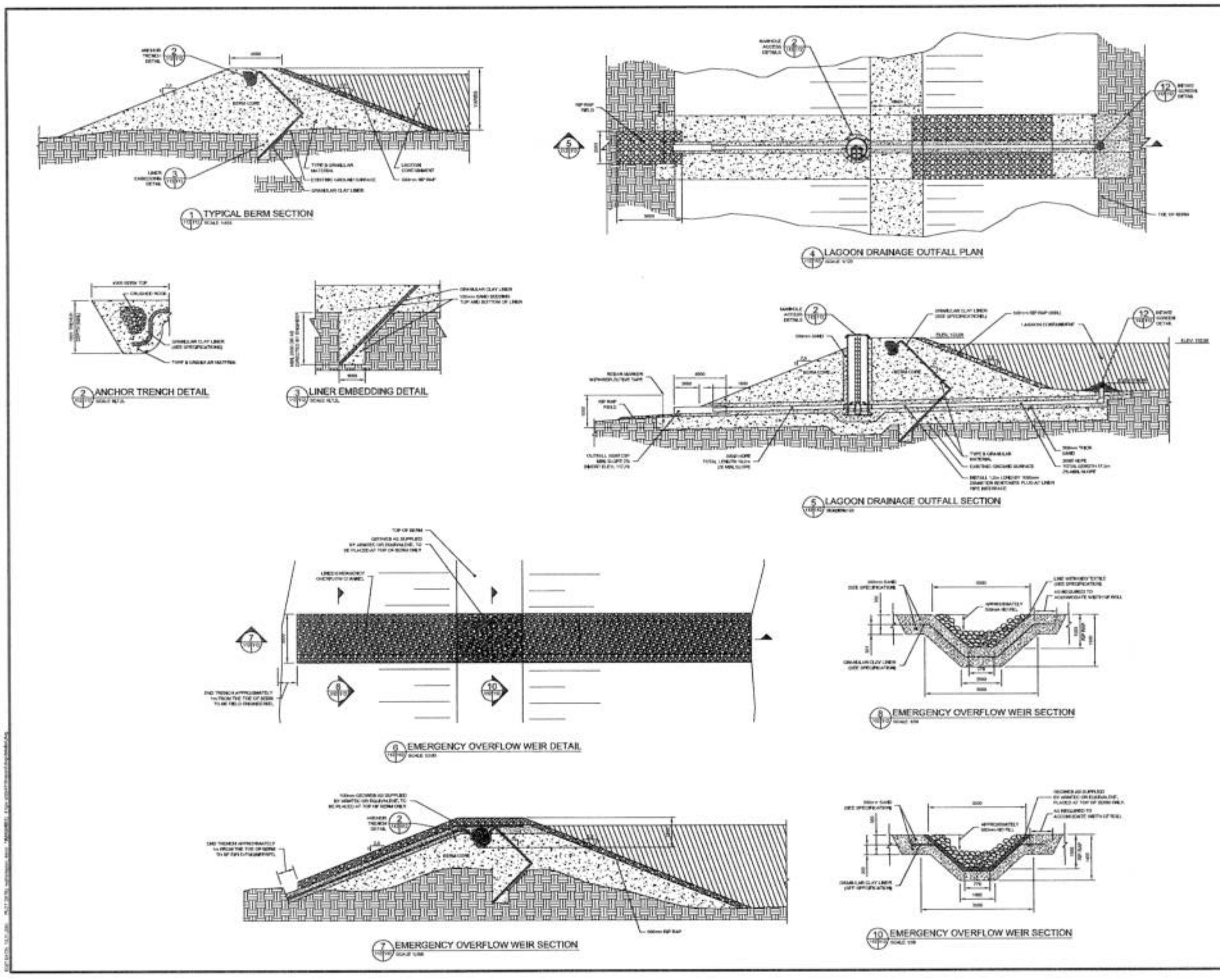


RECORD DRAWING

DRAWING REDUCED NOT TO SCALE

REVISIONS

DESIGN	DRAWN	CHECKED	DATE
GS	TPW	GS	NOV 07

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER
DILLON CONSULTING LIMITED

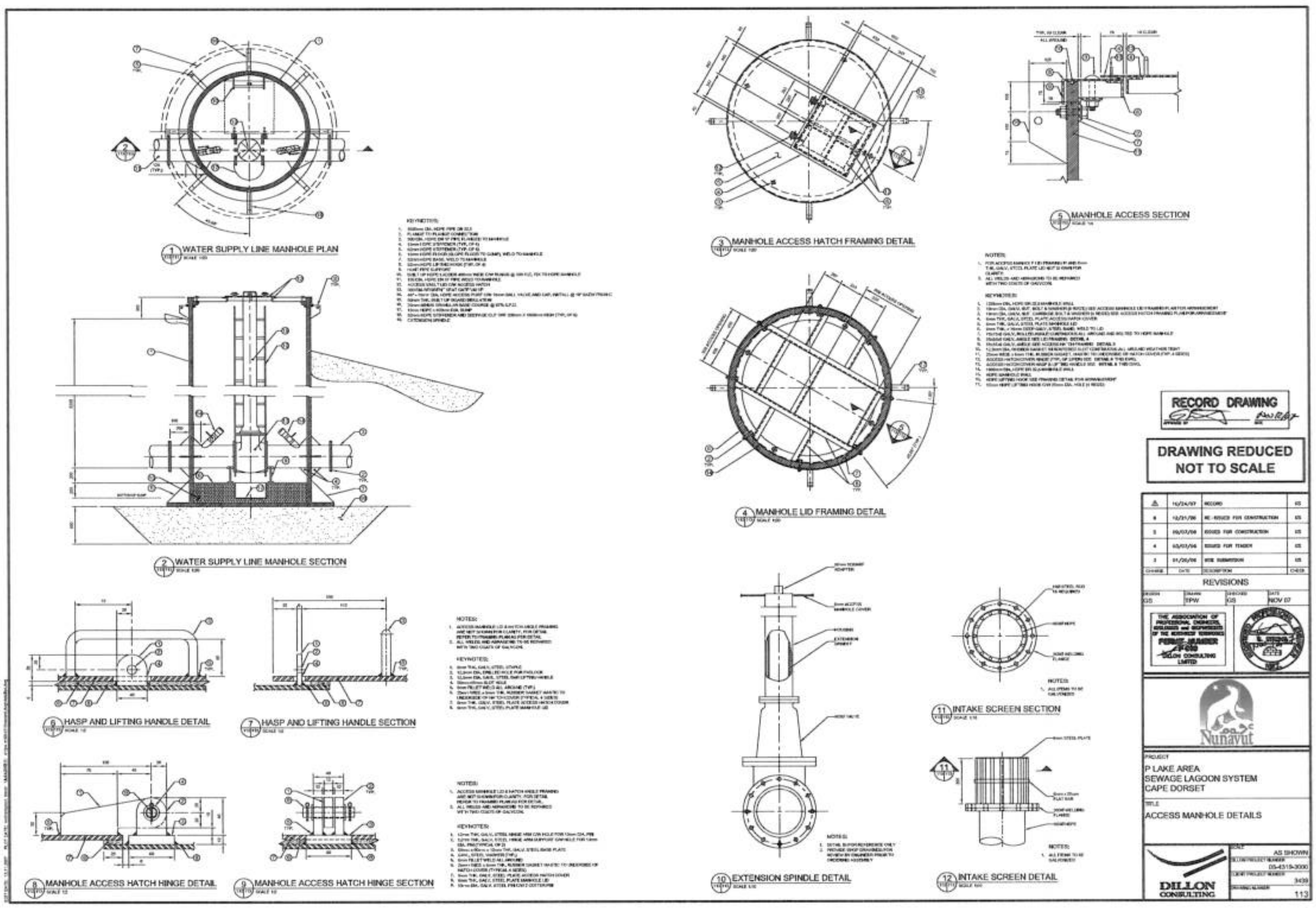
Nunavut

PROJECT
P LAKE AREA
SEWAGE LAGOON SYSTEM
CAPE DORSET

TITLE
LAGOON BERM SECTIONS AND DETAILS

DILLON CONSULTING

SCALE	AS SHOWN
DILLON PROJECT NUMBER	05-4319-3000
CLIENT PROJECT NUMBER	3439
DRAWING NUMBER	112


1 WATER SUPPLY LINE MANHOLE PLAN
2 WATER SUPPLY LINE MANHOLE SECTION
3 MANHOLE ACCESS HATCH FRAMING DETAIL
4 MANHOLE LID FRAMING DETAIL
5 MANHOLE ACCESS SECTION
6 HASP AND LIFTING HANDLE DETAIL
7 HASP AND LIFTING HANDLE SECTION
8 MANHOLE ACCESS HATCH HINGE DETAIL
9 MANHOLE ACCESS HATCH HINGE SECTION
10 EXTENSION SPINDLE DETAIL
11 INTAKE SCREEN SECTION
12 INTAKE SCREEN DETAIL
NOTES:
KEYNOTES:
RECORD DRAWING
DRAWING REDUCED
NOT TO SCALE
REVISIONS
GS
TPW
GS
NOV 07
Nunavut
PROJECT
P LAKE AREA
SEWAGE LAGOON SYSTEM
CAPE DORSET
TITLE
ACCESS MANHOLE DETAILS
AS SHOWN
05-4319-3000
3439
113
DILLON
CONSULTING

