NGL PROJECT NO. NFS09711

REPORT ON

GEOTECHNICAL INVESTIGATION
PROPOSED WASTE MANAGEMENT FACILITY
CENTRAL, NL

PREPARED FOR

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October 20, 2003
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- **Appendix B**  Test Pit Records TP1 to TP38, Figures 1 to 8; Gradation Curves and Plasticity Charts
- **Appendix C**  Drawing No. NFS09711-GE-01, Site Location Plan
1.0 INTRODUCTION

Acting at the authorization of Mr. Wayne Manuel, P.Eng., of the BAE Newplan Group Limited (BNG), Newfoundland Geosciences Limited (NGL) has carried out a geotechnical investigation for a proposed waste management facility in the Norris Arm North area, approximately 3.5 km west of Lewisport Junction, Newfoundland. The purpose of the investigation was to determine the general subsurface conditions across the proposed site, to determine the suitability of the site for the proposed development.

The scope of the work included:
- Test pit excavations and mapping bedrock outcrops across the site. The number and location points was determined based on a four to five day time limitation as specified by BNG.
- Compilation of geotechnical data and laboratory testing of soil samples.
- A factual geotechnical report detailing the findings of the investigation.

This report has been prepared specifically and solely for the project described above. It contains all of the findings of the investigation, including the Test Pit Records, laboratory test results and a site plan.

2.0 SITE DESCRIPTION AND GEOLOGY

The proposed site is located in the Norris Arm North area, between the Lewisport Junction road and the Norris Arm North access road, approximately 45 km west of the community of Gander, NL. The area investigated is an irregular, rectangular-like shaped block of approximately 1.1 x 3.4 km (approximately 3.7 km²); see figure NFS09711-GE-01.

The site is accessed by old logging roads and trails, from the Trans Canada Highway in the south, and the Norris Arm North access road in the west. The site is undeveloped and consists of wooded (approx. 80%) and boggy (approx. 20%) areas. The site is gently sloped towards the north-northwest, with a maximum elevation difference of approximately 60 m across the site (elevation data acquired by GPS, and may vary significantly from actual elevation).

Based on existing geological mapping and previous experience in the area, the principal overburden material beneath surficial organic soils consists of glacial till which overlies bedrock. Inferred bedrock geology in the area is comprise of Late Ordovician to Early Silurian sedimentary rocks of the Badger Group, consisting of purple, grey and orange-brown sandstone to siltstone, and grey conglomerate. No surface bedrock exposure was found within the investigation area.
3.0 PROCEDURE

NGL personnel contacted the Provincial Department of Government Services and Lands, and notified the department of our planned geotechnical investigation. The Department of Government Services and Lands granted permission to access the area with certain restrictions. No stream crossings or travel on bogs were permitted.

The field work for this investigation was completed during the period of September 25 - 29, 2003. A total of thirty-eight (38) test were completed at the locations shown on the site location plan (Drawing No. NFS09711-GE-01) located in Appendix C.

The test pits were completed using a Hitachi EX200LC excavator, supplied by A and B Construction Limited, to depths ranging from approximately 2.0 to 5.5 m below ground surface. The field work was conducted under the supervision of an engineering geologist from NGL who maintained detailed logs and obtained representative samples of the various strata encountered. All soil samples were stored in moisture proof containers where they will be stored for a period of three months, at which time they will be discarded, unless instructions to the contrary are received.

Test pit locations were selected and established in the field by NGL personnel, based on a maximum, evenly-spaced coverage for a four to five day work program. The locations and elevations were provided with the aid of a Garmin 12XL GPS, aerial photographs and topographic maps. The GPS elevation and coordinate information is referenced to North American Datum 1983 (NAD83), UTM Zone 21, and location information has a probable accuracy of ± 25 m. Elevation data provided on the Test Pit Records may vary significantly from actual elevations.

4.0 SUBSURFACE CONDITIONS

The overall subsurface conditions consist of a layer of organic soils and silty sands overlying sandy glacial till and bedrock. The subsurface-conditions are described below, and in detail on the Test Pit Records located in Appendix B. Laboratory test results are presented in Figures 1 to 8 and on the Test Pit Records.

4.1 Organics/Sand/Silt

A thin layer of dark brown to black, soft compressible peat and rootmat was encountered at the surface at all test pit locations. This stratum ranged in thickness from 0.1 m (thin rootmat) to 1.2 m (peat/bog).

At most test pit locations a variable layer of silt, sand and organic material was encountered beneath surficial peat, rootmat and bog. This stratum was noted to vary in colour (orange-brown, brown, grey), and contain
occasional to some cobbles and boulders. The thickness of these materials ranged from 0.3 to 1.3 m at the test pit locations, and based on direct inspection was classed as loose to compact.

4.2 Till

A layer of silty sand to silty sand with gravel glacial till, with occasional cobbles and boulders was found at all test pit locations, and noted to extend to depths of 5.5 m. Based on direct inspection in the test pits the relative density of this stratum is classed as compact to dense, with occasional very dense sections.

Gradation analyses completed on ten (19) representative samples of the till material obtained during this investigation indicated the following average group percentages: 17.4% gravel (range 0.9 to 39.9%); 47.7% sand (range 32.8 to 59.4%); and 34.8% silt/clay (range 20.5 to 59.4%). Atterberg Limits determinations completed on five (4) samples indicate the fines portion of the material non-plastic (high silt content). The average moisture content of the samples tested was approximately 10.9%.

4.3 Bedrock

Inferred bedrock was found at 20 of the 38 test pit sites at depths ranging from 0.6 to 5.2 m below surface. Bedrock was inferred by excavation refusal; no coring of the bedrock was completed. The bedrock is comprised of sandstone, siltstone and conglomerate of the Badger Group. In general, excavation of small surficial pieces of bedrock was possible, however at test pit TP3, excavation of the bedrock was possible to approximately 1.8 m below the bedrock surface. Based on limited visual inspection within the test pit excavations, the bedrock was observed to be severely fractured to moderately jointed.

5.0 GROUNDWATER

Groundwater was encountered at 31 of the 38 test pit locations at depths ranging from 0.4 to 4.4 m below ground surface. Test pits were not left open long enough for groundwater to stabilize. Groundwater levels may fluctuate seasonally and in response to precipitation events.

6.0 CLOSURE

The purpose of this investigation was to determine the general site conditions necessary for assessing site suitability, and for preliminary planning. It is our understanding that geotechnical comments and recommendations are not required at this time. We would be pleased to provide additional assistance with this project as project planning and design proceeds.
A subsurface investigation is a limited sampling of a site. Variations throughout the site may differ significantly from data collected at the sample locations. The extent of the limited area depends on the soil and groundwater conditions, as well as the history of the site reflecting natural, construction and other activities.

