineral surface. Other Regosolic soil subgroups identified in the study area were Orthic Regosols, Gleyed Regosols, and Gleyed Cumulic Regosols. Orthic Regosols are characterized by a C horizon overlain by an organic layer less than 15 cm. Gleyed Regosols found in the study area differed by having gley characteristics (mottling or seepage) in the C horizon. Gleyed Regosols surveyed were often peaty varieties (had greater than 15 cm of organic overlying the mineral surface). The Gleyed Cumulic Regosols found in the study area were characterized by thin layers below the surface that vary in organic matter content or colour from each other.

RgC Soil Unit

The RgC soil unit occurs on very coarse to medium textured materials. The parent materials often associated with this soil unit are Lacustrine, fluvial, glaciofluvial and till. The RgC soil unit is generally associated with Orthic Regosols, Gleyed Regosol, Orthic Humic Regosols, and Gleyed Cumulic Regosols. The RgC soils are similar to the RgF soils with the main difference being the coarser textures found with RgC soils.

Table C-7: RgC Summary Table

Dominant Soil Classification		Orthic Regosol, Gleyed Regosol, Orthic Humic Regosol, and Gleyed Cumulic Regosol	
Site and Profile Data		**Calculations**	
Texture	Very Coarse to Medium	Land Capability Class	5MR
Parent Material	Lacustrine, Glaciofluvial, Till, Fluvial	Reclamation Suitability (Topsoil/Subsoil)	N/A
Surface Expression	Level to Undulating	Wind Erosion Risk Rating	High
Range of Slopes (%)	0-12	Water Erosion Risk Rating (<5% / 5-9% / 9-15% slopes)	Low/Low/Moderate
Drainage Class	Imperfect, Poor, Rapid	Compaction Risk Rating (Topsoil/Upper Subsoil/Lower Subsoil)	N/A/N/A/Low
Topsoil/Subsoil texture	Organic/Loamy Sand, Sandy Loam	Average Topsoil thickness (cm)	21.7
		Area/Proportion of the Study Area (ha)/(%)	72.8/7

NOTE:
N/A = Not applicable

Table C-8: Description of RgC Soil Unit

Soil Classification	Gleyed Regosol
Parent Material	Very Coarse Glaciofluvial
Soil Drainage Class	Poor
Topsoil Thickness (cm)	25
Forest Land Capability Calculation	5MR
UTM Coordinates (northing/easting)	12U 6883417/414152

Example Profile – Site ST42							
Horizon	**Depth (cm)**	**Moisture**	**Colour**	**Texture**	**Coarse Fragment Content (%)**	**Structure**	**Consistence**
Om	25-0	–	–	–	–	–	–
C	0-60	Wet	7.5YR 3/4	Loamy Sand	80	Single Grain	Non-sticky

Table C-9: Physical and Chemical Characteristics of the RgC Soil Unit – Site ST42

Horizon	Depth (cm)	pH (Saturated paste)	EC (dS/m)	Saturation (%)	SAR	TOC (%)	TKN (%)	Texture
Om	25-0	–	–	–	–	30.0	0.38	–
C	0-60	7.8	0.36	27	0.3	–	–	Loamy Sand

NOTES:
[1] TOC = Total Organic carbon, EC = Electrical conductivity, SAR = Sodium adsorption ratio, and TKN = Total Kjeldhal Nitrogen

RgF Soil Unit

The RgF soil unit occurs on moderately fine to very fine materials. The parent materials often associated with this soil unit are lacustrine, fluvial, glaciofluvial, and till. The RgF soil unit is generally associated with Gleyed Regosol and Gleyed Cumulic Regosols.