LEGEND

PLAN:

EXISTING:
MINOR CONTOUR (1m)
MAJOR CONTOUR (5m)
THERMISTER LOCATIONS (STANDARD GPS ACCURACY)

NOTES

UTM COORDINATES ARE IN NAD83, WGS84 ELLIPSOID, UTM ZONE 18.

RECORD DRAWING

APPROVED BY / DATE

CHANGE	DATE	DESCRIPTION	CHECK
⚠	05/01/09	RECORD	GS
7	10/24/07	RECORD	GS
6	12/21/06	RE-ISSUED FOR CONSTRUCTION	GS
5	09/07/06	ISSUED FOR CONSTRUCTION	GS
4	03/07/06	ISSUED FOR TENDER	GS

REVISIONS

DESIGN	DRAWN	CHECKED	DATE
GS	TPW	GS	MAY 09

THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS and GEOPHYSICISTS OF THE NORTHWEST TERRITORIES
PERMIT NUMBER P 018
DILLON CONSULTING LIMITED

REGISTERED PROFESSIONAL ENGINEER G. STRONG N.W.T.

Nunavut

PROJECT

P LAKE AREA
SEWAGE LAGOON SYSTEM
CAPE DORSET

TITLE

THERMISTER LOCATIONS

DILLON CONSULTING

SCALE: AS SHOWN
DILLON PROJECT NUMBER: 05-4319-3000
CLIENT PROJECT NUMBER: 3439
DRAWING NUMBER: 114

APPENDIX-B:

Lagoon Berm Foundation Design

13 October 2005
YX00748

Dillon Consulting Limited
P.O. Box 1409,
4920 47th Street
Yellowknife, NT X1A 2P1

Attention: Mr. Gary Strong, P.Eng.
Project Manager.

Dear Mr. Strong:

Re: Geotechnical Investigation for P- Lake Sewage Lagoon, Cape Dorset, NU

At the request of Mr. Gary Strong, on behalf of Dillon Consulting Limited (DCL), AMEC Earth & Environmental (AMEC), a division of AMEC Americas Limited conducted a geotechnical investigation and geothermal modeling for the proposed sewage treatment system in Cape Dorset, NU. Authorization to proceed with the investigation was received by signing Dillon's Short Form Agreement for Sub-Consultant Service dated June 3, 2005 for the above noted project.

1.0 BACKGROUND INFORMATION AND SCOPE OF WORK

The community of Cape Dorset is located on the Dorset Island (southwest of Baffin Island) and occupies two river valleys that extend inland and then end abruptly against precipitous bluffs of the Kingnait Hills.

The sewage lagoon is to be located about 1.9 km south of the airport and 800 m southeast of the community. It is understood that the proposed sewage lagoon will have a footprint area in the order of 2.4 ha. It is also understood that the lagoon berm is to be designed on the basis of a frozen-core, low permeability material, or synthetic liner concept.

Based on AMEC's proposal dated April 11, 2005 and subsequent discussions with DCL the objective of the investigation was to:

- Conduct a review of available aerial photographs and relevant geotechnical information.
- Conduct a review of the climatic and permafrost historical data,
- Conduct a site reconnaissance and hand auger drilling program across the proposed lagoon site.

AMEC Earth & Environmental
a Division of AMEC Americas Limited
Suite #6, 5102 – 50th Avenue
P.O. Box 2245
Yellowknife, NT X1A 2P7
Tel: +1 (867) 920-4140
Fax: +1 (867) 920-4402
www.amec.com

- Conduct a hand auger drilling program at select local borrow sources.
- Conduct a laboratory analysis on select samples obtained during the drilling program.
- Conduct a geothermal analysis of the proposed berm configuration to assess the potential effectiveness of a frozen core liner concept.
- Prepare this geotechnical report that summarizes the results of the geotechnical investigation that includes:
    - Discussion of subsurface conditions encountered at the borehole locations,
    - Recommendations for the development of low permeability lagoon walls, including a geothermal analysis of the berm structures,
    - Development of design requirements for lagoon wall stability,
    - Discussions of borrow source materials, and,
    - Recommendations for site grading and drainage, if required.

2.0 CLIMATE, TERRAIN AND GEOLOGY

Cape Dorset is located geographically at approximately 64°14' N latitude and 76°32' W longitude. Climate records for Cape Dorset were reviewed for the period from 1971 to 2000. The average annual mean temperature is reported to be –8.9 °C. The average thawing and freezing indices for Cape Dorset are calculated to be about 507 °C-days and 3675 °C-days, respectively.

The topography of the Cape Dorset region is very rugged with elevations varying in excess of 300 m. The primary processes that created the regional landscape, are solifluction and frost wedging. These processes produce large talus slopes at the base of many bedrock outcrops. The talus slopes are created when weathered material is transported downslope due to gravity and accumulates in a fan like pile at the base of the hill.

Bedrock in the Cape Dorset area generally consists of extremely old Precambrian gneiss and marble with granite intrusions of Aphebian era. The bedrock is fairly closely jointed with numerous small faults. The impact of these faults on the dyke design is expected to me minimal as Cape Dorset Island is located within a Seismic Zone (Z_a/Z_v) of 0 to 1 (Canadian Foundation Engineering Manual, 1992). The close jointing typically results in blocky and broken ground surface and facilitates rapid accumulation of talus.

The surficial materials include glacial till, talus and marine beach deposits. Isolated deposits of glacial silty sand and gravel (till) overlay bedrock in the uplands. Talus is the most common surficial material in the area. A granular composition of this material varies from silt to gravel sizes. The thickness of the deposits would be up to several meters. Beach deposits may be encountered at elevations below 180 m and become more common and increase in particle size with decreasing elevation. The beach soils comprise sand and gravel with numerous inclusions of cobbles and boulders. The thickness of the deposits is unknown.

3.0 PERMAFROST

Cape Dorset Island lies within the continuous permafrost zone. The depth of the seasonal thaw varies from about 1.0 m to 2.0 m, depending on ground vegetative cover and surface disturbance. The mean annual permafrost temperature within the study area would be about -5 °C to –7°C at a depth of 10 m to 12 m.

4.0 REVIEW OF EXISTING INFORMATION

AMEC has reviewed the following information for this investigation:

- **Aerial Photographs Interpretation and Terrain Analysis,** Cape Dorset, N.W.T, June 1979, Submitted to Town Planning and Lands Division, Department of Local Government, Government of the Northwest Territories, submitted by Thurber Consultants Ltd.
  - aerial photographs, scale 1:60 000 were interpreted and review of published geological information was undertaken. As a result, surficial geology and bedrock conditions were marked on the photographs and subsequently transferred to the completed aerial photograph mosaic. Unfortunately, the mosaic was not available for AMEC.
- **Report of Subsurface Investigation Land Evaluation Study**, Cape Dorset, N.W.T., August 1985, Submitted to the Oliver, Mangione, McCalla & Associate Limited, submitted by John D. Paterson & Associates Ltd.
  - five boreholes were drilled at various locations, recommendations on spread footing and pile foundations are provided.
- **Granular Material Sources Investigation,** Cape Dorset, N.W.T, May, 1990, Submitted to the Municipality of Cape Dorset, submitted by Engineering Division, Department of Public Works and Highways, Government of Northwest Territories.
  - location of existing and potential sources of granular materials and quarries sites in the Cape Dorset area are provided.