We trust that the report contains all of the information required at this time. If you have any questions please contact us at your convenience.

Yours truly,

NEWFOUNDLAND GEOSCIENCES LIMITED

[Signature]

David J. Butler, P. Geo.

James Powell, P. Eng.

PROVINCE OF NEWFOUNDLAND
PERMIT HOLDER
CLASS "A"
This Permit Allows
NEWFOUNDLAND GEOSCIENCES LTD.
To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by APEGN 70199 which is valid for the year 2003.
APPENDIX A

Symbols and Terms Used on the Test Pit Records
SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology Describing Common Soil Genesis

**Rootmat** - vegetation, roots and moss with organic matter and topsoil typically forming a mattress at the ground surface

**Topsoil** - mixture of soil and humus capable of supporting good vegetative growth

**Peat** - fibrous aggregate of visible and invisible fragments of decayed organic matter

**Loam** - silty sand or sand with silt mixed with organics matter

**Till** - unstratified glacial deposit which may range from clay to boulders

**Fill** - any materials below the surface identified as placed by humans (excluding buried services)

Terminology Describing Soil Structure

**Homogeneous** - same colour and appearance throughout

**Stratified** - composed of alternating successions of different soil types, e.g., silt and sand

**Lens** - inclusion of small pockets of different soils

**Laminated** - alternating layers of varying material or colour with the layers less than 6 mm thick

**Layer** - thickness > 75 mm

**Soil** - thickness between 2 mm and 75 mm

**Parting** - thickness < 2 mm

Grain Size and Plasticity

Terminology describing soils on the basis of grain size and plasticity is based on the Unified Soil Classification System (USCS) (ASTM D-2487). The classification excludes particles larger than 76 mm (3 inches). This system provides a group symbol (e.g., SM) and group name (e.g., silty SAND) for identification. Note: terminology describing materials in the absence of laboratory analysis is based on the ASTM D-2488 visual method.

Terminology describing materials outside the USCS (e.g., particles larger than 76 mm, visible organic matter, construction debris) is based on the (visually estimated) proportion of these materials present:

- **Trace, or occasional**
  - Less than approximately 10%

- **Some**
  - approximately 10-20%

- **Frequent**
  - Greater than approximately 20%

Standard Penetration Test ‘N-Value’

The performance of the Standard Penetration Test provides an ‘N-value’, the number of blows of a 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (51 mm) O.D. split spoon sampler one foot (305 mm) into the soil. For split spoon samples where insufficient penetration is achieved and ‘N’ values cannot be determined, the number of blows is reported over sampler penetration in millimetres (e.g., 50/75).

Density of Cohesionless Soils

The standard terminology to describe cohesionless soils includes the compactness (formerly “relative density”), as determined by laboratory test or by the Standard Penetration Test ‘N-value’.

<table>
<thead>
<tr>
<th>Density</th>
<th>N-Value</th>
<th>Compactness %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Loose</td>
<td>&lt; 4</td>
<td>&lt; 15</td>
</tr>
<tr>
<td>Loose</td>
<td>4-10</td>
<td>15-35</td>
</tr>
<tr>
<td>Compact</td>
<td>10-30</td>
<td>35-65</td>
</tr>
<tr>
<td>Dense</td>
<td>30-50</td>
<td>65-85</td>
</tr>
<tr>
<td>Very Dense</td>
<td>&gt; 50</td>
<td>&gt; 85</td>
</tr>
</tbody>
</table>

Consistency of Cohesive Soils

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by in situ vane tests, penetrometer tests, unconfined compression tests, or occasionally by standard penetration tests.

<table>
<thead>
<tr>
<th>Consistency</th>
<th>Undrained Shear Strength</th>
<th>N-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ksf</td>
<td>kPa</td>
</tr>
<tr>
<td>Very Soft</td>
<td>&lt; 0.25</td>
<td>&lt; 12.5</td>
</tr>
<tr>
<td>Soft</td>
<td>0.25-5</td>
<td>12.5-25</td>
</tr>
<tr>
<td>Firm</td>
<td>0.5-10</td>
<td>25-50</td>
</tr>
<tr>
<td>Stiff</td>
<td>1.0-2.0</td>
<td>50-100</td>
</tr>
<tr>
<td>Very Stiff</td>
<td>2.0-4.0</td>
<td>100-200</td>
</tr>
<tr>
<td>Hard</td>
<td>&gt; 4.0</td>
<td>&gt; 200</td>
</tr>
</tbody>
</table>
ROCK DESCRIPTION

Rock Quality Designation (ROD)

The classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. ROD was originally intended to be applied to NW core; however, it can be used on different core sizes if most of the fractures caused by drilling stresses are easily distinguishable from in situ fractures.

<table>
<thead>
<tr>
<th>RQD (%)</th>
<th>Rock Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100</td>
<td>Excellent - intact, very sound</td>
</tr>
<tr>
<td>75-90</td>
<td>Good - moderately jointed, massive, sound</td>
</tr>
<tr>
<td>50-75</td>
<td>Fair - fractured, blocky and seamy</td>
</tr>
<tr>
<td>25-50</td>
<td>Poor - severely fractured, shattered and very seamy or blocky</td>
</tr>
<tr>
<td>0-25</td>
<td>Very poor - very severely fractured, crushed</td>
</tr>
</tbody>
</table>

Total Core Recovery (TCR)

Total core recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

Weathering State

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slight</td>
<td>Weathering limited to the surface of major discontinuities. Typically iron stained.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Weathering extends throughout rock mass. Rock is not friable.</td>
</tr>
<tr>
<td>High</td>
<td>Weathering extends throughout rock mass. Rock is friable (crumbles naturally or broken between fingers).</td>
</tr>
</tbody>
</table>

Terminology Describing Rock Mass

<table>
<thead>
<tr>
<th>Spacing (mm)</th>
<th>Bedding, Laminations, Bands</th>
<th>Discontinuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-6000</td>
<td>Very Thick</td>
<td>Very wide</td>
</tr>
<tr>
<td>600-2000</td>
<td>Thick</td>
<td>Wide</td>
</tr>
<tr>
<td>200-600</td>
<td>Medium</td>
<td>Moderately close</td>
</tr>
<tr>
<td>60-200</td>
<td>Thin</td>
<td>Close</td>
</tr>
<tr>
<td>20-60</td>
<td>Very Thin</td>
<td>Very close</td>
</tr>
<tr>
<td>&lt; 20</td>
<td>Laminated</td>
<td>Extremely close</td>
</tr>
<tr>
<td>&lt; 6</td>
<td>Thinly Laminated</td>
<td></td>
</tr>
</tbody>
</table>

RECORD SYMBOLS AND ABBREVIATIONS

Sample Types

- SS: Split spoon sample (obtained by performing the Standard Penetration Test)
- WS: Wash sample
- BS: Bulk sample
- RC: Rock chip sample
- ST: Shelby tube or thin wall tube
- HQ, NQ, BQ, etc: Rock core samples obtained using standard size diamond drilling bits.