Table C-10: RgF Summary Table

Dominant Soil Classification		Gleyed Regosol and Gleyed Cumulic Regosol	
Site and Profile Data		**Calculations**	
Texture	Moderately Fine to Very Fine	Land Capability Class	4R
Parent Material	Lacustrine, Glaciofluvial, Till, Fluvial	Reclamation Suitability (Topsoil/Subsoil)	N/A
Surface Expression	Level to Undulating	Wind Erosion Risk Rating	Low
Range of Slopes (%)	0-7	Water Erosion Risk Rating (<5% / 5-9% / 9-15% slopes)	Low/Low/Moderate
Drainage Class	Imperfect, Poor, Well	Compaction Risk Rating (Topsoil/Upper Subsoil/Lower Subsoil)	N/A/N/A/High
Topsoil/Subsoil texture	Organic/Clay Loam, Loam, Clay	Average Topsoil thickness (cm)	25.7
		Area/Proportion of the Study Area (ha)/(%)	218.7/20

NOTE:
N/A = Not applicable

Table C-11: Description of RgF Soil Unit

Soil Classification	Gleyed Regosol
Parent Material	Moderately Fine Lacustrine
Soil Drainage Class	Poor
Topsoil Thickness (cm)	32
Forest Land Capability Calculation	4R
UTM Coordinates (northing/easting)	12U 6888441/416366

Example Profile – Site ST10							
Horizon	**Depth (cm)**	**Moisture**	**Colour**	**Texture**	**Coarse Fragment Content (%)**	**Structure**	**Consistence**
Of	32 – 19	–	–	–	–	–	–
Om	19 – 0	–	–	–	–	–	–
Ckgj	0 – 90	Wet	10YR 5/3	Clay Loam	3	Massive	Sticky

Table C-12: Physical and Chemical Characteristics of the RgF Soil Unit – Site ST10

Horizon	Depth (cm)	pH (Saturated paste)	EC (dS/m)	Saturation (%)	SAR	TOC (%)	TKN (%)	Texture
Of	32 – 19	–	–	–	–	42.4	0.47	–
Om	19 – 0	–	–	–	–	31.1	0.39	–
Ckgj	0 – 90	7.5	0.83	48	0.2	–	–	Clay Loam

NOTES:
[1] TOC = Total Organic carbon, EC = Electrical conductivity, SAR = Sodium adsorption ratio, and TKN = Total Kjeldhal Nitrogen

Cryosolic Order

Cryosols in the study area were found to be either mineral or organic. Mineral Cryosols were only classified as static (had no marked evidence of cryoturbation) in the study area and were found on moderately fine to very fine textured parent material (lacustrine or glaciolacustrine). Static Cryosols had peaty material no thicker than 40 cm. Organic Cryosols in the study area are defined by having peaty material greater than 40 cm.

Drainage observed for Cryosols in the study area ranged from imperfect to poorly drained in the mineral profiles and was very poorly drained in the organic profiles. The Cryosolic soils found in the study area had permafrost within 1 m of the organic or mineral surface (CSSC, 1998).

Regosolic Static Cryosols and Histic Regosolic Static Cryosols were the only mineral Cryosols found during the soil survey. They differ by Histic Regosolic Static Cryosols having 15 to 40 cm of peat and Regosolic Static Cryosols having less than 15 cm of peat. A range of peat depths were observed in the study area on Static Cryosols. Both these soils have minimal horizon development.

The types of peat material found on the study area in all types of Organic Cryosols were fibric and mesic in organic texture. Fibric material is the least decomposed organic material. Mesic material is organic matter that is moderately decomposed. These soils can be further divided by where mineral contact was found. Terric Fibric and Terric Mesic Organic Cryosols have mineral contact within 1 m of the surface. Fibric and Mesic Organic Cryosols had mineral contact below 1 m of the soil surface and ranged from 120 to 168 cm in the study area.

CrO Soil Unit

The CrO soil unit occurs on organic materials. The parent materials often associated with this soil unit are organic. The CrO soil unit is generally associated with Fibric Organic Cryosols, Mesic Organic Cryosols, Terric Mesic Organic Cryosols and Terric Fibric Organic Cryosols.