5.0 SUMMARY OF FIELD INVESTIGATION

A geotechnical investigation (field reconnaissance) was conducted by Mr. Robert Verrall of AMEC's Yellowknife office. The field program consisted of advancing a hand-auger borehole at the proposed lagoon site and sampling of prospective borrow sources near the community landfill and airport.

The lagoon site during the field investigation was noted to be fully covered with shattered granite, 8 cm to 15 cm in size. Due to the fractured rock, only one location was able to be drilled with the hand-auger. The borehole was drilled to a depth of about 0.15 m.

Disturbed soil samples were recovered from the prospective borrow sources near the community landfill and airport. Results of the material testing from the borrow site is presented in Appendix C.

6.0 INFERRED SUBSURFACE CONDITIONS

An examination of the aerial photograph (Figure 1, Appendix A) and field reconnaissance undertaken by AMEC in August 9 and 10, 2005 suggests that majority of the proposed lagoon site is swamp and covered with a thin organic layer (Photographs 1 and 2, Appendix B). The ground surface is strewn with rounded and subrounded boulders and rock fragments (Photograph 3, Appendix B).

Based on the rounded shape of the boulders, it is expected that the lagoon site stratigraphy consist of glacial deposits (till), including sand, gravel and boulders. These deposits overlay bedrock of metamorphic or igneous origin. It is also expected that the overburden material (till) is about 1 m to 2 m thick.

Bedrock outcrops, as shown at Photograph 4 (Appendix B) surround the proposed lagoon impoundment. It can be seen at the photograph that the bedrock is moderately weathered and fractured.

The mean annual permafrost temperature at the site is expected to be in a range of -5 to –7°C at a depth of 10 m to 12 m. The thickness of the active layer is expected to be about 1.5 m. These values correspond to sandy/gravelly soil of a moisture content in the range of 10 to 20 percent with a thin moss cover.

7.0 ENGINEERING RECOMMENDATIONS

This section provides recommendations on borrow materials, design and construction of the dyke and results of the dyke temperature modelling.

7.1 Borrow Sources

Review of the data collected during the site investigations, the existing information and aerial photographs (scale 1: 20000) interpretation allowed the identification of several prospective borrow sources. Borrow Sources 1 through 3 are deemed as potential sources of finer grained soils, while Borrow Sources 4 and 5 are existing borrow pits for sand and gravel. The location of the potential and existing borrow sources are shown on Figure 1, Appendix A.

Based on data provided in the John D. Paterson report, it appears that boreholes were advanced within borrow source 1 and 5. Boreholes were also drilled immediately north from borrow source 3. Based on the borehole data, borrow material likely comprises of silty sand and sand with various amount of gravel and inclusions of cobbles and boulders.

Results of the field reconnaissance have shown that a clayey material may be found in the vicinity of the community landfill and airport. Photograph 5 (Appendix B) illustrates that the clayey material near the dump could contain numerous inclusions of cobbles and boulders while the clayey soil near the airport is mainly uniform and containing lesser amounts of the coarse material (Photograph 6, Appendix B). Grain size distribution analyses confirm the above conclusions. The borrow material near the landfill contains about 35% gravel sizes and about 30% fines; the borrow material near the airport does not contains gravel while the fines contain is about 50% (Appendix C).

In general, the local silty/sandy materials will require moderate to significant processing to render them suitable for dyke construction.

7.2 Sewage Lagoon Dyke Design

Figure 2 provides a proposed cross section of the sewage dyke as it is designed by DCL. The upstream and downstream slopes of the dyke are 1V:2 H, corresponding to a slope steepness of about 26.5 degrees. The proposed dyke is 5 m high and 4 m wide at the crest.

Silty sand, sand and gravel may be used for the dyke construction. This material should be screened and cobbles and boulders removed. The material, used for the construction, should be unfrozen in time of the placement and should be spread by lifts of 250 mm thick (compacted thickness). The compaction can be undertaken by bulldozers, D-6 or heavier. At least three bulldozer passes per lift should be applied. The upper layer, 0.5 m thick (Figure 2), may contain cobbles, up to 200 mm in size, protecting the dyke slopes against water erosion. All soils used in the dyke construction should be saturated after placement and compaction.

An appropriate synthetic liner should be installed in a near vertical position to an assumed elevation of 98 m, 2 m below existing ground surface, near the upstream slope (Figure 2, Appendix A). The liner should extend into a 2 m deep excavation below the base of the dyke. The excavation should be backfilled with compacted clayey material or grouted. The liner curtain then goes straight up to the top of the dyke as shown at Figure 2, Appendix A. An alternative liner option is shown at Figure 3, Appendix A. It is understood that the constructability of the alternative option is more favourable however the liner is about twice as long.

The use of a synthetic liner system, extending from a cut-off trench below the dyke to the crest of the dyke appears warranted as the primary containment system. Alternatively, a low-permeability soil cut-off wall within the dyke, designed for unfrozen performance may also be considered.

8.0 SEWAGE DYKE GEOTHERMAL ANALYSIS

A detailed geothermal analysis has been carried out to assess the present and future thermal regime within the Cape Dorset sewage lagoon dykes and the dyke foundation soils. The analysis considered the following dyke details and geometry:

- Height of dyke is 5 m.
- Width of crest is 4 m.
- Upstream and Downstream slope of dyke are 1V:2H.
- Local soil (silty sand, sand and grav e) is proposed for the dyke core construction.

- A waterproof liner is proposed to be placed as shown at Figures 2 or 3, Appendix A.
- The dyke core will be protected with coarse rockfill, about 0.5 m thick.

The geothermal modeling program SIMPTEMP, 2D version, (developed in-house by AMEC) was used to analyze geothermal regimes for the dyke. The simulator uses the finite element method to compute a numerical solution of the heat transfer problem. Physical/mathematical algorithms used in the SIMTEMP model have been published, and the simulation process has been verified: both against well-known analytical solutions of the heat transfer problem, and as compared with numerical solutions produced by other commercial/non-commercial geothermal software. AMEC has successfully used the SIMPTEMP program for a variety of geothermal applications over a ten years period.

The following section briefly describes the initial geothermal conditions assumed for dyke subgrade, the model setup, input parameters and the result of the SIMPTEMP analysis.

8.1 Boundary Conditions for Dyke

The air temperature data and snow depth used for the present analysis were based on the Climate Normals for Cape Dorset weather station for period from 1970 to 2000. The mean monthly air temperatures and snow thicknesses used for the SIMPTEMP model are presented in Table 1.

Table 1: Mean Monthly Air Temperatures and Snow Thicknesses

Data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp., °C	-25.0	-26.0	-21.6	-14.1	-5.5	2.3	7.4	5.7	1.5	-3.9	-11.7	-20.2
Snow, m	0.48	0.47	0.55	0.58	0.41	---	---	---	---	0.13	0.25	0.40

Mean monthly surface temperatures were applied over exposed dyke surface, ground surface beyond downstream slope of the dyke and over water surfaces beyond upstream slope of the dyke. To obtain the mean monthly surface temperatures, various n-factor coefficients were used over the dyke, downstream ground surface beyond the dyke and water surface.

Dyke Slopes and Crest. It was assumed that practically no snow would accumulate on the dyke slopes and crest. Therefore, an n-factor of 0.9 was applied to the mean monthly air temperatures to obtain the mean monthly winter temperatures on the dyke surface. An n-factor of 1.2 was applied to the mean monthly air temperatures to obtain the dyke surface temperature in summertime. An n-factor of 1.2 corresponds to bare rockfill surface (meaning that the rockfill surface is warmer than the corresponding air temperature).

Downstream Terrain Beyond Dyke. It was assumed that snow could accumulate beyond the toe of the dyke. Based on 1D geothermal analysis, it was estimated that n-factors for the terrain type, shown at Photographs 1 and 2 (Appendix B) would be 0.65 and 0.83 for the winter and summer air temperatures, respectively. These n-factors represent the insulating/warming effect of snow cover in the winter, and the cooling effect of the moss/lichen vegetation in the summer.