Laboratory Tests

- S: Sieve analysis
- H: Hydrometer analysis
- A: Atterberg limits

Water Level Measurement

Indicates recorded water level in a borehole, test pit or standpipe.

Strata Plot

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:

- Boulders
- Sand
- Silt
- Clay
- Organics
- Asphalt
- Concrete
- Fill
- Igneous Bedrock
- Metamorphic Bedrock
- Sedimentary Bedrock

Solid lines between strata indicate the boundary between different strata. Dashed lines between strata indicate the boundary between strata is inferred.
APPENDIX B

Test Pit Records TP1 to TP38
Figures 1 to 8; Gradation Curves and Plasticity Charts
NEWFOUNDLAND
GEOSCIENCES
LIMITED

CLIENT: BAE - Newplan Group Ltd.
PROJECT: Proposed Waste Management Facility, Central Newfoundland
LOCATION: Norris Arm North
DATES (mm-dd-yy): DUG 9-28-03

WATER CONTENT & ATTERBERG LIMITS

DEPTH (m)    ELEVATION (m)    DESCRIPTION

124.00

0

Rootmat

123.7

Loose to compact, orange - brown, silty SAND
(SM); occasional cobbles

123.4

Compact to dense, grey to yellow - grey, silty
SAND with gravel (SM); occasional cobbles
and boulders: TILL

120.3

BS 1 S 0

Purple, sandstone/siltstone: BEDROCK

End of Test Pit

Slow groundwater seepage observed at 2.1 m
depth.

Refusal on probable bedrock at 3.8 m depth.
### TEST PIT RECORD

**CLIENT:** BAE - Newplan Group Ltd.  
**PROJECT:** Proposed Waste Management Facility, Central Newfoundland  
**LOCATION:** Norris Arm North  
**DATES (mm-dd-yy):** DUG 9-27-03  
**WATER LEVEL:** N/A  
**PROJECT No.:** NFS09711  
**DATUM:** UTM NAD83 Zone 21

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>Rootmat</td>
</tr>
<tr>
<td>0.80</td>
<td>Loose to compact, orange - brown, silty SAND (SM); occasional cobbles</td>
</tr>
<tr>
<td>4.30</td>
<td>Compact to dense, grey - brown, silty SAND (SM); occasional cobbles and minor boulders: TILL</td>
</tr>
<tr>
<td>9.70</td>
<td>Weathered, purple sandstone/siltstone, conglomerate: BEDROCK</td>
</tr>
<tr>
<td></td>
<td>End of Test Pit</td>
</tr>
</tbody>
</table>

Slow groundwater seepage observed at 3.0 m depth.  
Refusal on probable bedrock at 4.4 m depth.
TEST PIT RECORD

NEWFOUNDLAND GEO SCIENCES LIMITED
CLIENT BAE - Newplan Group Ltd.
PROJECT Proposed Waste Management Facility, Central Newfoundland
LOCATION Norris Arm North
DATES (mm-dd-yy) DUG 9-27-03
WATER LEVEL N/A
PROJECT No. NFS09711
DATUM UTM NAD83 Zone 21
TEST PIT No. TP3

DEPTH (m) ELEVATION (m)

93.00

92.8
Rootmat

Loose to compact, brown, silty SAND with gravel (SM); occasional cobbles: TILL.

92.4

Severely fractured, weathered, purple sandstone/siltstone: BEDROCK

90.6

End of Test Pit

Moderate groundwater seepage observed at 0.6 m depth.

Refusal in bedrock at 2.4 m depth.
65.00

Rootmat

64.7

Loose to compact, orange - brown, silty SAND (SM); occasional cobbles

64.3

Compact to dense, grey, silty SAND (SM); occasional cobbles and boulders: TILL

60.3

Purple, sandstone/siltstone: BEDROCK
End of Test Pit

No groundwater seepage observed.

Refusal on probable bedrock at 4.8 m depth.
TEST PIT RECORD

NEWFOUNDLAND GEOSCIENCES LIMITED

BAE - Newplan Group Ltd.

Proposed Waste Management Facility, Central Newfoundland

Norris Arm North

9-27-03

N/A

UTM NAD83 Zone 21

TEST PIT No. TP5

PROJECT No. NFS09711

LOCATION

PROJECT

DUG

WATER LEVEL

N/A

DATUM

DEPTH (m) ELEVATION (m) DESCRIPTION

63.00 Rootmat; peat

62.7 Loose to compact, yellow - brown to brown, silty SAND (SM); occasional cobbles and boulders

62.2 Compact to dense, grey to yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL

57.8 End of Test Pit

Slow groundwater seepage observed at 1.8 m depth.

Bedrock not encountered.
NEWFOUNDLAND GEOSCIENCES LIMITED

CLIENT: BAE - Newplan Group Ltd.
PROJECT: Proposed Waste Management Facility, Central Newfoundland
LOCATION: Norris Arm North

TEST PIT RECORD

DATE: 9-28-03
WATER LEVEL: N/A

DEPTH (m) | ELEVATION (m) | DESCRIPTION
---|---|---
0 | 66.00 | Very loose/soft, black PEAT (PT)
1 | 65.7 | Loose to compact, grey, SAND (SP)
| | occasionals cobbles
1 | 65.5 | Compact to dense, orange - brown, silty SAND (SM); occasional cobbles
1 | 65.0 | Compact to dense, grey - yellow, silty SAND (SM); occasional cobbles and boulders: TILL

End of Test Pit

Slow groundwater seepage observed at 0.4 m depth.

Bedrock not encountered.
<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>81.00</td>
<td>Rootmat</td>
</tr>
<tr>
<td>80.8</td>
<td>Loose to compact, brown to yellow - brown, silty SAND (SM); occasional cobbles and boulders</td>
</tr>
<tr>
<td>80.3</td>
<td>Compact to dense, yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL</td>
</tr>
<tr>
<td>76.1</td>
<td>End of Test Pit</td>
</tr>
<tr>
<td>5</td>
<td>Slow groundwater seepage observed at 2.4 m and 4.6 m depth.</td>
</tr>
<tr>
<td></td>
<td>Bedrock not encountered.</td>
</tr>
<tr>
<td>Depth (m)</td>
<td>Elevation (m)</td>
</tr>
<tr>
<td>----------</td>
<td>--------------</td>
</tr>
<tr>
<td>0</td>
<td>84.00</td>
</tr>
<tr>
<td></td>
<td>83.6</td>
</tr>
<tr>
<td></td>
<td>83.3</td>
</tr>
<tr>
<td>0</td>
<td>79.1</td>
</tr>
</tbody>
</table>

Slow groundwater seepage observed at 0.5 m depth.

