

APPENDIX D

# Geotechnical Program

## **SUBSURFACE CONDITIONS AT DREDGE AREA**

Two sediment layers were encountered at drillholes DH-BGC11-07 to -24, with the exception of DH-BGC11-20, where the sediment was mixed with coal fill. Note, the first layer is overlying the second layer.

The following provides a geotechnical description of the two sediment layers and in addition, the native soils underlying the sediment. In addition, Table 1 provided after the soils descriptions includes a summary of depths, elevations, and the overall thickness of the stratigraphic units logged in the boreholes.

### **First Sediment Layer -**

The first sediment layer consisted of a black SILT and CLAY. The black sediment layer was encountered at El. ranging from -13.80 m at DH-BGC11-23 to -17.24 m at DH-BGC11-15. The layer extended to El. ranging from -13.90 m at DH-BGC11-23 to -18.05 m at DH-BGC11-11. At DH-BGC11-08, where the sediment layers are overlain by the coal fill, the black SILT and Clay layer extends from El. -18.64 to -18.80 m. This material contained some trace fine sand and traces of gravel (often coal), and had a very soft (S1) consistency, a coal tar odour, and an oily sheen.

### **Second Sediment Layer -**

The second sediment layer, a greenish grey SILT and CLAY, was encountered at El. ranging from -13.90 m at DH-BGC11-23 to -18.05 m at DH-BGC11-11. The layer extended to El. ranging from -14.70 m at DH-BGC11-23 to -18.47 m at DH-BGC11-09. At DH-BGC11-10 to -19 and -21 to -22, this sediment layer extended to the maximum drilled depth. At DH-BGC11-08, where the coal fill is present, the greenish grey SILT and Clay layer extends from El. -18.80 to -18.86 m. This material contained trace fine sand and was characterized by a very soft (S1) consistency. The colour ranged from brownish grey to greenish grey.

### **Underlying, Native Soils -**

Where drillholes were advanced deep enough, the SILT and CLAY sediment was overlying a layer of SAND and GRAVEL and/or a layer of glacial till, overlying a sandstone and siltstone bedrock.

The SAND and GRAVEL layer, likely alluvial in origin, was encountered underneath the sediment at boreholes DH-BGC11-07 and DH-BGC11-09. This layer was encountered at El. -18.46 m at DH-BGC11-07 to El. -18.47 m at DH-BGC11-09 and extended to the maximum drilled depth. At DH-BGC11-09 the layer consisted primarily of gravel and contained some cobbles and at DH-BGC11-07 it consisted primarily of sand and contained some gravel, some silt and trace clay. This material was characterized at both locations by a grey colour, rounded to subangular particles, and a very loose to loose relative density.

Glacial till was encountered at boreholes DH-BGC11-20, DH-BGC11-23 and DH-BGC11-24, all located near the edge of Pier No.4. The glacial till was encountered at El. ranging from -14.70 m at DH-BGC11-23 to -16.50 m at DH-BGC11-24 and extended to the maximum

drilled depth. The glacial till at these locations consisted primarily of gravel, but contained a wide range of particle sizes. It was characterized by some cobbles, some sand to sandy, some silt to silty and a greyish pink to greyish brown colour. The relative density of the glacial till encountered was very loose to compact.

At drillholes DH-BGC11-08 and DH-BGC11-20, a layer of gravel-sized coal fill pieces was found above the SILT and CLAY sediment layer. This layer extended from El. -15.61 to -18.64 m at DH-BGC11-08 and El. -13.93 to -15.13 m at DH-BGC11-20. The coal fill was a black material of gravel-sized pieces. At DH-BGC11-20, the coal material was found to contain some silt, sand and clay, likely mixed from the sediment layer. At both locations, this layer was characterized by a very loose to loose relative density.

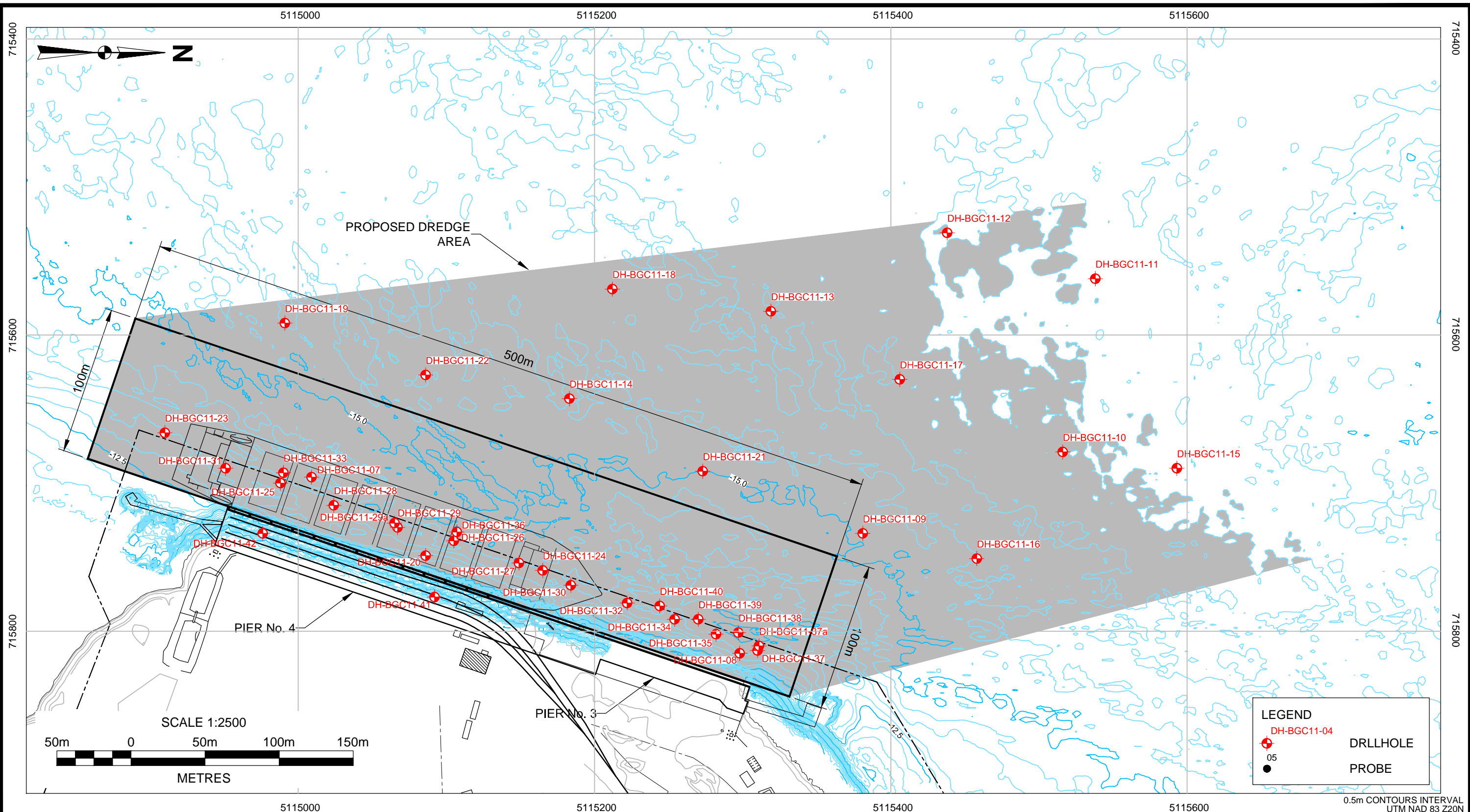
**Table 1 – Subsurface Stratigraphy Summary**

