

November 1, 2006

YX00748

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Attn: Gary Strong, P.Eng.

Dear Sir:

Re: Geotechnical Investigation – Sewage Lagoon, Cape Dorset, NU

1.0 INTRODUCTION

At the request of Mr. Gary Strong, on behalf of Dillon Consulting Ltd (DCL), AMEC Earth & Environmental, a Division of AMEC Americas Limited (AMEC), carried out a drilling program at the Cape Dorset lagoon site.

The purpose of the drilling program was to assess the soil and permafrost conditions along the proposed berm alignment and within the lagoon impoundment for consistency with the assumed subsurface conditions used for the geothermal modeling and development of the berm design recommendations presented in AMEC report for the site dated October 2005.

2.0 FIELD PROGRAM

The field drilling program was conducted on September 8th and 9th, 2006 under the supervision of Mr. Dmitry Dumsky, a permafrost engineer with AMEC. Twenty-two shallow boreholes and two test pits were drilled/excavated at the site. Borehole and test pit locations were determined by Mr. D. Dumsky in the field in consultation with Dr. A. Tchekhovski. Due to method of the drilling, the boreholes could be advanced to the maximum depth of 3.10 m below the ground surface. The test pits were excavated to about a 2.0 m depth. Locations of the boreholes and test pits are presented in Figure 1, Appendix A.

Sealed steel conduits were installed in boreholes BH – 01 through BH – 04. The conduits were installed to depths of 3.0 m to allow for ground temperature monitoring. However, due to ingress of groundwater in the boreholes, reliable temperature data were obtained only in BH-04.

The method of the drilling did not allow for an assessment of the material composition or the ice/moisture content for overburden; however, location of the bedrock table was determined

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based on a drilling rate and the shape and mineral composition of cuttings as they were returned to the surface.

3.0 SITE DESCRIPTION

The sewage lagoon is located about 800 m southeast of the community, beside the communities gravel pit. It is understood that the proposed sewage lagoon will have a footprint area in an order of 2.4 ha. The lagoon site was noted to be mostly covered with shattered granite blocks, up to 5 m in size; large bedrock outcrops were also visible around the lagoon perimeter.

4.0 DRILLING RESULTS

The overburden was observed to be generally thicker in the middle of the lagoon and thinner along the berm alignment. Boreholes and test pits data are shown in Table 1 and measured ground temperatures are shown in Table 2 below.

Table 1: Depth to Bedrock

Borehole (Test Pit) #	Depth to Bedrock, m	Thickness of Active Layer, m	Location
1	0.0	Not determined	Main Berm
2	0.0	Not determined	Main Berm
3	0.0	Not determined	Main Berm
4	0.0	Not determined	Northeast Berm
5	2.1	Not determined	Main Berm
6	0.6	Not determined	Main Berm
7	0.9	Not determined	West Berm
8	1.8	Not determined	Lagoon Impoundment
9	1.8	Not determined	Lagoon Impoundment
10	2.1	Not determined	Lagoon Impoundment
11	2.3	Not determined	Lagoon Impoundment
12	2.4	1.8	Lagoon Impoundment
13	2.7	Not determined	Lagoon Impoundment
14	over 3.1	Not determined	Lagoon Impoundment
15	2.4	1.8	Lagoon Impoundment
16	1.8	Not determined	Lagoon Impoundment
17	1.5	Not determined	Lagoon Impoundment
18	2.1	Not determined	Lagoon Impoundment
19	1.8	Not determined	Lagoon Impoundment
20	1.2	Not determined	Lagoon Impoundment
21	1.8	Not determined	Lagoon Impoundment
22	2.4	Not determined	Northeast Berm
TP – 1	Not determined	2.0	Lagoon Impoundment
TP – 2	Not determined	2.0	Lagoon Impoundment

Table 2: Ground Temperature Data in BH-04

Depth Below Ground Surface, m	Temperature, °C
1	-0.10
2	-0.4
3	-0.6

The average thickness of the overburden along the main berm alignment is 1.2 m and the maximum thickness (BH-05) is 2.1 m. However, no boreholes were drilled in the central portion of the main berm alignment due to high groundwater table and rough ground surface in this area. It is expected that the depth to bedrock is more represented by BH-08 to BH-13, drilled within the lagoon impoundment about 40 to 50 m to the east of berm centerline. The average dip to bedrock in these six boreholes was 2.2 m, and ranged from about 1.8 to 2.7 m below ground surface. The thickness of the active layer is expected to be about 1.8 to 2.0 m in this area. The permafrost temperature at 3 m depth was -0.6 °C. Taking into account that the drilling was undertaken in September, the mean annual permafrost temperature at a depth of about 15 m at BH-04 location was extrapolated to be in a range of -4.0 °C to -5.0 °C.

In BH-04, located in the northeast berm area, two boreholes were advanced at the northeast berm alignment. Bedrock was encountered from the ground surface in BH-04 while the overburden thickness was 2.4 m in BH-22.

The average thickness of the overburden over the lagoon impoundment is about 2.0 m. However, BH-14, advanced within the middle part of the impoundment, did not encounter bedrock to a depth of 3.1 m.

5.0 CLOSURE

The results of the drilling confirmed that the soil and permafrost conditions at the lagoon site are in a close agreement with the assumed subsurface conditions described in the AMEC geotechnical report. Based on this, AMEC considers that the results of the geothermal modeling provide reliable data on the temperature regime of the berm and the berm subgrade. The recommended depth of the cut-off trench, based on the berm subgrade temperature, both in the AMEC geotechnical report and DCL design specifications also can be considered sufficient to eliminate unlikely seepage under the berm.

This report has been prepared for the exclusive use of Dillon Consulting Limited or their agents for specific application to the development described within this report. Any use that a third party makes of this report, or any reliance or decisions based on this report are the sole responsibility of those parties. It has been prepared in accordance with generally accepted soil and foundation engineering practices.

Respectfully submitted,

**AMEC Earth & Environmental,
a division of AMEC Americas Limited**

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Nov 1, 2006

Reviewed by: Paul Cavanagh, M. Eng., P. Eng.,
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PERMIT TO PRACTICE AMEC Earth & Environmental, a Division of AMEC Americas Limited	
Signature	<i>[Signature]</i>
Date	<i>November 1, 2006</i>
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