Bedrock not encountered.
**NEWFOUNDLAND GEOSCIENCES**

**CLIENT** BAE - Newplan Group Ltd.

**PROJECT** Proposed Waste Management Facility, Central Newfoundland

**LOCATION** Norris Arm North

**DATES (mm-dd-yy)** DUG 9-28-03

**WATER LEVEL** N/A

**PROJECT No.** NFS09711

**DATUM** UTM NAD83 Zone 21

**TEST PIT RECORD**

**TEST PIT No.** TP9

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>87.00</td>
<td>Rootmat</td>
</tr>
<tr>
<td>86.8</td>
<td>Loose to compact, orange - brown, silty SAND (SM); occasional cobbles and boulders</td>
</tr>
<tr>
<td>86.3</td>
<td>Compact to dense, grey to yellow - grey, silty SAND (SM); occasional cobbles and boulders; TILL</td>
</tr>
</tbody>
</table>

End of Test Pit

No groundwater seepage observed.

Bedrock not encountered.
95.00
Rootmat

94.7
Loose to compact, yellow - brown, silty SAND (SM); occasional cobbles and boulders

94.2
Compact to dense, very dense at bottom of stratum, grey to yellow - grey, silty SAND (SM); occasional cobbles and boulders: TILL

90.1
End of Test Pit

No groundwater seepage observed.

Bedrock not encountered.
<table>
<thead>
<tr>
<th>ELEVATION (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Rootmat</td>
</tr>
<tr>
<td>1.8</td>
<td>Loose to compact, orange - brown, silty SAND (SM); occasional cobbles and boulders</td>
</tr>
<tr>
<td>1.3</td>
<td>Compact to dense, grey - brown, silty SAND with gravel (SM); occasional cobbles and boulders: TILL</td>
</tr>
<tr>
<td>98.4</td>
<td>Grey sandstone/siltstone: BEDROCK</td>
</tr>
<tr>
<td>98.3</td>
<td>End of Test Pit</td>
</tr>
</tbody>
</table>

Very slow groundwater seepage observed at 2.1 m and 3.5 m depth.

Refusal on probable bedrock at 3.7 m depth.
<table>
<thead>
<tr>
<th>ELEVATION (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>99.00</td>
<td>Rootmat, boggy</td>
</tr>
<tr>
<td>98.7</td>
<td>Loose to compact, yellow-brown, silty SAND (SM); occasional cobbles and boulders</td>
</tr>
<tr>
<td>98.0</td>
<td>Compact to dense, very dense at bottom of stratum, grey to brown, silty SAND (SM); occasional cobbles and boulders: TILL</td>
</tr>
<tr>
<td>94.7</td>
<td>End of Test Pit</td>
</tr>
</tbody>
</table>

Moderate groundwater seepage observed at 2.4 m and 3.3 m depth.

Bedrock not encountered.
TEST PIT RECORD

CLIENT: BAE - Newplan Group Ltd.

PROJECT: Proposed Waste Management Facility, Central Newfoundland

LOCATION: Norris Arm North

DATES (mm-dd-yy): DUG 9-28-03

WATER LEVEL: N/A

DATUM: UTM NAD83 Zone 21

DEPT (m) | ELEVATION (m) | DESCRIPTION | STRATA PLOT | WATER LEVEL | TYPE | NUMBER | OTHER TESTS | UNDRAINED SHEAR STRENGTH - kPa |
---|---|---|---|---|---|---|---|---|
98.00 | | | | | |
97.8 | Rootmat | | | | |
97.4 | Loose to compact, brown to orange - brown, silty SAND (SM); occasional cobbles and boulders | | | | |
92.8 | Compact to dense, grey to yellow - grey silty SAND (SM); TILL | | | | | |

End of Test Pit

Moderate groundwater seepage observed at 2.7 m and 4.9 m depth.

Bedrock not encountered.
NEWFOUNDLAND GEO SCIENCES
CLIENT BAE - Newplan Group Ltd.
PROJECT Proposed Waste Management Facility, Central Newfoundland
LOCATION Norris Arm North
DUG 9-28-03
WATER LEVEL N/A
DATUM UTM NAD83 Zone 21

TEST PIT RECORD
TEST PIT No. TP14
PROJECT No. NFS09711

DEPTH (m)  ELEVATION (m)  DESCRIPTION

1.06.00
1.05.8  Rootmat

1.05.4  Loose to compact, orange - brown, silty SAND (SM); occasional cobbles and boulders

1.01.4  Compact to dense, very dense at bottom of stratum, grey to yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL

1.00.0  End of Test Pit

Moderate groundwater seepage observed at 3.3 m depth.

Bedrock not encountered.
### Test Pit Record

**Location:** Norris Arm North  
**Dates:** 9-28-03  
**Water Level:** N/A  
**Datum:** UTM NAD83 Zone 21  
**Test Pit No.:** TP15  
**Project No.:** NFS09711

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Elevation (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>91.00</td>
<td>Rootmat</td>
</tr>
<tr>
<td>90.7</td>
<td>Loose to compact, grey - brown, silty SAND with gravel (SM); occasional cobbles: TILL</td>
<td></td>
</tr>
<tr>
<td>89.5</td>
<td>Severely fractured, weathered, clay altered, purple sandstone/siltstone to conglomerate: BEDROCK</td>
<td></td>
</tr>
</tbody>
</table>
| 82.0      | End of Test Pit  
Slow to moderate groundwater seepage observed at 0.9 m depth.  
Refusal on probable bedrock at 2.0 m depth. |

**Undrained Shear Strength:** kPa

<table>
<thead>
<tr>
<th>Water Content &amp; Atterberg Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wp</td>
</tr>
</tbody>
</table>

**Samples:**

- BS 1 S

---

*Note: This record includes various geological observations and test results typical of geotechnical engineering reports.*
NEWFOUNDLAND GEOSCIENCES LIMITED

CLIENT: BAE - Newplan Group Ltd.
PROJECT: Proposed Waste Management Facility, Central Newfoundland
LOCATION: Norris Arm North
DATES (mm-dd-yyyy): 9-28-03
WATER LEVEL: N/A
DATUM: UTM NAD83 Zone 21

DEPT (m): 101.00
ELEVATION: 0
DESCRIPTION: Very loose/soft, black PEAT (PT)

99.8
DESCRIPTION: Loose to compact, grey, SAND (SP)

99.4
DESCRIPTION: Compact to dense, yellow - brown to grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL

96.3
DESCRIPTION: Grey conglomerate: BEDROCK
End of Test Pit

96.3
DESCRIPTION: Moderate groundwater seepage observed at 1.2 m depth.

Refusal on probable bedrock at 4.6 m depth.
NEWFOUNDLAND
GEOSCIENCES
LIMITED

BAE - Newplan Group Ltd.