Table C-13: CrO Summary Table

Dominant Soil Classification		Fibric Organic Cryosol, Mesic Organic Cryosol, Terric Mesic Organic Cryosol and Terric Fibric Organic Cryosol	
Site and Profile Data		**Calculations**	
Texture	Mesic and Fibric	Land Capability Class	5OR
Parent Material	Organic	Reclamation Suitability (Topsoil/Subsoil)	N/R
Surface Expression	Level	Wind Erosion Risk Rating	N/A
Range of Slopes (%)	0-2	Water Erosion Risk Rating (<5% / 5-9% / 9-15% slopes)	N/A
Drainage Class	Very Poor	Compaction Risk Rating (Topsoil/Upper Subsoil/Lower Subsoil)	High/N/A/ Moderate
Topsoil/Subsoil texture	Organic/Organic, Sandy Loam, Loamy Sand	Average Topsoil thickness (cm)	98.4
		Area/Proportion of the Study Area (ha)/(%)	101.4/9

NOTE:
N/A = Not applicable

Table C-14: Description of CrO Soil Unit

Soil Classification	Terric Mesic Organic Cryosol
Parent Material	Peat over Medium textured Till
Soil Drainage Class	Very Poor
Topsoil Thickness (cm)	115
Forest Land Capability Calculation	5OR
UTM Coordinates (northing/easting)	12U 6888272/416636

Example Profile – Site ST08							
Horizon	**Depth (cm)**	**Moisture**	**Colour**	**Texture**	**Coarse Fragment Content (%)**	**Structure**	**Consistence**
Om	0 – 55	–	–	–	–	–	–
Omz	55 – 115	–	–	–	–	–	–
Cgz	115 – 130	–	2.5Y 4/4	Loamy Sand	5	Massive	Very Firm

Table C-15: Physical and Chemical Characteristics of the CrO Soil Unit – Site ST08

Horizon	Depth (cm)	pH (Saturated paste)	EC (dS/m)	Saturation (%)	SAR	TOC (%)	TKN (%)	Texture
Om	0 – 55	–	–	–	–	44.1	1.59	–
Omz	55 – 115	–	–	–	–	44.4	0.46	–
Cgz	115 – 130	5.8	0.48	225	<0.1	–	–	Loamy Sand

NOTES:
[1] TOC = Total Organic carbon, EC = Electrical conductivity, SAR = Sodium adsorption ratio, and TKN = Total Kjeldhal Nitrogen

CrM Soil Unit

The CrM soil unit occurs on moderately fine to very fine materials. The parent materials often associated with this soil unit are lacustrine and glaciolacustrine. The CrM soil unit is generally associated with Gleyed Static Cryosols, Regosolic Static Cryosols and Histic Regosolic Static Cryosols.

Table C-16: CrM Summary Table

Dominant Soil Classification		Gleyed Static Cryosols, Regosolic Static Cryosols and Histic Regosolic Static Cryosols	
Site and Profile Data		**Calculations**	
Texture	Moderately Fine to Very Fine	Land Capability Class	3D
Parent Material	Lacustrine and glaciolacustrine	Reclamation Suitability (Topsoil/Subsoil)	N/A
Surface Expression	Level	Wind Erosion Risk Rating	Moderate
Range of Slopes (%)	0-1	Water Erosion Risk Rating (<5% / 5-9% / 9-15% slopes)	Low/Low/Moderate
Drainage Class	Imperfect to Poor	Compaction Risk Rating (Topsoil/Upper Subsoil/Lower Subsoil)	N/A/N/A/Low
Topsoil/Subsoil texture	Organic, Silt Loam/Silty Clay Loam, Clay Loam	Average Topsoil thickness (cm)	32.7
		Area/Proportion of the Study Area (ha)/(%)	25.6/2

NOTE:
N/A = Not applicable

Table C-17: Description of CrM Soil Unit

Soil Classification	Regosolic Static Cryosol
Parent Material	Fine Textured Lacustrine
Soil Drainage Class	Imperfect
Topsoil Thickness (cm)	13
Forest Land Capability Calculation	3D
UTM Coordinates (northing/easting)	12U 6886418/415896

Example Profile – Site ST49							
Horizon	**Depth (cm)**	**Moisture**	**Colour**	**Texture**	**Coarse Fragment Content (%)**	**Structure**	**Consistence**
LFH	13 – 0	–	–	–	–	–	–
Ck1	0 – 20	Wet	7.5YR 4/4	Loamy Sand	–	Single Grain	Non-sticky
Ck2	20 – 58	Wet	7.5YR 4/3	Clay Loam	–	Massive	Slightly Sticky
Ckgj	58 – 99	Wet	10YR 4/4	Clay Loam	–	Massive	Sticky
Cgz	99 – 110	–	–	–	–	–	–