Water (Upstream Beyond Dyke). It was assumed that snow would accumulate on the lagoon surface in the winter. Similar to the downstream terrain area, an n-factor of 0.65 was applied to the mean monthly air temperatures for the winter months (October through May). From June through September, it was assumed that the water temperature over the entire depth of the water column was the same as the mean monthly air temperatures. Table 2 provides data on the mean monthly surface temperatures that were applied over the upper boundary of the geothermal models.

Table 2: Mean Monthly Surface Temperatures on Model Mesh

Data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dyke Crest and Slopes	-22.5	-23.4	-19.4	-12.7	-5.0	2.8	8.9	6.8	1.8	-3.5	-10.5	-18.2
Downstream Surface	-16.2	-16.9	-14.0	-9.2	-3.6	1.9	6.1	4.7	1.2	-2.5	-7.6	-13.1
Water	-16.2	-16.9	-14.0	-9.2	-3.6	Water temperature equals air temperature.				-2.5	-7.6	-13.1

8.2 Physical and Thermal Soil Properties

Estimates of physical properties for various typical soils expected to be encountered within the dyke and dyke foundation were based on published information (see Section 4.0) and the field reconnaissance. Thermal properties of the materials (thermal conductivity and heat capacity) were selected based on available published data, and on previous experience with similar materials. Table 3 summarizes the material physical and thermal properties applied for the geothermal analyses.

Table 3: Physical and Thermal Soil Properties

Soil Type	Dry Density, kN/m^3	Moisture Content, %	Thermal Conductivity, W/m/°C		Heat Capacity, $MJ/m^3/°C$	
			Frozen	Unfrozen	Frozen	Unfrozen
Bedrock	28	2	2.90	2.90	2.58	2.58
Unsaturated overburden and dyke sand and gravel	20	7	2.90	2.73	2.26	2.68
Saturated rockfill, overburden and dyke sand and gravel	19.6	15	2.61	2.26	2.26	2.51
Unsaturated rockfill	20	5	2.9	2.73	2.09	2.26
Water	10	---	2.20	0.58	1.95	4.19

8.3 Grid and Soil Layers Description

The following soils/materials were identified within the sewage dyke cross-section:

- Unsaturated Rockfill
- Saturated Rockfill
- Unsaturated dyke core and overburden
- Saturated dyke core and overburden
- Bedrock
- Water

Dimensions of each of the individual layers are shown at Figures 3 through 7, which also present the results of the modeling at the end of summer (September 30). Physical and thermal properties of the constituent soils/materials identified are provided in Section 7.2.

The geothermal modeling grid extended about 104 m below the crest of the dyke and contained 9350 finite elements and 4816 nodes Don't you normally have more nodes than elements???. The dyke and active layer initial temperatures were taken as +2 °C, corresponding to the assumed dyke material temperature and active layer temperature at the end of summer. The initial water temperature also was taken as +2 °C. The initial soil temperature from the base of the active layer and to a depth of 12 m was taken to decrease gradually from 0 °C to -5 °C; the soil temperature then was warmed gradually down to the bottom of the grid with the geothermal gradient of 0.02 °C/m.

Zero heat flux was applied at lateral boundaries of the grid, while the heat flux at the mesh bottom corresponded to the geothermal gradient of 0.02 °C/m.

8.4 Results of Geothermal Modelling

Figure 4, Appendix A shows that after the first year of the dyke operation, the active layer at the dyke crest is about 2 m. The majority of the dyke core has a temperature in a range from 0 °C to -1 °C while the ground temperature under the dyke is about -2 °C. One can see that due to a warming effect of the lagoon water, the ground temperature beyond the upstream slope of the dyke is at about 1 degree warmer than the ground temperature beyond the downstream slope of the dyke.

Figures 5 through 8 show that no considerable changes of the dyke temperature regime are observed from the fifth to thirtieth year of the dyke operation (dyke temperature remains in a range from 0 °C to -2 °C). It can be observed that a thickness of the unfrozen zone under the lagoon is increased, while the ground temperature under the dyke is decreased down to -5 °C.

The analyses did not include any component of climate warming over the expected life of the lagoon and following decommissioning. Typical climate warming values could be in the range of 0.1 °C/year (1 °C/decade). Applying a climate warming scenario to the analysis would result in warmer dyke temperatures.

The following conclusions may be drawn from the investigations and thermal analyses:

- The concept of a frozen core dyke to provide the primary containment of lagoon waters is considered to technically tenuous at best, and likely not technical feasible, given the applied input conditions.
- No assessment of seepage under or through the cut-off curtain below the dyke has been made. Further, AMEC has not assess whether the proposed 2 m deep cut-off system under the dyke is sufficient, although thermal modelling suggests that the subgrade will remain frozen (see Figures 4 to 8, Appendix A).

9.0 CLOSURE

The engineering recommendations presented herein are based on the results of the field reconnaissance, aerial photograph interpretation and reviewing of the available information. No drilling was undertaken at the prospective borrow source locations to estimate soil composition.

Results of the geothermal modeling have shown that the dyke temperature will remain relatively warm (range from 0 °C to -2 °C) during the operation years. Thus, it is essential to install a reliable liner as shown at Figures 2 or 3, Appendix A. An alternative option would be to construction a clayey cut-off core of the dyke. However, an implementation of this option depends on quality and quantity of the available clayey material within the Cape Dorset area.

It should be stated that the results of modelling are valid for boundary conditions and soil properties described in Sections 7.1 and 7.2. If actual boundary conditions (soil properties) differ considerably from the assumed parameters, then the actual temperatures of the dyke could vary from the predicted temperatures.

amec

This report has been prepared for the exclusive use of Dillon Consulting Limited and its agents for the specific application described in this report. The use of this report by third parties is done so at the sole risk of those parties. It has been prepared in accordance with generally accepted permafrost and foundation engineering practices. No other warranty, expressed or implied, is made.