PROJECT
Proposed Waste Management Facility, Central Newfoundland

LOCATION
Norris Arm North

DATES (mm-dd-yy): DUG 9-28-03

WATER LEVEL
N/A

DATUM UTM NAD83 Zone 21

TEST PIT RECORD

DEPTH (m)
ELEVATION (m)

DESCRIPTION

STRATA PLOT
WATER LEVEL

SAMPLES

UNDRAINED SHEAR STRENGTH - kPa

WATER CONTENT & ATTERBERG LIMITS

10 20 30 40 50 60 70 80

89.0

Loose to compact, brown, silty SAND (SM); occasional cobbles and boulders

89.7

Compact to dense, very dense at bottom of stratum, grey to yellow - grey, silty SAND (SM); occasional cobbles and boulders: TILL

85.7

End of Test Pit

Slow to moderate groundwater seepage observed at 1.8 m and 2.7 m depth.

Bedrock not encountered.
# Test Pit Record

**Client:** BAE - Newplan Group Ltd.

**Project:** Proposed Waste Management Facility, Central Newfoundland

**Location:** Norris Arm North

**Dug Date (mm-dd-yy):** 9-28-03

**Water Level:** N/A

**Datum:** UTM NAD83 Zone 21

---

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Elevation (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>91.00</td>
<td>Rootmat</td>
</tr>
<tr>
<td>0.7</td>
<td>90.7</td>
<td>Loose to compact, orange - brown, silty SAND (SM); occasional cobbles and boulders</td>
</tr>
<tr>
<td>2.2</td>
<td>90.2</td>
<td>Compact to dense, very dense at bottom of stratum, grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL</td>
</tr>
<tr>
<td>5.1</td>
<td>86.1</td>
<td>End of Test Pit</td>
</tr>
</tbody>
</table>

Moderate groundwater seepage observed at 4.3 m depth.

Bedrock not encountered.
TEST PIT RECORD

NEWFOUNDLAND GEO SCIENCES LIMITED

BAE - Newplan Group Ltd.

PROJECT
Proposed Waste Management Facility, Central Newfoundland

LOCATION
Norris Arm North

DATES (mm-dd-yy)
9-26-03

WATER LEVEL
N/A

DATUM
UTM NAD83 Zone 21

DEPTH (m) ELEVATION (m)

<table>
<thead>
<tr>
<th>Depth</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>84.00</td>
<td>Very loose/soft, black PEAT (PT)</td>
</tr>
<tr>
<td>83.8</td>
<td>Loose to compact, grey, silty SAND (SM); occasional cobbles</td>
</tr>
<tr>
<td>83.6</td>
<td>Compact to dense, yellow - grey, silty SAND (SM); occasional boulders: TILL</td>
</tr>
<tr>
<td>79.1</td>
<td>Grey to purple, sandstone/siltstone: BEDROCK</td>
</tr>
<tr>
<td>79.0</td>
<td>End of Test Pit</td>
</tr>
<tr>
<td>7.0</td>
<td>Slow to moderate groundwater seepage at 0.9 m depth.</td>
</tr>
<tr>
<td>5.0</td>
<td>Refusal on probable bedrock at 5.0 m depth.</td>
</tr>
</tbody>
</table>

TEST PIT No. TP19

PROJECT No. NFS09711

UNDRAINED SHEAR STRENGTH - kPa

WATER CONTENT & ATTERBERG LIMITS

GEDYVCSA TEST PIT IN METERS 1071563
Very loose/soft, black PEAT (PT)

Loose to compact, brown, silty SAND (SM); occasional cobbles and boulders

Compact to dense, grey to brown, silty SAND with gravel (SM); occasional cobbles and boulders: TILL

End of Test Pit

Slow groundwater seepage at 2.7 m and 3.4 m depth.

Bedrock not encountered.

Refusal on possible boulders at 4.3 m depth.
<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>112.00</td>
<td>Rootmat</td>
</tr>
<tr>
<td>111.8</td>
<td>Loose to compact, orange - brown, silty SAND (SM); occasional cobbles and boulders</td>
</tr>
<tr>
<td>111.4</td>
<td>Compact to dense, grey to yellow - grey, silty SAND (SM); occasional cobbles and boulders; TILL</td>
</tr>
<tr>
<td>108.6</td>
<td>Grey, sandstone to siltstone: BEDROCK</td>
</tr>
<tr>
<td>108.5</td>
<td>End of Test Pit</td>
</tr>
</tbody>
</table>

No groundwater seepage observed.

Refusal on probable bedrock at 3.5 m depth.
TEST PIT RECORD

CLIENT: BAE - Newplan Group Ltd.
PROJECT: Proposed Waste Management Facility, Central Newfoundland
LOCATION: Norris Arm North
DATES (mm-dd-yy): 9-27-03
WATER LEVEL: N/A
DATUM: UTM NAD83 Zone 21

DEPTH (m) | ELEVATION (m) | DESCRIPTION |
--- | --- | --- |
0.00 | 115.00 | Very loose/soft, black PEAT (PT) |
0.7 | 114.7 | Loose to compact, brown - grey, silty SAND (SM); occasional cobbles |
0.5 | 114.5 | Compact to dense, grey to brown - grey, silty SAND (SM); occasional cobbles and boulders: TILL |
2.9 | 112.9 | Weathered, rusty orange to brown: BEDROCK |
2.8 | 112.8 | End of Test Pit |

Groundwater seepage observed at 1.8 m depth.

Refusal on probable bedrock at 2.2 m depth.
**TEST PIT RECORD**

**NEWFOUNDLAND GEOSCIENCES LIMITED**

**CLIENT** BAE - Newplan Group Ltd.

**PROJECT** Proposed Waste Management Facility, Central Newfoundland

**LOCATION** Norris Arm North

**DATES** (mm-dd-yy): 9-27-03

**WATER LEVEL** N/A

**TEST PIT No.** TP23

**PROJECT No.** NFS09711

**DATUM** UTM NAD83 Zone 21

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>ELEVATION (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>122.00</td>
<td>Rootmat, very loose/soft, black PEAT (PT)</td>
</tr>
<tr>
<td>0.8</td>
<td>121.8</td>
<td>Loose to compact, brown, silty SAND (SM); occasional cobbles and boulders</td>
</tr>
<tr>
<td>1.4</td>
<td>121.4</td>
<td>Compact to dense, grey to yellow - grey, silty SAND (SM); occasional cobbles and boulders; TILL</td>
</tr>
</tbody>
</table>

**End of Test Pit**

Moderate groundwater seepage observed at 0.6 m and 2.1 m depth.