Table C-18: Physical and Chemical Characteristics of the CrM Soil Unit – Site ST49

Horizon	Depth (cm)	pH (Saturated paste)	EC (dS/m)	Saturation (%)	SAR	TOC (%)	TKN (%)	Texture
LFH	13 – 0	–	–	–	–	41.4	0.73	–
Ck1	0 – 2 0	5.5	0.34	32	0.2	–	–	Loamy Sand
Ck2	20 – 8	7.2	0.74	54	0.2	–	–	Clay Loam
Ckgj	58 – 99	7.2	0.74	54	0.2	–	–	Clay Loam
Cgz	99 – 110	–	–	–		–	–	–

NOTES:
[1] TOC = Total Organic carbon, EC = Electrical conductivity, SAR = Sodium adsorption ratio, and TKN = Total Kjeldhal Nitrogen

Organic Soil Unit

The Organic (Org) soil unit occurs on mesic, and humic materials. The parent materials often associated with this soil unit is organic. The Org soil unit is generally associated with Terric Mesisols and Terric Mesic Humisols. Compaction Risk for these soils is high for organic topsoils and moderate for lower subsoils in terric profiles. Average topsoil depth for these soils in the study area is 80 cm.

They are found in only 4 percent of the Thor Lake Study Area. Organic topsoil texture is organic over various mineral textured subsoil (in Typic soils the subsoil texture is not applicable). The Org soils occur on level surface expressions and have an average slope of 0%.

Bedrock

The bedrock (R) soil unit occurs on bedrock. The R soil unit is generally associated with thin Orthic Regosols and nonsoils. Areas defined as bedrock or non-soils have less than 10 cm of unconsolidated mineral or organic material overlying them (CSSC, 1998). The bedrock observed in the study area had 0 to 7 cm organic material overlying them. Zero centimeters of organic material overlying the bedrock was the most common observance in the study area.

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Appendix A.5

Thor Lake Rare Earth Metals Baseline Project Environmental Baseline Report: Volume 5 – Vegetation 2010

THOR LAKE RARE EARTH METALS BASELINE PROJECT

Environmental Baseline Report:
Volume 5 – Vegetation Resources

FINAL INTERIM REPORT

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EXECUTIVE SUMMARY

In 2009 baseline vegetation studies were completed on behalf of Avalon Rare Metals Inc. for the Thor Lake Project, Nechalacho Deposit. These studies were planned based on recommendations contained in a "gap analysis" completed in 2007 by Jacques Whitford AXYS (now Stantec) for the same area. The 2007 gap analysis recommended that terrestrial ecosystem mapping be completed for the area around the proposed Project. In addition, the gap analysis indicated that a rare plant survey be completed as part of the baseline studies.

Vegetation field surveys were undertaken in June 2009 to gather data in support of terrestrial ecosystem mapping (TEM) of the Thor Lake area. An early-summer rare plant field survey was also completed in June 2009.

Two separate study areas were defined for the purposes of this baseline reporting: the local study area (LSA) and the regional study area (RSA). The LSA is almost 1800 hectares and the RSA is 44,030 hectares. Following field work, ecosystem mapping was completed for the LSA or approximately 1797 ha surrounding the proposed Project footprint. A total of twenty-one (21) vegetated ecosystem units and nine non-vegetated units (such as rock and open water) were mapped in the study area. Vegetation classification mapping was completed for the larger RSA area to support general vegetation assessment as well as in support of wildlife habitat capability and suitability assessment.

Ecosystem maps were then analyzed to determine the abundance and distribution of ecosystems in the study areas at Baseline (2009).

This Technical Data Report is to be considered interim.