Respectfully submitted,

AMEC Earth & Environmental

REGISTERED PROFESSIONAL ENGINEER
K.G. BARNES
LICENSEE
NWT/NU

Keith Barnes, P.Eng.
Geotechnical/Permafrost Engineer

REGISTERED PROFESSIONAL ENGINEER
A. TCHEKHOVSKI
LICENSEE
NWT/NU

Alexandre Tchekhovski, Ph.D., P. Eng.,
Senior Permafrost Engineer

Reviewed by: Jim Oswell, Ph.D., P.Eng
Senior Permafrost Engineer

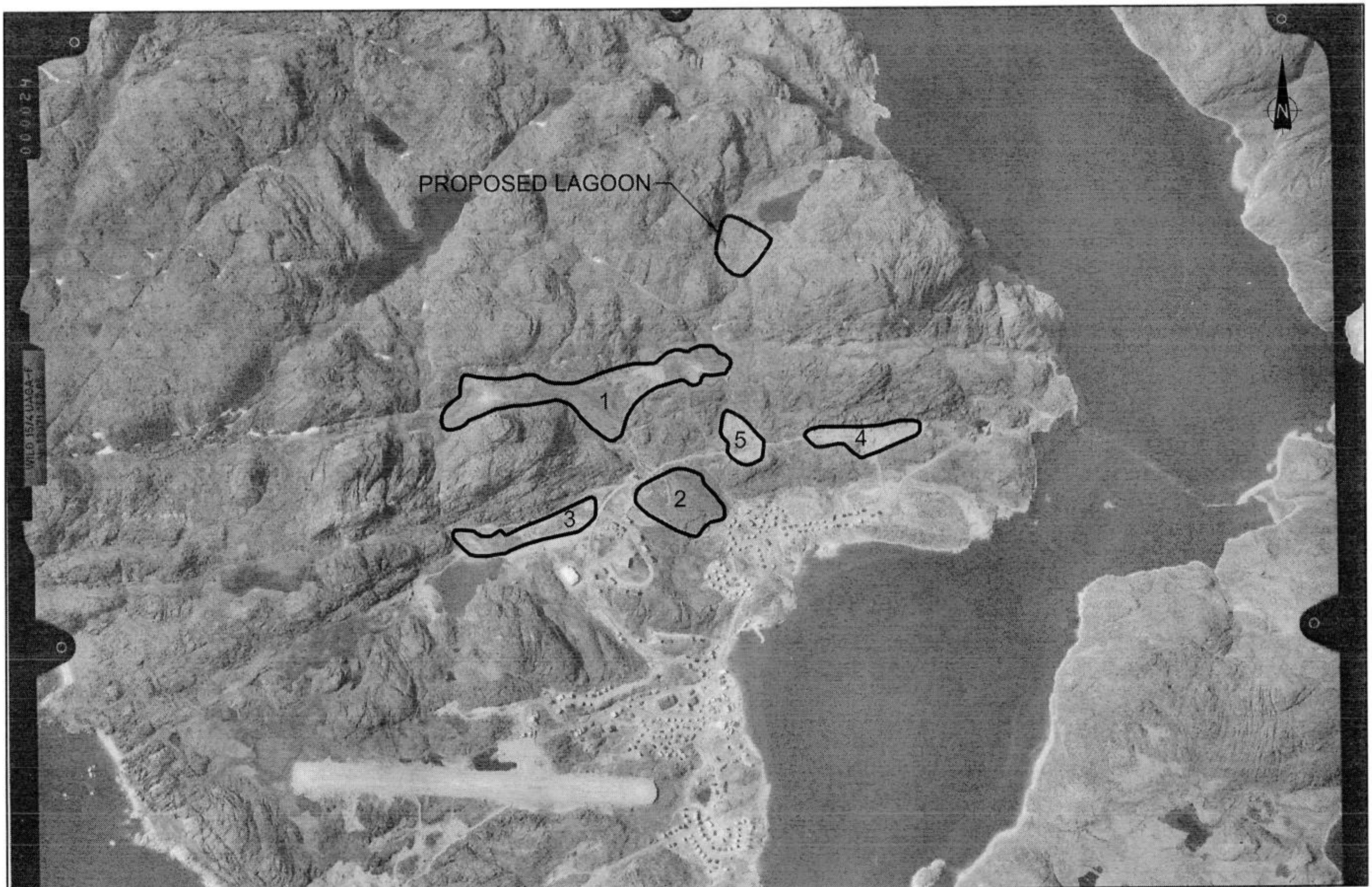
PERMIT TO PRACTICE
AMEC Earth & Environmental, a Division of AMEC Americas Limited

Signature ____________

Date ____________

PERMIT NUMBER: P 047
The Association of Professional Engineers, Geologists and Geophysicists of the NWT / NU

Appendix A



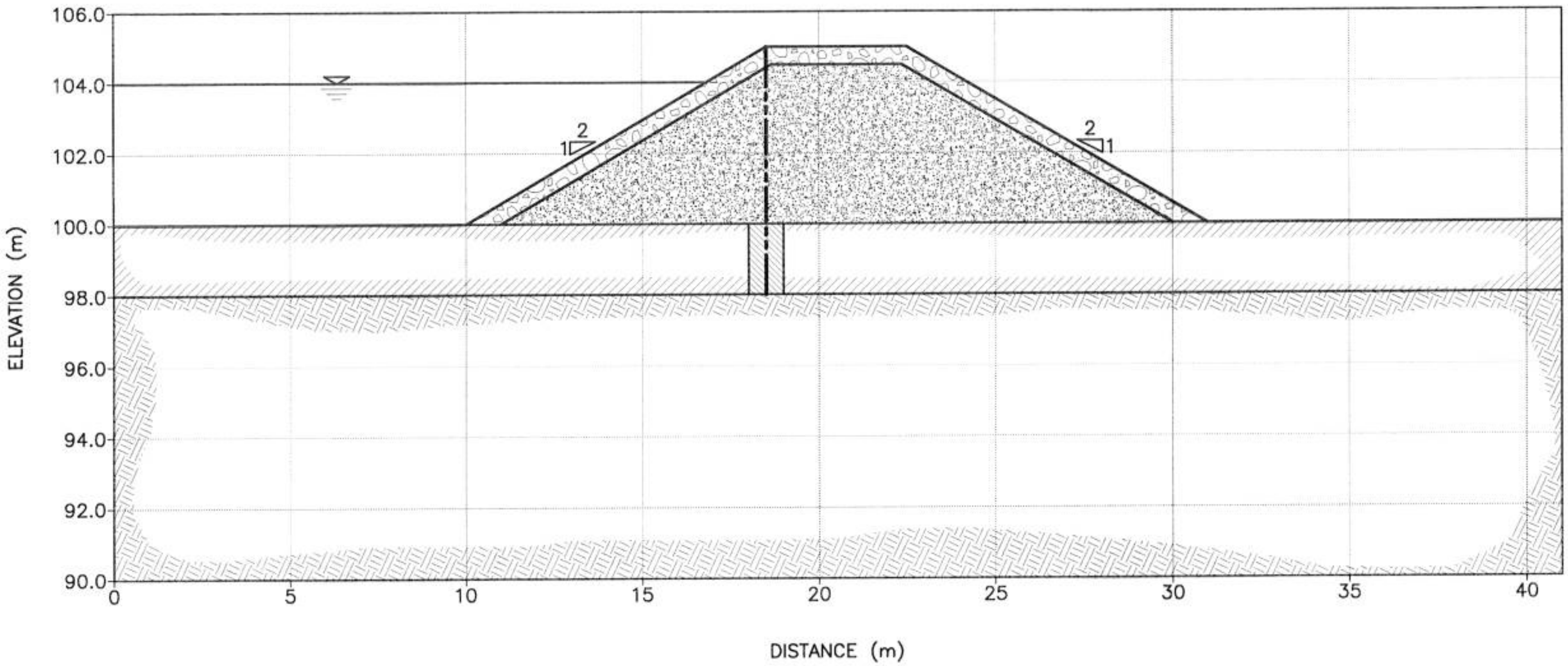
REFERENCE AERIAL PHOTO: AS27863-94, 29-08-29, 1:20 000

SCALE
1:20 000
0 200 400 m

amec Earth & Environmental	PROJECT: GEOTECHNICAL INVESTIGATION FOR P-LAKE SEWAGE LAGOON, CAPE DORSET			
	TITLE: LOCATION OF PROSPECTIVE BORROW SOURCES			
CLIENT: DILLON CONSULTING LIMITED	DATE: SEPTEMBER 2005	JOB No.: YX00748	CAD FILE: 00748S01.dwg	FIGURE No.: FIGURE 1	REV. A

I:\YX\00748\00748S01.dwg - FIGURE 1 - Sep. 21, 2005 11:11am - scott.scholy

*PLOT 1:1=A (L)



LEGEND:

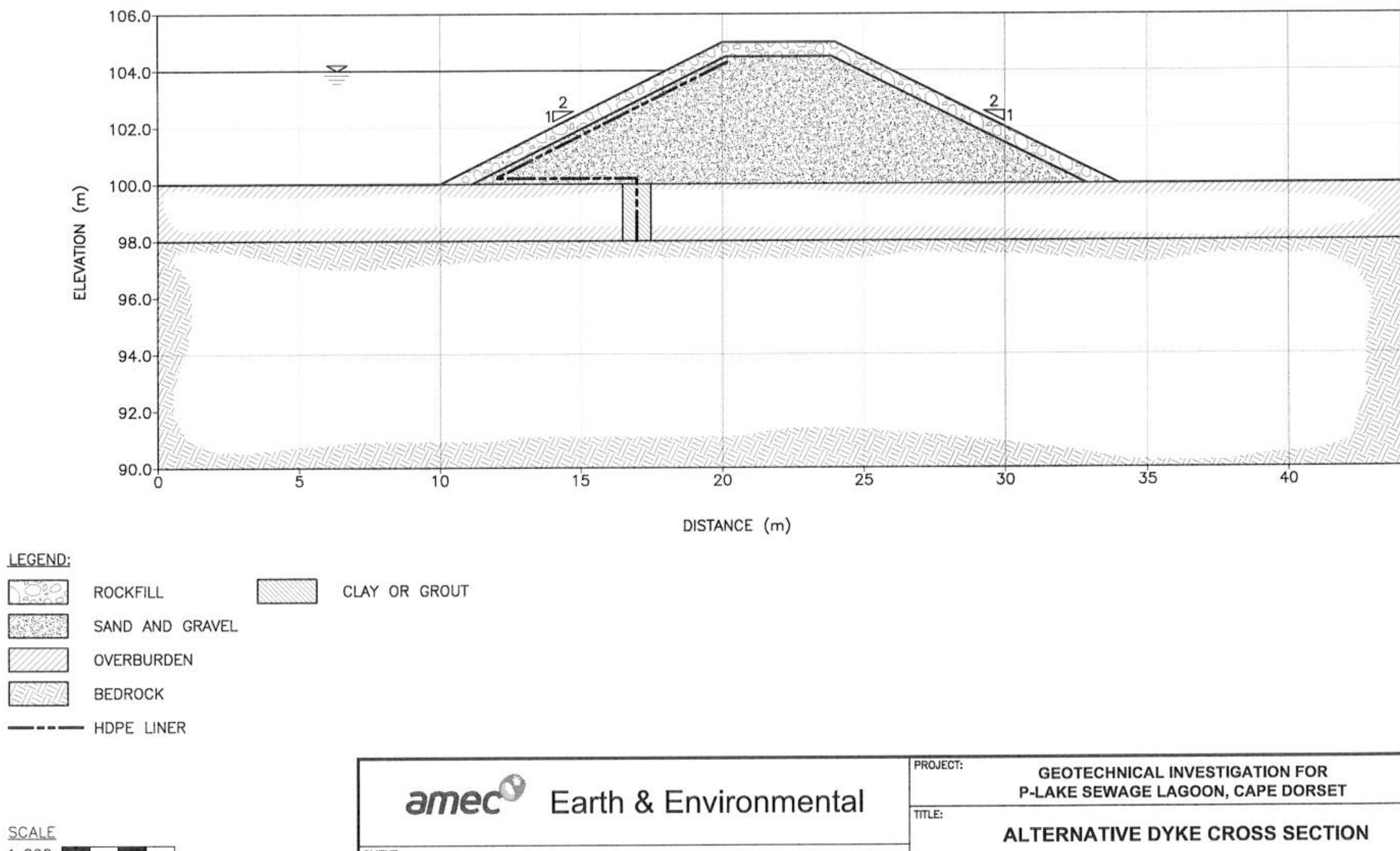
- ROCKFILL
- SAND AND GRAVEL
- OVERBURDEN
- BEDROCK
- HDPE LINER
- CLAY OR GROUT

SCALE
1:200 0 1 2 3 4 m

amec Earth & Environmental	PROJECT: GEOTECHNICAL INVESTIGATION FOR P-LAKE SEWAGE LAGOON, CAPE DORSET				
	TITLE: PROPOSED DYKE CROSS SECTION				
CLIENT: DILLON CONSULTING LIMITED	DATE: OCTOBER 2005	JOB No.: YX00748	CAD FILE: 00748B00.dwg	FIGURE No.: FIGURE 2	REV. A

I:\YX\00748\00748B00.dwg – FIGURE 2 – Oct. 13, 2005 11:43am – shelley.brown

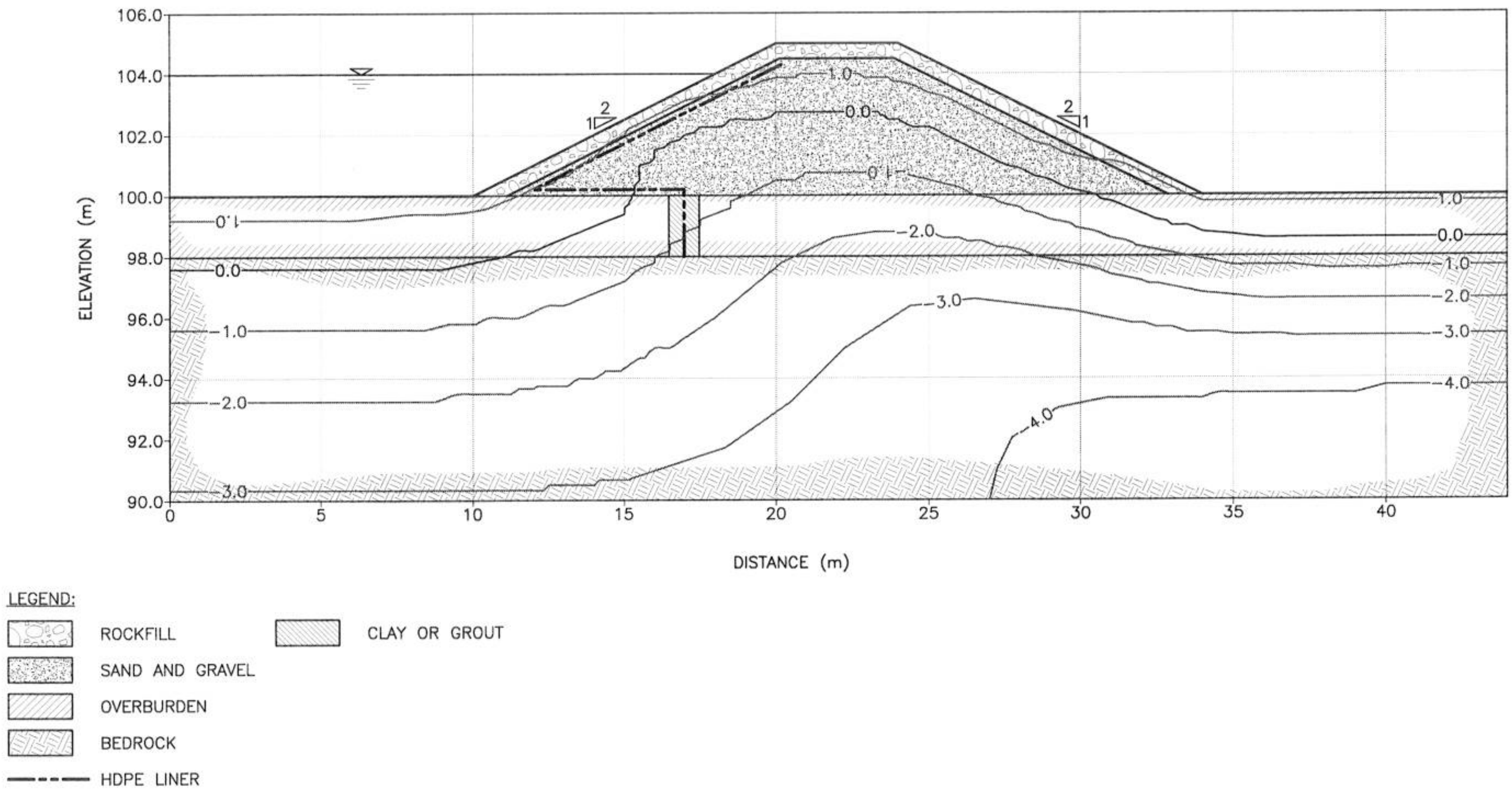
*PLOT 1:1=A (L)



amec Earth & Environmental	PROJECT:	GEOTECHNICAL INVESTIGATION FOR P-LAKE SEWAGE LAGOON, CAPE DORSET
	TITLE:	ALTERNATIVE DYKE CROSS SECTION
CLIENT: DILLON CONSULTING LIMITED	DATE: OCTOBER 2005	JOB No.: YX00748 / CAD FILE: 00748B00.dwg / FIGURE No.: FIGURE 3 / REV. A

*PLOT 1:1=A (L)