Refusal on probable bedrock at 2.9 m depth.
**NEWFOUNDLAND GEOSCIENCES LIMITED**

**TEST PIT RECORD**

**CLIENT:** BAE - Newplan Group Ltd.

**PROJECT:** Proposed Waste Management Facility, Central Newfoundland

**LOCATION:** Norris Arm North

**DATES:** 9-27-03

**WATER LEVEL:** N/A

**TEST PIT No.:** TP24

**PROJECT No.:** NFS09711

**DATUM:** UTM NAD83 Zone 21

---

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>ELEVATION (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>0.00</td>
<td>Very loose/soft, black PEAT (PT)</td>
</tr>
<tr>
<td>1.02</td>
<td>0.80</td>
<td>Loose to compact, brown, silty SAND (SM); occasional cobbles and boulders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compact to dense, grey to yellow - grey, sandy SILT (ML); occasional cobbles and boulders: TILL</td>
</tr>
<tr>
<td>2.50</td>
<td>0.60</td>
<td>Grey, siltstone/sandstone: BEDROCK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End of Test Pit</td>
</tr>
</tbody>
</table>

---

Slow to moderate groundwater seepage observed at 0.9m, 2.4 m and 3.0 m depth.

Refusal on probable bedrock at 3.5 m depth.
Rootmat

Loose to compact, orange - brown, silty SAND
(SM); occasional cobbles and boulders

Compact to dense, grey, silty SAND (SM); occasional cobbles and boulders: TILL

Grey to purple, sandstone/siltstone:
BEDROCK

End of Test Pit

Slow groundwater seepage observed at 3.7 m depth.

Refusal on probable bedrock at 4.4 m depth.
## Test Pit Record

**Location:** Norris Arm North  
**Project No.:** NFS09711  
**Test Pit No.:** TP26  
**Dates:** 9-27-03  
**Datum:** UTM NAD83 Zone 21  
**Project:** Proposed Waste Management Facility, Central Newfoundland

### Soil Description:

- **Depth:** 68.00 m  
  - **Elevation:** 0 m  
  - **Description:** Very loose/soft, black PEAT (PT)

- **Depth:** 67.6 m  
  - **Description:** Loose to compact, brown to orange - brown, silty SAND (SM); occasional cobbles and boulders  
  - **Description:** Compact to dense, grey to grey - brown, silty SAND (SM); occasional cobbles and boulders: TILL

- **Depth:** 63.3 m  
  - **Description:** Grey, siltstone: BEDROCK  

- **Depth:** 63.2 m  
  - **Description:** End of Test Pit  
  - **Description:** Slow groundwater seepage observed at 3.0 m and 4.3 m depth.  
  - **Description:** Refusal on probable bedrock at 4.7 m depth.
TEST PIT RECORD

NEWFOUNDLAND GEOSCIENCES LIMITED

BAE - Newplan Group Ltd.

PROPOSED WASTE MANAGEMENT FACILITY, CENTRAL NEWFOUNDLAND

Norris Arm North

9-27-03

DUG

N/A

WATER LEVEL

N 5443412 E 634846

PROJECT No.

NFS9711

DATUM

UTM NAD83 Zone 21

UNDRAINED SHEAR STRENGTH - kPa

Wp W wL

WATER CONTENT & ATTERBERG LIMITS

S

SAMPLES

OTHER

Mesh

DESCRIPTION

DEPTH (m)

ELEVATION (m)

Rootmat

Loose to compact, yellow - brown, silty SAND (SM); occasional cobbles and boulders

Compact to dense, yellow - grey to grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL

Purple to grey, sandstone to siltstone: BEDROCK

End of Test Pit

Slow groundwater seepage observed at 3.5 m depth

Refusal on probable bedrock at 3.8 m depth.
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
<th>Strata</th>
<th>Water Level</th>
<th>Other Tests</th>
<th>Undrained Shear Strength (kPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>Rootmat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.9</td>
<td>Loose to compact, yellow - brown, silty SAND (SM); occasional cobbles and boulders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>Compact to dense, grey to yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.5</td>
<td>Purple, sandstone to siltstone: BEDROCK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

End of Test Pit

Slow groundwater seepage observed at 4.4 m depth

Refusal on probable bedrock at 4.7 m depth.
## Test Pit Record

**Location:** Norris Arm North

**Dates:** 9-27-03

### Depth (m) | Elevation (m) | Description |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.66</td>
<td>Loose to compact, grey - brown, silty SAND (SM); occasional cobbles and boulders</td>
<td></td>
</tr>
<tr>
<td>0.649</td>
<td>Compact to dense, very dense at bottom of stratum, grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL</td>
<td></td>
</tr>
<tr>
<td>0.613</td>
<td>End of Test Pit</td>
<td></td>
</tr>
</tbody>
</table>

Slow groundwater seepage observed at 0.9 m and 2.7 m depth.

Bedrock not encountered.

Refusal on very compact, very dense till.
Rootmat

Loose to compact, orange - brown, silty SAND (SM); occasional to frequent cobbles and boulders

Compact to dense, yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL

Purple, sandstone to siltstone: BEDROCK

End of Test Pit

Slow groundwater seepage observed at 3.0 m depth.

Refusal on probable bedrock at 5.3 m depth.
<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>Rootmat</td>
</tr>
<tr>
<td>0.70</td>
<td>Loose to compact, yellow - brown to orange - brown, silty SAND (SM); occasional cobbles and boulders; occasional roots</td>
</tr>
<tr>
<td>0.30</td>
<td>Compact to dense, very dense at bottom of stratum, yellow - grey, silty SAND (SM); occasional to frequent cobbles and boulders: TILL</td>
</tr>
<tr>
<td>5.90</td>
<td>End of Test Pit</td>
</tr>
</tbody>
</table>

No groundwater seepage observed.