BGC Hole No.	Harbour Bottom Elevation <sup>1</sup> (m)	Coal Fill Thickness (m)	Bottom of Coal Fill Elevation <sup>1</sup> (m)	Black Silt/Clay Sediment Thickness (m)	Bottom of Black Silt/Clay Sediment Elevation <sup>1</sup> (m)	Greenish Grey Silt/Clay Sediment Thickness (m)	Bottom of Greenish Grey Silt/Clay Sediment Elevation <sup>1</sup> (m)	Gravel/Sand Thickness (m)	Bottom of Gravel/Sand Elevation <sup>1</sup> (m)	Glacial Till Thickness (m)	Top of Glacial Till Elevation <sup>1</sup> (m)	Bottom of Glacial Till Elevation <sup>1</sup> (m)	Depth to Bedrock (m)	Top of Bedrock Elevation <sup>1</sup> (m)	Total Hole Depth (m)	Bottom of Hole Elevation <sup>1</sup> (m)
DH-BGC11-07	-15.35	-	-	0.45	-15.80	2.66	-18.46	>1.24	m.d.d <sup>2</sup>	-	-	-	-	-	4.35	-19.70
DH-BGC11-08	-15.61	3.03	-18.64	0.16	-18.80	0.06	-18.86	-	-	-	-	-	3.25	-18.86	4.35	-19.96
DH-BGC11-09	-15.52	-	-	0.55	-16.07	2.40	-18.47	>0.45	m.d.d <sup>2</sup>	-	-	-	-	-	3.40	-18.92
DH-BGC11-10	-16.88	-	-	0.30	-17.18	>1.90	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	2.20	-19.08
DH-BGC11-11	-17.23	-	-	0.82	-18.05	>1.53	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	2.35	-19.58
DH-BGC11-12	-13.99	-	-	0.40	-14.39	>3.4	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	3.80	-17.79
DH-BGC11-13	-16.27	-	-	0.40	-16.67	>1.45	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	1.85	-18.12
DH-BGC11-14	-16.11	-	-	0.58	-16.69	>1.57	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	2.15	-18.26
DH-BGC11-15	-17.24	-	-	0.44	-17.68	>0.16	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	0.60	-17.84
DH-BGC11-16	-15.87	-	-	0.46	-16.33	>1.39	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	1.85	-17.72
DH-BGC11-17	-16.73	-	-	0.40	-17.13	>0.95	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	1.35	-18.08
DH-BGC11-18	-16.82	-	-	0.30	-17.12	>0.90	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	1.20	-18.02
DH-BGC11-19	-16.67	-	-	0.30	-16.97	>0.90	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	1.20	-17.87
DH-BGC11-20	-13.93	1.20	-15.13	-	-	-	-	-	-	>0.90	-15.13	m.d.d <sup>2</sup>	-	-	2.10	-16.03
DH-BGC11-21	-16.02	-	-	0.19	-16.21	>1.56	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	1.75	-17.77
DH-BGC11-22	-15.82	-	-	0.31	-16.13	>1.59	m.d.d <sup>2</sup>	-	-	-	-	-	-	-	1.90	-17.72
DH-BGC11-23	-13.80	-	-	0.10	-13.90	0.80	-14.70	-	-	>3.60	-14.70	m.d.d <sup>2</sup>	-	-	4.50	-18.30
DH-BGC11-24	-15.10	-	-	1.14	-16.24	0.26	-16.50	-	-	>1.00	-16.50	m.d.d <sup>2</sup>	-	-	2.40	-17.50

<sup>1</sup>All elevations are in reference to Chart Datum.

<sup>2</sup>m.d.d. = maximum depth drilled

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TITLE: PEV WHARF AND DREDGE AREA GEOTECHNICAL SITE PLAN		
PROJECT No.:	DWG No.:	REV.:
0612-006-002	02	