ABBREVIATIONS AND ACRONYMS

ATV .... All Terrain Vehicle
BC .... British Columbia
cm .... centimetre
COSEWIC .... Committee on the Status of Endangered Wildlife in Canada
DBH .... diameter at breast height
ENR .... Northwest Territories Environment and Natural Resources Department
ETM+ .... Enhanced Thematic Mapper Plus
GIS .... Geographic Information systems
GPS .... Global Positioning System
ha .... hectares
HD-MAPP .... High Definition Mapping and Applications
HHERA .... Human Health and Ecological Risk Assessment
JWA .... Jacques Whitford AXYS Ltd.
km .... kilometre
LA .... lake
LSA .... Local Study Area
m .... metre
MVRMA .... *Mackenzie Valley Resource Management Act*
NDVI .... Normalized Difference Vegetation Index
NIR .... near infrared
NWT .... Northwest Territories
PFS .... Prefeasibility Study
RIC .... British Columbia Resource Inventory Committee Standards
RSA .... Regional Study Area
SIL .... survey intensity level
SLC .... Scan Line Corrector
SW .... Southwest
TDR .... Technical Data Report
TEM .... Terrestrial Ecosystem Mapping
UTM .... Universal Transverse Mercator
VENUS .... Vegetation and Environmental Data Nexus

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Appendix E .... Interim LSA Ecosystem Descriptions
Appendix F .... Interim Ecosystem Mapping Legend and Mapped Hectares
Appendix G .... Edatopic Grid of Mapped Ecosystems within the LSA
Appendix H .... Landscape Profile of Mapped Ecosystems within the LSA
Appendix I .... Moisture Regimes and Ecosystems found within the LSA
Appendix J .... Interim Rare Plant Survey Coordinates
Appendix K .... Interim Preliminary Species List

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1 INTRODUCTION

Avalon Rare Metals Inc (Avalon) is currently undertaking a Prefeasibility Study (PFS) for the development of the Thor Lake Project, Nechalacho Deposit, located on mineral leases it holds at Thor Lake in the Northwest Territories. The Nechalacho deposit is located approximately 100 km southeast of Yellowknife and 4 km north of the Hearne Channel of Great Slave Lake.

The Thor Lake Project site is located within the Akaitcho Territory, an area currently under negotiation of a comprehensive land claim between the federal government and the Akaitcho First Nations, representing First Nations in Lutselk‟e, Fort Resolution, Ndilo and Dettah. Thor Lake lies within the Mackenzie Valley region of the NWT and is, therefore, subject to the provisions of the *Mackenzie Valley Resource Management Act* (MVRMA) in addition to other federal and territorial legislation of general application.

The Thor Lake site has been subject to mineral exploration since the 1970s. Previous exploration focused on beryllium resources in the T-zone and included drilling and bulk sampling. Since acquiring the property in 2006, Avalon has focused on delineating the rare earth resource within the Nechalacho Deposit. Preliminary development concepts being considered for the Nechalacho Deposit during the PFS include development of an underground mine, mineral concentration, tailings disposal, waste rock disposal, fuel and concentrate storage, power generation and transportation infrastructure (airstrip, upgraded site roads, wharf on Great Slave Lake). Concentrate would be shipped off-site seasonally for refinement into a marketable rare earth product.

Stantec (formerly Jacques Whitford AXYS Ltd.) initiated environmental baseline studies at the Thor Lake project, Nechalacho Deposit in the fall of 2008. Aquatic monitoring of drilling was undertaken during fall 2007 and winter 2008. This Technical Data Report (TDR) presents and analyzes data collected for the vegetation discipline as of fall 2009.

This interim report for 2009 presents background information, methods, and results for baseline vegetation studies conducted for Avalon related to this Project. A data gap analysis was completed in the same study area during 2007 by Jacques Whitford AXYS Ltd. (JWA) (now Stantec).

This gap analysis recommended that terrestrial ecosystem mapping (TEM) be conducted at a scale of 1:20,000 following BC Resource Inventory Committee (RIC) Standards. Also, the gap analysis recommended that the regional mapping be expanded to cover about 40,000 hectares. In addition the JWA analysis recommended that a rare plant survey be conducted in areas with high potential for rare plants such as wetlands, riparian areas, areas of shallow water, and rock outcrops – particularly those with warm exposures.