Bedrock not encountered.
NEWFOUNDLAND
GEOSCIENCES
LIMITED

CLIENT BAE - Newplan Group Ltd.
PROJECT Proposed Waste Management Facility, Central Newfoundland
LOCATION Norris Arm North
DATES (mm-dd-yy): DUG 9-25-03
WATER LEVEL N/A
DATUM UTM NAD83 Zone 21

TEST PIT RECORD

DEPTH (m) ELEVATION (m) DESCRIPTION STRATA PILOT WATER LEVEL SAMPLES UNDRAINED SHEAR STRENGTH - kPa
0 81.00 Rootmat

80.8
Loose to compact, yellow to brown, fine silty SAND (SM); occasional cobbles and boulders

80.1
Compact to dense, very dense at bottom of stratum, yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL

77.7
End of Test Pit
No groundwater seepage observed.
Bedrock not encountered.
Refusal at 3.3 m depth.

NO TESTS

WATER CONTENT & ATTERBERG LIMITS
### TEST PIT RECORD

**CLIENT**  
BAE - Newplan Group Ltd.

**PROJECT**  
Proposed Waste Management Facility, Central Newfoundland

**LOCATION**  
Norris Arm North

**DATES (mm-dd-yy): DUG**  
9-26-03

**WATER LEVEL**  
N/A

**TEST PIT No.**  
TP33

**PROJECT No.**  
NFS09711

**DATUM**  
UTM NAD83 Zone 21

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Rootmat</td>
</tr>
<tr>
<td>0.7</td>
<td>Loose to compact, yellow - brown, silty SAND (SM); occasional cobbles and boulders</td>
</tr>
<tr>
<td>1.2</td>
<td>Compact to dense, yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL</td>
</tr>
<tr>
<td>5.7</td>
<td>Grey, fine grained sandstone or siltstone: BEDROCK</td>
</tr>
<tr>
<td>6.0</td>
<td>End of Test Pit</td>
</tr>
</tbody>
</table>

- Slow groundwater seepage observed at 1.1 m depth
- Refusal on probable bedrock at 4.4 m depth.
TEST PIT RECORD

CLIENT: BAE - Newplan Group Ltd.
PROJECT: Proposed Waste Management Facility, Central Newfoundland
LOCATION: Norris Arm North
DATES (mm-dd-yy): 9-26-03
DUG
WATER LEVEL: N/A
DATUM: UTM NAD83 Zone 21
TEST PIT No.: TP34
PROJECT No.: NFS09711

DEPTH (m) | ELEVATION (m) | DESCRIPTION |
---------|--------------|-------------|
0        | 91.00        | Rootmat     |
<pre><code>      | 90.8         | Loose to compact, orange - brown to yellow - brown, silty SAND (SM); occasional gravel and cobbles; some boulders |
      | 89.5         | Compact to dense, grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL |
      | 86.1         | End of Test Pit |
      |              | Slow groundwater seepage observed at 4.3 m depth |
      |              | Bedrock not encountered |
</code></pre>
<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>DESCRIPTION</th>
<th>STRATA CLIENT</th>
<th>WATER LEVEL</th>
<th>SAMPLES</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>Rootmat, peat</td>
<td></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>0.7</td>
<td>Loose to compact, orange - brown, silty SAND (SM); occasional cobbles and boulders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.6</td>
<td>Compact to dense, grey to yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders; very dense till at base of test pit: TILL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>76.9</td>
<td>End of Test Pit</td>
<td></td>
<td></td>
<td>BS 1</td>
</tr>
</tbody>
</table>

No groundwater seepage observed.

Bedrock not encountered.
99.00     Rootmat

98.8     Loose to compact, orange - brown, silty SAND (SM); occasional cobbles and boulders

98.4     Compact to dense, grey to yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL

95.6     Fine grained purple to grey, sandstone to siltstone: BEDROCK

95.5     End of Test Pit

Moderate groundwater seepage observed at 1.8 m depth

Refusal on probable bedrock at 3.5 m depth.
NEWFOUNDLAND GEOSCIENCES

TEST PIT RECORD

CLIENT: BAE - Newplan Group Ltd.
PROJECT: Proposed Waste Management Facility, Central Newfoundland
LOCATION: Norris Arm North

DATES (mm-dd-yy): 9-27-03
WATER LEVEL: N/A

DATUM: UTM NAD83 Zone 21
TEST PIT No.: TP37
PROJECT No.: NFS09711

DEPTH (m) | DESCRIPTION |
---|---|
0 | Rootmat
83.9 | Loose to compact, yellow - brown, silty SAND with gravel (SM); occasional cobbles and boulders
82.9 | Compact to dense, yellow - grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL

79.7 | Purple sandstone: BEDROCK
79.5 | End of Test Pit

Moderate groundwater seepage observed at 4.0 m depth

Refusal on probable bedrock at 4.5 m depth.
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Elevation (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>106.00</td>
<td>Very loose/soft, black PEAT (PT)</td>
</tr>
<tr>
<td>0.7</td>
<td>105.7</td>
<td>Loose to compact, yellow - brown, silty SAND (SM); occasional cobbles</td>
</tr>
<tr>
<td>0.2</td>
<td>105.2</td>
<td>Compact to dense, grey, silty SAND with gravel (SM); occasional cobbles and boulders: TILL</td>
</tr>
<tr>
<td>1.1</td>
<td>103.1</td>
<td>Purple, sandstone to siltstone: BEDROCK</td>
</tr>
</tbody>
</table>

End of Test Pit

Slow groundwater seepage observed at 1.8 m and 2.6 m depth.

Refusal on probable bedrock at 3.0 m depth.
U.S. STANDARD SIEVE OPENING IN INCHES | U.S. STANDARD SIEVE NUMBERS | HYDROMETER

PERCENT FINER BY WEIGHT

PERCENT COARSER BY WEIGHT

GRAIN SIZE IN MILLIMETRES

COBBLE | GRAVEL | SAND | SILT and CLAY

<table>
<thead>
<tr>
<th>Sample</th>
<th>Depth (m)</th>
<th>Description</th>
<th>coarse</th>
<th>fine</th>
<th>coarse</th>
<th>medium</th>
<th>fine</th>
<th>W%</th>
<th>W_L</th>
<th>W_P</th>
<th>l_p</th>
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<tbody>
<tr>
<td>TP15-BS1</td>
<td>1.70</td>
<td>Silty GRAVEL with sand (GM)</td>
<td>10.7</td>
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<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>TP18-BS1</td>
<td>4.60</td>
<td>Silty SAND with gravel (SM)</td>
<td>10.0</td>
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</tr>
<tr>
<td>TP19-BS1</td>
<td>2.40</td>
<td>Silty SAND (SM)</td>
<td>9.4</td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Sample | Depth (m) | D100 | D60 | D30 | D10 | %Gravel | %Sand | %Silt | %Clay |
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<tr>
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<th></th>
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<td>9.7</td>
<td>57.5</td>
<td>32.8</td>
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</tbody>
</table>

REMARKS:

Client: BAE - Newplan Group Ltd.
Project: Proposed Waste Management Facility, Central Newfoundland
Project No.: NFS09711
Location: Norris Arm North