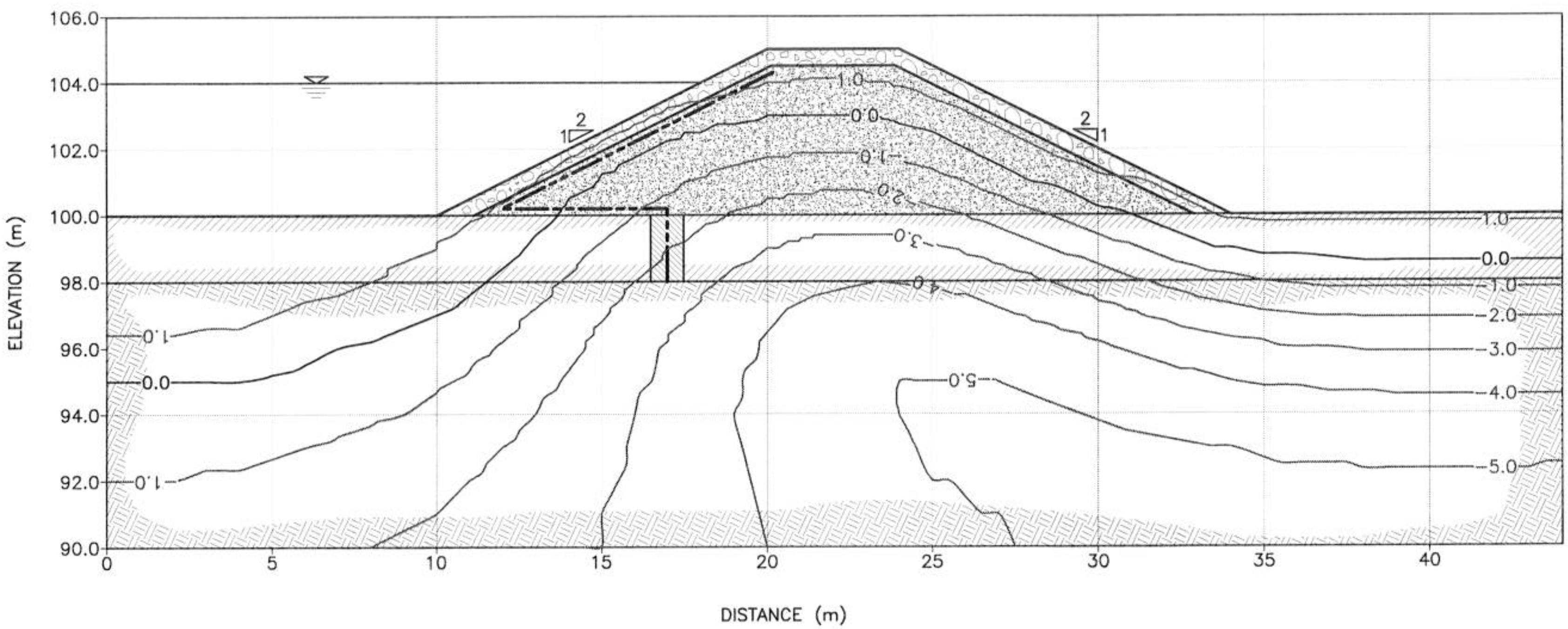
I:\YX\00748\00748B00.dwg - FIGURE 3 - Oct. 13, 2005 11:44am - shelley.brown



amec Earth & Environmental	PROJECT: GEOTECHNICAL INVESTIGATION FOR P-LAKE SEWAGE LAGOON, CAPE DORSET
	TITLE: DYKE TEMPERATURES AFTER 1 YEAR OF OPERATION
CLIENT: DILLON CONSULTING LIMITED	DATE: OCTOBER 2005 · JOB No.: YX00748 · CAD FILE: 00748B00.dwg · FIGURE No.: FIGURE 4 · REV. A

I:\YX\00748\00748B00.dwg - FIGURE 4 - Oct. 13, 2005 11:44am - shelley.brown

*PLOT 1:1=A (L)



LEGEND:

- ROCKFILL
- SAND AND GRAVEL
- OVERBURDEN
- BEDROCK
- HDPE LINER
- CLAY OR GROUT

SCALE 1:200

0 1 2 3 4 m

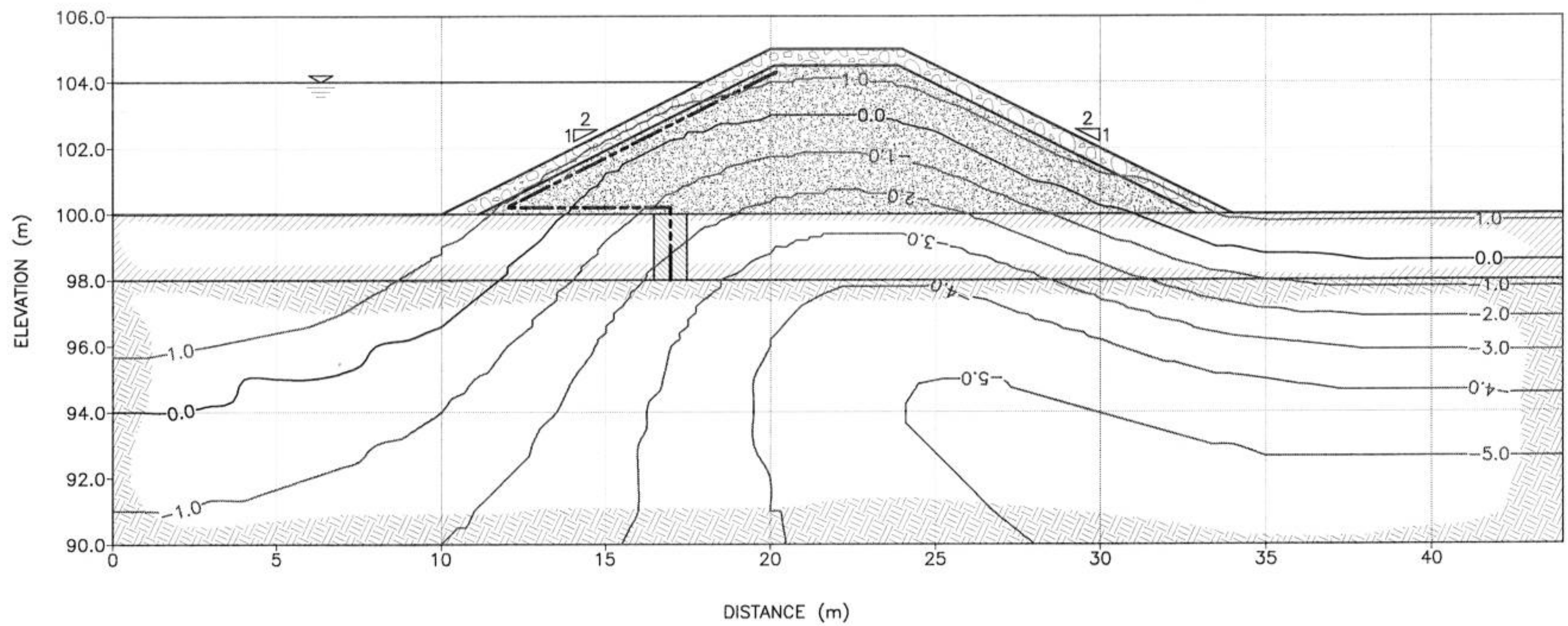
amec Earth & Environmental

CLIENT: DILLON CONSULTING LIMITED

PROJECT:	GEOTECHNICAL INVESTIGATION FOR P-LAKE SEWAGE LAGOON, CAPE DORSET
TITLE:	DYKE TEMPERATURES AFTER 5 YEARS OF OPERATION

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.
OCTOBER 2005	YX00748	00748B00.dwg	FIGURE 5	A

*PLOT 1:1=A (L)
I:\YX\00748\00748B00.dwg - FIGURE 5 - Oct. 13, 2005 11:44am - shelley.brown



LEGEND:

- ROCKFILL
- SAND AND GRAVEL
- OVERBURDEN
- BEDROCK
- HDPE LINER
- CLAY OR GROUT

SCALE
1:200 0 1 2 3 4 m

amec Earth & Environmental

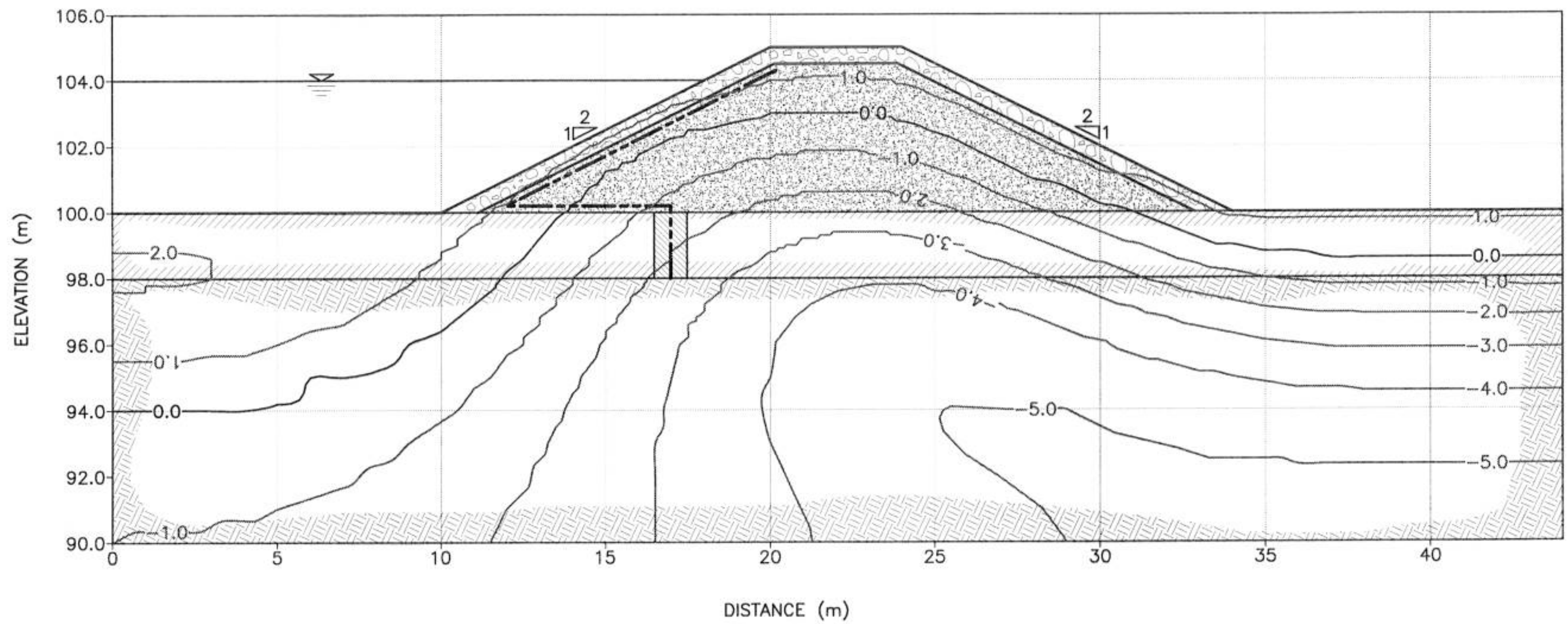
CLIENT: DILLON CONSULTING LIMITED

PROJECT: GEOTECHNICAL INVESTIGATION FOR P-LAKE SEWAGE LAGOON, CAPE DORSET

TITLE: DYKE TEMPERATURES AFTER 10 YEARS OF OPERATION

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.
OCTOBER 2005	YX00748	00748B00.dwg	FIGURE 6	A

*PLOT 1:1=A (L)
i:\YX\00748\00748B00.dwg - FIGURE 6 - Oct. 13, 2005 11:44am - shelley.brown



LEGEND:

- ROCKFILL
- SAND AND GRAVEL
- OVERBURDEN
- BEDROCK
- HDPE LINER
- CLAY OR GROUT

SCALE
1:200
0 1 2 3 4 m

amec Earth & Environmental

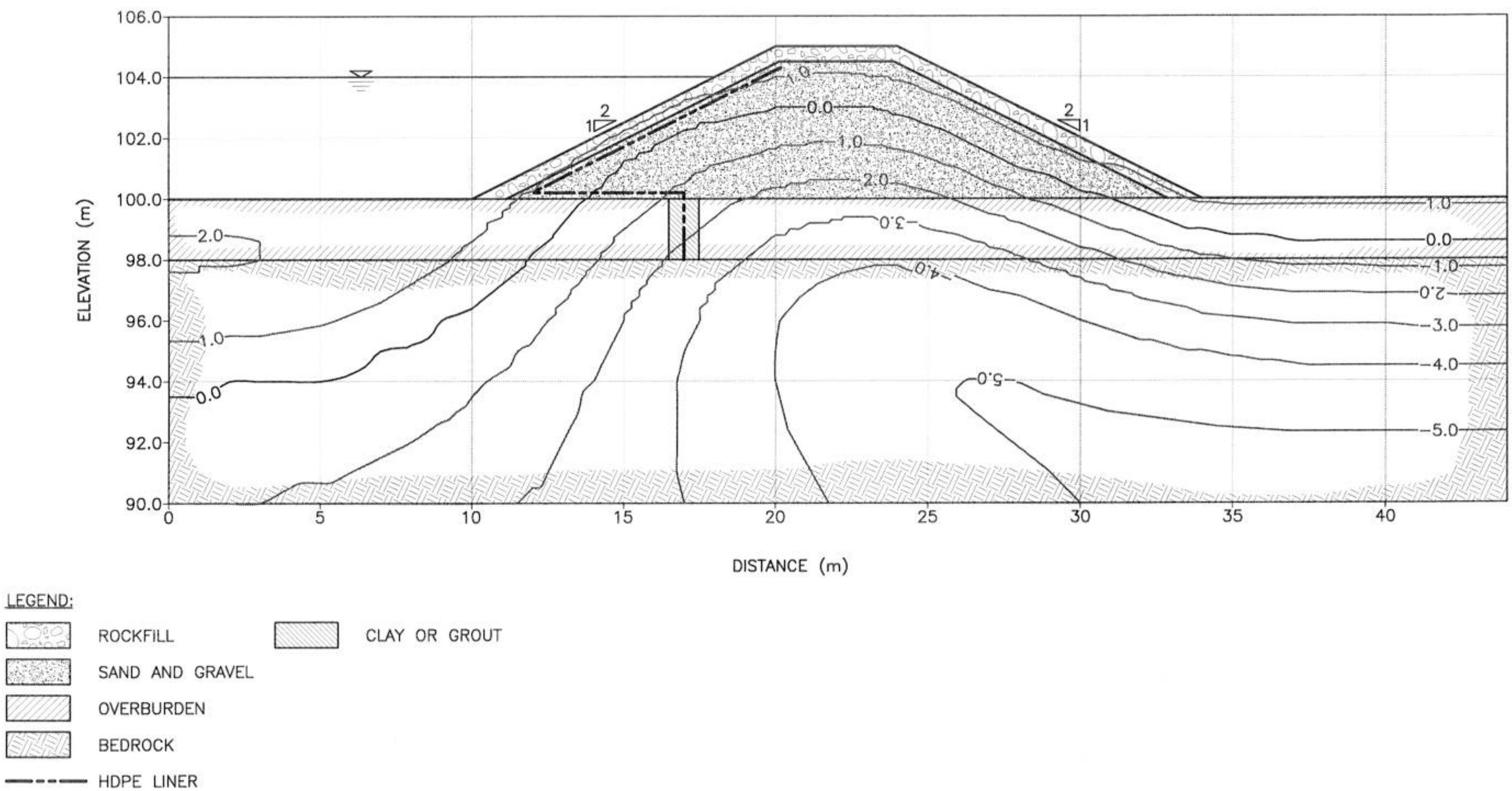
CLIENT: DILLON CONSULTING LIMITED

PROJECT: GEOTECHNICAL INVESTIGATION FOR P-LAKE SEWAGE LAGOON, CAPE DORSET

TITLE: DYKE TEMPERATURES AFTER 20 YEARS OF OPERATION

DATE:	JOB No.:	CAD FILE:	FIGURE No.:	REV.
OCTOBER 2005	YX00748	00748B00.dwg	FIGURE 7	A

I:\YX\00748\00748B00.dwg - FIGURE 7 - Oct. 13, 2005 11:45am - shelley.brown
*PLOT 1:1=A (L)



amec Earth & Environmental	PROJECT: GEOTECHNICAL INVESTIGATION FOR P-LAKE SEWAGE LAGOON, CAPE DORSET				
	TITLE: DYKE TEMPERATURES AFTER 30 YEARS OF OPERATION				
CLIENT: DILLON CONSULTING LIMITED	DATE: OCTOBER 2005	JOB No.: YX00748	CAD FILE: 00748B00.dwg	FIGURE No.: FIGURE 8	REV. A

*PLOT 1:1=A (L)
I:\YX\00748\00748B00.dwg - FIGURE 8 - Oct. 13, 2005 11:45am - shelley.brown