The 2009 baseline program was designed to address these identified gaps. Field programs were undertaken to inventory the vegetation resources as well as conduct terrain and soils studies. A modified TEM was completed to describe the distribution and abundance of ecosystems and a separate summer rare plant survey was completed.

Vegetation is a critical component in the diversity and function of natural ecosystems. Vegetation provides habitat and food for wildlife, performs important roles in environmental processes such as the water, air, and soil nutrient cycling, and provides a scenic backdrop for recreation. Changes in vegetation community or species diversity may alter ecosystem function and can have negative implications for wildlife, human recreation and physical environmental cycles.

There are two main sections in this Technical Report: the ecosystem mapping and the rare plant survey.

The detailed description and spatial mapping of ecosystems allow for the identification of sensitive or ecologically important ecosystems, culturally important plants, rare plants and rare ecosystems, and unusual forest types. Analyzing ecosystem distribution also serves as the basis for wildlife habitat suitability mapping and many other interpretations.

Rare plants are species that exist in small numbers or have a limited global or territorial distribution (Lancaster 2000). In the Northwest Territories, the Environment and Natural Resources (ENR) Department of the NWT Government is in the process of listing and ranking the status of plant species found in the territory and has begun monitoring their populations. The lists of these species with their corresponding ranks are presented in this document (See Section 4, Table 9).

In summary, the objectives of the entire vegetation baseline program are to:

- Develop ecosystem maps for local and regional study areas around the Thor Lake Project Nechalacho Deposit
- Survey the area for rare plants
- Collect lichen and other forage species samples for contaminants analysis
- Complete a general survey for the presence of invasive plants in the study area
- Provide a report describing baseline conditions of the proposed mine site area, which will in turn to support the permitting processes.

In 2009, the vegetation team completed one field trip. This interim Technical Data Report presents the background information, methods, and results of field work done in 2009.

Refer to the following appendices for supporting details and maps:

Appendix A	Interim RSA Vegetation Classification
Appendix B	Ecosystem Mapping Field Survey 2009 Locations (RSA &LSA)
Appendix C	Interim LSA Ecosystem Map (on Orthophoto)
Appendix D	Interim Regional Mapping Unit Descriptions
Appendix E	Interim LSA Ecosystem Descriptions
Appendix F	Interim Ecosystem Mapping Legend and Mapped Hectares
Appendix G	Edatopic Grid of Mapped Ecosystems within the LSA
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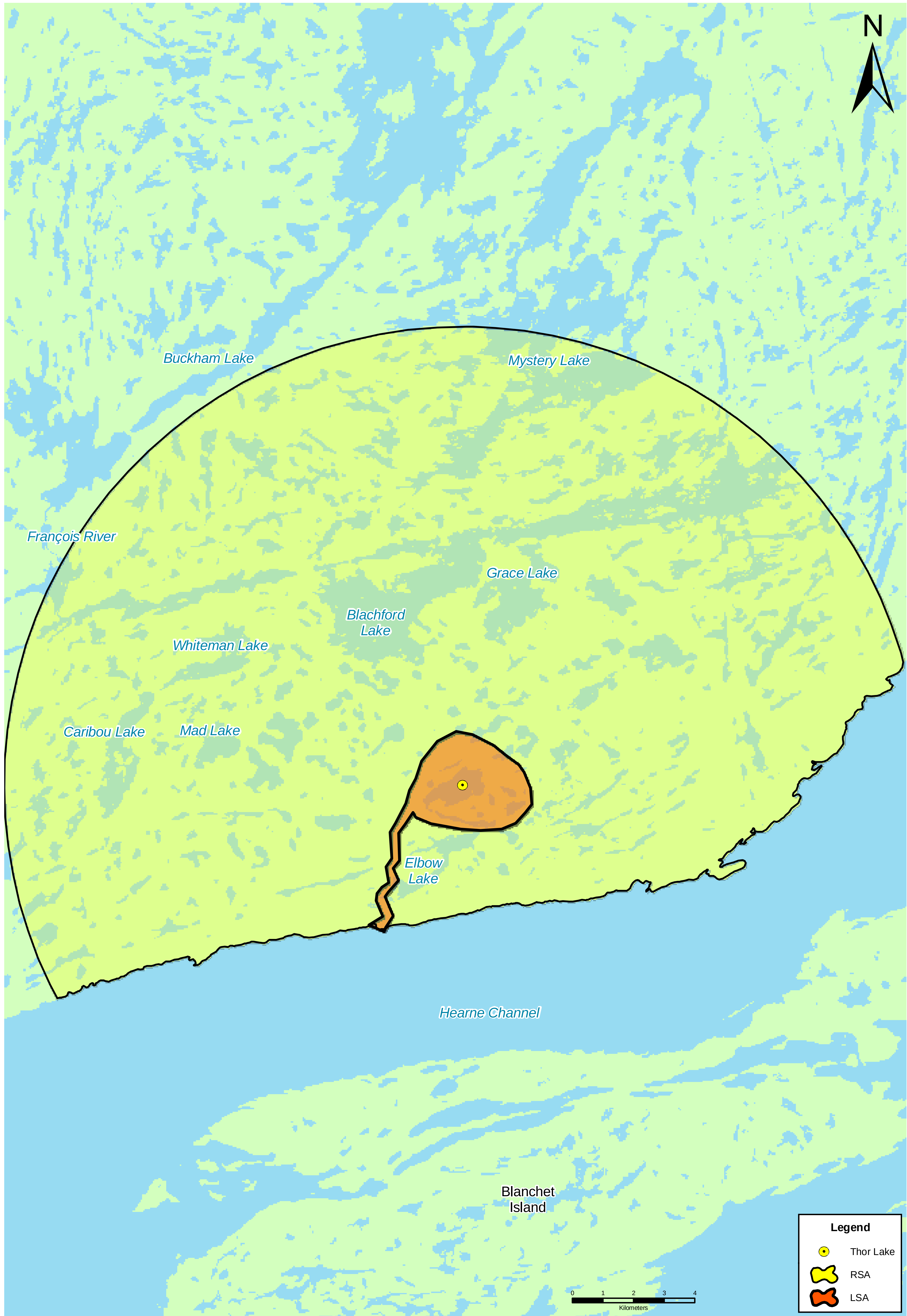
Appendix I	Moisture Regimes and Ecosystems found within the LSA
Appendix J	Interim Rare Plant Survey Coordinates
Appendix K	Interim Preliminary Species List

2 STUDY AREA BOUNDARIES

Two separate study areas have been defined for the purposes of this baseline reporting: the interim local study area (LSA) and the regional study area (RSA). These study areas are defined based on the proposed development as known in 2009 and by landscape features. (See Figure 1, Thor Lake Project Area indicating the Local and Regional Study Areas.)



2009 Baseline Studies for Avalon Ventures Ltd.
Proposed Thor Lake Rare Earth Metals Project

Thor Lake Project Area Indicating the Local and Regional Study Areas

AVALON RARE METALS INC.

PREPARED BY
Stantec

DRAFT DATE 16/10/2009		SCALE 1:116,000	
REVISION DATE 15/12/2009		PROJECT 1036222	FIGURE NO. 1
DRAWN JB	CHECKED SP	APPROVED CB	VOL

2.1 Interim Local Study Area

The interim 2009 Local Study Area (LSA) currently occupies an area of 1,797.2 ha and contains an anticipated direct projected footprint area (yet to be defined) while providing suitable data for both vegetation and wildlife assessments and interpretation over time. In order to support the Project assessment, the vegetation field work and the detailed ecosystem mapping was focused on the LSA.

2.2 Regional Study Area

The RSA occupies an area of 44,030.0 ha and is defined as a 15 kilometer radius around the anticipated project footprint. This broader study area is representative of the area affected by the project and is used to provide a regional context for the assessment of environmental affects – especially in support of regional wildlife habitat assessments.

Figure 2: General Overview Image Indicating the RSA (red boundary)

3 ECOSYSTEM MAPPING METHODS

Vegetation resources have been described through a combination of field inventory and 1:20,000 scale ecosystem mapping. The methods used to characterize vegetation resources in the study areas are described in this section.