FIGURE 2

GRADATION CURVES
### Gradation Curves

<table>
<thead>
<tr>
<th>Sample</th>
<th>Depth (m)</th>
<th>Description</th>
<th>W%</th>
<th>W_L</th>
<th>W_P</th>
<th>I_P</th>
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<td>Silty SAND (SM)</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>TP24-BS1</td>
<td>3.00</td>
<td>Sandy SILT (ML)</td>
<td>16.0</td>
<td>NP</td>
<td>NP</td>
<td>NP</td>
</tr>
<tr>
<td>TP25-BS1</td>
<td>3.70</td>
<td>Silty SAND (SM)</td>
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<td></td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Sample</th>
<th>Depth (m)</th>
<th>D100</th>
<th>D60</th>
<th>D30</th>
<th>D10</th>
<th>%Gravel</th>
<th>%Sand</th>
<th>%Silt</th>
<th>%Clay</th>
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<tr>
<td>TP21-BS1</td>
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<td>20.00</td>
<td>0.35</td>
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<td></td>
<td>10.2</td>
<td>59.4</td>
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<td>0.08</td>
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<td>59.4</td>
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<td>28.00</td>
<td>0.37</td>
<td>0.081</td>
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<td>12.5</td>
<td>57.8</td>
<td>29.7</td>
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</tbody>
</table>

**Remarks:**

Client: BAE - Newplan Group Ltd.

Project: Proposed Waste Management Facility, Central Newfoundland

Project No.: NFS09711

Location: Norris Arm North

**Figure 3**

Gradation Curves
FIGURE 4

GRADATION CURVES

REMATURES:

Sample Depth (m)  Description  COBBLE  GRAVEL  SILT AND CLAY  SAND

TP21-BS1  3.40  D10  12.3  NP  NP  WP  1P  Wp  WL  Ws  %Gravel  %Sand  %Silt  %Clay

TP24-BS1  3.70  D20  25.8  45.7  48.8  40.4  32.9

TP34-BS1  3.40  D50  4.0  0.51

TP39-BS1  3.70  D100  0.13

Sample Depth (m)  Description  COBBLE  GRAVEL  SILT AND CLAY  SAND

TP21-BS1  3.40  D10  12.3  NP  NP  WP  1P  Wp  WL  Ws  %Gravel  %Sand  %Silt  %Clay

TP24-BS1  3.70  D20  25.8  45.7  48.8  40.4  32.9

TP34-BS1  3.40  D50  4.0  0.51

TP39-BS1  3.70  D100  0.13

PERCENT FINE BY WEIGHT

GRAN SIZE IN MILLIMETRES

PERCENT COARSER BY WEIGHT

U.S. STANDARD SIEVE OPENING IN INCHES

U.S. STANDARD SIEVE NUMBERS

HYDROMETER
### REMARKS:

- Client: BAE - Newplan Group Ltd.
- Project: Proposed Waste Management Facility, Central Newfoundland
- Project No.: NFS09711
- Location: Norris Arm North

#### FIGURE 5

**GRADATION CURVES**
U.S. STANDARD SIEVE OPENING IN INCHES | U.S. STANDARD SIEVE NUMBERS | HYDROMETER

<table>
<thead>
<tr>
<th>PERCENT FINER BY WEIGHT</th>
<th>100</th>
<th>90</th>
<th>80</th>
<th>70</th>
<th>60</th>
<th>50</th>
<th>40</th>
<th>30</th>
<th>20</th>
<th>10</th>
<th>5</th>
<th>2.5</th>
<th>1.25</th>
<th>0.63</th>
<th>0.315</th>
<th>0.160</th>
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<th>0.040</th>
<th>0.020</th>
<th>0.010</th>
<th>0.005</th>
<th>0.001</th>
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</table>

PERCENT COARSER BY WEIGHT

GRAN SIZE IN MILLIMETRES

| PERCENT FINER BY WEIGHT | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 5 | 2.5 | 1.25 | 0.63 | 0.315 | 0.160 | 0.080 | 0.040 | 0.020 | 0.010 | 0.005 | 0.001 |
|-------------------------|-----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

COBBLE

<table>
<thead>
<tr>
<th>GRAVEL</th>
<th>SAND</th>
<th>SILT and CLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>coarse</td>
<td>fine</td>
<td>coarse</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample</th>
<th>Depth (m)</th>
<th>Description</th>
<th>W%</th>
<th>(W_L)</th>
<th>(W_P)</th>
<th>(I_P)</th>
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<tbody>
<tr>
<td>TP38-BS1</td>
<td>2.40</td>
<td>Silty SAND with gravel (SM)</td>
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<tr>
<td>TP5-BS1</td>
<td>5.10</td>
<td>Silty SAND with gravel (SM)</td>
<td>9.3</td>
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<td></td>
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<tr>
<td>TP7-BS1</td>
<td>3.70</td>
<td>Silty SAND with gravel (SM)</td>
<td>11.0</td>
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<table>
<thead>
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<th>Sample</th>
<th>Depth (m)</th>
<th>D100</th>
<th>D60</th>
<th>D30</th>
<th>D10</th>
<th>%Gravel</th>
<th>%Sand</th>
<th>%Silt</th>
<th>%Clay</th>
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<tbody>
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<td>28.00</td>
<td>0.42</td>
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<td></td>
<td>17.7</td>
<td>49.0</td>
<td>33.3</td>
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<tr>
<td>TP5-BS1</td>
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<td>0.53</td>
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<td>45.6</td>
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<tr>
<td>TP7-BS1</td>
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<td>16.5</td>
<td>47.7</td>
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</tr>
</tbody>
</table>

REMARKS:

Client: BAE - Newplan Group Ltd.
Project: Proposed Waste Management Facility, Central Newfoundland
Project No.: NFS09711
Location: Norris Arm North

FIGURE 6

GRADATION CURVES
REMARKS:

Client: BAE - Newplan Group Ltd.
Project: Proposed Waste Management Facility, Central Newfoundland
Project No.: NFS09711
Location: Norris Arm North

FIGURE 7
GRADATION CURVES
<table>
<thead>
<tr>
<th>Sample</th>
<th>Depth (m)</th>
<th>Description</th>
<th>W%</th>
<th>W_L</th>
<th>W_P</th>
<th>I_P</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP24-BS1</td>
<td>3.00</td>
<td>Sandy SILT (ML)</td>
<td>16.0</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>TP26-BS1</td>
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<td>Silty SAND (SM)</td>
<td>12.3</td>
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<td>N/A</td>
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<tr>
<td>TP32-BS1</td>
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<td>Silty SAND with gravel (SM)</td>
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<td>N/A</td>
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<td>N/A</td>
<td>0</td>
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</tbody>
</table>

REMARKS: Atterburg Limits tests indicate the fines content to be Non-Plastic.
APPENDIX C

Drawing No. NFS09711-GE-01, Site Location Plan